



3RD INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN ENGINEERING, MANAGEMENT & SCIENCES (ICETEMS-2018)

**BRIDGING GAPS THROUGH MULTI-DISCIPLINARY
RESEARCH AND INNOVATION**



OCTOBER 18-19, 2018
PROCEEDINGS

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Management Sciences

THE ROLE OF FINANCIAL AND NON-FINANCIAL FACTORS IN PREDICTING FINANCIAL DISTRESS

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Abstract

The prevalence of financial distress incidents has led to an increasing interest of the researchers in financial distress prediction models since 1960s. Most of the early literature reviews on this subject are now either too narrowly focused or outdated. Thus, a systematic review is conducted to address this issue by critically reviewing the literature and empirical studies published from 1966 to 2018 to provide an extensive evaluation of different variables used in the financial distress prediction models to identify factors that can serve this purpose more effectively, which previous studies have overlooked. The prediction accuracy of financial variables (profitability ratios, liquidity ratio, solvency ratio, efficiency ratio, market prospect ratio), non-financial variables such as firm specific factors (firm board size, firm age, ownership structure, ownership concentration, CEO duality) and macroeconomic factors (consumer price index, product price index, industrial product price index, gross domestic product, interest and tax rate) is found to be marginally better when they are jointly used. In addition, two new non-financial factors are identified i.e. protectionism (tariffs, import quotas, subsidies) and environmental dynamism (oil and gas prices, political instability, interest rate, inflation rate) in context of Pakistan that could be used in future for modelling financial distress.

Keywords: Financial Distress, Financial Ratios, Firm Specific Factors, Protectionism, Environmental dynamism.

Introduction

Nowadays, the competition among companies from different sectors is increasing with globalization of world economy. Business organization with poor management and lack of

financial resources cannot be succeeded in this competitive environment. As a result, the organization will face certain crises like financial crises, credit crises, human resource crises, innovation crises and so on, which may lead to financial distress and even bankruptcy (Sun and Li, 2009).

The importance of predicting financial distress increased after the bankruptcy of large organizations in the United States and Europe like WorldCom, Enron, Philip Holzmann, Parmalat, ASEA Brown Boveri (ABB), and Swissair, especially after 2007–2008 global financial crises (Aziz and Dar, 2006; Outcheva, 2007). These defaults had shocked creditors and investors worldwide, thereby spreading the awareness that in recent time both Small and Medium Enterprises (SMEs) and large corporations could face default (Outcheva, 2007). Due to its overwhelming prominence, Altman (1968) was the first person who introduced a model based on financial ratios to predict financial distress.

According to Geng, Bose and Chen (2015) "Financial distress of a company usually refers to the situation that operating cash flow of a company cannot supersede the negative net assets of the firm". The accounting rules and procedures are different in different countries and so as the financial distress definition given by the authors is not always similar. The consensus is that financial failure results in deterioration of a company's profitability over time (Geng et al, 2015).

Financial distress prediction has been considered as an important effort and one of the most challenging issues in the area of finance, accounting and business communities. It has practical significance in handling the corporate risk of bankruptcy (Sun, Li, Huang, and He, 2014). Similarly, for taking a sound business decision the accurate prediction of financial distress is very important because incorrect decision may lead a company towards financial crises or even bankruptcy. Moreover, previous research studies identified a significant impact of financial distress on the profitability and lending decisions of the companies (Kim & Upneja, 2014).

Since the seminal work of Beaver (1966) and Altman (1968) numerous studies have used financial ratios (profitability ratios, liquidity ratios, leverage ratios, turnover ratios and efficiency ratios) to predict financial distress (Ohlson, 1980; Altman, 1984; Andrade and Kaplan, 1998; Jones and Hensher, 2004; Hassan, Zainuddin and Nordin, 2018; Khurshid, 2013). The reason of using financial ratios as predictors of financial distress was that some of the previous studies were unsuccessful in accurately predicting corporate bankruptcy because they didn't adopt financial report information (financial ratios) in their bankruptcy prediction model (Ohlson, 1980). Although, financial ratios based prediction model has been adopted by researchers for many years but still this approach has been frequently criticized in recent studies. According to Memba and Job (2013) the financial ratios based model does not represent all the aspects of a firm. They suggested that there are also non-financial factors that can affect financial condition of businesses like customer concentrations, management experience, and qualified audit opinion so forth; therefore, these variables should be incorporated in the financial distress prediction model. Thus, the interest of researchers shifted towards combination of financial and non-financial variable for modelling financial distress prediction (Amendola, Retaino, and Sensini, 2015; Shahwan, 2015; Berger, Imbierowics, and Rauch, 2016).

However, the inclusion of non-financial factors has made more complexity in financial distress prediction model and researchers faced difficulties in selecting appropriate factors of financial distress. According to Mselmi, Lahiani and Hamza (2017) predicting financial distress is still a great challenge for researchers and they are still trying to introduce a perfect model that can accurately predict financial distress. This deficiency in the literature gives rise to a question i.e., what is the most appropriate combination of financial ratios and non-financial factors that can be used as predictors of financial distress? To answer this question, the current study conducted a systematic literature review to identify the most significant factors of financial distress. This study has critically analysed 74 papers on financial distress to find out possible research gap in current literature to provide future research direction. The literature of this study has been divided

into three parts. Part one includes all those studies which have only used financial factors (financial ratios) based models, part two consists of non-financial variables based model, while part three consists of combination of financial ratios and non-financial factors based model.

Literature Review

1. Financial variables

Financial statements information i.e. financial ratios are important factors for predicting the financial position of firms because these are the most reliable source of fundamental information that a company present before its stake holders and shareholders (Gibson, 2012). Considering its importance, Shirata (1998) stated that when a firm is unable to generate sufficient operating income to overcome liabilities then its chances of default increases significantly.

The first study regarding the prediction of financial distress was conducted by Beaver (1966) who used a single ratio based model. He observed that the financial ratios were stable for non-distressed firms throughout the period of the study, while in case of financially distressed firms, the financial ratios showed a marked deterioration in distress situation. Thus, it was concluded that financial ratios can be used as a predictor of financial distress. Later on, Altman (1968) selected five financial statement ratios and developed a model for the prediction of financial distress firms. After applying multiple discriminate analysis, the model accurately predicted the bankruptcy prior to two years of default. On the other hand, Mannasoo and Mayes (2009) argued that there was no universal set of variables that could be used for financial distress prediction; however, the combination of liquidity ratios, earnings ratios, asset quality, management efficiency and market risk sensitivity had a significant predictive ability to detect financial distress. Campbell, Hilscher and Szilagyi (2011) concluded that firms in financial distress condition had low return, high leverage ratio, low level of market to book value (MBV) and low share price.

Tian, Yu and Guo (2015) studied different predictors of corporate bankruptcy and investigated their relative importance. They adopted the "least absolute shrinkage selection operator" (LASSO) method for variables selection. The results identified that accounting based variables have significantly better prediction ability than market based variables and financial ratios based on market value. The model also provided better prediction accuracy than the model used in previous studies. Further, Pal (2013) examined the effect of financial ratios in predicting the financial health of the Indian steel companies. After applying discriminant analysis, he found that three financial ratios: Return on investment (ROI), debtor turnover ratio (DTR) and fixed asset turnover ratio (FATR) are the most important factors that can be used to differentiate between financially weak and financially strong companies. Similarly, Bae (2012) constructed a financial distress prediction model based on radial basis function support vector machines (RSVM). He used different financial ratios (Interest expense to sale, profit to total sale, operating profit to total sale, current liabilities to total capital, Growth rate of tangible assets, net financial cost, ordinary income to net worth and growth rate to current assets). The results showed that the model accurately predicted the financially distressed firms, thus supporting the previous findings of Pompe and bilderbeek (2005).

In banking sector, financial ratios such as better utilization of cash flow and loans, equity to total assets ratio and asset growth rate have an important role in financial performance of a bank, hence acting as key indicators of bank financial position (Zaki, Bah, and Rao, 2011). Another bankruptcy prediction model was proposed by Abbas and Rashid (2011). They selected 24 financial ratios from the four groups of ratios which were profitability, liquidity, leverage and turnover ratios. After applying MDA technique, the study identified three ratios namely: EBIT to total ratio, sales to total Assets and cash flow ratios that could be used as predictors for bankruptcy. Similarly, Low, Nor & Yatim (2001) used financial ratios based model to predict the probability of financial distress in Malaysian manufacturing companies. The sample of their study

was based on 26 distressed companies and 42 non-distressed companies. After applying logit model, the results indicated that the probability of financial distress increased when the value of current assets to current liabilities, change in net income of the company and sale to current assets increased. They further explained that cash holding of a company was a key predictor of a firm financial distress because the financial position of a company relied on the level of cash holdings. The role of financial ratios became limited with the passage of time and researchers started to use other factors like economic factors, and variables related to corporate governance. In study of Shirata (1998) profitability was not used for predicting bankruptcy. He gave the reason that even though if company profitability was not up to the mark, it had enough cumulative profit to adjust the risk of bankruptcy. The other reason was that it wasn't necessary that all firms should disclose statements of their financial resources and in such condition the auditor's report should be considered important.

2. Non-Financial Factors

After the introduction of financial ratios, several studies have used different types of models to improve the effectiveness of their prediction. However, researchers suggested that only financial ratios couldn't give accurate prediction of corporate default, therefore their interest shifted towards the use of non-financial variables such as ownership structure, corporate governance and some economic variables to maximize the predictive ability of the financial distress model (Simpson and Gleason, 1999; Lee and Yeh, 2004; Chang, 2009). The study that incorporated non-financial variables in financial distress model was first conducted by Keasey and Watson (1987). They stated that non-financial information alone can adequately predict the financial distress. The study results indicated that the non-financial ratios based model provide relatively better predictive ability than financial ratios based model.

i. Firm Specific Factors

There are several issues related to management of firms which are perhaps a source of financial distress (Sun et al, 2014). These studies gave their arguments in favour of the non-financial variables importance for predicting a firm financial position. The variables that measure the firms' corporate governance also had a significant role in financial distress prediction. Moreover, companies with better mechanism of corporate governance such as the reasonable number of independent directors, better board structure and size of board overcome the probability of financial distress. The reason was that sound corporate governance improved the performance of the companies and the prediction of bankruptcy (Fich and Slezak, 2008).

Most of the researchers aimed to reduce the board size to decrease the extra burden on firms; however, Manzaneque, Priego, and Merino (2016) found that board size had a positive link with the probability of financial distress, which suggested that a larger board size had the benefit to give diverse opinions and management could be improved. In situation of financial crises, when there was risk that the minority shareholder might expropriate, then a stronger corporate governance policy would be needed (Mitton, 2002). Wang and Deng (2006) found that state ownership and ownership concentration had a negative relationship with financial distress, while board size and CEO duality increased the probability of financial distress. Similarly, Berger et al. (2016) concluded that ownership structure was a significant predictor of financial distress. They further added that the shareholding of lower level manageress and Non-CEO managers (chief financial officers and chief operating officers) had a positive relationship with probability of default. These unexpected results were because of the moral hazard problem. However, Shahabudin, Khan, and Javid (2017) used ownership structure to predict financial distress in 146 public limited companies of Pakistan. They identified insignificant impact of institutional ownership structure on the financial health of the companies. They also identified a significant relationship between insider investors and financial distress in Pakistan

The organizational theory literature provided base for the researcher to test the connection between corporate governance and financial distress. Pranowo, Achsani, Manurung, and Nuryartono (2010) suggested that the management role was also important to handle the company financial performance to get advance information about the company financial position. Daily and Dalton (1994) stated that the relationship between organizational governance and bankruptcy increased due to application of centralization. Shahwan (2015) empirically examined the impact of corporate governance on firm performance and financial distress and identified that disclosure of transparency, board of director composition, shareholders' right and ownership structure decreased the probability of financial distress. Similarly, Elloumi and Gueyie (2001) investigated the relationship between corporate governance characteristics and firm financial distress. They identified that the ownership, directorship and number of outside directors influenced the probability of financial distress.

ii. Macroeconomic Factors

Recently, researchers have started to use macroeconomic variables such as consumer price index (CPI), industrial product price index (IPPI), producer price index (PPI) and supply of money, in prediction of financial distress whose effects were found significant (Sami, 2014). However, McNamara, Duncan, and Kelly (2011) argued that macroeconomic factors such as gross domestic product (GDP), interest rate, tax rate and inflation are controlled by government policies which indicate the connection between government policies and firm survival or financial health of firms.

An important combination of variables were used by Amendola et al. (2015) to study the impact of firm specific variables and microeconomics variables on different level of financial distress. They found that age of the firm, size, legal form and profitability could be used as predictors of financial distress. While, Zhang, Xie, Lu, and Zhang (2016) analyzed the determinants of financial distress in U.S. bank holding companies (BHCs) on the basis of Z-score and distance-to-default measures. They found that house price index and non-performing loan ratio are the significant determinants of financial distress.

a. Protectionism

Regan (1986) defined protectionism as "the protective tariff, a duty on imports of a certain good imposed for the purpose of securing a greater share of the home market for domestic producers of the good". After the independence in 1947, Pakistan adopted the policy of protectionism in its trade. Although, this policy was successful till 1970; however, it encouraged the investors to invest in less efficient companies because of the lack of competition. Consequently, most of the Pakistan industries became less efficient; hence, it was very difficult for them to compete with foreign competitors. This was supported in a news article of The Express Tribune (newspaper) written by Amanullah (2012) who stated that unfortunately there was no Pakistani company in fortune 500 companies. There were multiple factors involved that drag Pakistani firms toward financial distress such as government policies, nationalization and lack of governance. Moreover, he stated that the policy which had a very high impact on Pakistan industrial global competitiveness was protectionism. He also added that in order to safe guard the domestic industries against foreign competition, the government used protectionism as an instrument, by applying tariffs, imports quotas, subsidies and other trade restrictions. He extended that protectionism policy was applied to protect the industry from foreign competition, but it had some negative consequences such as it made the local companies inefficient; thus, compromising the growth of the industries. Majority of the economists agree on the fact that economic welfare and economic growth are adversely affected by protectionism (Fairbrother, 2014; Mankiw, 2015; Blinder, 2017; Poole, 2018).

Similarly, Henn and McDonald (2010) argued that restricting trade through protectionism would not be a good policy to tackle financial crises because due to this policy the overall economic growth of industries could be negatively affected. In 2008 financial crises, protectionism measures had been practiced in the world economy, which resulted in slowing down the growth of industries and created global trade disorder. At that time the members of G20 arranged a meeting in Australia, and they decided not to repeat the mistake of 1930, which caused the destruction of economic trade and lead to Great Depression due to economic barriers (Donnan, 2014).

b. Environmental dynamism

Dess and Beard (1984) defined environmental dynamism as “the rate and the instability of environmental change”. It refers to the unstable changes in the external environment of a firm. High dynamism of an industry creates high uncertainty (Simerly and Li, 2000). According to Khan (2009) the period of global financial crises, which also affected Pakistani economy very badly, a group of CEOs of local and foreign firms unanimously decided to revive the environmental dynamism with the focus on controlling inflation rate, gas and oil prices and maintaining political harmony. During the meeting, president of Overseas Investors Chamber of Commerce and Industry (OICCI), Farhat Ali said that democracy in Pakistan should be encouraged, because political uncertainty is a major determinant that can put stock market in a sluggish position which alternately affects firm financial health. Moreover, the president of Federation of Pakistan Chambers of Commerce and Industry (FPCCI), Sultan Ahmed Chawla said that in order to strengthen the economy, the government should curb the interest rate, control inflation and developed infrastructure. Furthermore, Chairman of All Pakistan Textile Mills Association (APTMA), Tariq Mehmood said that due to uncertain political environment most of the textile customers deters and they divert their orders to other countries which decreased the sale volume. To measure environmental dynamism, researchers have developed indexes using a number of variation in industry level activities such as return on equity (ROE), net sales, and technological volatility (Tosi, Aldag, and Storey, 1973; Bourgeois, 1985).

3. Combination of Financial and Non-Financial Factors

In traditional failure models, the predictive ability of financial variables is efficient only for a very short horizon and their accuracy decreases quickly after one year (du Jardin and Severin, 2011; du Jardin, 2015). Most of the literature regarding financial distress prediction is based on the use of quantitative predictors and the importance of qualitative (non-financial) predictors has been ignored. According to Kristanti, Rahayu, and Huda (2016) the adoption of firm specific variables such as corporate governance along with financial variables increased the prediction accuracy of financial distress prediction model. Therefore, current research studies are more inclined towards the use of non-financial variables.

However, researchers also tried to find an alternative way to improve the prediction accuracy by extending the horizon using non-financial information variables (Keasey & Watson, 1987; Laitinen, 1999; Back, 2005; Altman, Sabato, and Wilson, 2010). The introduction of non-financial variable in the financial distress prediction model was first carried out by Altman and Sabato (2007). They used a large sample which included 5,748,188 accounts of companies that survived, and 66,833 accounts that were declared bankrupt from 2000 to 2007. Their results indicated that non-financial information such as legal action by creditors to recover unpaid debts, audit report and filing histories were the significant factors that improved the predictive ability of default prediction model.

Similar results were also stated by Blanco-Oliver, Irimia-Dieguez, Oliver-Alfonso, and Wilson (2015). The study of Pervan and Kuvek (2013) found that the predictive accuracy of model based on financial and non-financial factors had higher predictive accuracy (65%) than the model which

was based on only financial ratios, which gave 52% predictive accuracy. To improve the performance of the model, Altman (2000) urged that there were some firm related characteristics which should be quantified to improve the model. After refining the model, an important set of variables were chosen such as return on assets, debt services, earnings stability, cumulative profitability, liquidity, capitalization and size of the business that could optimize the performance of the model.

Likewise, Pindado, and Rodrigues (2005) made an attempt to integrate the different financial variables (liquidity and leverage ratios) and non-financial variables such as change in firm investment policies. The findings of the study revealed that the model was significant and effective in providing stable information about the chances of default. Another model was proposed by Bhimani, Gulamhussen, and Lopes (2013) for predicting corporate financial distress, which was based on financial, macroeconomics and non-financial variables. They found that non-financial variables gave superior predictive ability than financial variables. They further explained that the combination of financial and non-financial variables had influential ability to give us early signals about financial distress. The same arguments were also presented by Altman, Iwanicz-Drozdzowska, Laitinen, and Suvas (2016) who concluded that both financial and non-financial variables improved the results of financial distress prediction model.

In the same way, Laitinen (2013) compared the relative significance of both financial and non-financial variables in prediction of financial distress of the small firms in Finland. The financial variables comprised of net sales to total asset ratio, return on investment, quick ratio and equity ratios, while the non-financial variables included firm re-organization, firm age, and gender of the entrepreneur of the firms. After applying logistic regression and survival analyses, the results indicated that non-financial variables outperformed financial variables. Firm reorganization actions proved to be a significant predictor of financial distress. They argued that the success of reorganization process was conditional upon a best fit between business and financial restructuring.

Similarly, Van der Colff and Vermak (2015) adopted financial ratios (total outside financing / total assets, EBIT / average total assets, total current assets & listed investment / total current liabilities, income after tax / average total assets, net cash flow / average total assets, stock / inflation adjusted total assets) from De la Rey (1981), and non-financial variables (vulnerability, flexibility, effectiveness, resources, capabilities) from Jenster and Hussey (2001) for predicting business failure. The study concluded that it is beneficial to combine financial and non-financial variables to enhance the prediction accuracy of financial distress model. While, Altman et al. (2016) found that both financial variables (solvency and turn over ratios) and non-financial variables (industry risk, payment behaviour, and board member characteristics) improved the significance of the bankruptcy prediction model. Alternatively, Abdullah, Ma'aji & Khaw (2016) developed a financial distress prediction model of financial, non-financial and governance variables (ownership structure and board structure) to predict financial distress among 172 SME's in Malaysia. The result identified that the model was capable of giving early warning signals about the financial distress.

Methodology

This study is the most comprehensive systematic review of the literature and empirical studies which are published from 1966 to 2018. "A systematic review searches for the answer to a particular question in the existing scientific literature on a topic" (Editage Insights, 2017). The study take on a positivist approach to review the existing body of literature objectively and critically in order to identify the most significant combination of financial and non-financial variables to be used in financial distress prediction model to increase its explanatory power. To serve this purpose, 74 research articles of different related local and international journals are

critically evaluated to answer the question: what is the most appropriate combination of financial ratios and non-financial factors that can be used as predictors of financial distress?

Discussion

The purpose of this study is to identify the most appropriate combination of financial ratios and non-financial factors that can be used to predict financial distress. The literature consists of financial variables based models, non-financial variables based models, and models based on combination of both factors. Initial studies on financial distress prediction have paid more attention to the use of financial ratios to predict bankruptcy or financial distress such as the research works of Beaver (1966), Altman (1968), Altman (2000), and even still it is applied by the researchers in some recent studies i.e. Tian, Yu, and Guo (2015), and Salehi, Shiri, and Pasikhani (2016).

However, researchers have criticized that financial information don't cover all aspects of financial position of a firm. There are multiple factors regarding the management and governance of firms that can contribute to financial distress such as the company board size and ownership concentration as reported by Lee and Yeh (2004), CEO duality identified by Aziz and Dar (2006), Mitton (2002), and Wang and Deng (2006), and change in investment policies indicated by Pindado and Rodrigues (2005). These findings support the argument that both financial variables and non-financial variables are important to build an effective model that can accurately predict financial distress.

To achieve the optimum combination of financial and non-financial factors that can help researchers to construct a powerful model for financial distress prediction, this study has found some significant factors after the synthesis of literature. In financial variables, the most significant variables that can be used for financial distress prediction are profitability ratios, liquidity ratios, market to book value ratio and leverage ratios (Mannasoo and Mayes, 2009; Campbell, Hilscher, and Szilagyi, 2011; Tian, Yu, and Guo, 2015; Salehi et al., 2016).

Besides financial variables, this study has also identified some important non-financial variables that can improve the predictive ability of financial distress model. These variables include firm specific variables such as size of the firms, ownership concentration, ownership structure, firm board size, and CEO duality (Mitton 2002; Fich and Slezak, 2008; Van der Colff and Vermak, 2015; Wang and Deng, 2006; Berger et al., 2016).

There are certain macroeconomic variables such as IPPI, CPI, PPI) and firm specific factors that can also be very helpful for the researchers interested working in this area (Sami, 2014; Agrawal and Maheshwari, 2016). Therefore, it is necessary that researchers should consider these factors in constructing a sound financial distress prediction model.

Protectionism has a very harmful effect on the financial position and growth of the companies because it limits the trade volume and level of innovation in industries. Therefore, the government should discourage the policy of protectionism and encourage free trade with other countries to safe guard corporate sector from financial distress. Similarly, environmental dynamism can also be used as a predictor of financial distress because in more dynamic environment firm financial position is in more uncertainty.

Conclusion

Financial distress production is a challenging issue for researchers and they are still working on the most appropriate combination of financial and non-financial factors of financial distress which will help them in prediction of firm financial health. After reviewing the literature, important factors such as financial ratios (profitability ratios, liquidity ratios, debt ratios and market to book value ratio), firm specific factors (ownership structure, ownership concentration, CEO duality, firm board size, and firm age), and macroeconomic variables (CPI, PPI, IPPI, GDP, interest and tax rates) are identified as the most important predictors of financial distress.

Furthermore, protectionism and environmental dynamism are the two new factors that are identified in context of Pakistan. The study suggests that financial distress is a multi-factors phenomenon; therefore, firm managers and stake holders should consider both financial and non-financial variables for accurate prediction of financial distress.

This study is important for corporate leadership to use these factors as a source of information to predict and control financial distress, provided that government is focused on developing a stable market conditions, promoting free trade to overcome protectionism.

As there are no underpinning theories behind the use of financial ratios in financial distress prediction model, so future studies should take this into account. The impact of protectionism and environmental dynamism on financial distress have rarely been investigated, these two variables can be used in modelling financial distress. Previous studies have used different types of models and different combination of variables to study this subject quantitatively; however, financial distress prediction is still a challenge, so future study should follow a qualitative research approach to study this issue in depth and explore more relevant factors, closer to the reality of the issue.

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DISCLOSING GREEN FINANCE PRACTICES AND INITIATIVES IN PAKISTAN BANKING INDUSTRY: A CONTENT ANALYSIS APPROACH

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Abstract

The importance of green finance in attaining sustainability alongside economic development has grown many folds in the 21st century due to the industrial revolution, not only for developing economies but for the whole world. The current study aims to explore the phenomenon of reporting green finance practices in the annual reports of Pakistan banking industry. The present study focused on the sample size of top ten commercial and non-commercial banks of Pakistan over a period 2015 to 2017. The data regarding green finance and its related activities is collected from the annual reports of these banks. The sentence count methodology through content analysis procedure is utilized to analyze the depth of green finance disclosures in the banks' annual reports. The findings of the study suggest that in somehow these banks are involved in generating and utilizing green finance strategies throughout the years. However, still, the reporting of these practices is low. Hence, it is recommended that the banking sector and other regulatory bodies of Pakistan should re-strategize their policies and more efforts to contribute to the broader categories of green finance. The findings of the study bring significant implications for different stakeholders and regulatory bodies.

Keywords: Green Finance, Banking Industry, Content Analysis, Pakistan

1. Introduction

According to Hühne, Khosla, Fekete, and Gilbert (2012) "green finance is a broad term that can refer to financial investments flowing into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy. Green finance includes climate finance but is not limited to it". Furthermore, green finance is often used interchangeably with green investment. However, in practice, green finance is a wider lens including more than investments as defined by Bloomberg New Energy Finance and others. Most important is that it includes the operational costs of green investments not included under the definition of green investment. Most obviously, it would include costs such as project preparation and land acquisition costs, both of which are not just significant but can pose distinct financing challenges (Zadek & Flynn, 2013, p. 07). The principle of green credit is the

driving force behind green finance. It acts as an intermediary to facilitate such projects which are environment-friendly. A series of financial institutions carry on research on green growth and to reduce pollution (Ng, 2018; UNDP, 2012). The green finance is the phenomena that combine environmental protection with economic development, aiming at sustainable utilization of resources. It facilitates the flow of funds to achieve effective management of traditional resources (Wang & Zhi, 2016).

According to the National Disaster Management Authority, the average annual loss due to unexpected events of climate change between 1994 and 2013 in Pakistan has risen to almost 4 billion US dollars. To fight the looming environmental catastrophes, Pakistan need urgent investments in international climate finance and modern technologies. The government of Pakistan under the National Climate Change Policy (NCCP) 2012 put some additional environmental rules and regulations to control the environment polluting activities by individuals, commercial businesses, and industries to take part in achieving the sustainable growth. One of the prime actions in this regard is the "Green Banking" to support the policy initiatives to transform the country into a more climate resilient and low carbon emitting economy. The main emphasis of the green banking is the inculcation of environmental awareness and reorientation of the operations and services of banks to lessen their environmental impact. The main objective of the guidelines of the green banking is to mitigate the risks and vulnerabilities of development finance institutions (DFIs) and banks against the environmental calamities, to provide with environmental protection facilities and to transform into a climate resistant and resourceful economy by providing the financial assistance in the shape of green finance. In this regard, the State Bank of Pakistan (SBP) in its 2017 report has provided with Green banking Guidelines (GBG) to be implemented within 12 months. The progress and implementation of these guidelines will be properly monitored by the State Bank on regular basis. Based on coordination with the DFIs/banks, there will be a proper development of a standard reporting procedure (State Bank of Pakistan, 2017).

The study of green finance is currently limited to a simple concept and there are no detailed studies regarding the green finance development challenges and opportunities. The aim of the current research is to investigate the challenges and hurdles in the way of green financing in Pakistan to meet the opportunities available to green financing. The objective of this study is to analyze the effectiveness of policies in Pakistan that support the green finance. The noneffective electricity distribution in the country and microgeneration plants represent an opportunity for the promotion of green financing in Pakistan to promote the establishment of such economic policies which can support the transition towards typical renewable resources having almost zero cost.

To address the exhibited research, a gap in the current study sets two research objectives. Firstly, to explore the status of green finance reporting in the banking industry of Pakistan, secondly, to evaluate and rank green finance disclosure in the said industry. After achieving the above research objectives, the current study contributes to the limited literature on green finance, particularly in Pakistan. Moreover, the findings of the study would have practical implications for regulatory bodies, top management and overall banking industry of Pakistan. The remaining sections of the paper are followed by literature review, research methodology, findings, discussions, and future directions.

Literature Review

Theoretical framework

The theoretical underpinnings of the current study are based on stakeholder theory to incorporate the role of green financing in environmental sustainability. The literature has a clear record that researchers have utilized this theory based on the role of different organizations from the environmental perspective. The current study, following the previous literature, has emphasized the role of green finance in different organizations to combat the issue of global warming and

climate change in a sustainable way. In the pursuit of increasing stakeholder's concern about environmental sustainability, companies are trying to embrace issue related to sustainability to showcase their corporate image explicitly about the sustainable environment without any actual figures related to such green activities to support sustainability (Saha & Darnton, 2005). The views of investors, regulators, and customers combine known as stakeholders are very much important in determining their impact on the common practice known as sustainability accounting. The existing and potential investors would benefit adequately if there are quality accounting information and proper environmental disclosure. There is a clear criticism on the part of corporations in respect of their aims to boost their "hegemonic claims" of sustainable development both on economic and environment side, due to the 'greenwashing' reported in their sustainability reports (Gray, 2010).

Green Finance

Industrial and economic activities are among the key factors causing environmental pollution due to the extra utilization of non-renewable energy resources. To preserve the natural resources from extra exploitation a new phenomenon of green finance evolved in the market to make the investment in markets on the environmental basis to promote the sustainability in the day to day business activities. The sustainable utilization of these resources via the pattern of green finance is a new and hot issue under the research, attracting many researchers in the field of environmental economics and business. The Green finance market is crucial to macroeconomic regulation. Financial institutions help in circulation of funds promotes trading according to market demand and productivity. To make use of green finance, the financial instrument plays a big role. In this regard, European Investment Bank (EIB) was the first one to issue the first-ever global Climate Awareness Bond to finance the projects related to the improvements in energy efficiency (Wang & Zhi, 2016). In a study, Wakeford et al. (2017) concluded that climate change mostly affects the rural agricultural and development processes like forestry, soil conservation, dairy and the use of renewable energy has the ability to reduce the emission of GHGs. Therefore, a need is felt to educate the firms about the importance of green innovations by providing rewards for such activities.

It is argued that green innovation is very crucial in reducing pollution and improving the resource productivity. Analyzing the case of developing economies, Wakeford et al. (2017) stated that developing countries of the world are having a limited system of green innovation. The study concluded that developing nations of the world as not giving enough importance to green innovation as required. Moreover, in a study, Wang and Zhi (2016) observed that there is very limited or no research work on the interconnection between the development of the energy industry and financial industry. It is argued that the banking industry can play a vital role in altering the sustainability and environment-related impacts of its customers, including borrowers and investors in a proper way (Baranes, 2009). It is said that green financing along with other expanded financial service-providers including insurance companies, retailer banks, and investment banks have evolved in the last of 20th and in the beginning of the 21st century (Chowdhury, Datta, & Mohajan, 2013). Based on the financial services provided by different financing entities in an environmental aspect to make the provision of loans to green entrepreneurs, the establishment of independent Green Investment Banks (GIBs) is very much important globally (Chowdhury et al., 2013).

Moreover, it is argued that the behaviour of investment can be affected by the underlying social and economic benefits, policies of the government, market demand and invested funds (Hongwei, Fuyuan, & Kanqi, 2012). Alongside these determinants, there are other concerns which should be kept in mind while investing, including alternative energy, climate change, community investing, diversity, human rights and other issues to make the investments more sustainable (Slater & Romi, 2013). Moreover, based on the challenges in managing the complex business environment,

globally there is a clear emphasis on the promotion of corporate social responsibility on the part of managers (Høgevold et al., 2014).

Methodology/Approach:

The study focused on the sample size of top ten commercial and non-commercial banks of Pakistan. The period of the study is selected from 2015 to 2017. The data regarding green finance and its related activities is collected from the annual reports of these firms. Annual reports were downloaded from the concerned websites of the banks. The sentence count methodology through content analysis procedure is utilized to judge the depth of green finance disclosures in company annual reports (Barnes, 2010; Janggu, Joseph, & Madi, 2007; Koskela, 2014; van Staden & Hooks, 2007; Yusoff, Mohamad, & Darus, 2013) using the following formula.

$$= \sum_{i=1}^n GrFin_{jit} \frac{\sum_{j=1}^n GrFin_{jit}}{\sum_{i=1}^n \sum_{j=1}^n GrFin_{jit}}$$

Where

\sum = Summation of sentences

$GrFin$ = number of sentences disclosed by the bank i for green finance j at time t

n = the number of banks under review

Some examples from concern bank websites are exhibited in Table 1.

Table 1 Green Finance Statements in Annual Reports

<p>“Agricultural banking products and services are specifically designed for Pakistan’s farming and rural business segment. This function of the Bank aims to extend credits on softer terms to farmers. Recently the markup rate was brought down to make this facility available at grass-root levels. Kissan evergreen finance, Kissan Tractor Finance, Kissan livestock development finance, Kissan farm mechanization finance, and Kissan Aabpashi finance”. (Askari, 2015)</p> <p>“Various campaigns and drills on energy conservation at workplace’ are carried out. These include curtailed energy consumption and deploying solar-powered ATMs to reduce the impact of carbon emissions from such sources”. (Bank Alfalah, 2016)</p> <p>“To integrate sustainable finance in the Banks core lending business, ESMS has become an integral part of the Bank’s credit approval process. SBP issued Green Banking Guidelines in October 17 for the banking sector. Bank Alfalah is well-poised to implement these guidelines in letter and spirit. They have focused on energy conservation initiatives and providing sustainable finance. ‘Alfalah Zarie Sahulat’ offers finance facilities covering an entire spectrum of farming and non-farming needs with a wide range of products on flexible short, medium and long-term repayment tenures at affordable markup rates”. (Bank Alfalah, 2017)</p> <p>“NBP provides Agri loans to individuals. The bank completed the project of installing alternate energy (solar power) at above 300 ATM sites, leading to more environmentally friendly and energy saving work platform”. (NBP, 2016)</p> <p>“During the year, Project Finance successfully delivered on two large project advisories for coal-based power plants”. (UBL, 2015)</p> <p>The credit policies of the bank were updated including “agricultural credit policy 2016” a simplified loan application form for facilitating agricultural lending has been adopted. Retail bank witnessed 12% growth overall, with increased disbursements to the SME and agricultural sectors. The bank capitalized on Dasu hydropower and Quaid-e-Azam thermal projects. (UBL, 2016)</p>
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Results

After evaluating the annual reports through content analysis, the following areas have been identified where the banks report green finance disclosures. Table 2 shows the green strategies in the concerned banks as follows.

Table 2 Prominent Green Finance Strategies among Pakistan Banking Industry

S. No	Banks	Reports on Green Financing		
		2015	2016	2017
1	Alfalah Bank Ltd.	<ul style="list-style-type: none"> Green Mortgage Product Environmental Societal Management System (ESMS) Alfalah green agricultural loans 	<ul style="list-style-type: none"> Campaigns and drills on energy conservation within the workplace Long-term strategies of adapting eco-friendly alternatives 	<ul style="list-style-type: none"> ESMS become an integral part of the credit approval system SBP issued green banking guideline Alfalah Zarie Sahulat
2	Meezan Bank Ltd.	<ul style="list-style-type: none"> Conservation of energy Natural Resources Efficiency 	<ul style="list-style-type: none"> Minimizing Carbon footprint through shuttle bus service Through plantation section 	<ul style="list-style-type: none"> Green IT Encouraging paper-free environment Green banking Energy conservation
3	Habib Bank Ltd.	--	<ul style="list-style-type: none"> Agricultural loans ESG activities 	<ul style="list-style-type: none"> Lender to the agricultural sector Water projects
4	National Bank of Pakistan	<ul style="list-style-type: none"> Agricultural products 	<ul style="list-style-type: none"> Agri loans Energy conservation 	<ul style="list-style-type: none"> Agricultural products
5	Muslim Commercial Bank Ltd.	<ul style="list-style-type: none"> Energy conservation Environmental protection measures Rural Development Program 	<ul style="list-style-type: none"> Agri financing product Shadabi & khushali plan Energy conservation Environmental protection measures Rural Development Program 	<ul style="list-style-type: none"> Agri financing product Shadabi & khushali plan Energy conservation Environmental protection measures Rural Development Program
6	Faysal Bank Ltd.	<ul style="list-style-type: none"> Agribusiness 	<ul style="list-style-type: none"> Issuance of Sukuk for fertilizer company Hydropower project Green power solution 	<ul style="list-style-type: none"> Environmental stewardship Financing hydropower project & coal-based power plants & The waste heat recovery system
7	Askari Bank Ltd.	<ul style="list-style-type: none"> Agricultural banking 	<ul style="list-style-type: none"> Agricultural banking 	--
8	United Bank Ltd.	<ul style="list-style-type: none"> Coal-based project financing 	<ul style="list-style-type: none"> Agricultural Lending Hydropower projects 	<ul style="list-style-type: none"> Agricultural loan efficiency
9	Allied Bank Ltd.	<ul style="list-style-type: none"> Agriculture finance for Dairy Farming & Poultry Farming Energy conservation and environment protection 	<ul style="list-style-type: none"> Agriculture finance for Dairy Farming, Poultry Farming & tractors Energy conservation and environment protection 	<ul style="list-style-type: none"> Agricultural finance products Energy conservation and environment protection

Table 3 reports the overall sentence count of green finance of nine banks in Pakistan. The overall results reported that there are some statements (sentences) on green finance from the banks over the period of three years. The highest number of sentences is recorded in MCB annual reports for each year from 2015 to 2017; however, the lowest sentences regarding green finance were recorded in an Askari bank report, as there was no sentence on green finance in the 2017 report. The total sentence count for each bank during the study period is exhibited in Figure 1 & 2 respectively. The figures showed that based on the overall green finance sentence count, the reports in 2016 were recorded highest in ranking.

Table 3 Overall sentence count of Green Finance

Bank	Year wise count of sentence for Green Finance strategies per Bank		
	2015	2016	2017
Alfalah Bank Ltd.	106	32	90
Mez	68	49	155
HBL	0	154	145
NBP	71	32	76
MCB	326	641	431
FBL	31	101	145
Askari	66	113	0
UBL	16	49	24
ABL	170	218	220
Total	854	1389	1286
Min = 0; Max = 641; Mean 130.70; and St. Deviation = 142.37			

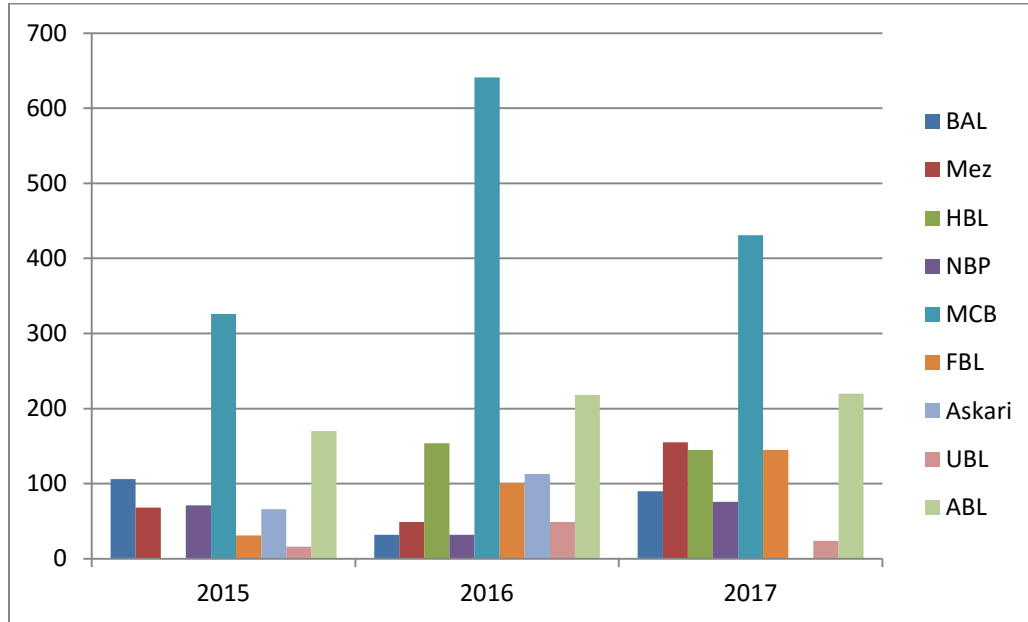


Figure 1. Year Wise Disclosure based on Sentence Count

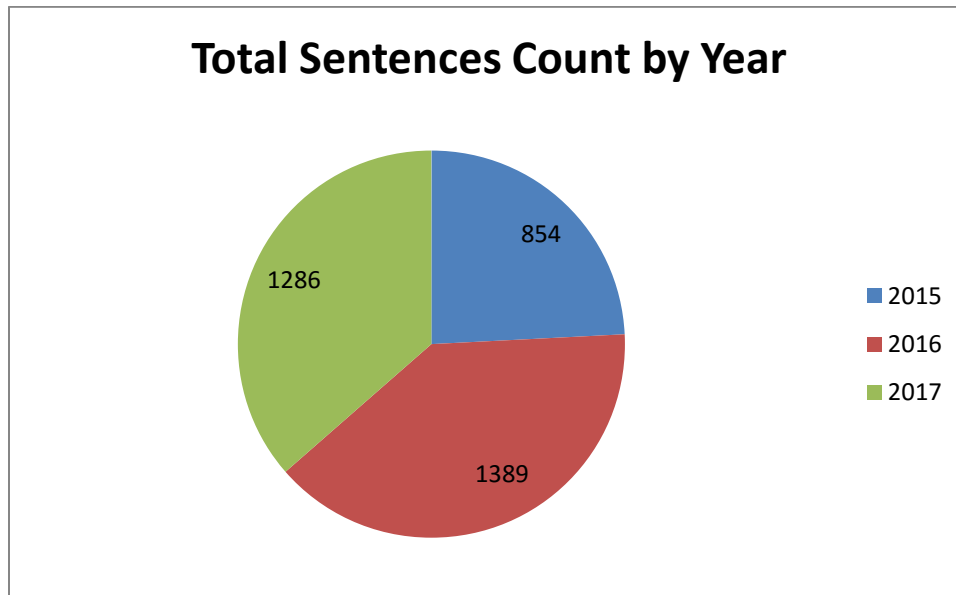


Figure 2 Year wise Total Sentences Count

Discussion and conclusions

The current study explores the extent of reporting on green finance practices in the annual reports of Pakistan commercial and non-commercial banks. The banking industry is chosen as banks are the main sources and streams of finance for multiple stakeholders. The findings of the study suggest that in somehow these banks are involved in generating and utilizing green finance strategies throughout the years. However, still, the reporting of these practices is low. Thus, there is a need that the banking sector of Pakistan should re-strategize their policies regarding green finance. Based on this outcome, it is recommended that the banking sector and other regulatory bodies of Pakistan should put more efforts and reshape their policies to contribute to the broader categories of green finance. Since Pakistan is in the grip of two sever predators, water security and energy-related issues, the role of the banks could be vital to provide finances to leverage such activities to mitigate their impact. A rational market mechanism of green finance can lead to the flow of funds in such a manner that can attain optimal allocation of social and environmental resources alongside effective environmental risk management. Similarly, the role of regulatory bodies is very important to instruct these banks to provide a further push to green finance activities. The banks should aware the investors to increase their interest to invest their funds in environment-friendly and green projects. It gives value to their corporate image and sustainable performance as well. Moreover, this awareness and media preferences for such green projects compel the organizations to invest in environmental projects. Based on the above findings, we can conclude that there is a tendency in Pakistani banks to invest in green projects; however, this trend is still less intensive. To boost this trend, these banks should strategize to invest in such projects and to report them to the broader stakeholders through their annual and sustainability reports. This study carries implications for the concern banks, stakeholders, top managers, policy makers and regulatory bodies to act in favor of green finance strategies among the Pakistan banking industry. Beside implications, the current study has limitations of single industry focus. Therefore, in the future, a multi-industry analysis would add more value to the field of green finance. Moreover, a causal analysis of green finance and firms' financial performance would be a sound preference for future studies.

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EFFECT OF NON-FINANCIAL REWARDS ON EMPLOYEE'S MOTIVATION: THE CASE STUDY OF ISLAMIC BANKS OF PAKISTAN

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Abstract

The study is all about the role of non-financial rewards in motivation process. For this purpose, 385 respondents were selected randomly from five full-fledged Islamic banks in the state, Islamic Republic of Pakistan. Pearson's correlation and ordinary least square regression analysis is used to test the evidences. Empowerment is not motivating the employees of operation department in these banks. However, positively significant evidences studied against training and development, appreciation and recognition, career advancement opportunities and work life balance. Moreover, the employees of these Islamic banks are satisfied from their social life because they may have sufficient time for their social activities. Working Environment is a mediating variable in this research study. After analyzing the results of Sobel test, it has been concluded that the association between appreciation & recognition, career advancement, work life balance is significantly effect by the intervening of the mediator i.e. work environment. The over-all conclusion of the study focuses on the improvement of non-financial rewards strategy to enhance the performance of the employees. The findings can be generalized to the over-all banking industry and also to the operation departments of other organizations.

Keywords: Motivation, Non-financial rewards, Work life balance, Career advancement, Recognition.

1. Introduction

1.1 Background of the Study

Motivation gives strength and a path way to the attitude of individuals and also elicits the propensity to continue (Farhad, Ghatari, & Hasiri, 2011). This explains that for achieving the required objectives employees must be contented with the job responsibilities and have clear vision regarding their goals. Motivation is an internal strength that propels employees of the organization to achieve individual and organizational goals (Ali & Ahmed 2009). Motivation helps to enhance the performance of employees and also directs towards achieving required goals for the organization (Khan, Farooq & ullah, 2010).

It is an accumulation of various ways which maneuver and indicate activities of individuals for achieving some particular objectives (Danish & Usman, 2010). According to Luthans (2003) motivation plays a significant part in the process of exhilarating individuals to act and attain particular objectives. As motivation concern, reward system is significant instrument for management to motivate their employees. Nowadays, the reward management system is applying both in public as well as in private sector. It was declared that when organizations giving reward to their employees their motivation to work is increase (Vroom, 1964).

Organizations invest large amount of money to spend for implementing effective reward system because it will boost the morale of employees. As described by (Cameron & Pierce 2006) a well-developed reward system needs an experimental behavior, continuous fine tuning of reward

management system. Danish and Usman (2010) suggested that effective and well developed reward management system tends to enhance employee's motivation and recognition of achievements, a need to achieve high standard to attain individual and organizational goals, increase effectiveness, productivity and feelings of competence and freedom.

Kreitner & Kinicki (2004) explained motivation is intellectual processes that cause the renewal and persistence of voluntary actions that helps for achieving objectives for the organization. Motivation based on intrinsic and extrinsic factors when collaborates result competent employees. According to Broad (2007), rewards and recognition are the most important factors that create effect on employee's motivation. As the employees committed with their job responsibilities then they will feel intrinsic motivation in their attitudes because their activities will necessarily be delightful and satisfactory for the individuals (Vansteenkiste, 2005). This research study emphasizes on how non- financial rewards create effect on employee's motivation.

1.2 Problem Statement

This research study will tend to identify how organizations are using non -financial rewards for motivating their employees as well as for enhancing their performance in the organizations and also determine at what extent non-financial rewards create impact on employee's motivation.

2. Literature Review

Dobre (2013) states that money has its own value no other motivational incentives can take its place. Herzberg (1959) described that financial benefits used either as an incentive or reward to support or boost the desired attitude. According to Morell (2011), both financial and non-financial rewards are obligatory as there are various jobs in the industry where only one type of reward does not attain the objectives of the organization. Therefore, as time passes the dominancy of non -financial rewards is increasing.

According to Drucker Peter (1954) employers or managers in organization want rewards for their dignity and self-esteem. Financial advantages are not only basic reason of motivation even though discouragement with them restricts performance contrarily non- financial rewards cannot satisfy for unhappiness with monetary rewards. Similarly, Brewster & Mayrhofer (2012) emphasized the significance of non- financial rewards by disclosing their part in increasing job satisfaction of employees as well as their engagement and performance. Erbasi & Arat (2012) investigated the effect of financial and non- financial rewards on employees' motivation and concluded that there is a significant and positive relationship exists in between financial and non-financial rewards on motivation of employees.

2.1 Hawthorne Studies

Hawthorne theory was presented by Elto Mayo in 1927. This research study was conducted among the employees of Hawthorne works factory of Western company in Cicero, Illinois. In this research study sample of female employees were taken and examined the variations in the working hours, salary packages, and rest periods, working conditions and relationship with supervisors for examining that which circumstances would create impact on performance of employees in the organization. This study identifies those attributes through which employees can enhance their productivity. According to his research study it has been observed that economic factors create impact on productivity of employees. The results indicated that productivity enhances but reasons are not related to economics. Researchers concluded that if more attention given to the workers it will improve or enhance their job performance level.

3. Research Methodology

This research study is explanatory and descriptive in nature because this study connects ideas and thoughts of other researchers and also understand or identify the cause and impact of non-

financial rewards on employees" motivation. In this research study primary data has been gathered through questionnaires collecting from the operation departments of Islamic banks in Pakistan through purposive judgmental sampling.

We incorporated full-fledged Islamic banks in this study; Al-Baraka Bank Limited, Bank Islami Pakistan Limited, Dubai Islamic Bank Limited and Meezan Bank Limited. Sampling has been done by using purposive judgmental sampling technique. Sample of 400 employees was selected for this research study. 385 out of 400 questionnaires were received with proper replies.

3.1 Hypothesis:

H1: Providing training & development opportunities creates motivating effect on employees of Islamic banks in Pakistan.

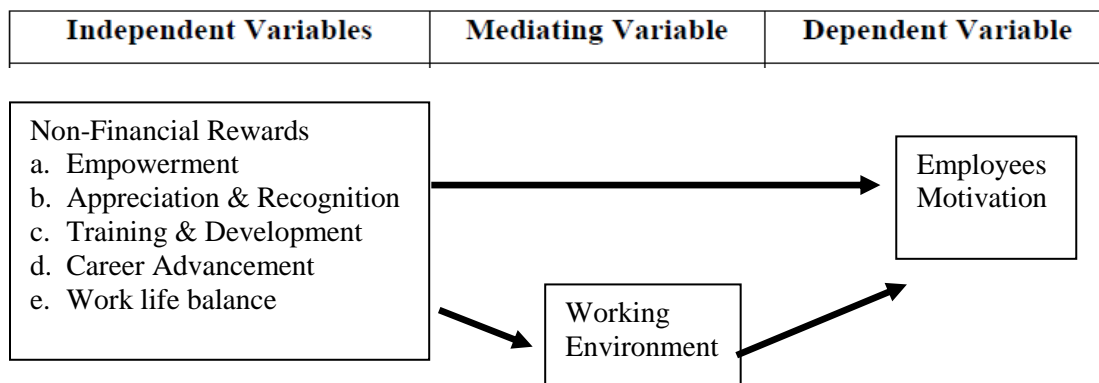
H2: Providing career advancement opportunities creates motivating effect on employees of Islamic banks in Pakistan.

H3: Providing appreciation & recognition creates motivating effect on employees of Islamic banks in Pakistan.

H4: Providing work life balance creates motivating effect on employees of Islamic banks in Pakistan.

H5: Providing empowerment creates motivating effect on employees of Islamic banks in Pakistan.

3.2 Conceptual frame work



4. Data Analysis

4.1 Descriptive Statistics

Table 1: Descriptive Statistics

	Y	WE	Emp	T&D	A&R	CA	WLB
Reliability Statistics (alpha)	0.712	0.743	0.756	0.728	0.73	0.701	0.775
Mean	2.8087	3.4424	3.4623	3.3437	2.6173	2.9931	2.6649
Std. Deviation	1.01894	1.13916	0.9319	1.15641	1.04756	0.92606	1.10423
Skewness	0.253	-0.707	-1.028	-0.45	0.273	0.057	0.269
Kurtosis	-1.23	-0.788	-0.093	-1.157	-1.427	-0.792	-1.357

Reliability analysis was performed by using test of Cronbach alpha it measures the reliability of questionnaire. According to Cooper and Schindler (2008) 0.7 is an acceptable and reliable coefficient. The reliability of all variables is 0.777, which shows that the reliability of questionnaire.

Table 2: Correlation Analysis

Correlations

		Y	WE	Emp	TnD	AnR	CA	WLB
Y	Pearson Correlation	1	.009	-.014	.100	.662**	.325**	.826**
	Sig. (2-tailed)		.000	.786	.051	.000	.000	.000
	N	385	385	385	385	385	385	385
WE	Pearson Correlation	.009	1	-.213**	.005	.015	.133**	.256**
	Sig. (2-tailed)	.866		.000	.925	.771	.009	.000
	N	385	385	385	385	385	385	385
Emp	Pearson Correlation	-.014	-.213**	1	-.247**	.050	-.041	-.125*
	Sig. (2-tailed)	.786	.000		.654	.333	.420	.014
	N	385	385	385	385	385	385	385
TnD	Pearson Correlation	.100	.005	-.247**	1	.074	.277**	.125*
	Sig. (2-tailed)	.051	.690	.734		.150	.000	.014
	N	385	385	385	385	385	385	385
AnR	Pearson Correlation	.662**	.015	-.050	.074	1	.178**	.636**
	Sig. (2-tailed)	.000	.000	.333	.150		.000	.000
	N	385	385	385	385	385	385	385
CA	Pearson Correlation	.325**	.133**	-.041	.277**	.178**	1	.197**
	Sig. (2-tailed)	.000	.000	.420	.000	.000		.000
	N	385	385	385	385	385	385	385
WLB	Pearson Correlation	.826**	.256**	-.125*	-.125*	.636**	.197**	1
	Sig. (2-tailed)	.000	.000	.014	.014	.000	.000	
	N	385	385	385	385	385	385	385

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Overall results show that work life balance, appreciation & recognition, working environment and career advancement opportunities shows positive and significant relationship with employees' motivation. Training and development shows positive but insignificant relationship with employees' motivation. While empowerment shows negative and weak relationship with employee's motivation.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.895 ^a	.801	.798	.45841	2.259

a. Predictors: (Constant), WLB, Emp, CA, WE, TnD, AnR

b. Dependent Variable: Y

Table 4: ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	319.248	6	53.208	253.198	.000 ^b
Residual	79.434	378	.210		
Total	398.682	384			

a. Dependent Variable: Y

b. Predictors: (Constant), WLB, Emp, CA, WE, TnD, AnR.

From the above R is the correlation co- efficient it has been shown the relationship between study variables, from the findings it has been shown that there is a strong positive relationship exist between the study variables as by $R = 0.895$. The model is nicely fitted with the F-statistic of 253.198 having p-value near to zero. Moreover, all pre-requisites of OLS have been relaxed before interpreting the results. The Durbin-Watson statistic is 2.259, which is near to the benchmark of 2. So, there is no autocorrelation exist in disturbances. Moreover, the variances of disturbances are also normally distributed.

Table 5 – A: First Regression test when independent variables (Empowerment, training & development, appreciation & recognition, career advancement) predicts mediator (Working environment).

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.527	.341		10.357	.000
Empowerment(1)	-.137	.065	-.113	-2.118	.035
Training & Development (1)	.059	.052	.063	1.134	.257
Appreciation & Recognition (1)	.167	.065	.156	2.569	.011
Career Development (1)	.034	.062	.028	.541	.589
Work Life Balance (1)	.225	.062	.232	3.602	.000

Table 5 – B: Second Regression When Mediator (Working Environment) predicts the dependent variable (Employees' Motivation).

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.361	.154		2.339	.020
WE	.207	.022	.232	9.268	.000
Emp	.000	.027	.000	.017	.002
TnD	.137	.023	.155	6.068	.000
AnR	.106	.031	.109	3.448	.001
CA	.147	.027	.134	5.381	.000
WLB	.747	.030	.809	24.485	.000

a. Dependent Variable:

Table 6: Sobel Test Analysis

Sobel Test Results			
S. #	Variable	T- Stats	P Value
1	Employee motivation	6.953	0.001
2	Empowerment	0	1
3	T&D	1.114	0.265
4	Appreciation and Recognition	2.115	0.034
5	Career Development	0.545	0.0585
6	Work Life Balance	3.591	0.00329

From the above table it has been shown that t- statistics of Sobel test is 6.953 whereas p value is 0.001 which is less than .05 so it has been concluded that association between mediating variable which is (Working Environment) and dependent variable which is (Employees' motivation) is creating significant effect. From the above table it has been observed that the t- statistics for Sobel test is 0 whereas the p value is 1 which is less than 0.05 so it has been concluded that the association between empowerment and employees' motivation is not significantly effect by the intervening of the mediator it means working environment is not significantly affect the association between empowerment and employees' motivation. From the above table it has been observed that the t- statistics for Sobel test is 1.114 whereas the p value is 0.2 which is greater than 0.05 so it has been concluded that the association between training and development and Employee motivation is not reduced significantly effect by the intervening of the mediator it means working environment is not significantly affect the association between training and development and employees' motivation. From the above table it has been observed that the t- statistics for Sobel test is -2.115 whereas the p value is 0.034 which is less than 0.05 so it has been concluded that the association between appreciation & recognition and Employee motivation is significantly effect by the intervening of the mediator it means working environment is significantly affect the association between appreciation & recognition and employees' motivation. From the above table it has been observed that the t- statistics for Sobel test is .545 whereas the p value is 0.05 which is equal to 0.05 so it has been concluded that the association between training and development and Employee motivation is significantly effect by the intervening of the mediator it means working environment is significantly affect the association between career advancement and employees' motivation. From the above table it has been observed that the t- statistics for Sobel test is 3.59 whereas the p value is 0.003 which is less than 0.05 so it has been concluded that the association between training and development and employees' motivation is significantly effect by the intervening of the mediator it means working environment is significantly affect the association between work life balance and employees' motivation.

5. Conclusion and Recommendations.

Many dimensions of non-financial rewards are related to employee's motivation but work life balance and appreciation & recognition have low mean values as compared to other variables of non-financial rewards. The mean value of working environment is also high it has been shown that good and comfortable working environment is also an important factor for motivating the employees of the organization.

From this research study it has been concluded that there is strong, positive and significant relationship exist in between work life balance and employee's motivation because leave policy motivates employees; ability to deliver services effectively and efficiently in conclusion work life balance practice is a necessary variable for enhancing motivational level of employees. The study concluded that majority of the respondents indicated that career advancement opportunities is the greatest component of employee's motivation. The study also concluded that appreciation and

recognition is also an important component for motivating the employees of the organization. Many organizations offer intrinsic reward for motivating and appreciating employees and this research study also reveals that if supervisors appreciate and recognize their juniors then it increases their motivational level. This research study also concluded that training and development create positive impact on employee's motivation through appropriate training and development the abilities and skills of the employees can increase. While on the other hand this research study also concluded that empowerment shows negative impact on employee's motivation. Good and comfortable working environment is also very essential for motivating the employees and it also increases their performance level and motivational level.

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RELATIONSHIP BETWEEN TRANSFORMATIONAL LEADERSHIP AND TRUST AND THEIR EFFECT ON KNOWLEDGE SHARING

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Abstract

Knowledge sharing among faculty members is of vital importance for the survival of higher education institutions in the changing technological era. The main aim of the current study, on one hand, is to investigate the relationship between transformational leadership and trust and on the other hand, studying their impact on knowledge sharing among employees of private sector universities in KPK. Six private universities, recognized by HEC were taken as target population. Faculties, serving these universities were taken as sample respondents. Questionnaires from previous literature were used to collect primary data. 150 questionnaires were distributed among respondents to ascertain their views. Simple random sampling technique was used for the study. The overall response rate for the study is 87%. Transformational Leadership, with four facets and Trust with two facets were taken as independent variables, whereas knowledge sharing was taken as dependent variable. Regression and correlation tests were used to testify the hypothesis. As per result of regressions, it is revealed that presence of trust among faculty triggers the process of knowledge sharing, under the umbrella of transformational leadership style.

Keywords: Transformational Leadership, Affect Based Trust, Competence Based Trust, Idealized Influence.

Introduction

Higher educational institutions apart from providing knowledge to students, also serve as reservoirs of knowledge. Knowledge management, constitutes information practices and learning strategies, is gaining acceptance in the field of education (Petrides & Nodine, 2003). Faculty within university manage, blend and shape knowledge among themselves, due to which knowledge sharing surfaced as challenging and an important concept in higher educational institutions.

Scholars term Knowledge sharing as a mean through which innovative ideas are streamlined and stands responsible for improving work processes and exploiting new business opportunities (Lin, 2006, 2008; Nonaka and Takeuchi, 1995; Yi, 2009). Individuals as a source of knowledge needs to be managed effectively in order not only to achieve better organizational performance (Andrews and Delahaye, 2000; Bartol and Srivastava, 2002; Refaiy and Labib, 2009) but also helps organization to achieve and sustain competitive advantage (Cabrera and Cabrera, 2005; Nonaka and Takeuchi, 1995). Knowledge created through knowledge sharing helps employee to achieve organizational goals and highlight the need for leader to identify factors that counts for creating knowledge sharing culture.

Recently the concepts of Transformational leadership has attracted the attention from both theoretical and practical perspective. They are termed as those leaders who through invoking

employees beliefs and values pushes followers to deliver beyond their expected level (Schaubroeck et al., 2012).

It is established through previous studies that individuals through personal relationships benefited each other (Brann and Foddy, 1988; Epstein, 2000; Fukuyama, 1995; Messick et al., 1983; Nonaka and Takeuchi, 1995; Organ, 1990). They, through element of trust exchange personal knowledge. Their willingness to share tacit knowledge is highly influenced by affect based connections.

The paper begins with the review of literature to explore possible relationship between trust and transformational leadership with their impact on knowledge sharing and develop hypothesis to guide the study. This is followed by analysis of data and discussions of findings and finally conclusion.

Literature Review

Knowledge, Knowledge Management, Knowledge Sharing

Among various assets processed by human beings, knowledge for them is an intangible asset. Resources, like land capital and labor are termed as finite resources, but knowledge through its systematic use and application generate returns and stands as an infinite resource (Dodgson, 1993). Knowledge is defined as "fluid-mix of framed experience, values, contextual information and expert insights that provide a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of the knower. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms" (Gray, 1989).

Nonaka & Takeuchi divided knowledge into tacit and explicit. Tacit knowledge, subjective its nature is difficult to express, communicated through verbal/visual forms. On contrary explicit knowledge objective in nature can easily be communicated and codified.

Knowledge Management encircles all these activities that affect knowledge creating, capturing, identifying, organizing, storing, representing and revising knowledge. Knowledge management process involves acquisition and creation of different forms of knowledge and utilizing them for achieving organizational goals (Holm, 2001). The importance of knowledge sharing has been gauged from the fact that it has received considerable attention (Hoof and de Ridder, 2004) on account of its vital role in enhancing organizational learning, knowledge creation (Van den) and innovation (Donate and Guadamillas, 2011). Knowledge sharing, a backbone of knowledge management helps in creation of innovative ideas. Bartol and Srivastava (2002, p. 65) defined knowledge sharing as "individual sharing organizationally relevant information, suggestions, and expertise with one another". Management, within an organization keenly exploits the employees' knowledge for its own benefits (Bircham, 2003; Hill and Matusik, 1998; Kuvaset al., 2012) by encouraging its sharing and gaining (Youndt and Snell, 2004). Utilizing knowledge as an organizational level asset demands active acquisition and sharing on part of employees (O'Dell and Grayson, 1998). The process through which knowledge is shared and gained opens gates for organizational learning (Gilmour, 2003). To reap mutual benefits through knowledge sharing, individuals need to cooperate with each other.

Trust

The significance of trust at workplaces has been highly favored by both researchers and practitioners (McCauley and Kuhnert, 1992). Hinds (2001) suggested that people share knowledge in organizational climate where they perceive high level of trust. Trust has been defined as the willingness of an individual to put oneself in a position of potential vulnerability to someone else (Dodgson, 1993; Huang and Vliert, 2006; Edelenbos and Klijn, 2007). There are two main types of interpersonal trust.

Affect based trust: In this type of inter personal trust individuals are linked together through emotional element, which provides a basis for trust. Affect based trust is developed through frequent informal interaction between evaluated and evaluating person (McAllister, 1995). Through continuous social interaction enough room is provided to evaluate person to trust the evaluated person with sensitive personal information, ideas and knowledge, thus making trusting individuals open to each other.

Cognitive bases trust: This type of trust rests upon the contention that how far the professional credentials and role performance of evaluated person are reliable. If a person being evaluated is seen reliable in performing complex roles and enjoys high professional credentials like excellent qualification, special training that person is taken upon as trustworthy (McAllister, 1995).

Interpersonal trust is considered as one of the most important pillar of knowledge sharing edifice (Al-Alawi et al., 2007; Costa et al., 2001; Holsteand Fields, 2010; Lin, 2006; Nonaka and Takeuchi, 1995). Employees are highly motivated to share knowledge, when trust rules. Nonaka (1990) observed that through interpersonal trust many evils like deception, cheating and tendency to blame employees for organizational failures are eliminated.

As stated earlier, about two forms of knowledge, tacit knowledge, highly complex in nature, requires trustful atmosphere. As hard to comprehend, it can be acquired through shared experiences, values, perceptions and mental models (Nelson and Winter, 1982).

Knowledge sharing as an activity, within her womb nurtures several risk for provider as well as receiver of knowledge. Knowledge giver, while giving out tacit knowledge, possibly loose competitive advantage over other. Similarly, recipient of knowledge may absorb knowledge of poor quality. In such situation during knowledge sharing, trust is seen as a vital factor that mitigates the perceived risk of exploitation, failures and opportunistic behavior.

Transformational Leadership

It is widely held among researchers that employees creativity can be successfully nurtured by transformational leadership style (Shin and Zhou, 2003; Jaussi and Dionne, 2003). Bass (95) opined that transformational leader through their mind reflect organizational vision and encourage employee to think in a novel way and come out with creative solution for a problem. Transformational leaders are those who can successfully transform the focus of their followers from instant self-interests to an isolated collective vision and inspire them to perform beyond their duties (Rubin et al., 2005).

Transformational leader has four important dimensions.

Idealized Influence

Transformational leader through their charisma earn respect and admiration from their followers. Transformational leader act as a role model, express confidence in the organizational vision, instill trust and faith among their followers. They enjoy ability to foster co-operation to emphasize collective sense of organization's mission (Bass & Riggio, 2006). Members under transformational leader give openly their opinions and share knowledge.

Inspirational Motivation

Transformational leader through building close relationship with their followers, not only make their followers to be committed to organization's vision, but encourage individual and team spirit. Employees working under transformational leader are committed to achieve organizational vision through team spirit. (Yukl, 2010).

Intellectual Stimulation

Leaders with transformational style stimulate their followers to adopt new approaches and challenge the existing assumptions. Leader ignites imaginative thinking of their followers to

address issues in innovative ways. The flow of intellectual stimulation through transformational leadership style motivates employees to start thinking in a new way to find solution (Bass and Avolio, 1995; Sosik et al., 1997). These behavioral characteristics serve as a prime source for promoting followers creativity (Tierney et al., 1999).

Individualized Consideration

This dimension takes into account the fact that how much leader address the followers' needs show support and applause their efforts. Leader following this style act as coaches and mentors, helping followers to develop job related competencies (Bass & Riggo). According to Elkins and Kellers (2003). Transformational leader helps in creating workplace where followers in the light of vision develop innovative capabilities to face challenges

Hypothesis

H1: Trust at a workplace impacts employee knowledge sharing behavior.

H2: Transformational leadership behavior impacts knowledge sharing behavior.

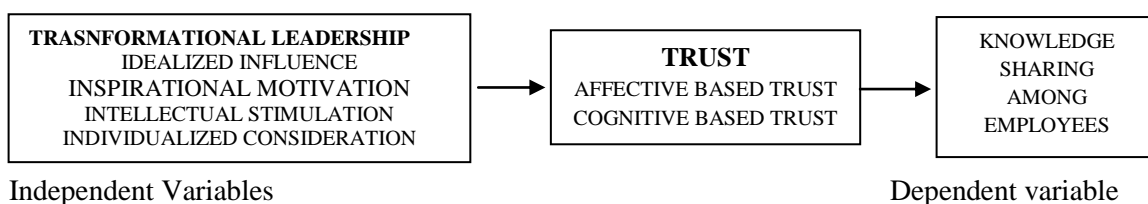
H3: Transformational leadership behavior is positively related to Trust

Theoretical Framework

The relationship between trust and transformational leader and followers is strongly built on the basis of trust. This close relation is reflected in several studies e.g., (Dirks and Ferrin, 2002; Dirks and Skarlicki, 2004). Followers, who view their leader untrustworthy, show no commitment to achieve organizational vision. As stated earlier, that when leader and followers show genuine concern and care, engage in social exchange, affective trust builds. The four dimensions of transformational leadership contribute to the cognitive and affective trust (Bass and Avolio, 1997). Looking through lens of idealize influence followers impinges trust and respect on their leader and view him/her as role model. Inspirational motivations on the part of transformational leader show his/her ability to express organizational vision. If followers feel that their leader has made a justified decision, they enter the process of social exchange and build trust bond with their leader (Pillai et al., 1999). Intellectual stimulation helps leader to strengthen trust ties with followers through asking them for their input in the decision making process (Gillespie and Leon Mann, 2004). Transformational leader nurtures the mind of their followers to address problems in different ways and force them to produce creative ideas. Through individualized consideration leader develops a trust through lending socio-emotional support to followers. Individually when leaders help followers, delegates opportunities to them and thinking for their welfare, they deepen the fabric of trust.

It has been established through previous literature that leadership style affects knowledge sharing, with certain leaders showing ability to foster knowledge sharing culture. The literature pointed out that under transformational leadership, followers develop goal directed behavior (Bass & Riggio, 2006). Under tutelage of transformational leaders, followers enjoy trust and respect and put in maximum efforts to achieve organizational goals (Bass, 1985). Transformational leaders can contribute to organizational learning. Followers are encouraged to participate in educational programs to enhance their skills.

Conceptual Framework



Methodology

The study examines the relationship between transformational leadership and trust and their effect on knowledge sharing among faculty serving private universities in Khyber Pakhtoon Khawa, recognized by Higher Educational Commission (HEC)

Population and Sampling

The target population for the proposed study was faculty of private universities of KPK. data was collected through questionnaire, filled by faculty. In total 150 questionnaires were distributed, 86% was response rate.

Measurement

The items for affective commitment and affect-based trust were obtained from scales developed by Meyer and Allen (1997) and McAllister (1995).

Transformational leadership was measured using a multifactor leadership questionnaire (MLQ) (Bass & Avolio, 2000). Each respondent was asked to rate aspects of leadership behavior related to each of the four TL components: (1) idealized influence, (2) Inspirational motivation, (3) intellectual stimulation, by which leaders promote learning and creativity among staff, and (4) individualized consideration, through which leaders provide satisfaction to members of staff by advising, supporting, and coaching them and listening to their individual needs.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.591 ^a	.349	.256	.83838

a. Predictors: (Constant), feel that s/he cares about me, Doubtless competence, Identify differing needs, freely sharing ideas, develop others' strengths, thrills us with the things we can do, Reliance on supervisor, encourages non-traditional thinking, seeks different perspectives, Spend time coaching and teaching, Boss seem knowledgeable, encourages creativity and innovation i, exciting image, to generate ideas, collective sense of mission.

Table 2: Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	6.707	.832		8.066	.000
freely sharing ideas	.187	.089	.247	2.105	.038
Reliance on supervisor	1.241	.454	1.687	2.736	.007
to generate ideas	-1.255	.454	-1.705	-2.766	.007
seeks different perspectives	-.218	.074	-.324	-2.949	.004
Spend time coaching and teaching	-.411	.102	-.452	-4.011	.000
feel that s/he cares about me	-.316	.086	-.449	-3.666	.000

a. Dependent Variable: Knowledge sharing with colleagues

Discussion and Analysis

Table 1 reflects Trust and transformational leadership style as independent variable and knowledge sharing as dependent variable. R in model summary shows the strength of association. The value of R is .591, which depicts that the Trust and transformational leadership style and knowledge sharing are 59.1% percent correlated to each other. This factual information supported our hypothesis 3. R^2 gives us the idea about variance explained in the dependent variable due to variation in the independent variable. The value of R is .349, which means that independent variables causes 34.9% variation in dependent variable, knowledge sharing.

Table 2 reflects the results of varying co-efficient of two independent variables, Trust and Transformational leadership, used in regression test. Freely sharing ideas and reliance on supervisor constitute Trust construct, whereas to generate ideas, seeks different perspectives, Spend time coaching and teaching, feel that s/he cares about me, reflects various facets of Transformational leadership.

Taking into account the results, the value of β for freely sharing ideas and reliance on supervisor is .187 and 1.24, with P- value being .038 and .007 respectively. It shows that one unit change in freely sharing ideas and reliance on supervisor co-efficient causes .187 and 1.24 units change in knowledge sharing, dependent variable. Thus it supported our Hypothesis 1 that trust has a significant impact on knowledge sharing.

In the same vein studying the remaining co-efficient which stands for transformational leadership, it has been established through taking into account their P- values respectively which are lower than .05 that these co-efficient are having significant impact on dependent variable, knowledge sharing. Thus it has supported our hypothesis 2.

Conclusion

Knowledge sharing among employees of higher educational institutions is need of hour in this changing and highly volatile technological environment. Knowledge sharing behavior in higher educational institutes in private sector will not only help to attain organizational goals, but also achieve competitive advantage through innovative ideas.

Study was meant to highlight important facets of transformational leadership style and role of trust in fostering knowledge sharing culture. Study reveals individualized consideration facet of transformational leadership coupled with intellectual dimension strengthen relationship of leader with followers. Leaders who cares about followers needs and concerns, turns them to be innovate, enjoys their confidence and strong support.

The research strengthens and supports the link between Transformational leadership and Knowledge sharing among teaching staff, showing that Transformational leadership provides support, intellectual stimulation, encouragement and trust, and promotes a KS culture. This gives an indication as to the most important factors that influence KS and provides a clue regarding how HEIs can promote KS activities.

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DETERMINANTS OF SYSTEMATIC RISK IN COMMERCIAL BANKS OF PAKISTAN

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Abstract

Controlling risk taking in deposit institutions is directly related with the protection of financial system and depositors of these institutions. Numerous attempts have been made in this regard to explain and quantify the risk taking including systematic risk of financial institutions. We examine the determining factors affecting systematic risk of banking firms in Pakistan. The study is based on the data of twelve commercial banks listed on Pakistan Stock Exchange which hold around 81.3% market share of the customer deposits in banking sector of Pakistan. We collected data for the period 2010 to 2016 for dependent variables i.e. Value at risk and stock beta and set of independent variables including asset quality, liquidity, firm size, firm growth, business mix, return on assets, loan growth and operating efficiency. The results show that asset quality, liquidity, firm size and return on assets have significant impact on systematic risk of banks in Pakistan, while Business mix reports insignificant impact on systematic risk of banks. Loan growth, operating efficiency and firm growth has given mixed results. Loan growth and operating efficiency has insignificant impact on stock beta while significant impact on VaR. On the other hand, firm growth has insignificant impact on VaR and significant impact on stock beta. It is concluded from these findings that model 1 where VaR is used as measure for systematic risk outperform model 2 where stock beta is used as measure for systematic risk. This study is a significant contribution in understanding and measuring the systematic risk and it is a kind of exposures for commercial banks in Pakistan. The research provides an insight to understand the dynamics of market risk for policy makers, investors and risk managers of commercial banks in Pakistan.

Keywords: Systematic risk, Stock beta, Value at risk, Commercial banks

1. Introduction

Controlling risk taking in deposit institutions is directly related with the protection of financial system and depositors of these institutions. Numerous attempts have been made to explain and quantify the risk taking behavior of financial institutions. Stability of financial system is a key determinant of in economic growth while a sound banking system is essential for financial system stability. Macroeconomics shocks make the banking system vulnerable. But the excessive risk

taking by banks also add to the vulnerability of banking crisis. Therefore understanding factors influencing the risk taking behavior of commercial banks nowadays is getting importance in the theoretical and empirical banking research.

The available literature on factors influencing the risk taking behavior of commercial banks includes the following factors. First the under estimation of business cycle by the management and ownership which leads to excessive bank lending. It results in financial accelerator effect and also creates financial bubbles. Second, the agency problems between ownership and management. Third, the moral hazard also contribute to the risk taking by banks in the form of deposit insurance, limited liability of shareholders and bailout plans. Fourth, the franchise value is also a determining factor of bank risk taking. Banks with higher franchise value reduce bank risk.

In the last few years banking sector in Pakistan has shown considerable growth and gaining strength. There is a considerable change in structure, performance and size of commercial banks after the introduction of reforms in financial sector. These reforms were made to make the financial sector competitive, sustain various types of risk and improve asset quality. Studies have been carried out in Pakistan regarding performance and efficiency of banking sector but no study has focused on the determinants of risk in banking sector of Pakistan. Banking is considered to be a risky business. Commercial banks take risk but they should do it consciously. Banking operations are very fragile and are built on depositors trust, brand reputation and leverage. The failure and collapse of banks can make spillover effects or shock waves throughout the economy. Bank management therefore should identify the type and degree of risk exposures and means to manage them. Risk taking is proportionate to return. But excessive risk taking and its inefficient management may result in great financial and brand reputation losses.

2. Literature Review

Management of market risk due to adverse conditions and fluctuations in market risk factors is an important apprehension for risk managers in banking institutions. Market risk in banks arises because of two important activities. First because of asset transformation and second due to agency and brokerage activities for providing products or services to businesses or households. The previous literature on market risk analyzed the relationship between accounting variables and market risk measures. The research work regarding systematic risk can be grouped in two categories. The first category is by estimating past beta values to predict future beta values using technical analysis. This methodology has been used by Amold (2005) and Mandelbrot (2004). The second category of research regarding systematic risk is estimating the impact of company fundamentals on its beta. The studies of Damodaram (2009) and Franzoni (2006) are among the few using operating leverage, financial leverage and company size as explanatory variables. Few studies explored the impact of various macroeconomic variables on firm beta. The study of Dilip et al. (2000) used exports, market capitalization, imports and inflation in their study. They concluded that all these variables have significant impact on market risk of the firm.

Non-performing loans are the actual source of systematic risk in the financial and banking sector. Increase in non-performing loans is determined by number of factors like real interest rates, inflation, short term interest rates and unemployment rate (Paul, 2012). The impact of macroeconomic instability on the bank balance sheet is also a major source of systematic for the banking sector. This macroeconomic instability affects the loan portfolio of banks. It is expected that credit expansion and non- performing loans ratio are procyclical in the economic cycle (Schinasi, 2005).

Operating efficiency also affects the systematic risk of bank. A higher operating efficiency generates higher profit and ultimately reduces the systematic risk of bank (Gu and kim, 2002). Eldomiaty et al. (2009) concluded a negative relationship between operating efficiency and systematic risk of non-financial sector. Liquidity has negative relationship with systematic risk in financial market. The studies of Lee and Jang (2006) and Eldomiaty et al. (2009) all asserted a

negative relationship of liquidity with systematic risk. Companies showing higher growth in revenue and assets are usually more vulnerable to changes in economic conditions. The study of Borde (1998) shows that there exist a positive relationship between bank systemic risk and its growth rate. Chan and Chen (1991) assert that small firms exhibit high level of risk as compared to large firms. Large firms are less exposed to bankruptcy risk and have more stable financial position. Some of the studies confirm that a negative relationship exists between systematic risk and profitability of financial institution. Higher level of profitability reduces the financial instability of firm (Borde, 1998; Gu and Kim, 2002)

Various studies have also examined the relationship between diversification or business mix and systematic risk of banks. In this regard Stiroh (2006) and Fraser, Madura & Weigand (2002) found that non-interest income contributes to volatile bank earnings. In similar study, De Young et al. (2001) also conformed that an increase in systematic risk is due to increase in non-interest income. The expansion of loan portfolio in a saturated banking system needs significant efforts. In this respect the effect of loan growth on bank risk is viewed by various researchers. In this connection, Hardy and Pazarbasioglu (1999) stated that extreme financial distress in banking is usually the consequences of rapid credit expansion. Similarly, Salas and Saurina (2002) credit growth leads to non-performing loans and therefore increases the bank risk.

Very few studies have been conducted to study the determinants of systematic risk in Pakistan. Nawaz et al. (2017) studied the relationship between systematic risk as measured by stock beta and various financial variables in the cement sector of Pakistan during a period of 2008 to 2013. They concluded that operating efficiency, industry size and profitability significantly impact systematic risk while financial leverage and liquidity have insignificant relationship with systematic risk. Nasir et al. (2016) analyzed the determinants of systematic risk in the insurance, banking and non-financial sector of Pakistan from 2010 to 2014. Generalized method of moments and common effect model was used to analyze the data. It was concluded that market value of equity, leverage, firm size and operating efficiency significantly impact systematic risk in banking sector of Pakistan. Market value of equity, dividend payout, profitability, firm size, operating efficiency, liquidity and leverage significantly explain the systematic risk in non-financial sector. On the other hand only firm size explains systematic risk in insurance sector of Pakistan. Iqbal and Shah (2010) studied the impact of eight financial variables on systematic risk of non-financial firms listed on Pakistan Stock Exchange during 2005 to 2010. It was concluded that profitability, operating efficiency, liquidity, dividend payment and market value of equity have significant impact on systematic risk of non-financial firms in Pakistan.

3. Research Methodology

This research study is based on secondary financial data collected from the official websites of concerned commercial bank and also from the official website of the Pakistan Stock Exchange during a period of 2010 to 2016. The sample includes twelve commercial banks listed on the Pakistan Stock Exchange. These banks include National Bank of Pakistan (NBP), Habib Bank Limited (HBL), Muslim Commercial Bank Limited (MCB), Allied Bank Limited (ABL), United Bank Limited (UBL), Bank Alfalah Limited (BAF), Bank Al Habib Limited (BAH), Askari Bank Limited, Bank of Punjab, Habib Metropolitan Bank Limited, Faysal Bank Limited, Standard Chartered Bank Limited. These selected banks represent 81.3% share of total customer deposits. Share of customer deposit for each bank is given in Appendix I. Monthly stock prices are used to calculate value at risk and stock beta. Monthly stock prices of the selected banks and monthly data of KSE 100 index has been collected from the official website of Pakistan Stock Exchange.

3.1 Measurement and operational definition of variables

The dependent variable of the study is systematic risk and is measured through value at risk (VaR) and Stock Beta (SB). VaR measures maximum loss that a stock may incur at a particular

confidence level or a given probability during a given time period. VaR is calculated using historical simulation method based on monthly stock prices of each commercial bank at 5% confidence interval.

Stock beta (SB) is another measure to determine systematic risk. It is measured by the slope of each bank monthly stock return and monthly return of the KSE 100 index.

The independent variables used in the study are asset quality (AQ), liquidity (LT), operating efficiency (OE), firm size (FS), growth of firm (GF), business mix (BM), profitability (ROA) and loan growth (LG). Independent variables are selected for this study based on the premise that it can help management for the assessment of systematic risk and can exercise their control using firm specific factors. Independent variables and their measurements are given in table 1.

Table 1: Measurements of Independent variables

Independent Variables	Measurements
Asset quality (AQ)	Ratio of non-performing loans to total loans
Liquidity (LT)	Ratio of current assets to current liabilities
Operating efficiency (OE)	Ratio of total revenues to total assets
Firm size (FS)	Log of assets
Growth of firm (GF)	Annual percentage change in EBIT
Business mix (BM)	Ratio of non interest income to total income
Profitability (ROA)	Return on assets
Loan growth (LG)	Difference between loan growth rate of a bank and median of all banks loan growth rate

The following regression models are applied based on panel data estimations.

Model 1:

$$\text{VaR} = \beta_0 + \beta_1 \text{AQ} + \beta_2 \text{LT} + \beta_3 \text{OE} + \beta_4 \text{FS} + \beta_5 \text{GF} + \beta_6 \text{BM} + \beta_7 \text{ROA} + \beta_8 \text{LG} + \varepsilon$$

Model 2:

$$\text{SB} = \beta_0 + \beta_1 \text{AQ} + \beta_2 \text{LT} + \beta_3 \text{OE} + \beta_4 \text{FS} + \beta_5 \text{GF} + \beta_6 \text{BM} + \beta_7 \text{ROA} + \beta_8 \text{LG} + \varepsilon$$

3.2 Hypothesis

The following hypotheses are put forward in order to understand the various determinants of systematic risk:

H₁: Asset quality is positively related to systematic risk

H₂: Liquidity is negatively related to systematic risk

H₃: Operating efficiency is negatively related to systematic risk

H₄: Firm size is negatively related to systematic risk

H₅: Firm growth is positively related to systematic risk

H₆: Business mix is positively related to systematic risk

H₇: Profitability is negatively related to systematic risk

H₈: Loan growth is positively related to systematic risk

4. Data Analysis

4.1 Descriptive Statistics

Table 2: Descriptive Statistics

Variables	Mean	Maximum	Minimum	Std. Deviation
BT	0.0035	0.00110	0.038069	0.001
VaR	-0.0368	-0.01320	-0.08341	0.0131
AQ	0.0142	0.81234	0.00084	0.01876
Lt	1.2819	7.30336	1.1350	1.1350
FS	13.026	14.6123	9.68444	1.0879
GF	22.464	10002.5	-5.87919	135.931
BM	0.4785	1.85322	0.01506	0.51638
ROA	0.0883	0.53827	0.01345	0.09331
LG	0.0051 0	0.82701	-0.9893	0.24336
OE	0.2251	2.09663	0.01489	0.44330

Table 2 shows descriptive statistics for banking sector in Pakistan. The data shows that mean value of beta for sample banks during 2010 to 2016 is 0.0035. This mean value of beta is less than the market index of 1. It shows that operations of commercial banks in Pakistan during 2010 – 2016 are not exposed to market changes. The mean of the daily average VaR is 3.68%. The mean value of asset quality is 0.014 with standard deviation of 0.018. Liquidity of banking sector for the period is 1.281 and standard deviation is 1.135. The mean value of firm size is 13.02 while the standard deviation is 1.087. Mean of the firm growth is 22.464 and standard deviation is 135.931. The data also shows that mean value of business mix is 0.478 and its standard deviation is 0.516. Return on assets has a mean value of 0.088 and its standard deviation is 0.093. The mean value of loan growth is 0.005 while its standard deviation is 0.243. Operating efficiency has a mean value of 0.225 and its standard deviation is 0.443.

4.2 Correlation Analysis

Table 3: Correlation Analysis

Variables	BTA	VaR	AQ	LT	FS	GF	BM	ROA	LG	OE
BTA	1.000									
VaR	0.2519	1.0000								
AQ	-0.187	-0.060	1.0000							
LT	-0.160	-0.091	0.5320	1.0000						
FS	0.2643	0.0804	-	-	1.0000					
			0.3735	0.4879		1.0000				
GF	0.0036	0.1231	-0.060	0.0835	0.0719	1.0000				
BM	0.0579	0.1064	-	-	0.3528	0.1397	1.0000			
			0.0323	0.1402				1.0000		
ROA	0.2098	-0.053	-	-	0.2446	0.0447	0.2538	1.0000		
			0.1327	0.2189					1.000	
LG	-0.030	-0.083	0.0361	-	0.3229	-0.041	-0.039	0.1230	1.000	
				0.2210						1.0000
OE	-0.108	-0.060	0.5684	0.3319	-	-0.041	-0.264	0.0862	-	1.0000
					0.2888				0.277	

Table 3 shows correlation analysis. Correlation analysis show that asset quality has a negative relationship between stock beta and VaR. Liquidity is also negatively related with stock beta and VaR. There is a positive relationship between firm size, stock beta and VaR. Beta and VaR is positively related with firm size. The relationship of firm growth with stock beta and VaR is also positive. Business mix has also positive correlation with stock beta and VaR. Return on asset is positively correlated with stock beta and has negative correlation with VaR. Loan growth has a negative relationship with stock beta and VaR. There is a negative relationship between operating efficiency, stock beta and VaR.

4.3 Breusch-Pagan Test

Table 4: Breusch-Pagan Test

Kind of Test	Critical/Standard Value	Reported Value
Breusch-Pagan Test	0.05	0.001

Table 4 shows results of Breuch-Pagan test in order to identify the problem of heteroscedasticity in the data. The results of Breuch-Pagan test shows that the reported value is less than the critical value. It is therefore concluded that there is no problem of heteroscedasticity in the data.

4.4 Hausman Test

Hausman test is used in order to select between fixed effect model and random effect model for panel data. The null hypothesis for Hausman test was that random effect model was preferred to fixed effect model. Hausman test reported a chi-square value of 14.211 with a p-value of 0.223 for model 1. It shows that the chi-square value was found to be insignificant. The null hypothesis was therefore failed to reject, so random effect model was recommended for model 1.

Hausman test also reported a chi-square value of 2.06 with a p-value of 0.979. It shows that chi-square value was found to be insignificant for model 2. The null hypothesis was therefore failed to reject, so random effect model was recommended for model 2.

4.5 Regression Analysis

4.5.1 Random Effect Model

Table 5: Random effect model using stock beta as dependent variable

Variables	Coefficient	Standard error	t-stat	P-value
AQ	0.5814	0.1547	3.76	0.021
LT	-0.1126	0.0323	-3.49	0.041
FS	-0.551	0.1639	-3.39	0.033
GF	1.8622	0.4913	3.79	0.019
BM	0.3603	0.2403	1.50	0.214
ROA	-0.3486	0.1375	-2.54	0.018
LG	0.0035	0.0069	0.50	0.731
OE	-0.9450	0.7964	-1.19	0.381
R-Square	81.13%			
Wald Chi	61.34			

Dependent variable: Stock beta

Table 6: Random effect model using value at risk as dependent variable

Variables	Coefficient	Standard error	t-stat	P-value
AQ	0.316	1.181	0.267	0.631
LT	-0.359	0.127	-2.839	0.035
FS	-0.197	0.067	-2.943	0.043
GF	7.031	8.403	0.837	0.831
BM	0.029	0.046	0.632	0.913
ROA	-0.562	0.140	-2.40	0.043
LG	0.324	0.028	4.58	0.016
OE	1.8622	-0.232	-6.28	0.037
R-Square	76.65%			
Wald Chi	56.31			

Dependent variable: Value at risk

Table 5 & 6 show result of regression analysis in order to determine the factors effecting systematic risk in the banking sector of Pakistan. The random effect model is used with asset quality, liquidity, firm size, firm growth, business mix, return on assets, loan growth and operating efficiency as independent variables. The R^2 for model 1 where stock beta (BTA) is used as dependent variable is 81.13% and for model 2 where value at risk (VaR) is used as dependent variable the R^2 is 76.65%. According to first hypothesis there is a positive relationship between asset quality as measured by non performing loans ratio and systematic risk. The results also confirm positive relationship between asset quality, stock beta and VaR but the results are insignificant. Liquidity has significant negative impact on stock beta and VaR, this finding is according to the study of Lee and Jang (2006) and Eldomiaty et al. (2009). This relationship supports the second hypothesis. The results also show that firm size has also significant negative impact on systematic risk as measured by stock beta and value at risk (VaR). Third hypothesis also supports this argument. Firm growth and business mix has insignificant positive impact on stock beta and value at risk. It shows that firm growth and business mix do not affect the system risk of banking firms in Pakistan, the study of Borde (1998) also supports this argument. The hypothesis of the study also states that systematic risk has negative impact on return on assets and operating efficiency of firms. The findings of the study show that return on assets has a significant negative impact on stock beta and VAR, the study of (Gu and kim 2002) also supports this argument. Operating efficiency has insignificant negative impact on stock beta while it has got negative significant impact on VaR of banking firms in Pakistan. This finding is also supported by the study of Eldomiaty et al. (2009). The eight hypothesis of the study enumerates that loan growth has positive impact on systematic risk. The findings suggest that loan growth has insignificant positive impact on stock beta and significant positive impact on VaR of banking firms in Pakistan. The study of Salas and Saurina (2002) also supports this argument.

5. Conclusion

Stability of financial system is a key determinant of in economic growth while a sound banking system is essential for financial system stability. Controlling risk taking in deposit institutions is directly related with the protection of financial system and depositors of these institutions. Numerous attempts have been made to explain and quantify the risk taking including systematic risk of financial institutions. This study is about determining factors affecting systematic risk of banking firms in Pakistan. This study is based on the data of twelve commercial banks listed on Pakistan Stock Exchange (PSX), the sample holds 81.3% market share of customer deposits. Data was collected from 2010 to 2016. The systematic risk for this study was calculated through stock

beta (SB) and value at risk (VaR). The independent variables used to determine the systematic risk are asset quality (AQ), liquidity (LT), firm size (FS), firm growth (GF), business mix (BM), return on assets (ROA), loan growth (LG) and operating efficiency (OE). The result shows that asset quality, liquidity, firm size and return on assets have significant impact on systematic risk of banks in Pakistan. Business mix has insignificant impact on systematic risk of banks. Loan growth, operating efficiency and firm growth has given mixed results. Loan growth and operating efficiency has insignificant impact on stock beta while significant impact on VaR. On the other hand, firm growth has insignificant impact on VaR and significant impact on stock beta. It is concluded from these findings that model 1 where VaR is used as measure for systematic risk outperform model 2 where stock beta is used as measure for systematic risk. This study is a significant contribution in understanding and measuring the systematic risk and its exposures for commercial banks in Pakistan. This study provides an insight to understand the dynamics of market risk for policy makers, investors and risk managers of commercial banks in Pakistan. This study can be further extended by including other financial institutions like insurance companies, mutual funds and Islamic financial institutions in the sample.

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PROPOSED CHEMICAL PLANT FOR THE PRODUCTION OF NATURAL HYDROXYAPATITE (100 KG PER DAY) MINERAL BY USING WASTE BOVINE BONES AS A RAW MATERIAL

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Abstract

Each year thousands of people lose or break bones due to accidents, chronic diseases, and dental surgeries. Surgeons mostly extract bone tissues of the same patient and then reutilize for reconstruction of the defective bones. Sometimes bone tissues are collected from donors, however, both of these methods are not preferred because of several difficulties. Fortunately, material scientists have discovered that hydroxyapatite (HA) crystals can be used to heal the broken bones. Presently, the import cost of the artificial bone material is far expensive for our nation (Korean grade HA for dental application is around RKR 10,000/cm³). Therefore, we have prepared a preliminary process design report to figure out the potential of indigenously prepared hydroxyapatite (HA) material. In general, the cost of the raw material (waste bovine bones) in our country is very cheap and therefore we believe that a huge revenue may be saved and also generated. Broadly, the proposed chemical plant will consist of dryer, double roll crusher, grinder, sieve shaker, ball mill, autoclave, heat exchangers, filter press, and furnace. The total capital investment including a world class quality control laboratory will be around 40 million PAK rupees, whereas the production cost of HA will be less than PKR 1,000 per kg.

Keywords: Hydroxyapatite (HA), process design, and cost estimates.

1. Introduction

Nowadays bone defects are very common due to accidents, bone cancer, and dental operations (B. Mondal & S. Mondal, 2012; Szcześ et al., 2017; Szurkowska et al., 2018). The need for restoring defected bone tissues leads to the development of various bone reconstruction and tissue engineering solutions (Miculescu et al., 2018; Szurkowska et al., 2018). Currently, there are various types of bone grafts (i.e. xenografts, allografts & auto-grafts) but every type is faced to disadvantages such as the risk of biological contamination, infection and fast absorption (xenografts); difficult harvesting and storage, high risk of tumor causing cells and pathogens transfer (allografts); low availability, additional surgical procedures, prolonged healing of harvested area (auto-grafts) (Miculescu et al., 2018). Synthetic and natural biomaterials, for example hydroxyapatite (HA) mineral, which may be extracted from waste bones can be affectively used for bone reconstruction and healing because of its similarity with the inorganic part of bone (B. Mondal & S. Mondal, 2012; Miculescu et al., 2018; Szcześ et al., 2017). Being the most promising synthetic material for bone regeneration, once placed in the damaged area the hydroxyapatite binds to the host tissue and becomes integrated, inducing the native bone formation and growth (Szurkowska et al., 2018). Simultaneously the graft is resolved by the natural remodeling process of the bone. At the end the tissue will be completely reconstructed and the material substituted by native bone (Kattimani et al., 2016; Szurkowska et al., 2018). The term Hydroxyapatite (HA) is a naturally occurring mineral and chemically identical to the mineral constituent of bones and solid tissues of mankind and mammals (i.e. it is well accepted by the body) (Thirumalai, 2018). HA is considered to be the gold standard in bone tissue regeneration (Miculescu et al., 2018). In clinical practice, it is used in the form of powders or granules as filler for bone replacement or for repair of post-resection defects (Szurkowska et al., 2018). HA is also successfully used as a coating material for metallic implants due to its bioactivity and favorable effects on the Osseo-integration process (Sharuzi et al., 2018). Porous structures may be used as temporary scaffolds for newly formed osseous tissue (Suna et al., 2017; Szurkowska et al., 2018). In dentistry, HA is a component of dental materials such as dental cements and toothpastes (Szurkowska et al., 2018). Moreover, it has further uses in polymer/ceramic bone composite materials, not only as a bioactive material but also as a provider of desirable mechanical properties (Szurkowska et al., 2018). Most importantly, it can be also used for control drug delivery to the affected or damaged organs of the patients (Kattimani et al., 2016; Szcześ et al., 2017; Szurkowska et al., 2018).

Chemically, bovine bones are a chemical combination of inorganic HA mineral and organic type I collagen proteins (Manalu et al., 2015; Sergey & Epple, 2002). The inorganic portion is about 70 %, while the rest is primarily collagen with presence of few percentages of water molecules (Manalu et al., 2015; Szcześ et al., 2017; Szurkowska et al., 2018). Fortunately, these waste bones can be treated to produce pure natural HA crystals (Manalu et al., 2015; Nasser et al., 2009). These prepared powders, blocks, or beads can be placed in the affected areas of damaged bones for bone regeneration (Szurkowska et al., 2018). Titanium and stainless steel implants are usually covered in HA coatings to trick the immune system of human body and thus reduces the chances of implant rejection (Kantharia et al., 2014; Szurkowska et al., 2018). On the other hand, organic fibrous proteins are highly valuable bio-chemical and commonly used in cosmetic surgeries, gelatin productions, glues, and food processing industries (Chi H. Lee et al., 2001).

In general, natural HA mineral can be extracted by two different chemical processes (Nasser et al., 2009; Sobczak et al., 2009). For instance, crushed bones are first treated in hot water (under subcritical conditions) to take out valuable collagen compounds and then heated to higher temperatures (700 °C – 800 °C), or bones can also be directly heated (700 °C – 800 °C) with an extremely low ramp rate to discard the bonded organic compounds (Nasser et al., 2009; Sobczak et al., 2009). This work discusses the details of the proposed HA production plant with understanding of overall economic assessment.

1.1 Proposed process flow sheet for Hydroxyapatite production

Initially, the collected piles of waste bones need manual cleaning and washing by using water to remove the attached meat lumps, fats, and all other possible debris. After that each batch of cleaned bones will be dried at a temperature of 110 °C in vertical tray dryers. These dried batches are then loaded on conveyor belts and transferred to double roll crushers in which the bone size may be reduced to 0.3 mm and then finally grinded to 200 µm size by using ball mill. The screens are also required to segregate the oversize particles for regrinding. The prepared powdered bones will be then poured into autoclave containing demineralized water by keeping a fixed solid/liquid ratio of 1:40. This autoclave will operate under high pressure and at a temperature of 250 °C to dissolve a considerable amount of polymeric collagens (structural protein) molecules. The remaining mixture of bone matrix and collagen slurry can be separated in plate and frame filter press. The separated collagen slurry is a valuable feed stock and will be exported to relevant chemical process industries. On the other hand, the solid mass needs further heating in a furnace to a temperature of 750 °C for several hours in order to discard the clumsy bonded hydrocarbons and thus finally fine hydroxyapatite crystals will be formed. Last but not least, cooled hydroxyapatite can be packed and shipped to concern industries. The flow sheet of proposed production facility is presented in Figure 1.

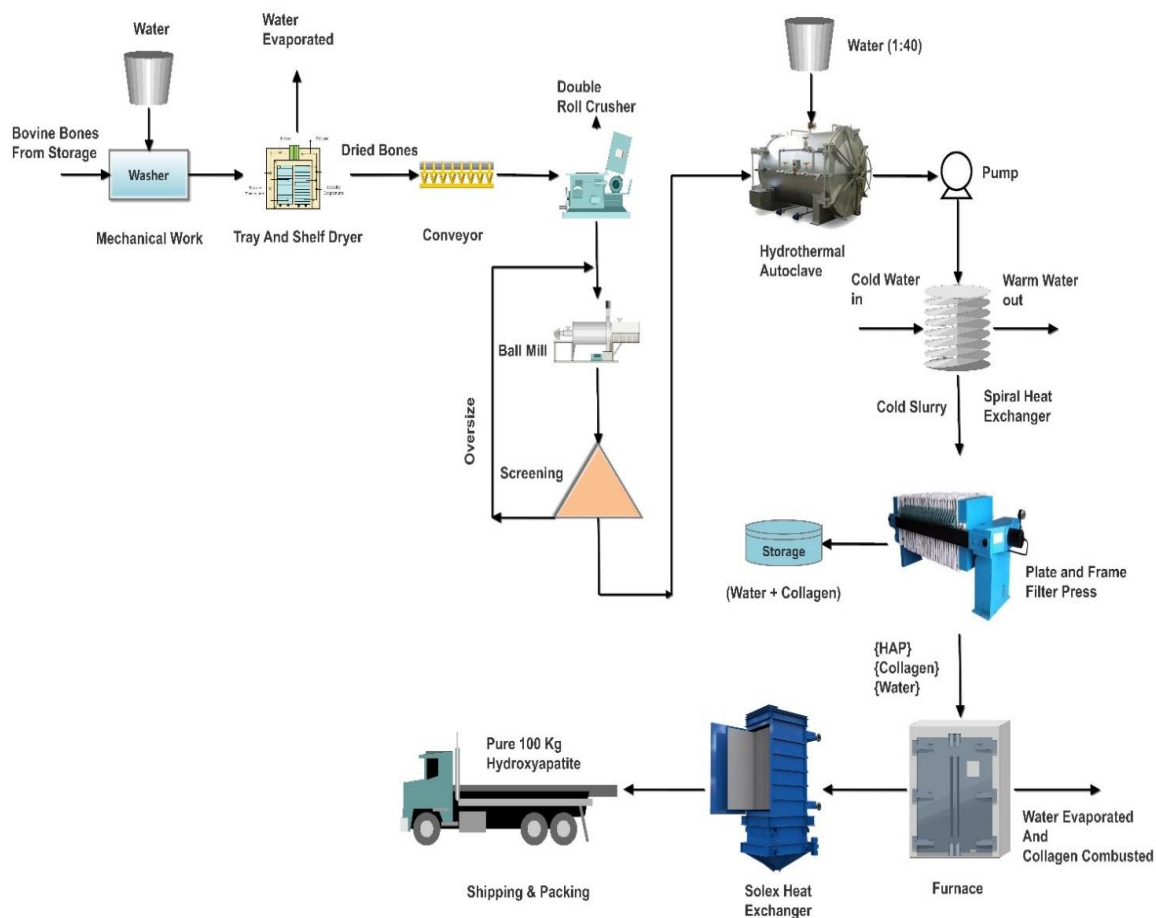


Figure 1 Process flow sheet for the production of hydroxyapatite from bovine bones.

2. Material, Energy, and Cost Analysis

A target of 100 kg HA/day production was set because of its expected local and international demand [18]. Material balance around each equipment was calculated by law of mass conservation equation (Input + Generation = Output + Consumption + Accumulation). Additionally, large number of laboratory scale experiments were also conducted to determine the basis for upscale calculations, i.e. from few grams to hundreds of kilograms. For example, through cleaning of 500 g of waste bone requires about 470 g of water, whereas soaking of bones in demineralized water for a considerable time absorbs 20 % of water. Thus in washing operation, 150 kg of demineralized water is required to handle 158 kg of waste bones. Furthermore, the lab scaled ball mill experiments displayed that less than 1 % of mass is wasted in milling operations, as shown by 1.4 kg of grinded bone accumulation in industrial scale ball mill operations. Similarly, on the basis of prior experiments, the details of the mass calculation of each equipment is presented in Table 1.

Table 1. Material balance of each process equipment, basis of calculation is 100 kg HA/day.

Type of Operation	Equipment	Feed (kg)		Product (kg)		Accumulation (kg)
Washing	Mechanical Work	(Water) 150 kg	(Bovine Bones) 158 kg	(Water) 139 kg	(Bovine Bones) 169 kg	0
Drying	Tray & Shelf Dryer	169 kg		(Water Evap.) 12.87 kg	(Dried Bones) 156.13 kg	0
Crushing	Double Roll Crusher	156.13 kg		156.13 kg		0
Grinding	Ball Mill	156.13 kg		154.73 kg		1.4 kg
Screening	Sieve Shaker	154.73 kg		(Required Size) (200 μ m) 140 kg	(Over Size) (Recycle) 14.73 kg	0
Hydrolysis	Autoclave	(Water) 5600 kg	(Bone Powder) 140 kg	5740 kg		0
Filtration	Plate & Frame Filter Press	5740 kg		(Filtrate) 5637 kg	(Cake) 103 kg	0
Calcination	Box Furnace	103 kg [HAP = 100kg, Water = 2 kg, Collagen = 1 kg]		Water Evap. 2 kg	Collagen Combusted 1 kg	(Hydroxyapatite) 100 kg 0

Estimates of needed energy for HA production is shown in Table 2. At this stage of the study the minimum time required for each operation is not known. Dryer, autoclave, and furnace are the energy intensive equipment, however, their operation cost for generating higher temperatures can be minimized by using alternative cheap combustible fuels, for example natural gas, and coal. In general, 14 kW centrifugal pump (2.4 m³/min) will be more than enough for washing 158 kg of waste bones. The dryer centrifugal fan for circulating 600 m³/min hot air consume about 4 kW energy. Similarly, crushing and grinding equipment will operate at 212 kW and 22 kW, respectively. Autoclave, which is supposed to handle 5740 kg of slurry needs 1222 MJ of energy, whereas on the other hand 182.2 MJ will be used for the production of refined HA crystals (calcination process).

Table 2. Shows energy requirement for each process equipment.

Type of Operation	Equipment	Temperature (°C)	Pressure (atm)	Energy Required
Washing	Mechanical Work	30	1	14 kW
Dryer fan	Tray & Shelf Dryer	100	1	4 kW
Crushing	Double Roll Crusher	30	1	212
Grinding	Ball Mill	30	1	22
Hydrolysis	Autoclave	250	4 – 6	1222 MJ
Filtration	Plate & Frame Filter Press	30	1	1.5 kW
Calcination	Box Furnace	750	1	182.2 MJ

A large number of laboratory experiments are still needed in order to determine the real design parameters of all proposed equipment. For instance, design engineer should know the real time and number of trays crucial to dry wet bones. However, since mostly stainless and carbon steel will be used as a material of construction, thus an approximate cost of each process equipment can be determined by using standard empirical equations (Robin Smith, 2005). As shown in Table 3, for the installation of international standard chemical plant a total of 20 million rupees will be needed. Moreover, operating cost of the project, for example raw material, electricity, water, natural gas, labor, and plant maintenance is far less when compared to the cost of imported HA material. For example, to purchase 160 kg of raw bones will cost around 12,000/- PAK rupees. Furthermore, HA is mostly used for medical treatments and thus requires the installation of high standard quality control laboratory and thus requires an added amount of 20 million rupees.

Table 3. Total fixed (Direct and indirect capital cost) balance sheet for the completion of project

Equipment	Equipment fabrication (PKR)	Equipment installation (PKR)	Piping and Onsite modifications (PKR)	Instrumentation & automation (PKR)	Electrical wiring installation (PKR)	Miscellaneous Utilities (PKR)	Fixed capital cost (PKR)
Tray Dryer (SS-304)	617,500	308,750	123,500	61,750	61,750	123,500	1,296,750
Double Roll Crusher	1,300,000	650,000	260,000	130,000	130,000	260,000	2,730,000
Ball Mill (SS-304)	1,560,000	780,000	312,000	156,000	156,000	312,000	3,276,000
Autoclave Reactor (CS)	260,000	104,000	182,000	52,000	26,000	130,000	754,000
Spiral Heat Exchanger (SS)	195,000	78,000	136,500	39,000	19,500	97,500	565,500
Filter Press (Reinforced PP Frames)	1,950,000	780,000	1,365,000	390,000	195,000	975,000	5,655,000
Furnace	2,600,000	1,300,000	520,000	260,000	260,000	520,000	5,460,000
Total Investment	8,482,500	4,000,750	2,899,000	1,088,750	848,250	2,418,000	19,737,250

3. Conclusions and Recommendations

Principally, our country needs to improve the percentage of exports for sustainable economy. Each year state bank of Pakistan pays huge import bills for the purchase of chemicals. Hydroxyapatite (HA) is a valuable chemical used in orthopedic and dental surgeries. The technology for HA production is rather simple, however, since the materials is mostly used in medical treatments thus requires a prior comprehensive testing and analysis. The total cost of the project including chemical plant and world class laboratory will cost around 40 million rupees. In general, this project will not only save a huge foreign reserves but will also offer new jobs for our graduates and labor. The raw material used for HA production is very cheap and our estimates shows that the produced crystals cost will be less than PKR 1000 per kg.

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AN INVESTIGATION INTO KEY MARKET SEGMENTS FOR INTERNATIONAL TOURISTS IN GILGIT-BALTISTAN, PAKISTAN

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Abstract

The purpose of this study is to find market potential and market segments for international tourists in Gilgit-Baltistan, Pakistan. The study is quantitative and descriptive in nature. Sample size is 143 international tourists. Factor-Cluster analysis is used to identify the tourists' segments. Findings of this study show that international tourists spend 1.34 trillion U.S. dollars worldwide. Six segments are identified namely Traditionalists, Relaxers, Adventurers, Nature lovers, Family tourists, and Relationship builders. Findings of this study will help the Tourism Department of Gilgit-Baltistan in calculating market share and design and offer proper services to international tourists in view of the identified segments.

Keywords: Market potential, Market segments, Destination Marketing, Gilgit-Baltistan

1. Introduction

Gilgit-Baltistan formerly known as Northern Areas of Pakistan having covered area 72971 square Kilo-Meters and population is about 14,92,000. Gilgit-Baltistan has ample of attraction to international as well as internal tourist like world known Karakorum highway(KKH), the junction-point of world's three mighty mountain ranges (Hindukush, Himalayas, and Karakorum), second highest peak of the world K2, five peaks over 8000 meters, more than hundred peaks over 7000 meters, more than five thousand glaciers, snow covered area of 2200 sq. miles and 119 lakes. Four national parks, 9 well-known native games, habitats for wild life, 20 species of fishes, lovely valleys, and historical sides awarded by British Airways, More than twenty historical forts, many polo grounds, many archeological sites, more than 39000 rock carvings, local festivals, a culture of hospitality and acceptance of visitors are some key brand elements for Gilgit-Baltistan Pakistan (Baloch, 2012). Gilgit-Baltistan is heaven for mountaineer, trekkers and hikers and famous for natural attraction and cultural heritage, biological diversity and beautiful landscapes. Many festivals held throughout the year like Silk route festival, Shandur polo festival, Naltar skiing competition, and Rama festival (Allan, 1990). Tourism in Gilgit-Baltistan was on decline due to war against terrorism, lack of infrastructure, however, tourism in Gilgit-Baltistan is now on rise sustainably (Fazlur-Rahman, 2013).

Destination branding emerges as one of the most interesting areas of research in last few decades. Many destinations internationally used branding strategies to enhance their images and became competitive among other destination. It is a challenge for a destination to become a powerful destination brand because other competitive destinations are always pushing the limits of market competition.

In this study Gilgit-Baltistan Pakistan is being taken as a destination where tourism is one of the most important pillars to earn foreign exchange and provides employment opportunities and contributes in boosting local economy. The marketing efforts which are fundamental in nature

includes as finding market potential, segmenting the market, develop positioning, measuring and improving image and developing a customer-oriented marketing mix.

Despite having many attractions for International Tourists, Pakistan stands 122 position out of 136 among international destinations (Crotti & Misrahi, 2017). Despite having many attractions for international tourists due to its natural, sports and cultural richness the tourism industry could not grow substantially due to unavailability of proper marketing practices. Due to inadequate marketing practices international tourists are not much aware about the brand attributes of Gilgit-Baltistan which is the main reason behind less international tourist arrivals.

The purpose of this study is to find the Market Potential and Market Segments of International Tourists for Gilgit-Baltistan, Pakistan and answer the research questions; What is the Market Potential, and What market segments that exist for International Tourists of Gilgit-Baltistan Pakistan? The study identifies the Market Potential and suggests Market Segments of International Tourists that exist in Gilgit-Baltistan, so that proper services be design by the Tourism Department of Gilgit-Baltistan, Pakistan in view of the characteristics of identified segments to boost its image and improve international ranking.

2. Literature Review

As defined by the marketing gurus market potential is defined as “All the potential individuals and organizations in a particular market who have some level of interest, income, access and qualification in the product/services (Kotler & Armstrong, 2010). Fazlur-Rehman (2013) conducted a study on tourism and discussed Gilgit-Baltistan’s potential, problems, and development by collecting time series data from 2000 to 2009. Findings of this study shows that local and international events organized as well as law and order situations are closely related to the inflow of international tourists. Baimai and Daniel (2009) found the tourism demand for developing markets using the secondary source of data and developed a useful framework for demand measurement of tourism. Alavi and Yasin (2000) studied natural competitiveness of Iran in tourism industry and found that this industry still not reached its total potential of tourists.

In their book Principles of Marketing Kotler & Armstrong (2010) defined Market Segmentation as “To divide a potential market into different chunks of potential buyers having different needs, wants, behavior, and characteristics and who might require different marketing mix to fulfill the same need. Bose (2012) suggested that it is useful for organizations to divide a whole market into clusters and offer different marketing mix for each cluster. Dolnicar (2004) identified different bases of market segmentation and found different ways of forming market segments. Bieger and Laesser (2002) found market segments in Switzerland using cluster analysis and found four clusters (segments) and among the four most of the visitors (52%) are family, friends and relatives oriented. In their study Tkaczynski, Rundle-Thiele, and Beaumont (2010) conducted two step cluster analysis and found three segments namely “wealthy travelers”, “young Europeans” and “long-stay travelers”. A study of market segments was done where international tourists were profiled and identified all the segments exist based on benefits sought and assessed the attractiveness of the identified segments, and suggested how Kedah Malaysia should be positioned itself in relation to the target market chosen (Kasim & Dzakiria, 2001).

3. Methodology

This study is quantitative and descriptive in nature. Survey approach is used to collect the data. Two hundred questionnaires were distributed to international tourist arrived in different locations of Gilgit-Baltistan, 143 questionnaires were returned therefore, response rate is 72%. Factor-Cluster analysis is used to extract Market Segments from the tourist’s motivational items. Cross-tab analysis is used to know the characteristic of segments with respect to tourist’s demographics. Through thirty-seven motivational questions international tourist of Gilgit-Baltistan are surveyed. Factor analysis is used to find segments of questions from these motivational questions and

Cluster Analysis is used on the extracted factors to find out the Market Segments of international tourists.

4. Results and Discussion

The findings from the descriptive study shows that most of the respondents were male (61%) while female comprises (39%). Majority of the respondents were able to speak English (26%) that followed by German (13%) and China (13%). Of those surveyed, most visitors had their ages between 41-50 (36%), followed by 31-40 (25%). Respondents were aware about Gilgit-Baltistan primarily from Internet (45%) followed by Friends (39%) and spend 21-30 days (38%), and 11-20 days (30%), while visitors expensed 100001- 200000 (28%) followed by 200001-300000 (27%).

Visitors were from 28 countries where majority of the tourists were from China (16%) followed by Spain (12%), USA and Germany (11%).

Respondents were asked to tell what they most liked during their visit in Gilgit-Baltistan. Majority of respondents liked "Nature/Sceneries" (31%) followed by "People" (30%) and "Mountains" 19%. The least liked were Glaciers (0.5%), Gemstones (0.9%), Lakes and Rivers (1.8%), Culture (2.8%), and Trekking (3.2%).

The research question "What is the Market potential of International Tourists for Gilgit-Baltistan, Pakistan" is answered using the secondary source of data. The statistics shows that In 2017, international tourism revenue amounted to 1.34 trillion U.S. dollars (Statista, 2018). According to United Nations World Tourism Organization there were 1323 million tourist arrivals in 2017 around the world (Organization, 2018) and the number of tourist arrivals is on rise. This amount 1.34 trillion U.S. dollars is the Market Potential for Gilgit-Baltistan, Pakistan.

Nine factors are found after factor analysis on the motivational items. Suitable names are given to the factors according the questions loaded in each factor, namely Relationship Builder, Value seekers, Family travelers, Culture lovers, Relaxer, Rural and Historical places, Adventures, Sceneries, and Weather. Table 1 "Segment mean Scores" show the result of K-means cluster analysis where factors from motivational items and their contribution in each cluster is shown. Nine factors were identified with factor analysis where eight factors are significant ($p \leq 0.05$) to contribute in the process of segmentation while one factor (weather) is insignificant ($p > 0.05$) and was not included for further process.

Table 1: Segment mean Scores

	Cluster						Sig.
	1	2	3	4	5	6	
Relationship Seekers	1.13270	.32569	-.01255	.44301	-.81323	-.52845	.000
Value Seekers	-.26518	-.47322	-1.09453	.67072	.36662	.17340	.000
Family Travelers	-.22575	.23670	-.54641	-.41334	.30619	.21360	.001
Cultural Seekers	-1.16034	.57764	-.16413	.68838	-.88685	.51709	.000
Relax	.26617	.95593	-1.10488	-.52478	.16464	.07627	.000
Rural and Historical	.34607	.28065	-.30715	.22941	-.15889	.35545	.002
Adventure	.09523	.42133	.09194	.14681	.53386	.03685	.015
Sceneries	.00267	.30361	-.12979	.79740	.33856	-1.00390	.000
Weather	.21004	.02073	-.35249	-.18872	.00997	-.29795	.056

It can be seen from Table 1 that the factor "Relationship Seekers" is contributing in segment 1, factors "Value Seekers, Cultural Seekers and Sceneries" in segment 4, factor "Family Traveler" in 3, factor "Relax" in segment 2, factor "Rural and Historical" in segment 6 and factor "Adventure" is contributing in segment 5.

Table 2 shows that six Market Segments are extracted from eight factors. Six segments exist for international tourists in Gilgit-Baltistan, Pakistan. For making it convenient the factors which are contributing in the same segment are renamed. Factor Relationship seekers makes one segment therefore renamed as "Relationship Builder". Factor Relax falls in one cluster therefore renamed as "Relaxers". Factor Family Travelers lies in one segment hence renamed as "Family tourist." Three factors namely Value Seekers, Cultural Seekers and Sceneries combinedly form one Cluster hence renamed this segment as "Nature Lovers." Factor "Adventure" lies only in one cluster and renamed as "Adventurers." last factor Rural and Historical is also lies in one segment and renamed it as "Traditionalists."

Table 2: Final Cluster Solutions

Clusters	Segment's Contribution in %	Factor	Clusters
1	13%	Relationship seekers	Relationship Builder
2	20%	Relax	Relaxers
3	13%	Family travelers	Family Tourist
4	16%	Value seekers Culture seeker Sceneries	Nature lover
5	18%	Adventure	Adventurers
6	20%	Rural & historical	Traditionalists

It can also be seen from Table 2 that majority of respondents falls in the segments of "Relaxers" and "Traditionalists" (20%) hence are the most attractive segments. Second attractive segment is "Adventurers" (18%) followed by "Nature lover" (16%), "Family Tourist" and "Relationship Builder" (13%).

Bieger and Laesser (2002) conducted a study on Market Segmentation and found four international tourist segments in Switzerland. Two clusters are similar with the segments extracted in this study like "Cultural" and "Family Travel".

A cross-tab analysis is made to know the difference between segments with respect to the gender of the respondents. It was found that there were no significant differences exist among the segments ($X^2 = 4.494$, $df=5$, $p>.05$), it means all segments are equally attractive for both male and female.

Table 3: Age and Clusters

Clusters	AGE						Total
	11-20	21-30	31-40	41-50	51-60	60 above	
Relationship Builder		33.3%	22.2%	33.3%	11.1%		100.0%
Relaxers	6.9%	20.7%	24.1%	34.5%	10.3%	3.4%	100.0%
Family Travelers		10.5%	15.8%	36.8%	26.3%	10.5%	100.0%
Nature Lover	4.3%	13.0%	30.4%	30.4%	4.3%	17.4%	100.0%
Adventurers		16.0%	24.0%	32.0%	16.0%	12.0%	100.0%
Traditionalist		14.3%	28.6%	46.4%	7.1%	3.6%	100.0%
	2.1%	17.6%	24.6%	35.9%	12.0%	7.7%	100.0%

Table 3 show the characteristics of segments with respect to their ages. Tourist having ages between 21-30 and 41-50 are more interested in building relationship with the local communities, ages between 41-50 are interested in the segment Relaxers, Traditionalists, Family Travelers, Adventurers, while ages between 31-50 are interested in Nature Lovers.

Table 4: Cluster with Stay Expenses

	Clusters Number of Case	N	Mean Rank
Stay Expenses	Relationship builders	18	51.17
	Relaxers	29	76.14
	Family Tourist	18	75.50
	Nature lover	20	62.45
	Adventurers	25	78.38
	Traditionalists	28	67.66

Table 4 show the stay expenses of visitors in many segments. Tourist visit for adventure are spending more during their visit to Gilgit-Baltistan (Mean Rank 78.38) followed by Relaxers (Mean Rank 76.14), Family tourists (Mean Rank 75.5), Traditionalist (Mean Rank 67.66), Nature Lovers (Mean Rank 62.45), and Relationship builders (Mean Rank 51.17).

5. Recommendations

Findings of this study can be used to strengthen Gilgit-Baltistan as a tourist destination brand. This study suggests six segments for Gilgit-Baltistan such as Adventurers, Nature Lovers, Traditionalist, Family tourists, Relationship seekers and Relaxers.

The concern authorities of Gilgit-Baltistan should focus on providing services close to the characteristics of segments identified. Traditionalists wants to visit rural and historical places and want to increase their knowledge on places, people and other things. Services related to demonstrate rural life and historical place should be designed to attracted tourists toward this segment. Visitors wants to be away from home and job and want to be relaxed, services need to be design for this segment according to their requirements. Visitors want thrill, and exploration by doing outdoor activities, services like hiking, skiing paragliding, racing, sports and tracking can be designing to attract "Adventurers".

Visitors want to enjoy outstanding sceneries, participate in cultural events, experience festival atmosphere and want value for their money by seeking information and with best deals, so services related along these lines can be made to attract the segment Nature Lovers. Visitors visit with their families, want to enjoy sun and warmth and want to visit cultural attractions, so activities for families can be designing to attract Family Tourists. Visitors also looking for unique indigenous people, want to see different ethics and want to experience different life styles. Well-developed tourist facilities should be provided, and travel guiders should be trained for the most preferred segments as per tourist's requirements.

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DO FIRMS' SPECIFIC CHARACTERISTICS AFFECT THEIR FINANCIAL PERFORMANCE? A PANEL DATA ANALYSIS

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Abstract

This study investigates the impact of a few firms' specific characteristics like age, size, and leverage on their financial performance measured by ROE. By employing a stratified random sample of the non-financial Malaysian listed companies, it is revealed that firms' size has a significant positive while leverage has a significant negative association with ROE. However, unexpectedly, the results also showing that firms' age exerts a significant negative effect on ROE. This posed some serious questions over the strategies and approach of already established firms in the market. The study contributes to the scarce literature with incongruent results. Also, the study updates managers, the board of directors and all other stakeholders regarding the importance and role of firms' specific characteristics in relation to their financial performance and profitability.

Keywords: Age, Size, Leverage, Firm Financial Performance, Non-financial Malaysian Listed Companies

1. Introduction

Firms, even within a similar industry, are different much from each other in many regards like firms' operational experience, size and financial risk among others. These firms' specific characteristics or differences could exert an obvious upward or downward impact on firms' performance (Manawaduge 2012; Tariq and Abbas 2013). Accordingly, these are included as control variables in most of the studies using a sample of the firms (Becker 2005). This study focuses on age (in years), total assets (log), and leverage (debt to equity ratio) for measuring firms' operational experience, size and financial risk respectively (Manawaduge 2012). Also, the study investigates the impact of age, size, and leverage of the firms on their financial performance. Because many studies noted the relationship between firms' specific characteristics and their performance but the results for it are mixed. Some noted positive while others found negative or no relationship of the age, size, and leverage of firms with their performance.

It is argued that the increase in firms' age not only reduces their initial efforts in regard to the establishment but also enhance their focus on the business. Also, it reduces costs by gaining economies of large-scale production, acquiring operational efficiencies and reaping the benefits of their research and development and advertising expenditures which improve their financial performance (Ardiana 2014; Demeke 2016). However, on contrary, it is argued that old and already established firms have a low potential for any further growth and ability to sustain market share and product demand through competing for new entrants in the market (Amran 2011; Tariq and Abbas 2013). Also, these firms are reluctant in responding to the changes posed by new regulations, public or environment which affect their financial performance (Amran 2011; Chay, Kim, and Suh 2015; Tariq and Abbas 2013). Likewise, the large size of the firms, by virtue of their resources, is believed an ability to repulse or absorb any abruptly arise risk or sustained losses. Furthermore, large firms are also capable to grab the talent to their top level teams that improve their financial performance (Carter et al. 2010; Lama, Tibbits, and Puttee 2012; Tariq and Abbas 2013). However, many studies documented that it is not the size of firms really associated with their performance (Manawaduge 2012; Sajjad and Rashid 2015; Zakaria, Purhanudin, and Palanimally 2014).

Regarding leverage, it is argued that access to loans whenever required and its effective use facilitate firms in attaining economies of large-scale, exploring new markets and promoting their products, among others. In addition, debt increases interest expense that improves firms' performance by decreasing tax payment (Ararat, Aksa, and Cetin 2010; Jensen and Meckling 1976; Manawaduge 2012; Mule and Mukras 2015). However, the opponents argue that firms' leverage not only increases interest expense but also the micromanagement of creditors which affect firm performance (Duppatti, Sune, and Samanta 2017; Zakaria et al. 2014). Based on these mixed findings and arguments, there is a need for further investigation. Accordingly, this study investigates the impact of age, size and leverage on the financial performance of 320 non-financial Malaysian listed companies for 5 years from 2010 to 2014. The study not only contributes to the scarce literature with mixed results but also update the key stakeholders like listed companies and their management about the importance of the firms' specific characteristics.

2. Literature Review and Hypotheses Development

2.1. Firms' Age and Performance

Age of the firm generally represents its efficiency and operational experience in the business and market (Demeke 2016). However, its relation to firms' financial performance is unclear due to contrasting arguments and findings (Ardiana 2014; Chay et al. 2015). For instance, the proponents of firms' age argue that firms overcome many of their initial barriers and hurdles with the passage of time. Also, they are of the view that old firms reduce costs particularly after gaining economies of scale and acquiring operational efficiencies which improve their financial performance (Ardiana 2014; Demeke 2016). Besides increasing research and development budget, these firms also improve their technologies and strategies in respect of business, market, environment, and economy of the country by virtue of their age (Ardiana 2014; Demeke 2016; Manne 1965; Sulong and Nor 2010). Overall, age improves firms' strategies which grant them an edge over their competitors that enhances the confidence of shareholders (Ardiana 2014; Manawaduge 2012; Manne 1965). Empirically, a significant positive association between firms' age and financial performance (ROA and ROE) (Manawaduge, 2012) in Ethiopia (Demeke 2016) and Malaysia (Sulong and Nor 2010).

However, in contrast, it is argued that shareholders have no or low confidence in the old firms. They express trust in the new firms due to their high potential for growth and profitability. Also, they think that old firms may face problems such as the declining stage of their products, the

introduction of close substitutes from their competitors, and the threat of new entrants in the market among others (Amran 2011; Tariq and Abbas 2013). Moreover, they believe that the old firms show less flexibility to any positive change posed by the market or environment. In addition, an increase in age of the firm not only complicates organizational intricacies but also decreases their capital expenditure which affects its profitability (Amran 2011; Chay et al. 2015; Tariq and Abbas 2013).

Empirically, it is found that firms' age has a significant negative association with financial performance (ROA and ROE) in Pakistan Tariq and Abbas (2013) and Malaysia Ibrahim and Samad (2011). Summing up, in view of the mixed findings and a random sample, this study investigates the relationship by assuming that firms' age will exert a significant positive impact on firms' financial performance.

H1: Firms' age has a significant positive impact on their financial performance.

2.2. Firms' Size and Performance

The value of total assets owned by a firm is considered its size; a large firm has a lot whereas a small firm has a few assets (Demeke 2016; Duppati et al. 2017; Manawaduge 2012; Tariq and Abbas 2013). The arguments and findings regarding the relation of firms' size with their financial performance are mixed and incongruent (Demeke 2016; Duppati et al. 2017; Lama 2013; Sajjad and Rashid 2015). For instance, some empirical studies found that a substantial amount of assets and their efficient utilization increases firms' ability in maximizing profitability and shareholders' wealth. Also, large firms get comparatively easy and cheaper funds in the market. These, in turn, facilitate large firms in economies of scale and decreasing per unit cost (Demeke 2016; Duppati et al. 2017; Durnev and Kim 2005; Lama 2013; Lama et al. 2012). Moreover, due to a high focus of the public and regulatory authorities, large firms hire efficient and competent managers who improve their financial performance by increasing compliance with good CG practices and other regulations (Carter et al. 2010; Lama et al. 2012; Tariq and Abbas 2013). In addition, large firms also have great potential or resilience, particularly to a financial crunch or economic downturn (Lama et al. 2012). Empirically, it is found that firms' size has a significant positive association with financial performance as measured by ROA (Manawaduge 2012) and ROE (Tariq and Abbas 2013). Hahn and Lasfer (2015) endorsed this finding by documenting that large firms are in a better position to maximize shareholder returns. In contrast, Ibrahim and Samad, (2011) and Zakaria et al., (2014) found that firms' size has a significant negative impact on financial performance.

To sum up, the previous studies found mixed results for the relation of firms' size with their financial performance. However, by following the logic and some empirical evidence, this study investigates the relationship by assuming a significant positive impact of the firms' size on financial performance (Ibrahim and Samad 2011; Lama et al. 2012; Manawaduge 2012; Owusu 2012; Tariq and Abbas 2013).

H2: Firms' size has a significant positive impact on their financial performance.

2.3. Firms' Leverage and Performance

Firms' leverage represents the ratio of their total debt to total equity. This ratio explains how firms finance their assets from the choice between equity and debt (Wahab, How, and Verhoeven 2007). The prime objective of every firm is to maximize shareholders' wealth. Accordingly, firms take financial decisions in a manner which could reduce their costs and maximize shareholder returns. Among others, leverage is one of the important financial decisions that affect the financial performance of the firms and confidence of the shareholders (Jensen and Meckling 1976; Mule and Mukras 2015).

The proponents of leverage or debt argue that it is a quick and easy source of firms' financing whenever required. Also, they argue that financial leverage or debt increases interest expense of the firm which decreases tax payment by deducting from net income. Therefore, leverage improves firms' profitability (Ararat et al. 2010; Jensen and Meckling 1976; Manawaduge 2012; Mule and Mukras 2015). Many empirical studies endorse these postulations by documenting that firms' leverage improves its financial performance (Ararat et al. 2010; Ibrahim and Samad 2011; Manawaduge 2012; Sulong and Nor 2010).

However, the opponents of firms' leverage argue that it increases debt and thus the interest expense of the firms which enhances the risk of their default (Duppatti et al. 2017; Zakaria et al. 2014). Also, they argue that it disturbs the cash flow of the firms due to the repayment of capital at a fixed time or specified dates which affect firms' profitability (Francis, Hasan, and Wu 2012; Lama et al. 2012). Empirically, many studies found a significant negative association between leverage and firms' financial performance (Duppatti et al. 2017; Ness, Miesing, and Kang 2010; Zakaria et al. 2014). To sum up, the previous studies found mixed results for the relation of firms' leverage with their financial performance. Therefore, this study further investigates the relationship by assuming a significant negative impact of firms' leverage on their financial performance.

H3: Firms' leverage has a significant negative impact on their financial performance.

3. Research Design

Following previous literature and an obvious effect, this study included the effects of time for 5 years from 2010 to 2014 and industry (9 sectors) as control variables. Out of 960 companies registered on Bursa Malaysia at the end of 2009, the study selected a random sample of 320 non-financial Malaysian companies (Economic Planning Unit, 2011). Data for all variables of the study extracted from Thomson Reuters DataStream.

Following are the two econometric models of the study.

$$ROE_{it} = \beta_0 + \beta_1 FAGE_{it} + \beta_2 FSIZE_{it} + \beta_3 FLEVRG_{it} + \beta_4 ID_{it} + \beta_5 TD_{it} + \varepsilon_{it} \dots \text{Model 1}$$

Where;

ROE_{it} = Return on Assets (ROA) and Earning per Share (EPS) of the i th firm at time t

β = Beta

$FAGE_{it}$ = Age of the i th firm at time t measured by number of the years since listing

$FSIZE_{it}$ = Size of the i th firm at time t measured by total market capitalization

$FLEVRG_{it}$ = Leverage of the i th firm at time t measured by Ratio of total assets to total equity

ID_{it} = Dummy variables for controlling sector-wise effects on i th firm at time t

TD_{it} = Dummy variables for controlling time effects of five years on i th firm at time t

ε_{it} = Error term of the i th firm at time t

3.1. Univariate Analysis

Table 1: Descriptive Statistics

Variables	Minimum	Maximum	Mean	Std. Dev
ROE	-1.85	3.70	0.07	0.22
FAGE	1	42	15.99	7.25
FSIZE	3.73	7.74	5.26	0.72
FLEVRG	-3.77	5.47	0.46	0.69

The statistics in Table 1 show that sample firms having an average age (AGE) of 16 years (15.99) with a minimum age of 1 and a maximum of 42 years. The average SIZE of the sample firms is 5.26 in a range from 3.73 to 7.74. With a minimum of -3.77 and maximum of 5.47, LEVRG has an average of 46% (0.46) which indicates that Malaysian firms rely on debt almost equal to that of equity financing.

Table 2 shows Pearson's correlation statistics for all independent and dependent variables of the study. The statistics evidence that firms' age (FAGE) has a weak significant and negative correlation with their performance (ROE). This is interesting and unexpected which might be due to a decrease in demand and entrance of new competitors in the market. However, as expected, firms' size (FSIZE) shows a significant positive correlation with ROE. This implies that the large size of the firms enables them to maximize returns for shareholders.

Table 2: Pearson's Correlation

Variables	ROE	FAGE	FSIZE	FLEVRG
ROE	1			
FAGE	-0.0004*	1		
FSIZE	0.2906***	0.3092***	1	
FLEVRG	-0.1082***	-0.0521**	0.1111***	1

***, **, *. Correlation is significant at the 0.10, 0.01, 0.05 level (2-tailed) respectively.

The statistics also show that firms' leverage (FLEVRG) has a significant negative correlation with ROE. This is logical as an increase in debt increases firms' interest expenses which decrease shareholders' return. Overall, none of the correlation between two predictors is equal or higher than 0.8 – a threshold for multicollinearity.

3.2. Multivariate Analysis

Table 2 shows no multicollinearity in the data set for the study. The findings for relevant diagnostic test revealed the presence of heteroscedasticity and serial correlation in the data as reported in Table 3. However, the statistics evidence no cross-sectional dependence in the data (Table 3). In view of these, the study employed Pooled Ordinary Least Squares (POLS) with Drisc. Kraay Standard Errors which is robust to heteroscedasticity and serial correlation (Reed and Ye 2011).

4. Findings and Discussion

H1 of the study assumes a significant positive impact of firms' age (FAGE) on their financial performance (ROE). However, the statistics reported in Table 3 show that FAGE exerts a significant negative impact on ROE. The findings which do not support H1 of the study are unexpected and interesting. But still, the findings are in line with many previous studies which found that the declining stage of the products or stiff competition from existing or new competitors may affect the financial performance of old firms. Also, the introduction of close substitutes for the products of these firms may affect their financial performance. Moreover, due to rigidity, these firms may fail to respond CG reforms or challenges posed by the rapidly changing external environment which negatively affects their performance (Amran 2011; Ibrahim and Samad 2011; Tariq and Abbas 2013). The findings endorse Amran, (2011) and Ibrahim and Samad, (2011) who found that age of the Malaysian firms has no significant or positive role in their financial performance. However, the findings are inconsistent with Demeke, (2016), Bathula, (2008) and Manawaduge, (2012) in Ethiopia, New Zealand, and Sri Lanka respectively. The findings are also inconsistent with the studies showing that firms gain experience and access

to a larger pool of competent managers, customers, and funds with time which improves their financial performance (Bathula 2008; Carter, Simkins, and Simpson 2003; Manawaduge 2012). Most probably, the inconsistency in findings may be due to the contextual variances of these studies among others.

Table 3: Pooled OLS with Drisc. Kraay Standard Errors

Variables	ROE
FAGE	-0.0139** (0.0033)
FSIZE	0.5661*** (0.0480)
FLEVRG	-0.0012 (0.003)
Const.	-2.1999** (0.5010)
Industry Dummy	YES
Time Dummy	YES
Observations (320 * 5 years)	1600
R Square	0.1434
F (18, 4)	164.44
Prob > F	0.000
Heteroscedasticity-Chi2(1)	19.33
Prob. > chi2	(0.000)
Auto Correlation F (1, 319)	15.019
Prob. > F	0.000
Pesaran's Cross Section independence	-0.233
Pr.	1.184

Standard errors in parentheses, *** p < 0.01, ** p < 0.05, *p < 0.10

Likewise, H2 of the study assumes that firms' size could positively impact their financial performance. As expected, the statistics reported in Table 3 confirm that FSIZE has a significant positive impact on ROE. The findings which support H2 of the study are consistent with Carter et al., (2010) who found that large size of the firms improves their financial performance by increasing compliance to CG regulations for avoiding a high focus of the public, media, and regulatory authorities. Aligned with many other studies, good compliance to CG improves firms' financial performance through ensuring the efficient utilization of their assets (Carter et al. 2010; Demeke 2016; Duppati et al. 2017; Lama et al. 2012; Tariq and Abbas 2013). Following others, the findings are also logical that bigger firms mostly have good and competent managers who improve their financial performance (Carter et al. 2010; Durnev and Kim 2005; Lama 2013; Lama et al. 2012; Manawaduge 2012; Tariq and Abbas 2013). The findings are consistent with Tariq and Abbas, (2013) and Manawaduge, (2012) in Pakistan and Sri Lanka respectively. However, the findings are inconsistent with Ibrahim and Samad, (2011) in Malaysia. The inconsistency may be due to the difference in sample, timing or statistical techniques of the study. Under H3 this study predicted that firms' leverage (FLEVRG) could exert a significant negative impact on ROE. As assumed, the statistics reported in Table 3 also endorse the assumption by showing a significant negative association between FLEVRG and ROE which accepts H3 of the study. The findings are logical as previous studies found that debt increases interest expenses of

the firms that, in turn, decreases their profitability (Duppatti et al. 2017; Jensen and Meckling 1976; Mule and Mukras 2015). The findings are consistent with Ness et al., (2010) who suggested a decrease in leverage for reducing its adverse effects and improving firms' performance. However, the findings are not consistent with Ibrahim and Samad, (2011) in Malaysia which might be due to sampling or statistical approach. To sum up, the study recommends that Malaysian firms should increase their reliance on equity instead of debt financing for decreasing their costs of capital and improving financial performance.

5. Conclusion and Recommendations

This study investigated the role and impact of firms' specific characteristics like age, size, and leverage on their financial performance measured by ROE. The findings revealed an unexpected and interesting result that firms' age has a significant negative role in regard to their financial performance. Among others, this might be due to changing trends and taste of the customers or entrance of new competitors which affect the products' demand of already established firms in the market. In view of these, this study suggests that firms and particularly old and already established must adapt their approach, plans, and strategies to cope with the changing environment. Also, these firms should increase the budget for research and development and establish risk management committees for a better handling of emerging trends and competition in the external environment and market. The findings also revealed that the large size of the firms is a key predictor of their financial performance which possibly hints the efficient utilization of assets. In view of this, management of the small firms and regulators must ensure a productive or synergetic use of all their resources. The findings also explain that an increase in leverage harms the interests of shareholders by increasing interest expense and micromanagement from creditors and investors. Accordingly, firms should increase their reliance on equity instead of debt financing. Overall, the study contributes the incongruent and scarce literature. Also, the study updates the practice and policy by providing empirical evidence regarding the role and importance of firms' specific characteristics in improving financial performance. Studies in the future might also consider some other characteristics like research and development expenditure, revenue from sales and risk. These studies may also employ some other outcome variables.

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TRANSFORMATION OF 3DS JOBS USING BUILDING INFORMATION MODELING (BIM) – A PROSPECTIVE OF MALAYSIAN CONSTRUCTION INDUSTRY

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Abstract

The construction industry of Malaysia is very dynamic in nature with significant contributions in the economy of this fast growing economic power. However, it is not performing to its full potential. The 3Ds jobs has resulted poor image in the eyes of local potential workforce. The inability to attract and develop the local workforce is one of the challenging tasks for the Malaysian construction industry. Therefore, the transforming the image of this pillar of Malaysian economy is the need of hour. The study aims to propose a development model which is deemed to transform and counter the perception of construction as a “Dirty, Difficult and Dangerous” image of industry. Building Information Modeling (BIM) has been adopted in such development. The implementation of proposed model is expected offset the 3D image, restore the trust and attract the local workforce in the industry ultimately resulting in the prosperity of industry and economy of the country.

Keywords: Malaysian construction industry, 3Ds, workforce, Building information modeling

Introduction

Construction is an integral part of every country's economy and accounts for a large portion of the economic activity. However, the efficiency of construction is one of the major factors that determines the competitiveness of a country's industrial power and the standard for quality of life of its people (Schella). The Malaysian economy is one of the fast growing in the South-East Asia (Sambasivan & Soon, 2007) and its construction industry presents a reasonable portion of the rapid growing economic power. In addition, it shared a large no. of employment opportunities for the skilled, semi-skilled and unskilled labour force (Gardezi, Shafiq, & Khamidi, 2013). However, the construction industry of Malaysia is not performing to its fullest potential due to certain limitations caused by its working environment and nature of work. The shortage of local labor and skill is one of the major challenges faced by the industry. This situation is predicted to become more serious in future as young people are not attracted to construction (Francis & Prosser, 2012). It is considered one of the most dangerous industries with regards to health and safety issues and hardworking environments (Meliá, Mearns, Silva, &

Lima, 2008). That's why the Malaysian people are reluctant to adopt the construction as their preferred carrier. The type of environment and culture is required to be reshaped into as a safe and healthy place to work in. Novel methods for improving its image have to be developed ensuring a safe and clean work environment along with adoption of latest technological advancement to perform different tasks(Kadir, Lee, Jaafar, Sapuan, & Ali, 2005). Building Information Modeling (BIM) is one of the choices in this regard. With the latest innovations in BIM, the reshaping the image into safe, quiet and healthy workplace is quite possible. A transformation model has been proposed to facilitate the reshaping of culture and environment. The implementation of prosed model shall help to change its image and attract the local labor force, ultimately resulting in the prosperity of local labor force as well as the country's economy.

Literature Review

Construction is an essential, vibrant and integral part of growing Malaysian economy. It plays a vital role in the development process, the economic growth, social prosperity and infrastructure necessary for a nation for wealth and shelter requirements. During the last decade, it has consistently contributed between 3% - 4% of the national GDP and 8.2 % to 9.5 % in employment generation (Statistics). The potential of dynamic construction industry has much more to offer but, unfortunately, it often has a limited and negative public image. Different researchers have highlighted the image of construction industry in the past, table.1:

Table. 1: Findings of previous works regarding 3D image of construction industry

Researcher	Findings
Barthorpe, Duncan, and Miller (2000)	Construction has a limited and negative public image of being dirty, dangerous and difficult.
Huang and Hinze (2006).	Despite the construction industry has been equipped with latest technologies and improved to a great extent but the safety records are not encouraging.
da Costa and Vieira (2010)	The works have to be performed in extreme climates, weather, heights, depths and congested work places. Accidents, injuries, disabilities and adverse health effects are the possible risks involved in such demanding occupations
Bieleman et al. (2010)	The workers may be subjected to musculoskeletal complaints
Abdullah and Wern (2011)	Workers are usually exposed to various risks of physical injury hazard due to usage of equipments.
Chun, Li, and Skitmore (2012)	Human errors and organizational issues are the main cause of accidents e.g. inappropriate work planning, insufficient communication whereas the organizational issues may include lack of safety training
Azhar and Behringer	Lack of adequate construction safety knowledge of the designers results in many safety hazards. Construction activities are labour-intensive, dangerous and polluting
Francis and Prosser (2012)	The construction works are, physically and mentally very demanding.
Danso (2012).	The physical conditions of the construction expose a variety of health hazards including, but not limited to, noise, contaminated soil and ground water, dust, fumes or gases etc. with a constant fear resulting in some permanent disability.
Sulankivi et al. (2013).	Safety planning is being carried out as a separate process from the construction planning whereas it should be a part of construction planning process.

Inability to attract and develop local workforce for the industry mainly due to the "dirty, dangerous, difficult" image of the industry (Malaysia, 2007). Due to this reason, the industry has

to rely heavily on foreign labour. The available government statistics show that the percentage of foreign workers in the construction sector increased from 7.5 % to almost 15% during 2001 to 2008 (Statistics). In order to offset the flow of foreign construction labour, unfortunately the involvement of local labour is not encouraging. Table.2 provides a comparative analysis of no. of vacancies and respective placement during the years 2009 to 2013

Table. 2: Vacancies and Placement Statics for Local force in Construction

Year	Vacancies	Placements
2009	111622	1363
2010	250820	782
2011	388241	480
2012	310954	587
2013*	191923	841

Source: Time Series Data -2013, Department of Statistics, Malaysia

The construction industry needs to develop a new working environment and culture (Abdullah & Wern, 2011). Currently, there is an urgent requirement of innovative measures not only to manage the psychological barrier but also enhance the image of Malaysian construction industry in the minds of its local workforce.

Research Methodology

Comprehensive literature review technique (CLRT) helped to highlight the issues regarding the image of construction industry. Significant factors contributing to the 3Ds image of Malaysian construction industry have been identified. Building information Modeling (BIM) was adopted for a selected building case study. Different concepts of BIM technology were exercised in a virtual environment to come up with a model for the transformation of 3Ds image to 3Ss image of the Malaysian construction industry. The application of proposed model, Fig 1, is expected to help in transforming the image of construction industry and manage the psychological barrier of local labor force to join the construction sector.

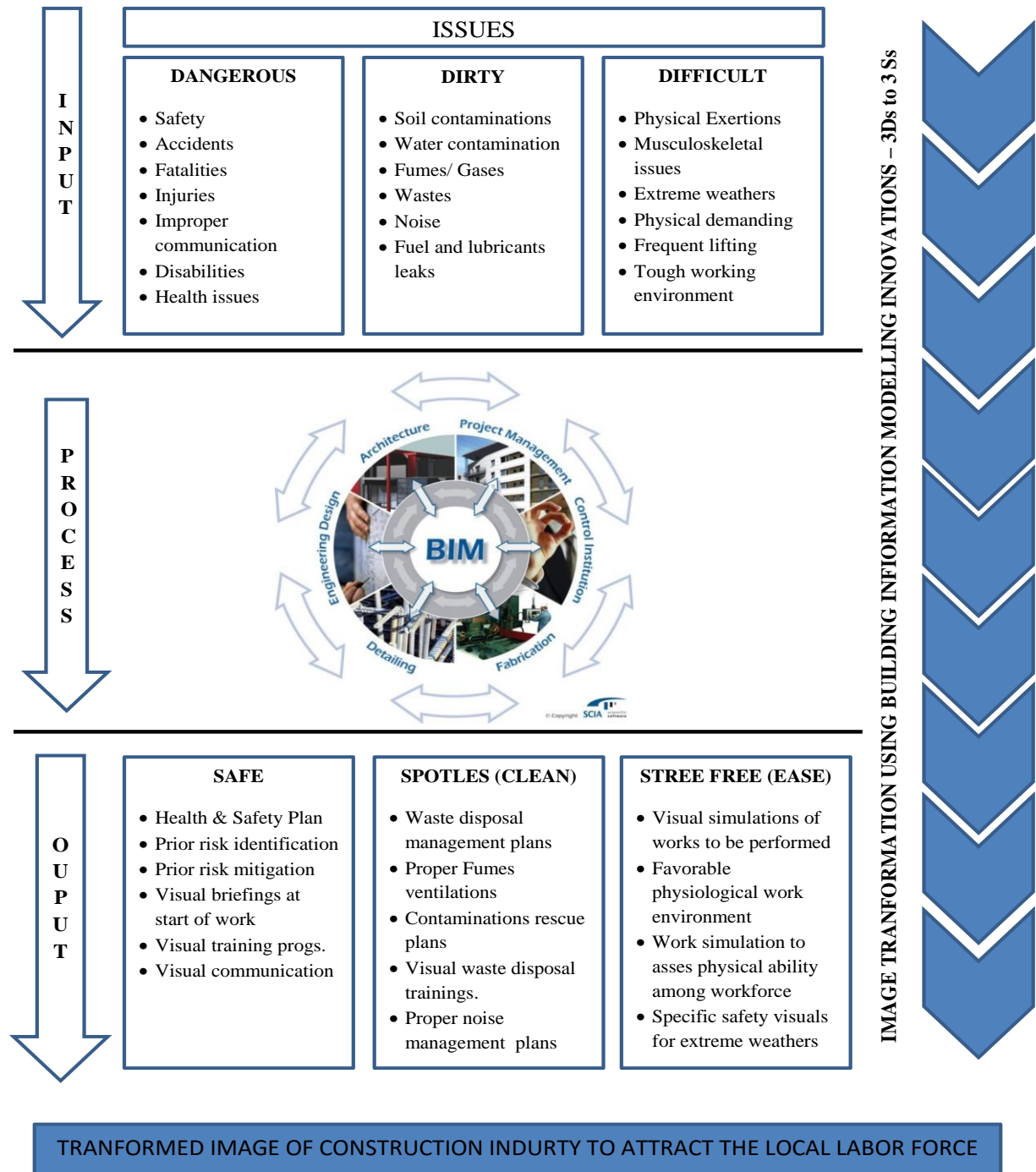


Fig. 1 : Proposed BIM based model for transformation of 3D jobs in Malaysian construction

Results and Discussions

The implementation of BIM allowed analyzing space and understanding the complexity of the project in AEC industry, thus creating new opportunities of value-added activities. Some of the outcomes achieved from the implementation of the proposed BIM model are given in subsections:

Solutions for Image Transformation - Dangerous to safe

The ability of BIM enabled to work in a mutual virtual environment and generate the safety plans during the design and planning phase of construction projects. The virtual environment helped to improve occupational safety by enabling the safety issues to be connected with the design, construction planning to generate alternate safety plans by adopting different scenarios, Fig. 2. The visualization attribute of BIM offered a totally new aspect for risk assessment, planning and safety management to the designers and safety engineers. The visual communication of different risk hazards and the mitigation plans has enabled the workers to perform their work in a safe manner and also help to repair the concept of an unsafe place to work within. However, the frequency of visual communication is important for continuous reviews of working conditions and potential hazards.

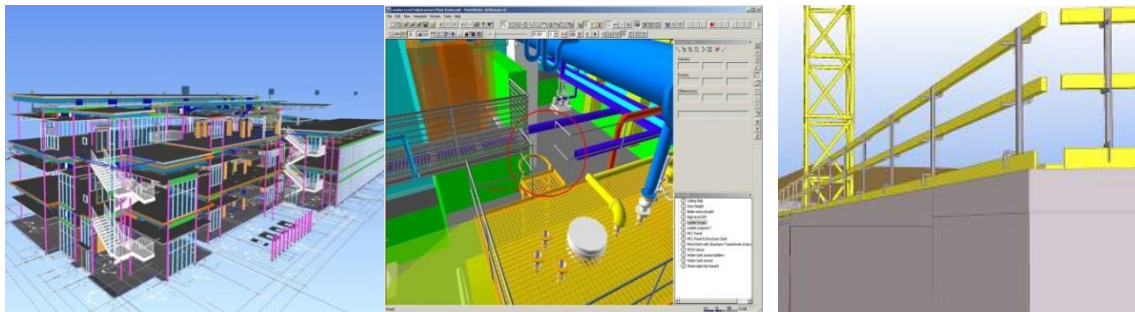


Fig. 2. BIM role aimed for construction site to a safe place.

Dirty to Clean

A proper site layout planning is the key to manage and avoid any contaminations. Different alternatives were generated visually according to the site conditions like access to the site, working space, temporary roads etc. Virtual environment helped to establish proper storage bins and yards for different materials, equipments maintenance, site offices, temporary roads, proper routes for temporary facilities, temporary labour camps equipments operation for different construction activities. The involvement of numerous stakeholders in such early stage of site planning not only helped to achieve an efficient and well managed construction plan but also help ordinary people to understand how things would be put together. This was one of the most valuable benefits of BIM for non-professionals. The virtual model, Fig. 3, ensured a constant intermingling of information throughout the various project phases to transform a better managed and neat place to work within.



Fig. 3. BIM role aimed for construction site to a properly managed and neat place.

Difficult to Easy

The attributes of the heights, congested spaces, and extreme weather conditions and above or below the ground make the image of construction industry as difficult place to work. However, if somehow, the work was planned and sequenced in such a way that it easy to perform, the output of manpower could be enhanced. However, the real power lied when visualization was connected to the construction program. In order to produce optimum ease in the working environment, the identification of nature of work and generation of different working environments in a virtual world helped to ease the working condition of a construction project. The ability of BIM, Fig. 4, to connect the geometry model with the construction program and scheduling can help the workers to track their own progress, manage their works effectively and manage their work environment safety. The visual communications before start of any activity can give workers a very good exposure to the nature of works, how to perform the works and also offset their psychological state of their mind.

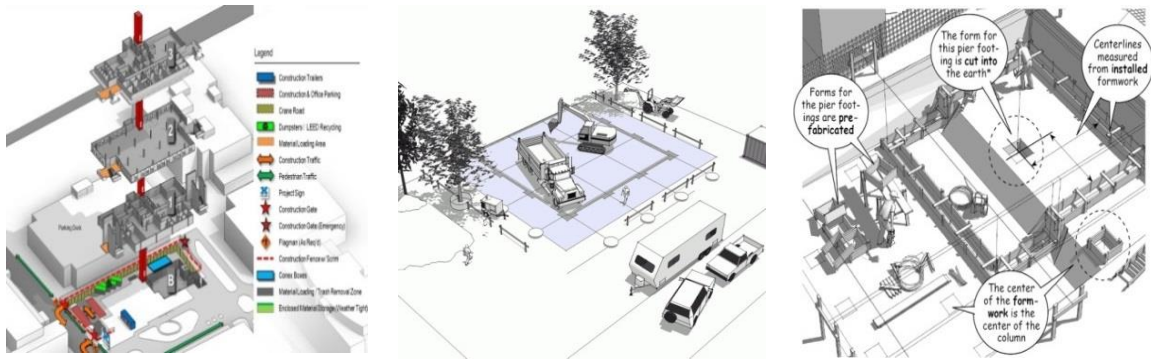


Fig. 4. BIM role aimed to facilitate an ease of working environment.

Financial Benefits

Apart from aiming the transformation of construction industry, the study has achieved certain monetary benefits by the adoption of proposed BIM model, table 3.

Table 3: Estimated Savings for Local workers by reduction in Foreign Employment

Year	Wages paid to Foreigners (000)	Saving @ 1 %	Saving @ 3 %	Saving @ 5 %
1999	-	-	-	-
2000	737034.18	7370.342	22111.03	36851.71
2001	-	-	-	-
2002	1286984	12869.84	38609.52	64349.2
2003	-	-	-	-
2004	1460496.38	14604.96	43814.89	73024.82
2005	1686661.61	16866.62	50599.85	84333.08
2006	-	-	-	-
2007	1859320.17	18593.2	55779.61	92966.01
2008	2078288.41	20782.88	62348.65	103914.4

From the above, it is clear that implementation of proposed model will not only result in the transformation of image but also result in a handsome amount of savings for construction industry image.

Conclusions and Recommendations

The Malaysian construction industry has a great potential to accommodate its own local labour workforce. Unfortunately, the psychological barriers of 3D image (dirty, dangerous and difficult) needs to be managed. The main conclusions drawn from this study are given as under:

- Some of the key factors which contributed to current image are inadequate knowledge of the safety issues at the design stage, improper work planning, insufficient and non-standard communication methods, lack of safety training programs and practices, non-availability of waste disposal management plans and practices, inadequate knowledge of the safety issues.
- Most of the issues could be resolved at an earlier stage before the actual physical construction by implementation of Building Information Modeling (BIM).
- The unified platform of BIM could ensure the image transformation from 3Ds to 3Ss by acting health surveillance instrument, evaluating occupational tasks by physical performance test, generating work simulations, training the employees on safety and ergonomics to identify contribution to risks, generate proper waste management and site safety plans etc.

The transformation of 3Ds image of the Malaysia construction industry is an uphill task. A close coordination among the industry stakeholders with a specific vision and environment needs to be developed. The transformation would require proper education and training, strict monitoring of conditions, effective communication and integration, health, safety and site planning functions along with standard procedures for different analysis

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MEDIATING ROLE OF ECONOMIC BENEFITS IN THE RELATIONSHIP BETWEEN DISTRIBUTIVE JUSTICE AND EMPLOYEE PERFORMANCE: A CASE STUDY OF CALL CENTER INDUSTRY OF PAKISTAN

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Abstract

This paper is unique for being among the few research studies that examined the influence of distributive justice on employee's performance with the mediating role of career incentives or economic benefits. A total of 120 call center employees participated in this study, but only 112 responses were considered good and reliable enough for further analysis. The participants were selected on a random basis from 10 call centers operating in the twin – cities (RWP-ISB) of Pakistan. Hierarchical regression analysis, descriptive analysis, and correlation analysis were used for analysis of data and testing of hypotheses. The overall findings of the study evaluated that there was a strong positive correlation between the distributive justice and employee's performance. It was also evaluated that the career incentives or economic benefits partially mediated the relationship between distributive justice and employee's performance. It was recommended that future researches should examine both the individualistic and organizational characteristics to understand the impact of career incentives over the performance of employees of an organization. Hence, an organization would need to implement a highly competitive compensation plan and remuneration package and other employee's benefit plans near the best practices of distributive justice to achieve consistent and long-term sustainability in its performance.

Keywords: Career Incentives, Economic Benefits, Distributive Justice, Employees Performance, Cellular Industry employees.

1. Introduction

Employee's performance is highly crucial for the long-term sustainability and growth of both the small and large-sized organizations, especially in the servicing sector across the globe. The success of an organization in the servicing industry is solely based upon the overall attitude and commitments of employees towards their respective organizations. There are a number of factors that directly and indirectly affect the performance of employees in a servicing industry that includes both the intrinsic and extrinsic factors, i.e., monetary benefits associated with one's job, recognition and promotions, etc.... However, the economic benefits or compensation offers to the employees has a considerable level of impact over their performance level because in private sector organizations employees are more sensitive towards their pay packages as compared to any other intrinsic motivational factor.

Just like the other developing countries of the world, most of the developed countries started outsourcing their production and servicing concerns to Pakistan, especially in the call center

sector. According to the report of PSEB, the call center sector of the country showed a remarkable growth in 2005, i.e. 110 call centers were established, which were employing more than 2500 agents and generated \$50 million, which is now reached to \$3 billion and employing more than 30,000 people (Baloch, 2018). Pakistan has been facing high inflation rate and lower purchasing power of its residents and especially that of the job holder segment of the population. It is also observed that the servicing industry of the country and especially the private firms are facing an issue of lower performance of employees, which is attributed to the lower monetary incentives that this sector is offering to its employees. The industry is expected to further grow with a rapid pace because of the recent reforms of the government regarding the IT sector and establishment of the IT industry in the country, which mean that there would be higher competition and opportunities for employment in this sector.

1.1. Problem Statement

Among the various servicing industries of the country, the rapidly declining performance of employees in the Call Center Industry of Pakistan has caused a set back into this sector, especially regarding compromise over the quality of work and organizational performance both regarding its operations and profitability. A number of past studies have provided that the challenges concerning performances of organizations are mostly associated with poor compensation and application of the outdated employees retention and recruitment strategies, lack of employee's participation in the decision-making process, failure of organizations to create and implement rational decisions and poor working environment (Khan & Du, 2014, p. 209). It is also possible that organizational success can be attained with the help of effective coordination between the systems and individuals responsible for running these systems and therefore, they need to possess the required knowledge and skills to execute planning and strategy in an organization. Recent studies and evaluations of the psychologists have noted that majority of the youngsters working in the call center industry are highly vulnerable to burn-out-stress syndrome (BOSS), symptoms of which include sleeplessness, problems with the digestive system and constant exhaustion, which in turns affects the quality and cost of the service. The attitude and frustration level of employees differ from region to region because one of the exclusive characteristics of call center is that they observe the holidays schedule of their clients instead of the holidays of their own country, which in turns negatively affects the motivation level of their employees towards the organization (M. Imran Malik, 2011, p.34).

1.2. Purpose of The Study

The primary purpose of this study is to evaluate the impact of distributive justice over the performance of employees in the call center industry of Pakistan, while keeping in view the mediating role of the economic benefits offered to such employees. The study is aimed to understand the overall organizational structure and performance matrices of the call center industry of Pakistan. It is also aimed to build an understanding of the various economic benefits that are offered to the employees of the call center industry and how these benefits impact the role of distributive justice in building employees performance.

1.3. Research Question

Based on the purpose of the study and the underlying problem statement, this study is conducted to provide answers to the following two questions:

- Whether economic benefits offered to the employees have an impact in shaping the relationship between distributive justice and employee's performance?
- Is there a relationship between the distributive justice and performance of employees in the call center industry of Pakistan?

This study will play an important role in unrevealing secrets behind the enhancement of

employee's performance and contributes to the present body of knowledge on distributive justice and its impact on employee's performance.

2. Literature Review

2.1 The role of Distributive Justice in Improved Employee Performance

According to Greenberg, (1990) distributive justice is a type of organizational justice that refers to the equal distribution and allocation of resources in an organization (p. 421). Whereas Janssen (2004) defined distributive justice as the perception of employees of an organization regarding the extent of the investments made in a particular period and the associated benefits/compensation to it (p.861). Distributive justice is not limited to the distribution of money/payments only rather it has a broader sense that includes various organizational outcomes such as work programs, promotions, compensation and benefits, punishments, and performance evaluation.

Distributive justice has a positive relationship with employee performance because it stems from equity theory. As indicated by equity theorists, people analyze a ratio of their perceived contributions to results derived from a correlation with that of a referent other. If the proportions are equivalent, the individual perceives fairness in distributive justice. On the other hand, if the proportions are unequal, the individual will perceive inequity in distributive justice (Abu Elanain, 2010, p.16).

According to the study of the Johnson, R., Selenta, C., & Lord, R. (2006), the employee gets direct impact from the condition of equity in an organization; therefore, according to equity theory, employees can adjust the quality and quantity of their work according to the condition of justice in their respective organizations (p.192). McDowall, A., & Fletcher, C. (2004) further argued that when employee found that an organization is not practicing the justice in its procedures and day to day business operations, they are less likely to pay attention to their work, performance, and to things that could balance everything instead they focus on their interests on the expanse of organization (p. 19). On the other hand, when an organization has fair organizational justice, where it treats all of its employees fairly, the employees are more likely to give importance to the interests of the organization over their personal interests. Olkkonen, M., & Lipponen, J. (2006) found that employee contribute high in the success of their organization when they feel that the organization has fair organizational justice (p.208).

Abu Elanain, (2010); Folger, (1987); and Johnson, Selenta& Lord, (2006) also found that distributive justice leads to improved employee performance and organizational effectiveness (p. 17); (p.147) and (p. 198), respectively.

2.2 The Impact of Economic Benefits on Employee Performance

Economic benefits in an organization referred to the economic value that employees receive in recognition of their exceptional performance or good conduct other than their basic salary or wages. Economic benefits are actually an investment in human capital that helps in improving the overall performance of employees and organization (López-Bazo& Moreno, 2008, p. 1301). Economic benefits in the form of rewards and compensation are motivational factors for employees in an organization (A, 2016, p. 31). According to Gubler, Pierce & Nickerson, (2013) rewards can be classified into two types: intrinsic rewards and extrinsic rewards. Intrinsic rewards are basically non-monetary rewards that are related to the job itself such as high satisfaction and appraisal from others upon completing a task or achieving something (p. 14472). Whereas extrinsic rewards are external to the job and are offered by an organization such as salary, medical allowance, insurance, job security, promotion and fringe benefits, etc. Rewards like a good salary, bonus, promotions, and recognition are the mediating factors between organizational justice and employee performance (Cameron & Pierce, 1994, p.363).

Cameron & Pierce, (1994) and A,(2016) have found in their studies that for getting higher employee performance, employees need to be motivated enough, and economic benefits offered by organizations are the best motivational tools that motivate employees to perform at their best regardless of working conditions (p. 361) and (p. 33), respectively.

2.3 The Relationship between Economic Benefits and Distributive Justice

A strong relationship between organizational reward policies and distributive justice has been found because the fairness of economic benefit policies is dependent on the fairness of distributive justice. Perception regarding the unequal distributions of rewards among employees by comparison with others results in tension among employees for which they become demotivated to perform at their full potential (Al-Zu'bi, 2010, p. 13). According to the study of Renn, R., Steinbauer, R., & Fenner, G. (2014) the unfair distribution of reward benefits results in lower organizational commitment, low self-esteem, poor performance, and high turnover intentions (p. 352). Job satisfaction and employee performance have a positive correlation, while job satisfaction is identified as a multifaceted component of employee's feeling, as it is comprised of both intrinsic and extrinsic components of a job (Misener et al., 1996, p.90).

The positive relationship between job satisfaction and distributive justice has also shown a positive relationship with high employee's performance. Employees that are highly satisfied are more likely to participate in the decision-making process of organization as well as are contributing efficiently in the work processes to help the organization in accomplishing its goals (Olkkonen&Lipponen, 2006, p.213).

2.4. Theoretical Framework

Based upon the above discussion the researcher has developed the following research framework:

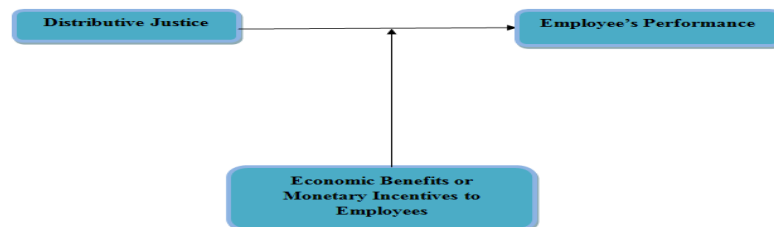


Figure – 1: Research Framework

Based upon the research framework the following hypotheses are developed for this study:

H1: Distributive justice is positively related to employee's performance.

H2: The relationship between distributive justice and employee's performance is mediated by the economic benefits or monetary incentives offered to employees.

The given hypotheses are developed with an intention to evaluate the possible relationships between the independent variable of the study that is distributive justice over the dependent variable that is employee's performance and how the monetary incentives mediates this relationship. It also explains that how employees in the private sector firms perceive distributive justice and whether it has any impact over the employee's performance matrices or not.

3. Methodology

The researcher has adopted a quantitative method with cross-sectional survey design for the execution of this study. The research design of this study enabled the researcher in collecting and

analyzing the data to identify the impacts of distributive justice over the performances of employees with the mediation of the monetary incentives/economic benefits. The researcher used close-ended questionnaires for measuring and obtaining the responses from the participants regarding the key variables of the study, i.e., distributive justice, employee's performance and monetary incentives/economic benefits offered to the employees.

Table – 1: Distribution of Variables

Variables	No of Items	Scales	References
Distributive Justice	Four	Likert Scale 1-5	(Hsu, Jiang, Klein & Tang, 2003)
Employees Performance	Five	Likert Scale 1-5	(Reisel, Probst, Chia, Maloles&König, 2010)
Monetary Incentives/Economic Benefits	Seven	Likert Scale 1-5	(Reisel, Probst, Chia, Maloles&König, 2010)

The questionnaire consists of 20 questions, where four questions belonged to the demographic section; four were asked for distributive justice; five for employee's performance and seven for monetary incentives/economic benefits offered to employees. The replies from the respondents were measured on a five-point Likert scale, where 1= strongly agree, and 5 = strongly disagree.

3.1. Population and Sample Size

The researcher has selected ten call centers from the twin – cities (RWP-ISB) of Pakistan, where all the employees of these call centers were taken as the population of this study, hence the total population was about 370. Out of this population, a sample of 120 employees was drawn, where 12 employees were selected from each call center on a random basis so that each employee in the population will enjoy an equal chance of selection into the given sample size. A set of 120 questionnaires was distributed among the selected samples, but only 115 replies were received out of which only 112 responses were considered good and reliable enough for carrying out further analysis. The reliability of the questionnaire was evaluated with the help of Alpha Coefficient or Cronbach's Alpha, which indicated the internal consistency of the questionnaire, the results of such test are given as under:

Table – 2: Reliability Statistics

Measure	No. of Items	Cronbach's Alpha
Distributive Justice	4	0.882
Employee Performance	5	0.759
Monetary Incentives/Economic Benefits	7	0.800

Factor analysis was conducted on this study to evaluate the extent of the relationship between the three variables on the given questionnaires and found that the results are appropriate, i.e., the

KMO value of 0.741 and $p=.000$, indicating significant Bartlett's Test of Sphericity as provided in the given table:

Table – 3: Factor Analysis

KMO (Kaiser – Meyer – Olkin Measure of Sampling Adequacy)		0.741
Bartlett's Test of Sphericity	Approx. Chi-Square	194.986
	DF	09
	Sig.	0.000

4. Analysis

The analysis of the collected responses from the participants would help the researcher in determining the relationship between distributive justice and the performance of employees with the mediating role of monetary incentives or economic benefits offered to the employees.

4.1. Analysis of the Demographic data

The researcher found that the response rate from senior staff members having ages of above 40 year was about 26.7%, while the respondents below 30 were 73.3%. It is because of the fact that the majorities of the call center jobs are very tough and have some hectic routine and only youngsters can cope with such a working environment. About 65% of the respondents were female, and 35% were male because the majority of the call centers prefer to hire female staff members because they are found as more persuading or having comparatively higher customer representation skills. With respect to the education level, the majority of the respondents were high school graduates or university graduates, i.e., 35% and 45%, respectively, while the rest of 20% were having a lower qualification. With respect to occupation, the majority of the employees were from tactical level of the organization, i.e., 98%.

4.2. Descriptive analysis of the variables

The following table exhibits the descriptive analysis of all the three variables:

Table – 4: Descriptive statistics of variables

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness
DJ	112	2	5	3.487	0.986	-0.203
EB	112	1	5	3.791	0.627	-0.762
EP	112	2.14	5	4.621	0.577	-1.000

Note: DJ = Distributive Justice, EB = Economic Benefits offered to employees and EP = Employees performance

The given tables showed that means of the variables are ranging from 3.487 to 4.621, which shows that the values of all the variables are ranging from moderately high to the highest one. It also shows that the distributive justice has the lowest mean value with a standard deviation of 0.986, which is followed by economic benefits offered to the employees and the employee performance with the highest value.

4.3. Correlation Analysis

The correlation analysis is used to indicate the direction or intensity of the linear relationship

between the given variables. The results are shown in the table below:

Table – 5: Correlation Analysis

	1	2
Distributive Justice	-	
Employees Performance	0.392**	-
Economic Benefits/Monetary Incentives	0.251**	0.628**

The table shows that the correlation among the variables of the study is helpful in the expected direction, the dependent variable performance of employees correlated with the independent variable distributive justice, i.e., $r = 0.392$, $p < .01$, while for distributive justice $r = 0.251$, $p < 0.1$. Here it is found that the mediating role of the monetary incentives or economic benefits correlates with the independent variable and it also correlates with the dependent variable. Hence hypothesis 2 is also accepted.

Table – 6: Regression Analysis

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	β	Std. Error	Beta		
(Constant)	2.403	.475		5.405	.000
EB	.517	.138	.527	4.391	.000
EP	.291	.169	.280	3.398	.000
Adjusted R Square = 0.392					

The results showed that there is a significant positive relationship between the distributive justice and employee's performance, while the mediating variable economic benefits or monetary incentives also showed significant relationship with both the dependent and independent variables, i.e., $\beta = 2.403$ and 0.291 , respectively. Furthermore, the independent variable distributive justice can cause variations into the dependent variable employee's performance up to the extent of 39.2%, which shows that a unit change in an independent variable can cause a corresponding change of 30.2% in the dependent variable.

5. Discussion

The basic objective of this study is to examine the relationship between employee's performance and distributive justice while investigating the mediating role of monetary incentives or economic benefits in establishing the relationship among these two variables. The researcher found that distributive justice has a significantly positive relationship with the employee's performance. Whereas, the study conducted by Reisel, Probst, Chia, Maloles&König, (2010) and Hsu, Jiang, Klein & Tang, (2003) found similar results with the given study (p. 78) and (p.365), respectively. The result of this study is also consistent with the studies of Khan & Du, (2014), M. Imran Malik, (2011) and Gubler, T., Pierce, L., & Nickerson, J. (2013) (p.213), (p.32) and (p. 14472). This evaluated that organizations can improve the performances of their employees through offering

them better economic benefits or monetary incentives because employees in private sector organizations and especially in organizations like call centers do not expect a long-term association or career growth. Unlike other larger conglomerates or public sector organizations, employees in call center industry do not look for a career growth related incentives rather they simply measure their advantage or benefit regarding the extent of monetary benefits that they can gain from an organization. The findings obtained by the regression analysis shows that economic benefits partially mediates the relationship between distributive justice and employees performance as the variable met all the four conditions of mediation. This means that employees feel motivated towards their work if they feel that the monetary incentives or economic benefits are justly distributed among all the employees of an organization. The findings of this study are therefore, consistent with the expectation or equity theory, which also states that employees will be motivated if they are given just and fair compensation with respect to the extent of work that they do for their organization.

6. Conclusion

This study expanded the knowledge and research work on the role of distributive justice in shaping the overall performance level of employees of an organization and the importance of inclusion of better compensation system that can help the employees in meeting their daily needs. The findings of this study evaluated that it is highly crucial for organizations to put in place better compensation systems in their organizations to motivate their employees and improve their performances in the long run. This study can serve as a guide for the management of private sector organizations, especially the call centers to build up a competitive compensation plan for their employees to get an enhanced level of performance output in the long run. Such initiatives will help in the achievement of positive attitudinal or behavioral outcomes from employees, which will inspire them towards supporting their organizations with their full potential. On the basis of the given discussion, it is concluded that there is a significant positive relationship between distributive justice and employee's performance if the employee's monetary compensation is increased and distributed among all employees on just and equitable grounds. However, using the monetary or economic benefits as mediating factor only restricts the findings of the study to this variable and neglected the other dimensions of the career incentive plans. Therefore, future researchers should focus upon other dimensions of the career incentive plans implemented by the employers in private sector organizations and their corresponding compliance with the code of corporate governance.

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RESISTANCE TOWARDS CHANGE; ITS CAUSES, IMPACTS AND CONSEQUENCES IN PAKISTANI UNIVERSITIES

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Abstract

The current study aims at exploring the potential of educational repatriates' in bringing the change, and the obstacles being faced by them. This narrative-com-exploratory study employed qualitative method by gathering responses through interviews of 13 respondents from different universities of Pakistan. The data obtained from interviews was analyzed through NVivo to obtain the thematic categories by thematic analysis. And the findings show that educational repatriates are the carriers of up-to-date knowledge that is the best source for introducing change and gaining competitive advantage. But the change though being intended towards positive outcomes, yet faces resistance from the members of the institutions. The resistance is mainly because they do not want to leave their familiar comfort zone, power or autonomy, developed habits and job security. And they do not want to face economic consequences and oldness of their knowledge and skills for which they start resisting blindly without having any logic or reason behind that. But the change can effectively be managed by educating them about the change, making them the part of change, addressing their genuine reservations and by manipulating or co-opting according to the available circumstances. Because competitive advantage can only be gained and sustained by changing with the time and adopting or adapting to the latest knowledge that is the need of the hour, else the institution will soon be out. Since, Pakistan is passing through the phase of development in higher education sector (HEC, Vision for 2030), the current study is timely conducted to highlight the opponent forces towards change.

Keywords: Change, blind resistance, educational repatriates.

1. Introduction

Today's world is growing into a competitors region where every business, either from production or services sector, is working for gaining competitive advantage over the rivalries. Every organization is willing to master the latest knowledge and change with the changing requirements of their respective industry. Therefore mastering knowledge and sharing it with changing conditions has become the need of the hour in order to gain sustainable competitive advantage (Muthiah, 2015). Where, Gupta and Govindarajan (2000) claims that properly managed and well integrated knowledge is the key source for creating and growing sustainable competitive advantage. And in such knowledge based society, expatriates and repatriates have become the sole exporters, importers and local traders of knowledge based proficiencies (Inkson, Arthur, Pringle and Barry, 1997). Since, the present era talks about innovations which can be made by learning or gaining up-to-date skills from all across the world (Doz, Santos and Williamson, 2001), which again can be achieved by services of the carries of the world-wide knowledge and

experiences; that is the expatriates and repatriates. But, Bonache and Za'rraga-Oberty (2008) states that certain social and organizational factors affect the transfer of knowledge. And this halts repatriates from sharing what they have got from abroad. Eventually the process of advancements through knowledge sharing faces resistance. And this resistance restricts organizations from making progressive changes.

2. Objective

The present work aims at highlighting the source of change and sorting out the antecedents of the resistance towards change, in higher education sector of Pakistan. Few suggestions are incorporated for introducing and effectively managing the change process and overcoming the resistance. Also mentioned are the expected outcomes or impacts of change brought through sharing of valuable knowledge of educational repatriates which they bring along from international assignments or working experiences. Later, the consequences are discussed that result in by escaping from the process of change.

3. Literature Review

The change process is as common and compulsory for educational institutes as for profitable organizations (Levin, 1993). Actually there are some internal and external factors that dramatically forces the changes in schools (Ragsdell, 2000; Dawson, 2003; Kreitner & Kinicki, 2010). But whether it is internal or external change, it is for speeding up, setting the direction and achieving the ultimate set goals of organizations (Dawson, 2003). And in bringing the change in educational institutes, the educational repatriates are the most important source (Inkson, Arthur, Pringle and Barry, 1997), for being equipped with latest international knowledge and experience. Whereas the local colleagues of repatriates are often witnessed to show resistance against the change (Cannon, 2000), for many reasons. But without change an organization cannot sustain (Martina K. Linnenluecke, 2010), and in bringing this change repatriates cannot be overlooked.

3.1 Sources of Change

In order to change and remain competitive, an organization needs to have up-dated global knowledge (Paik, Segaud & Malinowski, 2002), and the best practice in this regard is sending the employees on international assignments and learning from their experiences on their return (Paik et al., 2002). The knowledge held by repatriates is an important asset that can be shared among the local employees (Lazarova & Tarique, 2005), for being the most important source for an organization to stay competitive (Birkinshaw, 2001; Grant, 1996; Nonaka, 1991; Watson & Hewett, 2006). But the local colleagues show resistance against the changes emerging from repatriates knowledge (Cannon, 2000), for multiple reasons.

3.2 Resistance To Change

Habits die hard that is why individuals are never willing to move out of their comfort zone, unless they feel the new zone that they are going to enter is even more comfortable. This means the fear of uncertainty of new procedures, suspicion, insecurity and ambiguity of unknown, compared with the known parameter of operations are the causes for resistance against change. Resistance may be of several other reasons as; economic threat to the well-being with the arrival of immense hi-tech progressions, disruption in well adopted routine, variation in social lay-out of workplace, lack of job security, feeling of declining status and authority, perceived scarcity in budget and

resource allocations, and sentiments about not being consulted during change process, and many others.

But above all, in order to get aware of causes and solutions to overcome the resistance, it is more important to understand the types of resistance to change given in 1989 by Hambrick and Cannella (Burke, 2008). They classified resistance as blind, political and ideological resistance.

3.2.1 Blind resistance: It refers to the response of people believing that unknown is discomfort, without listening to the specifics. Employees with such believes resist the change without any good reason.

3.2.2 Political resistance: It denotes a state of mind where individuals perceive loss in their position, status, power and value in implementing change. Therefore, they start opposing change.

3.2.3 Ideological resistance: It is basically an intellectual resistance of honest individuals who really feel that the change is ill-timed or can cause more damage than benefit. Such employees resist for some good reasons, and hence, they must be listened and entertained.

3.3 Causes of Resistance

Though change aims at positive outcomes, yet individuals negatively resist the change (Boohene & Williams, 2012), either for not providing enough data about the nature of change or not recognizing the need for change. Few other factors to resistance against change include; worry in satisfying needs, habits, loss of autonomy, economic consequences, job security, fear of unknown, loss of power, oldness of knowledge and skills, workplace environment and scarcity of funds (Leanne, 2009; Lunenburg & Ornstein, 2008; Mullins, 2005; Robbins & Judge, 2009). The factors in organizational context are taken as under.

3.3.1 Needs fulfilment: It refers to the disturbances in social networking, status or any other such need and if such needs seemed to be affected; the change process will then encounter resistance.

3.3.2 Habits: It means that the well adopted routine if appears to be changing; employees will resist. Because employees are reluctant to behave in a manner that differs from accustomed.

3.3.3 Loss of autonomy: If previously enjoyed independence and sovereignty seems to be at stake, it will also results in resistance. Because in general employees are not easily willing to give away their powers and previously enjoyed freedom by becoming subordinate.

3.3.4 Economic consequences: If the change process is leading to some reduction in salary or other similar economic rewards, this again invites the employees to resist against such change.

3.3.5 Previous job security: Employees if start feeling their job to be at some risk during the change process; then employees would resist such changes.

3.3.6 Fear of unknown: It is a perception that entering unknown regions can results in instability in routine and creates anxiousness and anxiety among employees that make them resist the implementation of any such change.

3.3.7 Loss of power: A change resulting in reallocation of decision making powers and other such authorities is not tolerable amongst employees at any level if their powers face reduction and such change process triggers resisting elements among employees.

3.3.8 Oldness of skills: It is a real threat to employees specifically inexperienced towards latest technologies. When they feel their skills becoming obsolete, they resist towards carrying out such changes.

3.3.9 Organizational setup: If organization witness any change in structure; hierarchy of bureaucracy, rules and regulations that leads to disruption of certain needs, it will boost resistance factor.

3.3.10 Workplace environment: If environment and workplace settings get changed during change process and employees feel reduction in level of their comfort, again they oppose such change.

3.3.11 Shortage of resources: If during the process of change, application of limit in resource utilization is beheld, then employees will confront enactment of such change.

3.3.12 Loss of self-identity: It reflects the state where employees resist due to the sense of loss of their narrative. Employees are basically never willing to change their narrative easily in their social circle.

3.4 Overcoming the resistance

Misjudging the impact of change over employees can lead to the failure in accomplishing the change process (Kavanagh & Ashkanasy, 2006). Therefore, it is essential to address the psychological viewpoint of employees to tool change successfully (Martin, Jones & Callan, 2005). For this purpose, Kotter & Schlesinger (1979), gave six different ways for helping in overwhelming resistance to change, these are; education and communication, participation and involvement, facilitation and support, negotiation and agreement, manipulation and co-optation, explicit and implicit coercion. Administrators of educational institute can adopt these as under.

3.4.1 Education and communication; by educating and communicating the staff properly and logically and making them understand the true sense and purpose of change, they can be convinced to support and be a part of change process.

3.4.2 Participation and involvement; by including the staff in the process of change and appreciating their contribution in presenting ideas and suggesting solutions to the expected hurdles, the change process can be speeded-up.

3.4.3 Facilitation and support; the members showing resistance should be listened and their serious concerns should be addressed, and they should be provided with the help against the hardships they are genuinely facing during the change process. So that they should not oppose or resist change.

3.4.4 Negotiation and agreement; by sorting out the potential resistors against change and devising trade-offs with such staff members for being actually losing something of value during the process of change, they can be made ready to be the part of the change process.

3.4.5 Manipulation and co-optation; prior information about change is provided to the staff to make the change process structured, but if planned scheme seems not to be working properly or costing heavily then organization look for manipulation and co-optation.

3.4.6 Explicit and implicit coercion; it means that the initiators have power to implement the change process forcefully and members have to move along even unwillingly. However, it should be remembered that such coercion can result in poor performance, dissatisfaction and turnover. So, it is the least advocated way to initiate the change.

3.5 Consequences of not changing

Organizational change basically aims at changing the position from the present state to the one that is more desirable (Ragsdell, 2000), thus, not changing means lacking behind. And failure to meet present requirements of respective sector means facing economic losses; hence, organizations need to change for making profits (Cannon, 1994), and sustaining competitive position (Muthiah, 2015) by establishing sustainable competitive advantage. Therefore organizations need to keep on looking for possible changes, because when they overlook certain minor issues, considering them inconsequential, they often find themselves in a state where they are unable to address even the major issues (Lyon, 2004).

4. Design and Methodology

For accomplishing the requirements of this narrative-com-exploratory study, qualitative method has been employed. In which interviews from 13 respondents are conducted, as a source of data gathering. Respondents belonged to different universities of Pakistan. Qualitative methods are used for being the better way of narrating the experiences and exploring the aspects in-depth. Further, the study lies in constructive paradigm with anti-foundational arguments supporting the approach, such an approach is basically used to gain understanding by interpreting the viewpoint of the participants (Lincoln, Lynham, & Guba, 2011). The responses were recorded by the help of an audio recorder and later transcribed into MS Word. Then these transcribed interviews were analyzed through NVivo 12. And conclusions were drawn on the basis of thematic analysis.

5. Discussion

Regarding the source of change, literature and current responses, both showed repatriates as the carriers of the latest knowledge gained from international assignments and that can be helpful in bringing the change required as per circumstances. As one of the respondents said that *"I have learned to go an extra mile with my students that made me more comfortable and popular at my work. And earlier I was only respected and obeyed for being teacher but now I am much more admired, followed and beloved teacher among students"*. But at the same time a common response was that they faced resistance while sharing or implementing what they have got from abroad. Which is a big threat to the future of educational institutions, because avoiding the latest and up to date knowledge carried by educational repatriates will discontinue the learning process of students.

On inquiring about the support in bringing the change, mostly the respondents were of the view that either they are not listened or even if they are made the part of meeting, to put forward the suggestion, those meetings are mere formality and nothing beyond that. Because the respondents believe that either the head of the departments even themselves do not have the powers to implement changes or the bureaucratic structure do not allow them to do so. A respondent added as *"There are different constraints hindering the change process; as finance, bureaucracy, nepotism and sometimes even jealousy or incompetency of seniors"*. But altogether in a nut shell, this resistance is mainly the blind resistance, where employees are not willing to change just for the reason that they do not want to change well adopted habits and enter a new zone of unknown which might be difficult or result in complexities for employees.

The efforts of educational repatriates in bringing change are proving fruitless. And the local colleagues feel hesitation in learning from their repatriated colleagues for many reasons but neither of these reasons carried some logic or reason behind that resistance nor they had got some better options rather than the way suggested by repatriates. But if the issue remains unresolved, our institutions will lack behind and soon the knowledge being delivered and the way it is being delivered will become obsolete. Hence, there is an urgent need of correction in our teaching methodologies, procedures, teaching environment, and priorities of administration. These are the factors highlighted by the respondents as the key factors for improving our educational institutions.

Different suggestions have been made by the respondents to make the change process more smooth and applicable. Though the change is intended towards positive outcomes, yet resisted by the staff members. Therefore, at first the individuals are supposed to be convinced by showing them the positive side of the intended changes. They can also be made the part of change process in order to give them the confidence that they and their input is valued. And if certain members of the staff have some serious reservations or they have to undergo loss of power or identity, then these issues should be considered and addressed in order to remove that element of resistance. And another suggestion that was predominantly made by the respondents was that the authorities, in particular HEC, should take these changes into its priorities for the sake of enabling our institutions to compete the international institutions.

6. Conclusion

The findings show that the culture of accepting the change wholeheartedly is required to be developed in order to compete with the international universities. Foreign universities are ahead of our institutions for the reasons; they are following merit, valuing students, adopting well defined procedures, using technologies, building infrastructure, and equipping their staff with best teaching methodologies. Pakistani universities send our staff members for witnessing the differences and learning them so as to be replicated on their return. But on the return of these educational repatriates, they are not asked, allowed and made to share and implement what they have learned from abroad during their stay. This happens mainly because the local colleagues of repatriated member resist blindly so as to stay in the known region of comfort and keep performing the tasks the way they have become habitual of doing them. Over that, the management and administration is also sometimes reluctant towards introducing the suggested changes either because they are bounded by the system or they are incapable or incompetent for doing that. But the change has become an utmost need and undeniable fact for staying in competition. Otherwise the present knowledge, technology and methods will soon become obsolete. Thus, the factors resisting change should be addressed seriously. And the members

against the change should be encouraged and convinced to be the part of change by resolving their concerns. This is the only way for improving and meeting the HEC vision for 2030; improving the quality of higher education.

7. Limitations and Suggestions

The current study is just reflecting the qualitative aspect of the subject but the same can be verified by using mix method or just quantitative approach separately. And the same study can be replicated in other organizations and sectors to get the response. Moreover, by including the view point of managing staff the other side of the picture can also be seen. The convenient sampling technique was used for selecting the respondents, and the number of respondents were also not too large. One can further explore the trends by enlarging the sample size and reveal many more hidden elements connected with the current subject under discussion. The current study is conducted in a single timeframe but a longitudinal study can show different findings. The respondents in the present study were all from social sciences departments, but the faculty from applied sciences and arts can have different concerns about the subject.

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HEXACO MODEL OF PERSONALITY AS A PREDICTOR OF ACADEMIC ENTITLEMENT

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Abstract

Academic entitlement is considered a major concern in secondary and higher education. It is treated as documented problem however the causes are not well addressed. Recently, the role of personality has received an increasing attention in explaining academically entitled behaviors. The aim of this study was to identify personality traits that best predict academic entitlement. Population of this study included 5746 students from Management department of different Universities of Peshawar. A sample of 361 was selected arbitrarily using proportional and allocation method. However, only 269 individuals responded to the call (response rate=76.6%). All variables were measured using adapted questionnaires. Reliability of all the scales was tested using Cronbach's alpha coefficient. To test the hypotheses of the study multiple regression technique was used. Results reveal that HEXACO model is significantly related only with entitled expectations, a component of academic entitlement. This implies that academic entitlement was somewhat predicted by HEXACO model, that is, only extraversion was a significant predictor of academic entitlement. Overall, results stated that academic entitlement is somewhat predicted by HEXACO model of personality. It is recommended that as academic entitlement exists in higher education students, so precautionary measures should be adapted.

Keywords: Personality, HEXACO, Academic entitlement.

Introduction

We are living in a society where every individual progressively acquires what he/she wants. In other words, to satisfy their desires, people display behaviours that can harm others (Fisk, 2009). Today's young generation is more egocentric and unconstrained than earlier generations (Campbell, Bonacci, Shelton, Exline and Bushman, 2004). Thus sense of deserving attitude is called psychological entitlement (Snyders, 2002), it can be defined as a stable and pervasive sense that one deserves more and is entitled to more than others (Campbell et al., 2004). Generally the period of entitlement starts from communal resource allocation, extends to workplace, and then to academic settings. This is a quiet general and stable characteristic which exists among most

people. Such people demand for more incentives without taking any responsibility for performance (Harvey and Harris, 2010). Whereas when students demand for higher grades without taking any responsibility for performance, the phenomenon is known as academic entitlement (Turnipseed and Cohen, 2015). Academic entitlement is somewhat different, though moderately correlated with psychological entitlement (Chowning and Campbell, 2009). It is absolutely performed in academic domain (Chowning and Campbell, 2009), while psychological entitlement can be displayed in any situation and setting (Campbell et al., 2004).

The trend of academic entitlement emerged in 2002, when students of millennial generation entered universities for graduation. According to Achacoso (2002), academic entitlement has two facets, entitled expectations (beliefs of getting good grades without providing much personal efforts) and entitlement negotiations (beliefs of negotiating and debating for higher grades). Conversely, Chowning and Campbell (2009) defined academic entitlement as "the tendency to possess an expectation of academic success without taking personal responsibility for achieving that success" (p. 982). They identifies two key and related components of academic entitlement: Externalized responsibility (the degree to which student feels that he/she is accountable for using their efforts and abilities to accomplish desirable results), and Entitled expectations (the degree to which student feels that his/her classmates, professors, and institution as a whole are responsible to help him/her to attain desirable outcomes). Singleton-Jackson et al (2011) described entitled students in terms of having preference and power, and getting immediate satisfaction. So, such students believe that they can achieve passing grades without any constraints, and can negotiate for high grades (Ciani, Summers and Easter, 2008).

It is believed that entitled behaviours leads to student's disturbing and impolite behaviours (Achacoso, 2002; Chowning and Campbell, 2009). Disruptive and impolite behaviours that entitled students display usually include disobeying academics norms and values, using mobile phone during the class, coming late for class, taking lectures inconsistently, using electronic devices, like laptop and tablets inappropriately in class (Chowning and Campbell, 2009). Entitled students also continue disruptive and insolent behaviours outside the class; those include sending vulgar and impolite messages and e-mails etc. (Lippmann, Bulanda and Wagenaar, 2009). College students experience more stress due to educational and adjustment problem, because of school - college shifting (Kerr et al., 2004; Santiago-Rivera and Bernstein, 1996). Such stress in turn negatively influences their behaviour (Felsten and Wilcox, 1992). Some students display uncivil behaviour because of being unsuccessful in achieving desired academic outcomes at college level (McGlynn, 2001).

Through multiple investigations, various factors related to academic entitlement have been identified. Majority of studies by different researchers regarding Academic Entitlement (Sohr-preston and Boswell, 2015; Kopp and Finney, 2013) have been carried out on factors like gender, self-conception, family functioning, uncivil student behaviour, social commitment, academic dishonesty etc. Within the personality domain, researchers have studied various factors; including locus of control (Sohr-preston and Boswell, 2015), social aversive personalities (Turnipseed and Cohen, 2015), self-esteem, and general personality (Chowning and Campbell, 2009).

In the past, numerous lexical studies in English language were carried out to explore personality traits, and consequently a set of five personality trait were created repeatedly which is recognized as Big Five Personality traits (Goldberg, 1993). Recently, this model has become one of the most commonly studied frameworks of personality (Ashton, Lee and Vries, 2014). This model includes following five traits; neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience. Studies concerning the same subject were also carried out in other languages (i.e. European, Asian etc) in late 1980. However, results were not much consistent with the lexical studies conducted in English language (Ashton and Lee, 2001). After reviewing the lexical studies conducted in other languages, Ashton et al., (2004) proposed that personality structure is composed of six rather than five personality traits. They also observed that the new set of

personality traits vary from the Big Five (B5 or FFM) by one additional trait that is Honesty-Humility (Ashton and Lee, 2001). Although, a latest study about personality lexicon in English language, consisted of huge set of personality adjectives (sub traits), has supported personality structure consists of six traits and also viewed that those traits are very close to the traits identified in lexical studies in other languages (i.e. Dutch, French, German, Hungarian, Italian, Korean and Polish) (Ashton, Lee and Goldberg, 2004). This six trait personality model is named as HEXACO. It includes: H= Honesty-Humility, E= Emotional stability, A= Agreeableness, C = Conscientiousness, O= Openness to Experience and X= Extraversion (Ashton and Lee, 2007; Lee and Ashton, 2004). The extraversion, conscientiousness and openness to experience dimensions of this model are very close to the corresponding dimensions of B5 model, whereas the agreeableness and emotionality dimensions are different from corresponding dimensions of B5. While the last dimension i.e. Honesty-Humility is completely different from B5 model and shows no correspondence with B5 (Lee and Ashton, 2004).

Problem Statement

In an academic context, past studies have linked academic entitlement with student incivility (Kopp and Finney, 2013), student motivation and academic outcomes (Frey, 2015) etc. counterproductive behaviours (Chowning and Campbell, 2009; Greenberger, et al., 2008). However, limited work has been conducted with respect to personality. Therefore, Turnipseed and Cohen (2015) have highlighted the need for further studies to recognize stable individual differences (honesty-humility, conscientiousness, extraversion, neuroticism, agreeableness and openness to experience (Bing et al., 2007; Marcus et al., 2007; Salgado, 2002)) in personality domain to predict academic entitlement. Thus, the study aim's to identify personality traits that best predict academic entitlement among students of higher education institutions of Peshawar. Based on the recently noticed importance, the study focuses on HEXACO model of personality instead of B5 or MBTI.

Significance of the Study

This study is important and significant in academic context. It helps the teachers, higher educational policy makers, and employees of academic institutions to better understand the uncivil behaviour displayed by entitled students. It also helps them to understand the psychology and perception of students performing different entitled behaviours. In addition, this study helps individuals of academic organizations, especially faculty members to identify the personality factors that lead to academic failure or success of students. Moreover, it is one of the first studies which investigate the effect of HEXACO personality traits on academic entitlement.

Literature Review

Academic Entitlement

Today's young generation is more egocentric and unconstrained than earlier generations (Campbell, Bonacci, Shelton, Exline and Bushman, 2004). To satisfy their desires they display behaviours that can harm others (Fisk, 2009). This sense of deserving attitude is called psychological entitlement (Snyders, 2002), and is defined as a stable and pervasive sense that one deserves more and is entitled to more than others (Campbell et al., 2004). When students show deserving attitude in academic context is called academic entitlement. Academic entitlement is somewhat different. It is absolutely performed in academic domain (Chowning and Campbell, 2009), while psychological entitlement can be displayed in any situation and setting (Campbell et al., 2004). Researchers have defined the concept of academic entitlement in their own way, such as Singleton-Jackson et al. (2011) characterized academic entitlement as students thinking "they are entitled to or deserving of certain goods and services to be provided by their institutions and

professors that is outside of the students' actual performance or responsibilities inside the classroom". According to Morrow (1994) academic entitlement reflects a belief that some reward is deserved that is not justified based on academic achievement. Greenberger et al. (2008) stated that academic entitlement is a construct that comprises of expecting good grades for little effort and using demanding approach toward teachers for good grades.

Chowning and Campbell (2009) defined academic entitlement as "the tendency to possess an expectation of academic success without taking personal responsibility for achieving that success" (p. 982). " They discovered two key and related components of academic entitlement: those are externalized responsibility and entitled expectations. The externalized responsibility means the degree to which student feels that he is accountable for using their efforts and abilities to accomplish desirable results. Critical component in the definition of entitlement is that of expecting something that is undeserving (Jackson, Singleton-Jackson and Frey, 2011). Morrow (1994), and Singleton-Jackson et al., (2011) discussed that academic entitlement affects the value of higher education. Particularly, it is annoying that entitled behaviour can damage the value of approaches to get the higher education degree through making the course content more easier or assigning grades points to non-achieving outcomes (for example, attendance). Consequently, this makes more students able (including those whom may not deserve) to access to the reward of higher education degree. Sometimes, Academic entitlement is related to student consumerism. According to this concept, students consider themselves as customers paying for education and expect the same satisfaction as received by other category of customers (Correa, 2006; Delucchi and korgan, 2002; Fullerton, 2013). Students with such state of mind think likely that an "A" grade will be the expected academic outcome for education payment. It means that entitled students purchase a degree with high grades or GPA rather than to earn it (Schaefer et al., 2013). Prior studies have shown that academic entitlement is negatively correlated with academic performance (Jeffres et al., 2014) , interest in learning (Vallade, Martin and Weber, 2014), goal perseverance (Jones, 2013), academic satisfaction (Miller, 2013) and effort (Achacoso, 2002; Cornell, 2014; Kopp et al., , 2011). In addition, it is positively linked with student incivility (Kopp and Finney, 2013) and academic dishonesty (Cornell, 2014; Greenberger et al., 2008). When their findings combine together, suggest that highly academically entitled students expected to be more involved in negative behaviours and less in positive behaviours (learning process) (Frey, 2015).

HEXACO Model of Personality

The Big Five Model of personality is a collection of diverse personality traits, and has been summarized effectively into five stable traits, those are: conscientiousness, emotional stability, openness to experience, neuroticism, and extraversion (Lee et al., 2008). Regardless of its contribution to the I/O psychology, this model fails to provide optimal structure that is necessarily required to represent personality variations. Thus, lately through cross-culture studies, an alternative framework consisted of six dimensions has been suggested known as HEXACO model of personality (Ashton et al., 2014).

During the past, numerous lexical studies in English language were carried out to explore personality traits, and consequently a set of five personality trait were created repeatedly which is recognized as Big Five Personality traits (Goldberg, 1993). Recently, this model has become one of the most commonly studied frameworks of personality (Ashton et al., 2014). This model includes following five traits; neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience. Studies concerning the same subject were also carried out in other languages (i.e. European, Asian etc) in late 1980. However, results were not much consistent with the lexical studies conducted in English language (Ashton and Lee, 2001). After reviewing the lexical studies conducted in other languages, Ashton et al., (2004) proposed that personality structure is composed of six rather than five personality traits. They also observed that the new

set of personality traits vary from the Big Five (B5 or FFM) by one additional trait that is Honesty- Humility (Ashton and Lee, 2001). Although, a latest study about personality lexicon in English language, consisted of huge set of personality adjectives (sub traits), has supported personality structure consists of six traits, and also viewed that those traits are very close to the traits identified in lexical studies in other languages (i.e. Dutch, French, German, Hungarian, Italian, Korean, and Polish) (Ashton, Lee and Goldberg, 2004). This model of personality is known as HEXACO. It includes: H= Honesty-Humility, E= Emotional stability, A= Agreeableness, C= Conscientiousness, O= Openness to Experience, and X= Extraversion (Ashton and Lee, 2007; Lee and Ashton, 2004). The extraversion, conscientiousness, and openness to experience dimensions of this model are very close to the corresponding dimensions of B5 model, whereas the agreeableness and emotionality dimensions are different from corresponding dimensions of B5. While the last dimension i.e. Honesty-Humility is completely different from B5 model and shows no correspondence with B5 (Lee and Ashton, 2004).

Dimensions of HEXACO Model

Honesty-Humility

Honesty-Humility dimension is characterized by sincerity, honesty, and fairness (Lee and Ashton, 2004) as opposing to narcissism (Ashton and Lee, 2005) and pretentiousness (Lee and Ashton, 2004). This trait of personality measures individual differences in terms of greed avoidance, sincerity, fairness, and modesty. It was developed as a result of non-English lexical studies. Individuals with high level of Honesty-Humility help others in true sense and treat them justly even though when they are exploited (Ashton and Lee, 2007). On the other hand, individuals with low Honesty-Humility exploit and manipulate others (Ashton and Lee, 2007), insincere regarding interpersonal relationships, and think that they are superior to others (Lee and Ashton, 2004). Contrary to entitled individuals (Campbell et al., 2004), those with high degree of humbleness do not consider themselves as deserving preferential treatment or good rewards, and thus they probably give importance to other's needs and rights (Tangney, 2009). In agreement with the points of Tangney (2009), and Lee and Ashton (2005) found "greed-avoidance" as a new sub dimension of Honesty-Humility trait of HEXACO. Another component of Honesty-Humility dimension, that is, generosity is opposite to entitlement concept (Campbell et al., 2004). Across the HEXACO factors, Honesty-Humility has shown positive association with agreeableness, conscientiousness, and openness to experience. It has also shown moderately positive significant relationship with extraversion. Besides, it has shown moderately negative and significant association with neuroticism (Exline and Hill, 2016). Honesty-Humility of HEXACO model includes following sub dimensions: Sincerity assesses the tendency of a person's willingness or unwillingness to be manipulative or insincere when dealing with others with the intention of achieving preferred outcomes. People with high level of sincerity help others in true sense and treat them justly. Fairness assesses the tendency of a person's willingness or unwillingness to cheat with others, or use others for personal benefits. People with high level of fairness are honest and treat others with fair and equity. Greed Avoidance assesses degree of importance that a person gives to the things, such as, status, wealth, luxury, money etc. individuals with low level of greed avoidance give more importance to luxury, wealth, money, status etc. Modesty assesses the beliefs of a person regarding himself with respect to others. People with high level of modesty give more respect to others and don not consider themselves for preferential treatment.

Agreeableness

Agreeableness is characterized by traits including patience, tolerance, and gentleness anger and irritability. It is also described by low level of anger, and irritability characteristics that are sub

dimensions of big five neuroticism. The HEXACO agreeableness is different from big five agreeableness on the basis of additional factors including low level of anger, and hostility, as these traits were not included in big five agreeableness (Lee and Ashton, 2004). People with low level of agreeableness likely to hold grudges, and could become angered easily (Ashton, Lee and Goldberg, 2004; (Lee and Ashton, 2004), while people with high agreeableness have high degree of tolerance and may forgive others even though they are exploited (Ashton and Lee, 2007).

Emotionality

Emotionality component of HEXACO is characterized by traits including dependence, anxiety, and sentimentality opposed to toughness and bravery. This aspect is neutral in terms of social desirability, having content of desirability and undesirability at both poles. For instance, anxiety is socially undesirable at high pole, while sentimentality is desirable socially. On the other hand, fearlessness is socially desirable at low pole, while insensitivity is undesirable socially (Lee and Ashton, 2004). Emotionality is associated with kin altruism concept (Hamilton, 1964). Because it not only includes emotional attachment and empathic concern behaviours but also includes help-seeking and harm avoidant behaviours toward close people (kin) (Lee and Ashton, 2004).

Openness to Experience

Openness to experience is characterized by imaginations, intellectual curiosity, novelty of discovery, and process of exploring (McCrae and Costa, 1997). People including such trait are more creative, try to do new things, and learn and explore new cultures. People with low openness to experience are more likely traditional and conventional; in their interests, and show resistance to change. Besides, they prefer familiarity more than novelty (McCrae and Costa, 1997).

Conscientiousness

Conscientiousness is also known as conformity or dependability (Fiske, 1949). According to Botwin and Buss, (1989), Conscientiousness means dependability that is to be careful, thorough, organized and responsible. Digman (1990) has integrated other variables to the conscientiousness to more strengthen its definition; those variables included preserving, hardworking, and achievement (Bernstein et al., 1983; Borgatta, 1964; Conley, 1985; McCrae and Costa, 1997; Costa and McCrae, 1988). Such people might less be procrastinating.

Extraversion

Extraversion is associated with a person's desire for interaction with others, stimulation, and capability for happiness (Costa and McCrae, 1992). It has linked with positive trait affect (Larsen and Ketelaar, 1989). Individuals with high level of extraversion get energy when they intermingle with people. Beside this, such individuals are highly enthusiastic and action-oriented. However, introverts are less likely to interact with others, appear to be quiet, and deliberate. According to Piedmont (1998), facets that are related to extraversion are assertiveness, warmth, activity, positive emotions, and gregariousness.

Academic Entitlement and HEXACO Model of Personality

Campbell et al., (2004) have explored that highly entitled individuals are lower in agreeableness and emotional stability, and are more aggressive and egocentric. Thus, highly entitled Students have probably low degree of conscientiousness and agreeableness but have feeling of deserving more (Frey, 2015). Chowning and Campbell (2009) study has provided a detail relationship between big five dimensions and academic entitlement. Results showed that, agreeableness and conscientiousness has a negative relationship with externalized responsibility, a component of

academic entitlement, but positive association with neuroticism. But the other component that is entitled expectations has found no relationship with big five traits.

Contrary to entitled individuals Campbell et al., (2004), those with high degree of humbleness do not consider themselves as deserving preferential treatment or good rewards, and , thus they probably give importance to other's needs and rights (Tangney, 2009). In agreement with the points of Tangney (2009), Lee and Ashton (2005) found "greed-avoidance" as a new sub-trait of Honesty-Humility aspect of HEXACO. Another sub-trait of Honesty-Humility aspect .i.e. generosity has explained the lack of entitlement in a better way as compared to Honesty-Humility (Campbell et al., 2004). Across the HEXACO factors, Honesty-Humility has shown positive association with agreeableness, conscientiousness, and openness to experience, moderately significant. . It has also shown positive but moderately significant relationship with extraversion. Besides, it has shown moderately significant and negative association with neuroticism (Exline and Hill, 2016).

Hypotheses of the Study

Hypothesis 1(a)

H1: Honesty- humility has a significant effect on externalized responsibility.

Hypothesis 1(b)

H1: Honesty- humility has a significant effect on entitled expectations

Hypothesis 2(a)

H1: Emotional stability has a significant effect on externalized responsibility.

Hypothesis 2(b)

H1: Emotional stability has a significant effect on entitled expectations.

Hypothesis 3(a)

H1a: Extraversion has a significant effect on externalized responsibility.

Hypothesis 3(b)

H1b: Extraversion has a significant effect on entitled expectations.

Hypothesis 4(a)

H1a: Agreeableness has a significant effect on externalized responsibility.

Hypothesis 4(b)

H1b: Agreeableness has a significant effect on entitled expectations

Hypothesis 5(a)

H1a: Conscientiousness has a significant effect on externalized responsibility.

Hypothesis 5(b)

H1b: Conscientiousness has a significant effect on entitled expectations.

Hypothesis 6(a)

H1a: Openness to experience has a significant effect on externalized responsibility.

Hypothesis 6(b)

H1b: Openness to experience has a significant effect on entitled expectations.

Research Methodology

Population of the Study

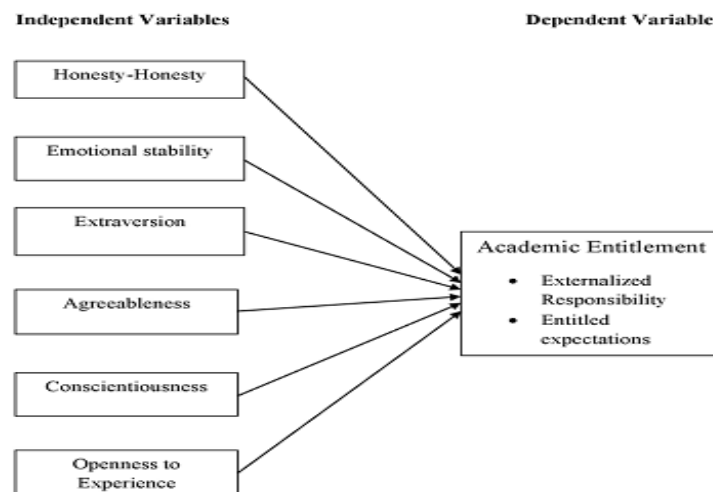
Students enrolled in institutions of higher education Peshawar was taken as the population of proposed study. However, because of a variety of constrictions including non-accessibility of data, non-availability of time, and financial problems, it was difficult to cover the whole population. So, target population has been considered. The target population for the study was students of Management Sciences departments of following universities: NUML, IM Sciences, Iqra National University, Abasyn University, City University, IM Studies, Sarhad University, Cecos University, Preston University, and Qurtuba University. According to the Information collected telephonically and through personal visits, numbers of students in those universities were approximately 5746. Thus, the target population was 5746.

Sampling Design

Sampling design helps in providing information about the sample size of the study and method to select the sample size. To select an appropriate sample size essentially depends on the factors including time availability, accessibility, and financial resources. On the basis of trend in prior studies, i.e. Taylor et al., (2015a), Turnipseed and Cohen (2015), and Sohr-preston and Boswell (2015) had a sample of 203, 169, and 401 students respectively, the sample size for this study was three hundred and fifty one (n=351). Moreover, to select the sample size proportionate allocation method has been used (Cochran, 1977). Moreover, the sample of this study has been arbitrarily selected. Also, the decision to take sample size of 351 is aligned to the standard provided by Krejice and Morgan (1970). As total sample size was 351, but after removing missing data, the sample was reduced to 269 (76.6%) students. The study by Velia Hernandez, (2015), also had total sample of 204 students.

Theoretical Framework

Theoretical frame of the study consists of six independent variables (Honesty-Humility, Emotional Stability, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience) and one dependent variable i.e. academic entitlement.



Variables Description and Measurement

This study has been adopted standardized scales to measure all the variables. Besides, Cronbach's Alpha coefficient has been used to test the reliability of all scales.

Academic Entitlement

According to Chowning and Campbell (2009), academic entitlement is the tendency to possess an expectation of academic success without taking personal responsibility for achieving that success. It has been assessed using 15- item Academic Entitlement scale developed by Chowning and Campbell (2009). The first 10 items of the scale assessed the subscale Externalized Responsibility, and the remaining 5 items measured another subscale .i.e. Entitled Expectations. Responses about each item has been ranked on 7-point Likert scale ranging from 1(strongly disagree) to 7 (strongly agree).

HEXACO Model

The six trait personality model emerged as a result of cross lexical studies and is named as HEXACO. It includes: H= Honesty-Humility, E= Emotional stability, A= Agreeableness, C= Conscientiousness, O= Openness to Experience, and X= Extraversion (Ashton and Lee, 2007; Lee and Ashton, 2004). These traits have been assessed using 60-item HEXACO scale developed by Lee and Ashton (2004). It included 60 items. Responses about each item has been ranked on 5-point Likert Scale ranging from 1 (strongly disagree) to 5 (strongly Agree).

Data Analysis

This study has used multiple regression technique to test the hypotheses of study. It is a commonly used technique to identify relationships between two or more than two quantitative variables (Sharma, 2009). As there is more than one independent variable in the study, therefore, multiple regression technique has been used. Besides, the dependent variable consisted of two dimensions that are externalized responsibility and entitled expectations. Thus, HEXACO model has been related with each dimension of academic entitlement. Regression models used by the study are as follow:

$$Y(a) = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + e_i \dots\dots\dots (3.1)$$

Where,

Y (a) = Externalized responsibility

X1= Honesty-Humility, X2= Emotionality, X3= Extraversion,

X4= Agreeableness, X5= Conscientiousness, X6= Openness to experience.

β_1 = Coefficient of X1, β_2 = Coefficient of X2, β_3 = Coefficient of X3,

β_4 = Coefficient of X4, β_5 = Coefficient of X5, β_6 =Coefficient of X6

α = Constant

e_i = error term

$$Y(b) = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + e_i \dots\dots\dots(3,2)$$

Where,

Y (b) = Entitled Expectations

X1= Honesty-Humility, X2= Emotionality, X3= Extraversion,

X4= Agreeableness, X5= Conscientiousness, X6= Openness to experience.

β_1 = Coefficient of X1, β_2 = Coefficient of X2, β_3 = Coefficient of X3,

β_4 = Coefficient of X4, β_5 = Coefficient of X5, β_6 =Coefficient of X6

α = Constant

e_i = error term

Results and Discussion

Descriptive Statistics

Cross distribution of respondents on the basis of Educational institutes and Gender

Table 4.1.3 illustrates the cross allocation of respondents on the basis of educational institutes and gender. According to results, total respondents are 269. Among 269 respondents, 139 male and 28 female were from public educational institutes, representing 62% of the total sample. Moreover, 32 male and 7 female respondents were from private universities, symbolizing 14.4% of the total sample. On the basis of gender, total missing respondents were 45. Among 45, 11 respondents were from public educational institutions and 1 respondent was from private educational institute. On the basis of educational institutions, total missing respondents were 51. Among 51, 16 male and 2 female respondents had not clearly mentioned their educational institutions. While remaining 33 (12.26%) respondents over all the study did not clearly mention their educational institutions and gender.

Table 4.3. Cross distribution of respondents on the basis of educational institutes and gender.

Educational institutions	Male	Female	Unspecified	Total
Public	139 (51.67%)	28 (10.4%)	11 (4%)	178 (66.17%)
Private	32 (11.89%)	7 (2.6%)	1 (.37%)	40 (14.86%)
Unspecified	16 (5.94%)	2 (.74%)	33 (12.26%)	51 (18.95)
Total	187 (68.40%)	37 (13.75%)	45 (16.72%)	269 (100%)

Descriptive statistics (Mean, Standard deviation, Variance)

As in this study five point and seven point likert scales has been used to take responses from respondents about variables i.e. HEXCO model of personality and Academic entitlement respectively. So, According to five point likert scale, the estimated mid-point is 3; thus, mean value lower than 3 demonstrates unsatisfactory region, while mean value above 3 illustrates satisfactory region. And according to seven point likert scale, the estimated mid-point is 4; so, mean value lower than 4 reflects the dissatisfactory area, while mean value 4 shows satisfactory area. According to results, mean value of Emotionality (3.3209) which is greater than mid-value stated that intensity of emotionality among respondents (students) was very high. In simple, it means that students living in the area of Peshawar have dominant personality trait of emotionality. Furthermore, mean value of Extraversion (3.2544) which is higher than mid value illustrated that, after emotionality, it is the second highest trait which is dominant among those students. While other personality traits that is Honesty humility (3.1404), Agreeableness (3.0843), Conscientiousness (3.1404), and Openness to experience (3.1995) have mean values equal to mid value 3, signifying that these dimensions of HEXACO model comes under neutral area. Moreover, the mean value of entitled expectations is 4.8113, which is greater than mid value (4), illustrated that intensity of entitled expectations is very much among such students in average. Besides, the mean value of externalized responsibility (3.7144) is almost closer to mid-value, demonstrated that it comes under neutral region.

Table 4.4. Descriptive Statistics

Variables	Mean
Honesty-mean	3.1404
Emotionality-mean	3.3209
Extraversion-mean	3.2544
Agreeableness-mean	3.0843
Conscientiousness-mean	3.1404
Openness-mean	3.1995
Externalized Responsibility-mean	3.7144
Entitled expectations-means	4.8113

Regression Analysis

In the current study there were six independent variables (Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to experience) and one dependent variable (academic entitlement). So, multiple regression technique has been used to test all the hypotheses. Besides, in this study, HEXACO traits have been linked with each dimension of academic entitlement.

Effect of HEXACO model on Externalized Responsibility

Table 4.5 shows results of regression analysis applied to test hypotheses (a) of the study. Results demonstrate that there is an insignificant effect of variables in HEXACO model on externalized responsibility. In other words, HEXACO model is an insignificant predictor of externalized responsibility ($F=1.769$, with $p\text{-value}=0.106$). The value of R square (coefficient of determination) is 0.039, which shows that only 3.9% of the variation in dependent variable is explained by independent variable. Moreover, all six (6) variables, that is, honesty-humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience have insignificant effect on externalized responsibility ($p\text{-values}$ greater than 0.05). Therefore, all null hypotheses (a) were accepted and it can be concluded that HEXACO traits did not predict externalized responsibility.

Table 4.5. Effect of HEXACO model on Externalized Responsibility.

Model	Unstandardized Coefficient		t-ratio	Sig
	B	Std. Error		
Constant	5.198	0.691	7.517	.000
Honesty	-0.155	0.123	-1.261	0.208
Emotionality	0.149	0.110	1.356	0.176
Extraversion	-0.017	0.107	-0.155	0.877
Agreeableness	-0.185	0.122	-1.513	0.132
Conscientiousness	-0.122	0.126	-0.962	0.337
Openness	-0.152	0.105	-1.445	0.150

Dependent Variable: Externalized Responsibility, R Square: 0.039, $F=1.769$, $p\text{-value}=0.106$.

Table 4.6 shows results of regression analysis applied to test hypotheses (b) of the study. Results demonstrate that there is a significant effect of variables in HEXACO model on entitled expectations. In other words, HEXACO model is significant predictor of entitled expectations ($F= 5.192$, with $p\text{-value}= 0.000$). The value of R square (coefficient of determination) is 0.107, which shows that only 10.7% of the variation in dependent variable is explained by independent variable. Moreover, among six (6) variables, only extraversion has found a highly significant and positive effect on entitled expectations ($p\text{-value}= .001$, which is less than $\alpha\text{-value}$.01). The regression coefficient value of extraversion is 0.377, states that increase or decrease in extraversion by one unit will cause positive effect of 0.377 on entitled expectations. Thus, hypothesis (3b) is accepted, and it is concluded that extraversion trait of HEXACO model has a significant effect on entitled expectations.

Table 4.6. Effect of HEXACO model on Entitled Expectations

Model	Unstandardized Coefficient		Standardized Coefficient	t-ratio	Sig
	B	Std. Error			
Constant	1.261	0.759		1.661	.098
Honesty mean	-0.013	0.134	-0.006	-0.096	0.924
Emotionality mean	0.153	0.121	0.076	1.269	0.206
Extraversion mean	0.377	0.117	0.202	3.213	0.001
Agreeableness mean	0.200	0.134	0.090	1.496	0.136
Conscientiousness mean	0.224	0.138	.101	1.615	0.108
Openness men	0.169	0.115	0.088	1.461	0.145

Dependent Variable: Entitled Expectations, R Square: 0.107, $F= 5.192$, $p\text{-value}= 0.00$.

Discussion

As the aim of the study is to find the intensity of academic entitlement among students of higher education institutions of Peshawar, the mean value of entitled expectations (4.8113) shows that academic entitlement exists among students in form of entitled expectations. Besides, results also illustrates that intensity of academic entitlement (entitled expectations) is high. It means that these students mostly depends on friends, classmates, teachers, and institutions, and think that these are responsible for helping them in achieving desirable academic outcomes.

Furthermore, the study aim is to investigate the effect HEXCO model on academic entitlement. The results shows that HEXACO traits combined have an insignificant effect on externalize responsibility component of academic entitlement. And also these traits individually are insignificantly related to externalized responsibility. The results further reveal that HEXACO model has a significant effect on entitled expectations dimension of academic entitlement. Besides only extraversion trait has found a significant effect on entitled expectations. This means that, extraversion has a positive significant relationship with academic entitlement. As past studies shows that a relationship exists between academic dishonesty and academic entitlement (academic dishonesty is a predictor of academic entitlement (Sohr-preston and Boswell, 2015)), and academic dishonesty is positively significantly related to extraversion (Aslam and Nazir, 2002). This implies that academic entitlement is positively significantly related to extraversion. Students with high level of extraversion are more active and warm, and desire for interaction with

others. Such students make strong relationships with their friends, classmates and teachers etc. so sometimes they make their selves depend on them and feel that they are responsible for help them in achieving desirable academic outcomes. This means that extravert students are more entitled toward academic entitlement according to the findings. While other personality traits are insignificantly related ton academic entitlement.

According to the results, Emotionality has a non-significant relationship with academic entitlement. This is consistent with the finding of Chowning and Campbell (2009). The study further demonstrates that agreeableness is unrelated to academic entitlement. This result is supported by the study of O'Connor and Paunonen (2007), which states that agreeableness is unrelated to academic entitlement. Moreover, the results also show that conscientiousness is insignificantly related to academic entitlement. This finding is supported by the study of Gallagher (2002), and Noel and Carey (2008), stated that conscientiousness has an insignificant relationship with academic entitlement. Besides, finding also reveals that openness to experience has an insignificant relationship with academic entitlement. This finding is aligned with the findings of Chowning and Campbell (2009).

In addition to the above mentioned similarity with prior studies, some findings of this study are in contrast with prior literature. In particular, the findings regarding agreeableness and conscientiousness have been found significant in some studies. As mentioned earlier, this domain of research is in emerging phase, with studies conducted in different regions reporting inconsistent findings. The inconsistent findings of the current study may also be attributed to cultural relativity, and academic context, as this study is one of the first in Peshawar, Pakistan. According to Campbell et., (2004) and Hong et al., (2012) academic entitlement changes with situation and attributes of academic environment. Some studies have found that academic entitlement might fluctuate with class that is class variables including class content, teacher etc. Cultural values can also influence academic entitlement (Hong and Cheng, 2012). Therefore, further work is warranted in this regard.

Conclusion

Academic entitlement is a major concern in secondary and higher education. It is documented as a familiar problem; however its causes are not well known. Recently, role of personality has received an increasing attention in explaining academically entitled behaviours. The aim of this study was to examine the intensity of academic entitlement among students and also to identify personality traits that best predict academic entitlement. Results indicate that academic entitlement exists among students of higher education. Besides, HEXACO model is significantly related only with entitled expectations, a component of academic entitlement. Only extraversion trait has found strongly positive and significant association with entitled expectations. Therefore it can be concluded that academic entitlement was somewhat predicted by HEXACO model, is only extraversion is a significant predictor of academic entitlement.

Recommendations and limitations

1. Findings of the study recommended that other factor are needed to explore in order to find out cause of academic entitlement.
2. Other personality traits should be related to academic entitlement in order to find out best predictor.
3. Except for management sciences students, other departments' students could also be taken as a sample.
4. Academic entitlement does exist in higher education students, so precautionary measures should be taken by concerned.
5. Universities (academic policy makers) should design such policies that prohibit academic entitlement among students.

6. Teachers/professors should encourage academic responsibilities among students, so academic entitlement could be discouraged.

INVESTIGATING THE RELATIONSHIP BETWEEN HEXACO MODEL OF PERSONALITY AND ETHICAL LEADERSHIP

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Abstract

The purpose of this study was to investigate the relationship between HEXACO model of personality and ethical leadership. Uptil now, ethical leader's behavior variation and its linkage to HEXACO model is not clear and therefore further investigation is required in this regard. An important focus of the study is to apprehend the strongest predictor of ethical leadership in personality traits of HEXACO. Population of this study included 131 leaders/ officer rank employees working in four educational organizations of Peshawar. A sample of 97 respondents was drawn using an arbitrary approach. The data was collected through questionnaires filled by leaders themselves (self-rated). The HEXACO personality traits (Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience) were measured through self-ratings using the HEXACO Personality Inventory Revised (HEXACO-PI-R). Ethical leadership behavior of the leader was measured using the ethical leadership scale by Brown et.al. (2005). Reliability of all scales was tested using Cronbach alpha coefficient and all scales were found reliable. All hypotheses were tested using linear regression. The findings reveal low but significant relationship between HEXACO personality traits and ethical leadership. As anticipated, conscientiousness appeared as one of the two strongest correlates of ethical leadership. Agreeableness was found to be the other significant positive predictor of ethical leadership. In contrast, Emotionality, openness to experience and extraversion were found unrelated to ethical leadership. Recommendations for research and practice have also been provided.

Keywords: Personality Inventory (PI), HEXACO model, Ethical leadership, Five Factor model.

Introduction

Leaders, whether they belong to business, government, sports, non-profit organizations, or even religious organizations play an important role in maintaining an ethical environment and upholding moral standards. Scandals like Enron and Ahold indicate that ethics is the foremost

priority of many organizations. It is considered as the most important part for any business so as to prevent such events in future. Selecting a leader that is not only good for organization but can create and keep ethical environment as a whole is highly important (Brown and Trevino, 2006). In order to have a veracious choice for an organization, it's crucial to comprehend ethical leadership behavior, its antecedents, character aspects, and cognitive moral development, responsibility as well as personality traits. Previous literature reveals very little about the exact characteristics or personality traits of ethical behavior. Extensively used and accepted models are the HEXACO, Big Five or Five Factor Model. Prior studies have shown no strong relationship exists between personality and leadership. Additionally, one of the meta-analysis results have shown stable effects (Bono and Judge, 2004). The five factors model that measure personality are extroversion, conscientiousness, agreeableness, openness to experience and neuroticism (Tupes and Christal, 1961). Brown and Trevino (2006) stated that conscientiousness and agreeableness are positively related to ethical leadership. In the studies conducted by Kalshoven et al., the Big Five traits, and conscientiousness are the most pertinent to ethical leader behavior. In this study the focus is mainly on a personality model called the HEXACO personality model. This model includes six factors represents personality. This model contains the five factors from the Five Factor Model and has a new dimension, called: honesty-humility (Ashton et al., 2004). Uptil now ethical behavior variations and its linkage to personality are not clear and more research is needed to find out ethical leader behavior relation with HEXACO personality dimensions. Therefore, in this study honesty-humility dimension of HEXACO model and ethical leadership will be emphasized. Brown et al., (2005) mentioned earlier that there is a growing interest in ethics and the stimulation of ethical behavior in organizations. This study is an attempt to sort out and understand the behavioral aspects of ethical leadership in relation to HEXACO. This study throws light on the concept of personality in academic literature. After that it describes the theory on leadership. Afterwards, relationship between ethical leadership and HEXACO personality model is enlightened.

Problem Statement

In leadership domain, previous studies have linked ethical leader behaviour with various factors such as core job characteristics (Piccolo, Greenbaum, Hartog and Folger, 2010), and Unethical Pro-organizational Behaviour (Miao, Newman, Yu and Xu, 2013) etc. However, limited work has been done in personality domain. Therefore, Kalshoven et al., (2010) emphasized the need for further investigation of leadership in the personality domain. Uptill now, studies relating leadership and personality have only been limited to the big five model of personality (Kalshoven, Hartog, and Hoogh, 2010). However, contemporary research has questioned the comprehensiveness of FFM and stressed the need to identify other models of personality. One of the contemporary models of personality is HEXACO. Therefore, the current study aims to examine the effect of personality traits in HEXACO model and ethical leadership.

Significance of the study

Preceding studies were mainly focused on personality traits i-e MBTI and five factor model generally highlight the role of dimensions from various perspectives. This study focuses on a new personality model called HEXACO which helps to understand the behavioral aspects in more detail. The study enhances and contributes in assessing the linkage between HEXACO personality and ethical leadership towards achieving better performance and ethical environment that leads to organizational success.

This study enables other researchers to have greater insights about human personality. Also this research facilitates organizations and companies to identify and gather the required information

they need to make effective decisions about what type of lead roles are crucial to improve the overall organization environment and performance as well.

Review Literature

There is a long history of research on personality. Many philosophers and writers have tried to investigate and describe human personality. Many theories have developed from time to time adding a few more understanding of existing concepts. Personality can be explained as vital or active part in the human psychophysical system which creates distinguishing forms of facial behavior, feelings and thoughts (Allport, 1961). By the early twentieth century, Sigmund Freud (1856-1939) described as "unconscious psychological functioning in the mind that people usually do not understand." Or personality is a withstanding and unique combination of attributes that may change in reaction to various situations (Mischel, 1968, 1973).

HEXACO Model

The recent HEXACO model that is accepted worldwide and is also suggested by lexical studies across several languages (Aston and Lee, 2001; Aston et al., 2004; Aston, Lee, and Son, 2000) found personality to be better explained through using six traits of i-e Honesty-humility, Openness to Experience, Extraversion, Emotionality, Agreeableness and Conscientiousness. The HEXACO personality Inventory is a potential replacement of NEO PI R. Studies have shown HEXACO PI to have significant predictive validity advantages (Aston and Lee, 2008). HEXACO PI was again modified to HEXACO PI R and mainly two changes i-e one of the facet of Extraversion was replaced to social self-esteem and secondly removal of evaluation facet.

Honesty-Humility

The newest personality factor, that is honesty-humility, is the sixth largest factor in various lexical investigations of personality structure. This factor was primarily named honesty, but was later changed in an attempt to capture and show the extensiveness of the content. Honesty-humility (HH) forms the basis on which the HEXACO structure is built and signifies the progressing from the Big Five and the FFM. This factor draws upon the FFM factor of agreeableness, which includes two key constructs, namely honesty and humility. It therefore can be concluded that the FFM agreeableness factor is a close match to the HH factor. This factor consists of four scales, namely sincerity, fairness, greed avoidance and modesty, all of which are included in the HEXACO-PI (Ashton and Lee, 2010; Lee and Ashton, 2012).

Emotionality

All research on personality structure has prompted in finding a factor that is characterized by fearfulness, anxiety, dependence and sentimentality. It has commonly been discussed as the Big Five emotional stability, but more recent studies have found that this factor has certain dissimilarities from the emotional stability component. It is important to note that this factor does not encompass irritability and temperament, which are both central to the low end of emotional stability. Furthermore, this factor includes sentimentality and sensitivity at the positive end and courage and toughness at the negative end, which varies from the low emotional stability dimension. It therefore can be deduced that the name emotionality can better define the factor than the emotional stability dimension (Ashton and Lee, 2010; Lee and Ashton, 2012).

Extraversion

Extraversion is a personality factor that is usually characterized by sociability, liveliness and cheerfulness on the one hand and passivity and being reserved on the other. It is important to note that certain elements that make up the Big Five extraversion dimension are not found within this

factor, but somewhat are considered to form part of the emotionality factor, for example bravery and self-confidence. Extraversion has been conceptualized to include facets that are found within the HEXACO-PI (Ashton and Lee, 2010; Lee and Ashton, 2012).

Agreeableness

This factor is usually described as being friendly, tolerant and agreeable on the one hand, and volatile, ill-tempered and quarrelsome on the other. As cited earlier, this factor differs from the corresponding Big Five factor mainly in terms of its content. From the provided differences, the HEXACO-PI includes four facets that form part of this dimension (Ashton and Lee, 2010; Lee and Ashton, 2012).

Conscientiousness

Conscientiousness is typically characterized in terms of organization, diligence and caution. It can be seen to be nearly identical to the corresponding Big Five dimension. It is important to note that the established Big Five conscientiousness dimension typically includes honesty, sincerity and a moral conscious, but these traits now form part of the honesty-humility factor. Conscientiousness has been conceptualized in a way to include facets that are found within the HEXACO-PI (Ashton and Lee, 2010; Lee and Ashton, 2012).

Openness to experience

The openness to experience dimension of HEXACO does not incorporate specific parts of the intellect facet that is mental ability or intelligence, whereas aspects like intellectual curiosity and inquisitiveness are included. There are four facets of openness to experience that are included in the HEXACO-PI. Aesthetics assesses an individual's appreciation of natural and artistic beauty, ranging from no appreciation to complete enjoyment of a number of art forms and natural glory. Secondly, inquisitiveness assesses the tendency to look for information concerning the natural and social world, i.e. the individual can either have slight inquisitiveness or is very interested in the natural and social world (Ashton and Lee, 2010; Lee and Ashton, 2012).

Leadership

Leadership, being an area of interest over centuries, has its roots in the beginning of civilization. Ancient Egyptians, Islamic era, Greek era, and biblical primates all possess one thing in common 'leadership'. There are many theories written on leadership and explained through various definitions. However, enough similarities are found among those descriptions explained era wise i.e leadership is exertion of social influence, vision, power and values in order to induce conformity (Wren, 1995).

Ethical leadership

Now days, the study of ethical leadership is increasingly gaining importance, as once mentioned that corporations have fallen from grace. Recently, collapse of Enron, failure of the Lehman Brothers, and housing business crash entitled to unethical behavior of organization (Thompson, 2010). Green and Odom (2003) perceived that hundreds of employee's instigated harm due to nonexistence of ethical leadership in Enron, raised the need of greater and firm government regulations, and unshakable customer confidence upon financial industry.

These incidents of organizations showing unethical behaviour have forced organizations/businesses to reconsider their strategic directions toward their goals, assisting them to learn that how ethical leadership is effective in to increase profitability for the organization (Moss, 2002). However, as Thornton (2009) notes, "Today in the global market exposure, there is a fierce competition for businesses and scarcity of resources, and also the possibility of problems

and incidents occurrence in leadership ethics has become evident.” Consequently, the current intensifying situation prevailing in organizations, it is eminent that there is a dire need for ethical leader (Darr, Singer, Mackie, Taylor, and Finegold, 2006).

Darcy (2010) said that the current environment is doubtful related to ethics of many organizations. In a research study conducted by the author, up to sixty six percent of individuals were selected and questioned “if ethical leadership now even exists”? it was revealed that trust was nearly absent named as “crisis of trust”. The conclusions drawn from the study found that the absence of trust is major problem of many organizations and individuals today.

These factors opened the doors of research and article writing related to ethical leadership. When comes a question that how a company can lead in an ethical manner along with producing a greater profits? The answer to this question requires some insights regarding scenario i-e one must previously study literature and develop a thorough understanding of ethical leadership. The one who encourages honesty, trustworthiness, team spirit and portray his actions with values and beliefs is called as ethical leader (Yukl, 2006). Beside all, due to the inclusion of various other elements, the author tried to clear his point of view by saying that ethical leadership is an ambiguous concept. Consequently, ethical leadership perhaps turns out to be a tough concept to grasp.

HEXACO and Ethical Leadership

The previously mentioned four personality characteristics (fairness, modesty, sincerity and greed avoidance) are facets that measure the new honesty-humility personality dimension. This dimension therefore is an average of and conceptualized by the four facets. Because all the four facets are hypothesized to be progressively associated to ethical leadership, this overall dimension of the four facets will be positively related as well. More specific, the characteristic of being honest as an ethical leader is mentioned in many studies about ethical leadership (e.g., Brown et al., 2005; Brown and Treviño, 2006; Carlson and Perrewe, 1995). According to Brown and Treviño (2006) ethical leaders are considered as authentic and trustworthy. Also it was stated that ethical leaders are categorized as honest, principled, and caring individuals (Brown and Treviño, 2006). Characteristics of ethical leaders identified by Weaver, Treviño and Angle (2005) included also caring, honesty and fairness. But they also found different attributes linked with ethical leadership such as readiness to convert faults into knowledge and modesty (Weaver et al., 2005). Research from Carlson and Perrewe (1995) indicate that honesty and integrity are important traits for an ethical leader. In the research of Treviño et al. (2003) it is said that ethical leaders are considered to be honest. In interviews with ethics officers about ethical traits, the trait honesty was represented 18 times in 12 out of 20 interviews and in interviews with executives honesty was mentioned 13 times in 9 out of 20 interviews (Treviño et al., 2003). This indicates that being honest is considered to be a characteristic of an ethical leader.

Hypotheses

The following hypotheses were tested in this study.

- H1:** There is a significant effect of Honesty-humility on ethical leadership.
- H2:** There is a significant effect of emotionality on ethical leadership.
- H3:** There is a significant effect of extraversion on ethical leadership.
- H4:** There is a significant effect of agreeableness on ethical leadership.
- H5:** There is a significant effect of conscientiousness on ethical leadership.
- H6:** There is a significant effect of openness to experience on ethical leadership.

Methodology

Population and Sample

The population for this study consists of officers having leadership roles in different institutions/universities of district Peshawar i.e Pakistan Academy for Rural Development Peshawar (PARC), Pakistan Forest Institute Peshawar (PFI), City University of Science and Information Technology (CUSIT), the University of Agriculture Peshawar (UAP). Only those individuals were selected who are having supervisory responsibilities. Information mainly collected through telecommunication resources, and through personal visits. The number of individuals in these universities/institutes is 131. Thus the total target population for conducting this study was 131.

Sampling design helps to gather information about a population without having to measure the entire population. Selecting an appropriate sample size of the study basically depends on the following factors that include time availability, accessibility of concerned individuals, and financial resources. Previous studies conducted by Kalshoven et al., (2010) took a sample of 91 supervisors. Based on the trends in previous studies of identical nature and area, a sample of 97 officer rank employees was selected from the target population by using proportional allocation method Cochran, 1971).

Variables

The 10-item *Ethical Leadership scale* (ELS) used in this study which was suggested by Brown et al. (2005). Example of items for ethical leadership include: 'Listens to what employees have to say'; 'Conducts personal life in an ethical manner'. Responses were made using 5- point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree".

The instrument assesses the six major dimensions of personality. The 60-item *HEXACO short measure scale* (HEXACO-PI-R) used in the study which was proposed by Michael, Aston and Lee (2008). Example items for HEXACO include: 'I would be quite bored by a visit to an art gallery'; 'I find it boring to discuss philosophy'. Responses were made using 5- point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree".

Data Analysis

Data collected from respondents were systematically appended and then analyzed by using frequency analysis and descriptive statistics through SPSS software. The items needed to be reverse code are recoded and changed accordingly. Mean scores were generated on the data. Afterwards outliers test was carried out on this data to find out any outliers and missing values present in data. Then, in order to check the internal consistency of data, reliability test was carried out on all items of the variable measures. Cronbach's alpha coefficient was the measure of reliability used. Lastly, multiple regression analysis was executed on data to find out the relation between dependent and independent variables. Hypotheses were tested using Multiple Regression technique which is one of the most common analysis techniques used for studying the relationship between quantitative variables.

Reliability

In reliability analysis, inter item consistency is measured through Cronbach's coefficient alpha (Cronbach, 1951), which is used for scaled items. Cronbach's alpha reliability coefficient normally ranges between 0 and 1. However, there is actually no lower limit to the coefficient. The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale (Sekaran, 2006). Hair et al (2003) developed a benchmark which considers an alpha score less than 0.60 to be poor and not acceptable reliability range. If it ranges from 0.60 to 0.7

then it is considered as moderate reliability, 0.7 to 0.8 as good whereas 0.8 to 0.9 reliability range is considered as very good.

Table 1: *Reliability Analysis*

Variable	No of items	Alpha Score	Reliability
Ethical Leadership	10	0.66	Reliable
HEXACO	60	0.71	Reliable

According to table 1, the Cronbach alpha value of Ethical leadership having 10 items was 0.66 which lies in acceptable range. There was no reverse coded item in ethical leadership scale. Overall HEXACO variables having 60 items were turned out 0.71, which shows good reliability. The Cronbach alpha value for Honesty-Humility scale having 10 items was found to be 0.60 (reliable). For emotionality factor the alpha value was 0.50 and similarly for agreeableness was 0.39 which was found to be low reliable. The Cronbach alpha for 10 item extraversion was 0.73, signifying good reliability. For conscientiousness value was 0.65 and for openness to experience, the alpha value was 0.61. Reverse items of HEXACO were reverse coded before applying the reliability test. Overall the scale / measures were found to be reliable i-e 0.75.

Regression Analysis

Regression analysis is used to determine the intensity of the relationship between two or more than two variables i-e one is called as the dependent variable (Y) and the other variable known as independent variables (X). There are two types of regression analysis; one is 'linear regression' which consists of one independent variable to predict the outcome of the dependent variable Y, while the other is known as 'multiple regression' which uses two or more than two independent variables to predict the outcome (Rubinfeld, 2011).

Diagnostics of multicollinearity (VIF)

Multicollinearity is a situation in which two or more than two independent variables in a multiple regression are closely correlated to each other. Usually multicollinearity gives rise to wider confidence intervals and also gives less reliable P-values for independent variables (Farrar and Glauber, 1967).

Table.2: *Collinearity Diagnostics*

Collinearity Statistics	
Tolerance	VIF
0.803	1.245
0.890	1.123
0.662	1.511
0.870	1.150
0.779	1.284
0.750	1.333

Regression Analysis for HEXACO model of personality and Ethical leadership.

According to the results the overall model is significant which means that the HEXACO model of personality has significant effect on ethical leadership. ($F = 3.120$ with $p\text{-value} = 0.008$). Two dimensions agreeableness and conscientiousness have rather significant effect over ethical leadership ($p\text{-values}$ less than 0.10) while the four dimensions of HEXACO model which are Honesty-humility, emotionality, extraversion and openness to experience have insignificant effect on ethical leadership.

It is evident that the $p\text{-value}$ of $F\text{-statistic}$ is less than the 5% and the level of significance suggesting that overall model is significant at 0.05 level that is ($P < 0.008$). The regression coefficient sign is positive for all variables i-e ($\beta = 0.070, 0.067, 0.077, 0.163, 0.168, 0.046$), hence positive relationship exists between independent variables and dependent variable. The values of VIF are less than 10 and (0.803, 0.890, 0.662, 0.870, 0.779, and 0.750) respectively showing that there is no multicollinearity problem exists.

Table 3: *HEXACO Personality and Ethical leadership*

Model	Unstandardized Coefficients		t-ratio	Sig.
	B	Std.Error		
(Constant)	2.185	0.560	3.904	0.000
Honesty Humility	0.070	0.076	0.913	0.364
Emotionality	0.067	0.083	0.810	0.420
Extraversion	0.077	0.078	0.989	0.325
Agreeableness	0.163	0.094	1.735	0.086
Conscientiousness	0.168	0.086	1.953	0.054
Openness to experience	0.046	0.078	0.595	0.553

Dependent variable: Ethical leadership, $R^2 = 0.172$, F value = 3.120, P value = 0.008

Discussion and Conclusion

The study examined HEXACO model of personality in relation to ethical leadership. The overall outcome of this study reveals that there exists a significant relationship between HEXACO model of personality and ethical leadership. And the outcomes are in partial agreement with the previous studies conducted in personality area. Kalshoven et al. (2010) stated that the outcomes from two independent studies which consist of slightly different measures are consistent and are predominantly in line with those of Walumbwa and Schaubroeck (2009) due to the fact that they also reveal low but significant relationships between the Big Five model and ethical leadership. Lim and Ployhart; (2004); Tepper, Duffy, and Shaw, (2001) also revealed that the correlations of the study were not high and were similar in extent to those found in prior research linking to leader personality.

This study found the overall model of HEXACO and ethical leadership as significant. However, traits of conscientiousness, extraversion and agreeableness show low levels of positive correlation with ethical leadership. Traits of conscientiousness and agreeableness appear to be moderately significant. This finding is aligned with the results of Kalshoven (2010), which shows that after controlling for other traits, agreeableness did not show the expected unique significant relationship with ethical leadership. Also Craig (1998) found no link between conscientiousness and the integrity factor of ethical leadership. This is not in line with the findings of Walumbwa and Schaubroeck, (2009) and with another study conducted by Kalshoven et al. (2010) who found

significant results to both variables. As expected, openness to experience, emotionality and extraversion appears to be highly insignificant compared to the other variables. This finding is in harmony with (Kalshoven et al., 2010; Walumbwa and Schaubroeck, 2009). In addition to that Judge et al., (2002) also found negative relationship between emotional stability and leadership. Hence it can be concluded that the partial alignment of results of current study leave the field open to further inquiry.

This study contributes to personality and ethical leadership research area. Also, this study tries find out a connection between HEXACO model of personality and ethical leadership. In this way, the study raises a question of factors or traits responsible behind ethical leadership. So far, the HEXACO model used in this study did not clearly shows of its contribution to ethical leadership. Conscientiousness and agreeableness as previously mentioned in other studies up to some extent relate to ethical leadership. This study is carried out to create a ameliorate understanding of ethical leadership. Practical implications include ethical environment where leaders become an inspiring personality having combination of desirable traits and sets an example for subordinates.

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WORKPLACE POLITICS AND EMPLOYEE PERFORMANCE: AN EMPIRICAL STUDY OF EDUCATION SECTOR IN PAKISTAN

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Abstract

Presence of intensely competitive and complex business environment has completely changed the way of organizations used to interact and conduct their businesses. As complexity in business globe is increasing, so is the competition in the companies to enhance their performance and meet their goals within defined timespan. However, it is considered that increase competition and lot of pressure on organizations is leading toward lot of organizational politics. This research paper completely revolves around investigating and examining the Impact of organizational politics on the performance of employee in educational sector. Johnson and Scholes Cultural Web Theory 1992 is used in this paper. The research is quantitative in nature, and after in-depth analysis and consideration, questionnaire has been adopted in order to collect data from the respondents. The respondents of the study are employees that are teachers and management staff of the colleges and universities of Lahore, Sialkot, and Gujranwala. Probability random sampling has been adopted and the total sample size is 257 respondents. The data have been deeply analyzed through the implication of regression and correlation analysis for the model testing by using SPSS. Main predictors of model summary are organizational politics, political behavior, decision making and employee performance. The findings of this research highly recommend that by changing the attitudes and make the participatory role high for the employee gives them liberty to raise their voice, share their opinions and the transparency will take place which decrease the negative aspects of the organizational politics. Future recommendations are given in this research paper.

Keywords: Organization politics, Political Behavior, Decision Making and Employee Performance.

1. Introduction

Since last few years, lot of research studies have been conducted within the area of organizational politics reflects its impacts and influences. It is analyzed that as the competition in the business globe is dramatically increasing, organizations have started to get engage in employee empowerment and team working that have results in high organizational politics (Vigoda-Gadot, 2007). In accordance to considerations, organizations need to analyses and examine how organizational politics can be transformed in more productive aspect leading to enhancing the organization as well as employee performance and productivity (Jurkiewicz & Giacalone, 2004). Organizational politics is described as activities and tasks that permit people in the organization to achieve goals and objectives without going through the proper channels (Mayes, Finney, Johnson, Shen, & Yi, 2017). Whether the political activities harms or assist organization is completely dependent on whether goals of the individuals are being consistent with organizational goals and objectives (Jurkiewicz & Giacalone, 2004). It is considered that they are considered to be no doubts that the political beliefs are labeled to be ordinary observable facts in organizations (Gull & Zaidi, 2012).

Organizational politics is represented by the devious employee behavior and attitude towards the work environment only for the own self-interest (Abbas & Awan, 2017). However, this self-interest might be at cost of the other employees or might be organizational goal as well (Chang, Rosen, & Levy, 2009). It is also considered as one of unofficial advancements for the attaining of power. Similarly, it can be explained by accomplishing power through the number of ways except fortune or merit. Politics is sometimes used by the employees for the accomplishing of power, either by positive means or negative means. This is only done for the accomplishment of personal benefits and advantages, such as for promotions, getting strong projects, obtaining high funds as well as other resources and many other related aspects (Kuyumcu & Dahling, 2014).

Productive politics are always beneficial to an organization, especially in terms of enhancing the employee's performances and job satisfaction (Bentley, Treadway, Williams, Gazdag, & Yang, 2017). However, It is considered that the employees which do not believe is hard working are completely dependent on the nasty politics in order to ensure their position secure at workplace (Karatepe, 2013). They mostly play politics for gaining limelight and undue attention as well as appreciation from seniors (Poon, 2004), thus, overall resulting in the productivity of organization. This research paper investigates and examines the Moderating role of organizational culture on organizational politics with impact on the performance of employee. Johnson and Scholes cultural web theory 1992 is used in this paper where the employees take the culture as for granted and react for their safe sides. In this theory, there is a paradigm that constructs the web of stories, symbols, rituals, organizational culture, power structure and control system. We are using the organizational culture and power structure in context on organizational politics on the employee performance.

1.1 Problem statement:

How the politics will be fruitful for the organization if used for the healthy performance of employees in education sector. As presence of intense competition and complexity in the business globe has put lot of pressures on the organization to survive and get hold of market share. It is analyzed that as competition is increasing, working in the organization is also becoming complex, difficult and more and more people are involved in the politics. Politics has both positive as well as negative impacts. Negative aspects might have devastating impact on the organization. Thus, this research revolves around examining and investigating the workplace politics and employee performance. Specifically, the main research problem is focusing on is presented as followed: *"To what extent the workplace politics affect the employee Performance: An Empirical Study of Education Sector in Pakistan"*.

2. Literature Review:

In accordance to (Latham & Dello Russo, 2008) referred political behavior in the organization consists of the self-serving actions and behaviors taken by the individual or group. Specially, they are directed towards goals of the furthering one's own self-interest without consideration for well-being of the others in the organization. In the organization, political behavior includes ingratiation and self-promotion. In accordance to putting forward the argument by (Andrew & Leon-Cazares, 2015) that has pointed that political behavior reflects that one self is more committed than employees, however, it is also argued that as the competition is increasing, and businesses are looking forward to the committed employees, probability of political behavior is really low as it is not working especially in the private sector (Cullen, Edwards, Casper, & Gue, 2014).

Research (Gull & Zaidi, 2012) attempted at examining and determining the role of organizational politics on the job satisfaction of employees of the health sector. The research identified and examined that association between organizational politics behavior and employee satisfaction. Research findings reflected that the employees behavior acting in self-serving way attaining the

valued results is not concerned with job satisfaction level of employees in health sector. It is considered that the silent actions of employees attains personal advantages are deliberated to be negatively associated with job satisfaction and employee performance (Awadh & Alyahya, 2013). Related to (Dekoulou, Dekoulou, Trivellas, & Trivellas, 2017) further stressed that the bad political behavior can highly effect an organization, as it might not be suitable in lot of situations and scenarios, especially, where some of the employees divert the organizational resources for the personal benefits at expense of the organizational goals. For example, in case of the Jacques Attali who was European Bank's managing director who took position as bank's head, and took benefit of his position to the embezzle resources of company. He spent more than \$1.5 million for changing marble in the new offices of bank in accordance to taste, and spend almost same amount in hiring the private jets for personal use. (Salimäki & Jämsén, 2010)

During his position, organization spent more than \$310 million total on itself twice Amount Company invested and lend to various other countries in the Eastern Europe and various other countries. On other hand, it is argued that (Cording, Harrison, Hoskisson, & Jonsen, 2014) that bad political behavior might thwart organizational decision making in the situations and scenarios where the managers can deliberately influence the decision making in suiting the interest of individual by the prevention of formal discussions of any problems that they do not support by considering not the issue on agenda.

Professional jealousy is a major factor that leads to the selfishness at the workplace. People sometime due rivalries get selfish and are expected to get involved in different unfair activities that lead to incongruity of values among other colleagues. But if they are directed towards the positive behavioral activities then such people will be considered good for organization (Gotsis & Kortezi, 2011)

An international research has been made on the readymade garment employees in Bangladesh in which there is no relationship between organizational politics and employee performance however there is a relationship in which employee commitment is get affected from organizational politics (Rahman, Hussain, & Haque, 2011) On other hand, research also tells that political skills of the employees are very useful in dealing with the relationship with the leaders/Heads of the organization but they can motivate the organizational citizenship behavior. (Li & Kong, 2015)

According to the article (Appelbaum & Hughes, 1998) the organizational politics has two perspectives one is general and second one is ingratiation in which a person use some tactics to make itself prominent in the organization. Such individuals create their attractiveness towards the other employees by uniqueness in their work tasks. However on individual basis the results are mixed up as they are affected by the seasonal factors of different sets of job. (Meisler & Vigoda-Gadot, 2014) Alleged organizational politics have connection with the emotional intelligence of an employee in which he/she get capable of discriminating between the emotions of others employees at the workplace and it also distress the work outcomes.

In the article "Antecedents of organizational politics perceptions in Kuwait business organizations" (Muhammad, 2007) shows that the substantial predictors from which the organizational politics arise is the work/job context dynamics and the hierarchical level. But the centralization does not have significant effect on the perceptions of employees regarding organizational politics.

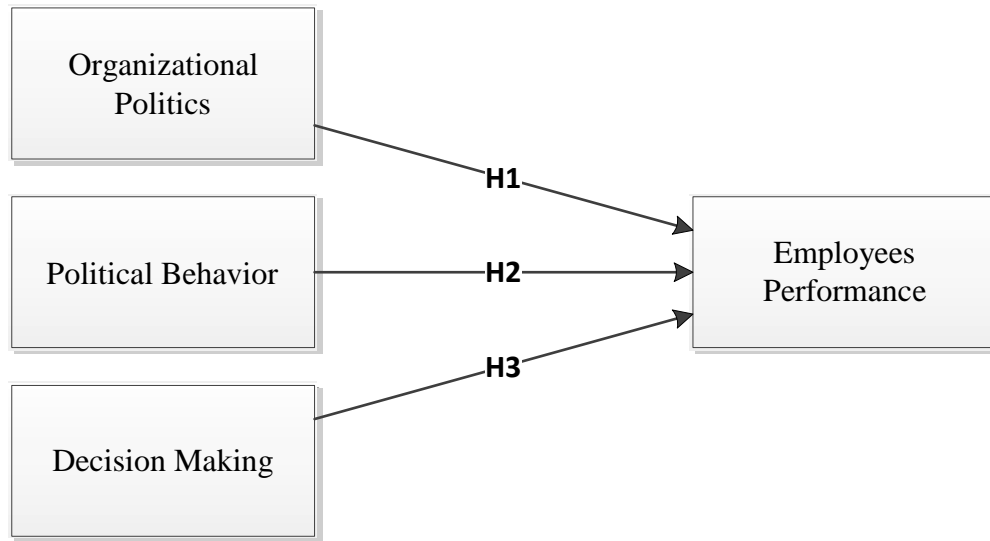
Voice behavior shows strong association with the outcomes that are considered favorable for the accountability of the employees and the political skills whereas the low preemptive voice shows negative effect on accountability of employee. (Hochwarter, Ellen, & Ferris, 2014)

In article of (Salimäki & Jämsén, 2010) they found that the few forms of politics like favoritism and compression affect the performance appraisal of the employee and the pay structure get affected from the injustice of distributing equal rights that leads to high turnover and less employee commitment with the firm. Leadership style plays a pivotal in the employee

performance, as if the employee gets support from the top management or from peers they feel secure at the workplace.

2.1 Theoretical Framework Model

Relevant literature and research studies have assisted in the design and development of research theoretical framework model. Theoretical Framework model is comprised of four different types of variables that include dependent, and independent variables. Dependent variable is Employees Performance, whereas independent variables are organizational politics, political behavior and decision making. Theoretical Framework Model is presented as followed:



2.2 Hypotheses

On the basis of theoretical framework model, research hypotheses are developed and presented in context of defining the relationship between independent and dependent variable.

H1: Organizational politics are positively associated with employee performance.

H2: Political behavior is negatively associated with effective employee performance.

H3: Decision making is positively associated with employee performance.

3. Research Methodology

Research methodology bears significant importance in the research process. However, selecting of the right research methodology needs high consideration as it has great impact on the overall research process. Complete process of research methodology comprises of various set of phases that are interlinked with each other. The research study, Workplace Politics and Employee Performance: An Empirical Study of Education Sector in Pakistan is quantitative in nature. Quantitative research tools and instruments are considered for the execution of the research.

3.1 Research design

Importance of selecting appropriate research design for the research study cannot be neglected at any instance. Research design provides an appropriate road map to the research clearly identifying the direction that needs to be followed. After conduction and consideration of existing research scenario, we have considered the selection of quantitative research tools and methods for conducting research. After in-depth analysis and consideration, questionnaire has been adopted in order to collect data from the respondents.

3.2 Sample size

Research, "Workplace Politics and Employee Performance: An Empirical Study of Education Sector in Pakistan" is completely based focusing on educational sector of Pakistan, especially, colleges and universities. The main respondents of study include employees that are teachers and management staff of the colleges and universities of Lahore, Sialkot, and Gujranwala. Probability random sampling has been adopted and the total sample size is 139 respondents. However the questionnaire was distributed among 300 individuals, out of which 257 respondents give it back. We have selected 139 respondents as these individuals have fulfill the questionnaire properly and share the required necessary details required for the process. The data collected from the respondents have been deeply analyzed through the implication of regression and correlation analysis for the model testing.

4. Data analysis and results:

Data analysis and findings of this research paper is designed and developed under the strong consideration to determined and analyzed the Moderating role of Organizational Culture on Workplace Politics and its impact on Employee Performance. Data analysis and findings are based on two main statistical tests. These statistical tests are hypothesis testing through practically apply correlation analysis and multiple regression analysis model. Correlation and multiple regression analysis models are considered as statistical terms. The main functionality of multiple regression analysis is used to analyze the impact of all the independent variables on dependent variable. The results of data analysis and findings are presented as followed:

4.1 Hypothesis Testing

The result of hypothesis testing is presented as followed:

		Table 1			
		Organizational Politics	Political Behavior	Decision Making	Employee Performance
Organizational Politics	Pearson Correlation	1	.186*	.074	.717*
	Sig. (2-tailed)		.000	.000	.000
	N	139	139	139	139
Political Behavior	Pearson Correlation	.186*	1	.022	.599*
	Sig. (2-tailed)	.000		.000	.000
	N	139	139	139	139
Decision Making	Pearson Correlation	.074	.022	1	.571*
	Sig. (2-tailed)	.000	.000		.000
	N	139	139	139	139
Employee Performance	Pearson Correlation	.717*	.599*	.571*	1
	Sig. (2-tailed)	.000	.000	.000	
	N	139	139	139	139

*. Correlation is significant at the 0.05 level (2-tailed).

*Source: author compilation

First research hypothesis is about organizational politics are positively associated with employee performance. The correlation value of organizational politics and employee performance is .717*, show positive relationship, level of significant is 0.000 and hypothesis is proved.

Second research hypothesis is political behavior is positively associated with employee performance. The correlation value of political behavior and employee performance is .599*, show positive relationship, level of significant is 0.000 and hypothesis is proved.

Third research hypothesis is decision making are positively associated with employee performance. The correlation value of decision making and employee performance is .571*, show positive relationship, level of significant is 0.000 and hypothesis is proved.

4.2 Regression analysis

Regression analysis is considered as statistical terms which are used to determine and analyzed that impact of all the independent variables on dependent variable. These variables are derived through framework model of paper. The result of model summary is presented as followed:

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.821 ^a	.906	.159	1.02044

a. Predictors: (Constant), Decision Making, Political Behavior, Organizational Politics

b. Dependent Variable: Employee Performance

**Source: author compilation*

The main predictors of model summary are organizational politics, political behavior, decision making and employee performance. In according to the results, it has been analyzed that the value of regression is 82.1%, R square is 90.6%, adjusted R square is .159 and standard error of estimation is 1.02044. Hence, these values are considered as good for further more proceeding of study. The result of ANOVA analysis is presented as followed:

Table 3: ANOVA^b

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.946	3	.315	30.3	.000 _a
Residual	140.576	135	1.041		
Total	141.522	138			

a. Predictors: (Constant), Decision Making, Political Behavior, Organizational Politics

b. Dependent Variable: Employee Performance

**Source: author compilation*

ANOVA analysis is used to determine the variance in research model. In according to the results, it has been analyzed that frequency is denoted by F i-e 30.3% shows variance in model at level of significant is .000. The result of coefficient analysis is presented as followed:

Table 4: Coefficients

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.403	.448		7.600	.000
	Organizational Politics	.010	.080	.011	.129	.000
	Political Behavior	.049	.077	.055	.633	.000
	Decision Making	.051	.077	.057	.659	.000

a. Dependent Variable: Employee Performance

*Source: author compilation

Coefficient analysis is derived through multiple regression analysis models. Coefficient analysis is composed of two main components. These components are unstandardized coefficient and standardized coefficient. In according to the results, it has been analyzed that standardized coefficient is used to identify the best predictors from research model based on the value of beta. The result shows that first predictor is decision making having beta value is .057, at level of significant is .000. Second predictor is political behavior having beta value is .055, at level of significant is 0.000 and third predictor is organizational politics having beta value of .011, at level of significant is 0.000. Hence, this predictor's are very helpful for bring change in current system and improve overall employee's performances.

5. Conclusion and Recommendations

It has been concluded that organizational politics is not considered as good sign for organizational growth and for its culture in Pakistan. Employees are key resources for organizational productivity but when politics come into it, the performance get affected. During the investigation it has been found that the faculty and staff members of the educational institutes have mixed views but all end up in negative comments about organizational politics. Positive affords of employee is very helpful for organization to accomplished goals within set time frame. The effect of organizational politics is directly as well as indirectly impact employee's performance. It has been analyzed that effects of organizational politics are based on decrease in overall employee's productivity, provide wrong information about products and services to customers, increase employees stress level, affects concentration, and spoils the ambience, changes employees' attitude and demotivated employees as well which lead to lack of commitment.

Today, the contribution of top level management is focused on designed policies and procedures related to organizations to manage load, well perform operations functional organizational activities and also reduce the factors of organizational politics. Organizational politics overall disturb operational functional activities of organizations, not effectively to manage human and physical resources. If the communication is top down and is censored as well it will affect the culture as the employees don't have any role to raise their voice. Management of organizations is avoiding any kind of politics within current system and takes effective decision to complete their task, objectives and goals.

5.1 Recommendation:

It has been highly recommended that the top management decisions play a very important role to minimize organizational politics from current system of organization. Organizational political

always affect employees overall performance, their attitudes, their way of thinking and the satisfaction level. So, the current management of organizations designed model for effectively managed human and physical resources helpful for complete tasks, objectives and goals in according to their requirements. Today, in the presence of highly competitive business environment management must play important role in terms of decision making and also to minimize the concept of organizational politics. The findings of this research highly recommend that by changing the attitudes and make the participatory role high for the employee gives them liberty to raise their voice, share their opinions and the transparency will take place which decrease the negative aspects of the organizational politics.

5.2 Future Research

Research "Moderating role of Organizational Culture on Workplace Politics in Decision Making, the change approach and its impact on Employee Performance in educational sector" is considered to be really important topic as it interlinks the concept of organizational politics with the employee performance. However, due to small budget and specified time span, researcher could not work on the broader domains; thus, in future research work should be conducted in similar domain at different scale, in order to have more clearer view.

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DEPENDENCE OF SUKUK INDEX ON CONVENTIONAL STOCK INDICES OF PAKISTAN

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Abstract

Sukuk are a growing portion of the Pakistan Stock exchange and a source of Shariah compliant securities for faith conscious investors in Pakistan. Sukuk market started only a few years ago in Pakistan and is still in early phase of growth. For this reason, we need to focus our research on this growing segment of securities market and help to explore new growth opportunities along with influencing factors within Pakistan's Stock Market. In this research we tried to find out if a relation exists between Shariah Compliant stock market and other non Shariah compliant indices like KSE30 and KSEAll. We took 5 years of daily stock index returns data from these indices and used it under multiple linear regression analysis to find out existence of correlation among these markets and the strength of this correlation accordingly. Results were found consistent with provided hypothesis that there exists a significant relationship among KMI Index and the KSE Indices and the dependence of KMI 30 index over KSE indices was proven. The research suggested a multiple regression equation to calculate fluctuations in KMI30 index if the KSE 30 and KSE All index had a rise or fall.

Keywords: KMI 30, KSE 30, KSE All, Sukuk, Correlation.

1. Introduction

Islamic financial system runs according to the Islamic law (called Sharia) and therefore is the core part of Islamic ideology. Like the traditional financial system, there are institutional bodies of Islamic finance are banks, capital, fund managers, investment agencies, and insurance companies. These institutions are governed by both the rules and regulations of Islamic laws as well as the financial industry. Although the Islamic finance industry itself is quite young, ideology of Islamic economics existed for more than 1400 years. In fact, many Muslim scholars have introduced the major concepts of Islamic economics which are today being practiced in Islamic Finance. The political and social conflicts in Muslim societies and fiqhs had left Islamic finance under-nourished and unexplored for a very long time. In the 20th century, Muslim scholars and other traditional scholars seriously started to implement Islamic finance and began to tackle these issues with a productive approach.

According to Sharia (Islamic religious law), Sakk (plural Sukuk) is an Islamic financial certificate, like a bond is in Western finance. Because the bond structure utilizes interest returns and is not permissible in Islam. The issuer of a Sukuk sells a certificate of ownership to an investment group, and then uses income from that transaction to buy the asset, in which the investment group is partner of ownership and share both profit and loss. The issuer must also make a contractual promise to buy back the bond at a future date at par value. However, such a design of transaction will result in giving Sukuk more of a debt nature rather than the ownership nature in that asset. For this purpose, in Pakistan we have eliminated the last part of Sukuk contracts and thus the buyback of these securities is left optional to the Sukuk holder's will. The

SBP Definition of Sukuk is "Sukuk Certificates represent proportionate beneficial ownership and may be described as an Islamic Bond for a defined period the risk and return on which is associated with cash flows generated by a particular asset belonging to the investors i.e. Sukuk holders." (Arif, Corporate Sukuk Issuance and Prospects).

There has been an intensive push by supervisory establishments in Pakistan in the last few years to encourage Islamic finance industries. Lately, the Securities and Exchange Commission of Pakistan (SECP) issued guidelines on the issuance of privately placed sukuk. Corporate sukuk are an essential part of Islamic debt capital markets, which provide a substitute to borrow resources without having to negotiate extensive loan contracts with banks. During the past one decade more than a hundred sukuk have been issued in Pakistan with a total net worth of PKR 1.16 trillion in which PKR 865 billion worth of sukuk were issued by the Government of Pakistan and a PKR 150 billion by public sector entities. However, a total of PKR 170 billion worth of sukuk were also issued by corporate entities. This enable the Government of Pakistan to tap the international Capital markets on many occasions that included in 2005 with a USD 600 million sukuk and USD 1 billion sukuk in both 2014 and 2016.

We wanted to examine the dependence of Sukuk yields with the overall stock market yields and to find out the extent to which Sukuk are dependent on overall market yields. There are many types of sukuk as there are many types of securities in the market and thus need to be evaluated as an independent security in the market. In this study we are focused on finding out whether the fluctuations in Sukuk yields are correlated with the fluctuations in other securities on the Market (PSX). The aim of this study is to find out if there is any dependence of Sukuk on overall market fluctuations and if there is dependence, then what is the degree of this dependence of Sukuk over conventional securities market fluctuations?

2. Literature Review

Nader (2016) found that a symmetrical dependence exists in sukuk markets and stocks volatility in Saudi Arabian Markets. He used 3 Archimedean copula models having differing tail dependence structures: the Gumbel, Clayton and Frank structures. The data he took was from 23rd November, 2010 till 6th October, 2014 and comprised of daily yield to maturity of liquid sukuk from Thomson Reuter Website. His research concluded that the sukuk yields and stock market volatility are linked with each other in an intense manner and they are immune to extreme events. Farhan, Iqra and Anjum (2016) compared the daily closing price volatility of KSE 30 with KMI 30 indices and the daily closing price volatility of Dow Jones Islamic Market Index (DJIMI) with Dow Jones Industrial Average (DJIA) for the period of 2012 till 2016. Their findings also established the relationship of conventional and Islamic indices and revealed the impacts of geographical boundaries on stock market volatility relationships. The study utilized the Autoregressive Conditional Heteroskedastic model and Generalized Autoregressive Conditional Heteroskedastic models. The variants utilized in study were Power Autoregressive Conditional Heteroskedastic, Threshold Autoregressive Conditional Heteroskedastic and Exponential Generalized Autoregressive Conditional Heteroskedastic.

Alex, Alberto, Stefano and Andrea (2016) studied the global markets for active correspondences and volatility connections among international markets. Their study concluded that there exists a strong correlation among the Islamic sukuk markets and the international markets of the UK and US. They also found that the linkages of volatility are usually higher during the era of crises and that other factors of quality also affect these linkages. Their study utilized the generalized autoregressive conditional heteroskedasticity models with dynamic conditional correlations.

Nader, Shawkat and Al Dohaiman (2016) studied the sukuk markets of Malaysia, Saudi Arabia and United Arab Emirates in relation to stock markets of national, regional and global levels. They utilized diversified Archimedean copula models (Gumbel, Clayton, Frank and AMH) with a

varying tail dependence structure. Their study concluded that the Islamic markets show dependence to the conventional markets but this dependence is only linked with the stocks volatility. Moreover, the local sukuk markets show more dependence to the global stock markets and less with the international Islamic stock markets and conventional national and local stock markets.

Ejaz and Waheed (2015) studied the performance of both Islamic and conventional stocks in Pakistan by utilizing the GARCH-M model (Generalized Autoregressive Conditional Heteroskedastic in the mean) and by taking the data of July 2008 till November 2013 for their analysis. His findings concluded that there exists a momentous impact of interest rate volatility on KSE 100 index but it had no effect on KMI 30 index showing interest free security properties in its true sense. However, the exchange rate volatility had a substantial impact on both the KSE 100 and the KMI 30 indices.

Zulkhibri (2015) performed a three perspective study on both the theoretical literature and the empirical literature on Sukuk. The three perspectives were the underlying theory its nature, the sukuk's operational issues and structures and economic development roles of a sukuk. He concludes that the literature on sukuk mostly comprises of theoretical nature and is of qualitative nature and not of the quantitative nature with most of the writings available from conferences and seminar papers. He further concludes that the reason for lacking in quantitative is mostly the lack of reliable historical data and a consistency among the data units as well. There is a lack of academic institutions that are dedicated to Islamic finance and economics research only, and a limited number of Islamic economics journals and still a very ambiguity of sukuk among Muslim Scholars. He finally concludes that the biggest reason for such an underdevelopment in research of sukuk is the lack of a unified common global standard for Islamic finance.

Shaukat, Walid, Juan and Khuong (2014) utilizes the time series data of years 1999 till 2013 to find out if there exists any dependence among international sukuk markets and the international Conventional Stock markets. For this purpose, they utilized the Dow Jones Islamic Market Index as global Islamic market index and for global conventional equity indices they used Asian, European and United States Market Indices. The authors used copula approach for their study analysis and found that the Dow Jones Islamic Market index demonstrates significant dependence with global conventional equity indices of Asia, Europe, and United States.

GINANJAR et al (2014) studied the multi time scale analysis of both the Islamic and the conventional stock exchanges and found that the Islamic market showed diminished and limited effects of recent few nine major crises due to lower leverage effects in Islamic securities. The study utilized wavelet decomposition methods to check impacts of such crises and these shocks were transmitted via excessive linkages in all markets. Their study also revealed that the Islamic market are also less diversified in their portfolios and thus show an increased exposure to other kinds of crises.

Nursilah, Nurazira and Zurina (2012) studied the macroeconomic impacts on sukuk allotments and issuances for the Malaysian markets and they studied for the historical data from 1996 till 2011. They utilized the VAR Models (Vector autoregressive), the VDC model (variance decomposition) and the IRF model (impulse response functions) for their study and found that the factors they had chosen for study actually did had an impact on sukuk issuances. Furthermore, the impact found that sukuk Granger affects GDP whereas, GDP Granger affects Producer Price Index and the consumer price index.

3. Research Methodology

We took time series data consisting of daily stock market index returns covering the period from 1st April 2013 to 30th April 2018. The Data was collected from daily Quotations from *ksestocks.com* website.

Dependent Variable = KMI 30 Index Returns

Independent Variable 1 = KSE 30 Index Returns
Independent Variable 2 = KSE All Index Returns

The daily stock index returns (R_t) are calculated as follows:

$$R_t = Ln\left(\frac{P_t}{P_{t-1}}\right) \times 100$$

Where;

R_t = Daily Returns of indices at time t

Ln = Natural logarithm multiple

P_t = Daily closing price of index at time t

P_{t-1} = Daily closing price of index at time " t " minus 1 (One-day prior price)

On the basis of daily data, we established 1,259 observations per index comprising of five years span. That makes a total of 3,777 observations. The Analysis Tool used was SPSS and the Analysis used was Multiple Linear Regression Analysis with significance level of 0.05 (α) and the values of returns were taken up to four decimal points for accuracy in fluctuations. However, to simplify our observation charts and regression diagrams, we used only monthly averages of Price indices and calculated returns making a total of 240 Observations for regression diagrams and charts only.

3.1 Hypothesis

We have following hypotheses devised against the dependent and independent variables.

H_0 = There is no correlation relationship among dependent and independent variables

H_1 = There exists a significant correlation among the KMI Index and the KSE indices

3.2 Model Equation

$$KMI_{30} = \beta_0 + \beta_1 KSE_{30} + \beta_2 KSE_{All} + \varepsilon$$

Where;

KMI_{30} = Dependent Variable

KSE_{30} = Independent Variable 1

KSE_{All} = Independent Variable 2

β_0 = Beta zero or the Intercept of Regression Equation

β_1 = Beta one or the Slope of Regression line for Independent Variable 1

β_2 = Beta two or the Slope of Regression line for Independent Variable 2

ε = Epsilon or the Standard Error Term of equation.

3.3 Conceptual Framework



Figure 1: Conceptual Framework

4. Results

Table 1: Descriptive Statistics

	Mean	Std. Deviation	N
KMI 30	.069532	1.0425007	1259
KSE 30	.035172	1.0275763	1259
KSE All	.074491	.8298209	1259

Analysis of Variance (ANOVA) test provided the following results, enabling us to reject the Null hypothesis that there is no correlation among the variables and accept the alternate hypothesis that a significant correlation exists among the dependent and independent variables.

Table 2: ANOVA^a

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	963.034	2	481.517	1496.363	.000 ^b
	Residual	404.170	1256	.322		
	Total	1367.204	1258			

a. Dependent Variable: KMI 30

b. Predictors: (Constant), KSE All, KSE 30

Next step was to check if there exists Multicollinearity issues among our independent variables. For this purpose, we have performed Collinearity Test with following results.

Table 3: Collinearity

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	KSE 30	.862	1.159
	KSE All	.862	1.159

a. Dependent Variable: KMI 30

The Variance Inflation Factor (VIF) is well under the set standard limit of 5, proving that the multi-collinearity problems do not exist among independent variables. However, the tolerance factor should be greater than 2 as per standards but if the VIF factor is under control we do not need to bother to check tolerance levels and can be ignored.

Next brings us to the Durbin Watson Test (DW-Test) where we performed to see if Autocorrelation exists within the variables.

Table 4: Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.839 ^a	.704	.704	.5672667	.704	1496.363	2	1256	.000	2.440

a. Predictors: (Constant), KSE All, KSE 30

b. Dependent Variable: KMI 30

From the above table we can see that a negative autocorrelation of 2.44 exists within variables and thus each previous value effects the next value negatively but in a weak and in an insignificant manner. A Value of 2.4 is regarded insignificant by researchers as firstly it is very near to neutral value of 2.0 and secondly, a negative autocorrelation is rarely seen during research.

From our tests, we can say that our research model is valid to provide a significant insight from daily data. This brings us to the main purpose of our research viz to find firstly, is there exists a correlation among dependent and independent variables and secondly, to find out how strong these indices are correlated to each other if such correlation exists.

Table 5: Correlations

		KMI 30	KSE 30	KSE All
Pearson Correlation	KMI 30	1.000	.823	.458
	KSE 30	.823	1.000	.371
	KSE All	.458	.371	1.000
Sig. (1-tailed)	KMI 30	.	.000	.000
	KSE 30	.000	.	.000
	KSE All	.000	.000	.
N	KMI 30	1259	1259	1259
	KSE 30	1259	1259	1259
	KSE All	1259	1259	1259

The above Figure shows that KMI 30 index is strongly positive correlated with the KSE 30 index and moderately positive correlated with the KSE All Index. Also, as per the 1 tailed test, the value is less than 0.05 showing that the correlation among variables is significant. Note that, the above-mentioned correlations are independent of each other and does not govern a combined effect on dependent variable as per autocorrelation tests.

4.1 Graphical Representation of Correlation

We looked in to the movements of KMI 30 index returns with the KSE 30 index returns and observe that both the indices show a remarkable tendency to move closely together showing a strong correlation in movements among both variables. The KSE 30 index shows a greater falls and rises in returns making the conventional stocks as riskier as well as profitable at the same time.

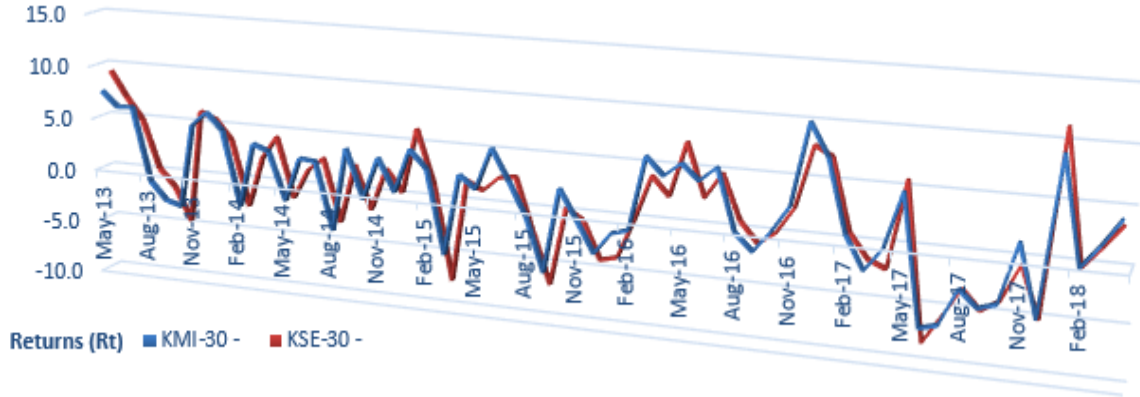


Figure 2: KMI₃₀ vs KSE₃₀

Next, we have taken the graph of KMI 30 index with the graph of KSE All index and found that Although most of the time both indices move together but there are at times some non-synchronized movements in both indices showing a weak to moderate positive correlation among both variables and thus justifying the correlation values earlier mentioned in results.

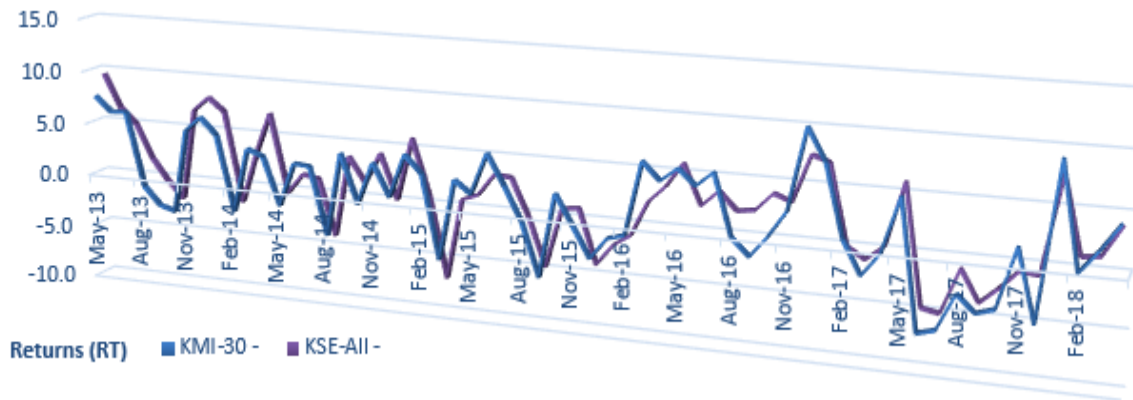


Figure 3: KMI₃₀ vs KSE_{All}

4.2 Regression Equation

We formulated a regression equation from coefficients table as already proposed in the Research model portion and is used to find out actual influence of independent variables on the dependent variable.

Table 6: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.026	.016		1.617	.106
	KSE 30	.768	.017	.757	45.852	.000
	KSE All	.222	.021	.177	10.709	.000

From the above we can define multiple linear regression equation as follows:

$$KMI_{30} = 0.026 + 0.768KSE_{30} + 0.222KSE_{All} + \varepsilon$$

Where 0.026 is the intercept of the regression line or in other words when there is no change in indexes of KSE 30 and KSE All indices, the KMI 30 index returns will still be 0.026. Also a change of 1% in KSE 30 index returns will increase a 0.768% return in KMI 30 index returns and a change of 1% in KSE All index returns will increase a 0.222% return in KMI 30 index.

5. Conclusion

In Pakistan, we are living in a conglomerate financial environment where we have recently introduced Islamic financial products but the majority of market is governed by traditional securities and comprise of more than 85% of the market. These are the reasons why Sukuk markets (KMI 30 indexes) are so much influenced by conventional Markets like KSE 30 and KSE All indices. In our study, we have made an effort to determine this level of influence from KSE markets on KMI market and hence proved our hypothesis that KSE Markets are highly influential over the KMI market and thus KSE Predict most of the returns movements in KMI. In other words, if KSE Markets suffer a sudden fall or rise, KMI Index is likely to follow and respond in the same way as KMI 30 is positively correlated with KSE 30 and KSE All Indices.

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DESCRIPTIVE STUDY: INDUSTRY 4.0 EVOLUTION AND EXPECTED CONSUMER BEHAVIOR IN PAKISTAN

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Abstract

Industry 4.0 is the biggest emerging industry now days. The smart cities, smart factories and smart product are being introduced everywhere. The consumers of smart connected devices are increasing day by day. We can easily titled these consumers as smart consumer. The requirements and expectation of smart consumers towards industry is increasing very rapidly. In this paper basic focus is on smart consumer behavior from Pakistan for coming industrial revolution. Basically this paper consists of two portions.

At first Hawkins Best and Coney model 2004 about consumers buying behavior is consider. This model is used and discussed most of the researches conducted to ensure consumer buying behavior. This model is developed for past industries. The feature of automation is added in this model as a moderator to use this model for future technologies and smart consumers.

At the second stage a survey is conducted to evaluate the behavior of consumer. Descriptive study of consumer behavior is done. For this purpose, One research instrument as a questionnaire is selected among best available four questionnaires. The survey is conducted among smart customers. As a population post graduate students of management and IT department of universities in Pakistan are preferred. It is observed that there is a great scope for smart products in Pakistan.

Keywords: Industry 4.0, consumer behavior, automation, descriptive study, smart customer

1. Introduction

We are living in the world of technology. Technology is doubling, tripling itself day by day. The internet is used by 31.7 % population of the world in 2012. The user of networks and internet is gradually growing rapidly. (Howe, W., 2012) Services by internet and networks as WIFI, internet of things, web2.0 and integrated networks design are being developed in scientific manner. Smart products are monitored through internet by smart phones. This automation like smart cities, home automation, health care and automobiles are only possible due to the high speed connectivity of internet. (Vatsa, R.).

New industry of integrated products is called industry 4.0, which is developed with the help of digitization, automation and Internet of Things (Huizinga et al., 2015). Industry 4.0 is evolving technologies from all over the world which makes the growth of this industry innovative and rapid but the elements, attributes and definitions of industry 4.0 are still under development. (Brettel, Friederichsen, Keller, & Rosenberg, 2014; Hartmann & Halecker, 2015).

Richins (1997) developed the Consumption Emotion Set (CES) which was gathered from the analysis of three consumption situations including automobile, recreational, and sentimental products. There were 17 emotions generated such as anger, discontent, worry, sadness, fear, shame, envy, loneliness, romantic love, love, peacefulness, contentment, optimism, joy, excitement, and surprise.

In the word of technology and connected products, the customer is the main entity. The changing trends of products influenced by enabling technologies like internet of things, wifi, connected engineering and integrated networks of products forces the researchers to explore the customer purchasing behavior on smart products. The researcher also applied existing and new theories to measure customer satisfactions. where the automation is the force which differentiate between old

industry and new one.(ROOK & FISHER, 1995); (Hausman, 2000); (Kacen & Lee, 2002); (Evans, et al., 2006); (Solomon, et al., 2013); (Schiffman, et al., 2012); Porter, M. E., &Heppelmann, J. E. (2014).

Automation is the instrument which is necessary part of industry 4.0. The automation industry also changes the decision about product by consumer. (M Wollschlaeger, T Sauter , 2017).The consumer of industry 4.0 is termed as smart consumer. The automation of products for individual consumers is a value added activity and the level of automation change the consumer behavior towards product positively.(Kagermann, 2015; Yu, Subramanian, Ning, & Edwards, 2015).

The consumer behavior, habits and responses are very valuable for an organization. Companies must track consumer feedbacks and follow up these feed backs of consumer behavior for further facilitation because the customer needs defines its decision to purchase products. (Kotler & Armstrong, 2012).

The study about the consumer decisions made at the time of purchase indicates consumer behavior .According to Kotler (2009) buying process tells about the buyer characteristics and responses normally 4ps which are place, price, promotion and product used as market motivation. (Kotler, 2009).This study will evaluate the expected consumer behavior towards industry 4.0.

1.1 Research objectives

- To find out what extent observations of outcomes and beliefs impact customers attitudes and objective to purchase in the smart products market in Pakistan.
- To make a framework for industry 4.0 of external influence and internal influence. Which impact self-concept, automation and life style of the consumer that appeals purchasing decision making process?
- To investigate what are the problem which influence and sooner or later motivate the customer to buy smart products in Pakistani market.

1.2 Research question

- Descriptive study how does attitude and individual rules influence the consumer behavior towards smart products in Pakistani market?
- Descriptive study what impact are the external influence (social status, Demography, Culture, Reference Group, Family, culture, and marketing activities) on the consumer for purchasing smart products in Pakistan?
- Descriptive study what is the internal influence (perception, motivation and emotion) on the consumer buying smart products in Pakistan?
- Descriptive study how the decision making process of consumer is influenced by social norms, lifestyle and automation in Pakistani market?

2. Literature Review

Smart devices are interconnected devices. These devices with the help of internet and networking perform assigned activities. These are digitized and automated devices. (Suarez-Tangil, G., Tapiador, J. E., Peris-Lopez, P., & Ribagorda, A. 2014).In a survey it is observed that smart technology helps in increasing the activeness among young communities then other conventional devices. These devices are user friendly and fully automation. The automation increase the quality of services.(Musatova, Z., Mkhitarian, S., Nevostruev, P., Sidorchuk, R., & Komleva, N. 2016).

Smart devices also exercise intelligent processes. These intelligent processes produce activities and events. To deal with smart devices it is necessary to build new or improve old frameworks and models for smart and connected devices to overcome the new challenges faced by researchers. (Berger, T., & Trentesaux, D. 2017).

The uprising of Integrated and internet based devices make value chain more effective through which the level of service, product and supply chain is increased. This theory is further named as smart industry or industry 4.0.(Haverkort, B. R., & Zimmermann, A. 2017). The new emergent fashion in smart industry advance innovation and co creation of new business models.(Lee, Kao, & Yang, 2014).In his research upon case studies of more than 16 companies Saraee suggest that in case to improve innovation process we should improve existing models for smart industry. (Saraee, M. H. 2016)

Based on the Smart Industry report, it is proved that technologies with collaboration to each other help smart products improve their functionally and their level of automation. (Huizinga, et al., 2015). A case study by Agarwal et al (2015) on General Electronics also facilitates the previous statement where hardware, software, connectivity and information technology act as enabling technologies helpful for smart evolution. (Agarwal et al., 2015). Information technology infrastructure is needed for a company which is producing or interested in manufacturing smart products. The automation is the basic component which helps the customer to choose better product. (Brettel, et al., 2014; Tippins & Sohi, 2003).

Theories like internet of things is also necessary theory which supports smart industry.(Hartmann and Halecker 2015). As Lee, et al (2014) argues that integration and automation is very compulsory for a successful smart industry. Integration and collaboration of all networks must be assured. (Brettel, et al., 2014). The smart industry concept support innovations in technology and force companies to introduce new products gradually. (Pisching, et al., 2015). CE (Connected Engineering) is also an effective method for developing smart products (Prasad, B. (2016).

The smart connected products entirely change the customer and organization's way of thinking. These products like Tesla car are efficient in sense because this product mostly depends upon software and automation. (Porter, M. E., &Heppelmann, J. E. 2014).The existing customers are aware of new technologies. They use new devices like smart phone; tablets etc. Old mindset of traditional devices is not enough to catch this type of customer. There is need to change the mindset for companies. They should add automation with the help of internet and connected engineering. (Hui, G. 2014). As the level of automation increases the it was attractyed by the customer.

The smart evolutions entirely change the value creation for a company. Information Technology with the help of sensors takes the humanity into new horizon of smart world where customer is mainly focused and served. The customer of such products are named as smart customer.New models are to be created, innovated and automated. (Porter, M. E., &Heppelmann, J. E. 2015).

There are some barriers in the growth of smart products. One of them is that the customer must also be smart for smart products. The customer must have internet and other related facilities required for small products.the must be aware about automation and level of automation in products.(Töytäri, P., Turunen, T., Klein, M., Eloranta, V., Biehl, S., Rajala, R., & Hakanen, E. 2017, January).The trends of customer and society must be considered while developing smart products. (Schweitzer,F., & den Hende, E. A. 2016). In this connected word of smart product customers are the main value creator. He also defines that how much valued the product is? (Verhoef, P. C., Stephen, A. T., Kannan, P. K., Luo, X., Abhishek, V., Andrews, M., ... & Hu, M. 2017).

In the project completion report of consumer changing behavior, it is concluded that society plays a vital role in technology adoption. Behaviors should be measured at launching and during the life cycle of the smart product. As said by Patricia Seybold, "It is believed that the new market is all regarding internet but I feel it is fuelled by internet. It is all about customer." (MARUCA, 2000).

This is the era of technology where integration and automation is modifying the products. The manufacturers are thinking to facilitate customers according to customer's satisfaction. The customer of industry 4.0 is magnetized through automation. A lot of research has been done to observe the customers behavior like (ROOK & FISHER, 1995); (Hausman, 2000); (Kacen & Lee,

2002).and theories are implemented to observe customer behavior (Evans, et al., 2006), (Solomon, et al., 2013), (Schiffman, et al., 2012).

As stated by Solomon, consumer behavior is selection process done by user while making selections about the use or remove of product and services while obtaining desired needs. (Solomon, et al., 2010).

The behavior of changing needs, desires and wants of individuals, that a person reflect while searching, buying, using and evaluating products to fulfill his requirements.(Schiffman, 2012).Consumer make a lot of decisions daily which reflects its buying patterns and behavior to study these behaviors. This is very important for marketers to make decisions and forecasting. (Kotler & Armstrong, 2012).

3. Conceptual Framework

In this research the researcher used Best and Coney model developed by Hawkins in 2004. In this model the external influence and internal influence factors are discussed. This model also shows that how these factors have impact upon decision making process of consumer behavior. This Model helps to analyze the behavior of smart products consumer purchase decisions. This model is abstracted from the Engel, Kollat and Blackwell model and further extended in to external and internal influences. (Hawkins, Best and Coney (2004)).

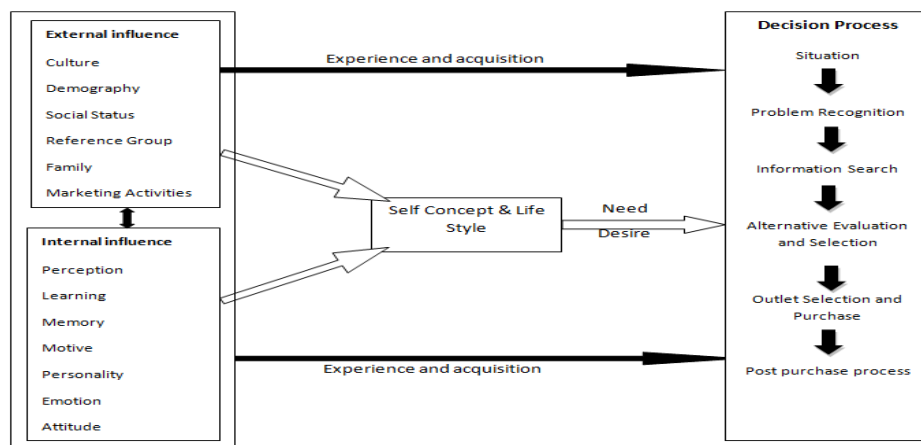


Fig 1: Best and Coney Model by Hawkins 2004

The external influence like culture, demographics, reference group, family, marketing activities and social status are external stimulus which creates self concept and life style towards need and desire. This need and desire describe customer behavior towards decision making process.

Lifestyle is the tradition and mind-set of a consumer to spend money and time. (Solomon, 2006).Life style shows a person's means of living in this word (Kotler et al, 2009).Life style and social concepts derived from external and internal influence forms a need for decision making process.

The decision process consists of situation, problem recognition, information search, alternative evaluation and selection, outlet selection and purchase post purchase process. Smart products are connected products with smart phones. This connectivity and wireless networks further describe the concept of internet for things and industry 4.0 (Porter, M. E., &Heppelmann, J. E. 2015).

Several factors which effects the purchase decisions for smart phones and smart products. Social factor, self actualization, brand concern, price concern and product feature concern are the basic factors for smart evolution which effects purchase decisions of consumers. (Mohan, A. 2014).

Brand also impact upon the consumer purchase decisions of smart phones and products.(Gelenbe et al., 2013).Brand equity , brand awareness , customer brand engagement ,brand loyalty and brand association influence the decision of small product purchase. (Mohan, A. 2014). The above given literature shows that different factors which effect purchase decision and brand influence customer behavior of smart products in decision making process which support the research objectives and question.

The automation is the tool which forces the smart customer to prefer products. The consumer evaluates the level of automation in the products while making buying decisions. (Andersson & Mattsson, 2015; Dominici et al., 2016) .In industry 4.0 the products and services are measured through their level of automation. The competition to automate and digitize product for customer is increasing in small and medium organizations. (SME; Sommer, 2015) The consumer for smart product always considers automation of product while making his buying decision. (Court, 2015; Rocco & Bush, 2016)

The industry 4.0 progress in three ways Digitization, Automation and Automatic data interchange. The automation is more concerned with consumer behavior and decision making. (Almada-Lobo, 2016; Schlechtendahl, Keinert, Kretschmer, Lechler, & Verl, 2015) Most of the managers have less knowledge about IT. These managers also educated with new transforming industry. (Hansen & Sia, 2015) The digital thinking must be developed in industry and society. (Scheer, 2012) The improvements in automation become helpful for consumers to decide about individual product. We should modify our theories and models according to new digitized industry. (Kane et al., 2015; Schlechtendahl et al., 2015).

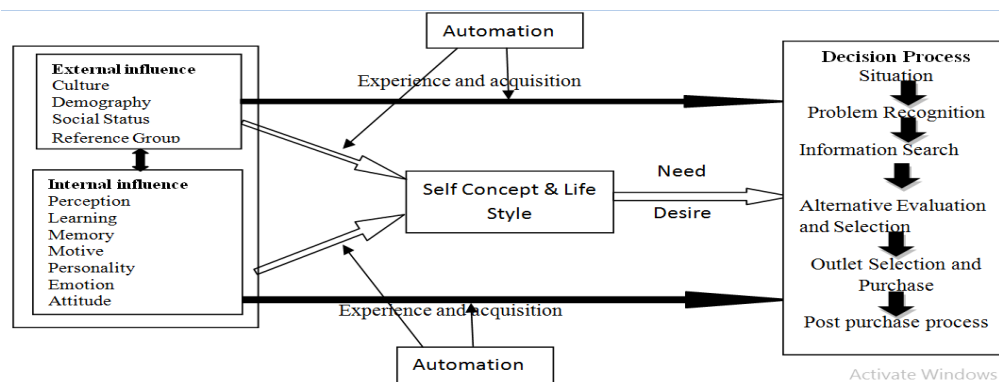


Fig2: Extended Model of consumer behavior for industry 4.0

The automation is added as a moderator in existing Hawkins best and Coney model. The existing old model was developed in 2004.The model is modified where external Influence and internal influence are dependent variable in above given model. Decision process is independent variable. The experience and acquisition, life style and self concept act as a mediator in the model. The automation works as a moderator in the model. (Roblek et al., 2013; Zoroja, 2015).

4. Research Design

4.1. Population and Sample

The population of this research is students of public and private universities from Business and Information Technology departments in Pakistan as they are aware with upcoming industry 4.0.As sample students and staff from three universities which are University of Management and Technology Lahore, Virtual university of Pakistan (Lahore) and Superior University Lahore are selected.

We have two target populations for this research one is the student of business department and other are from Information technology department.

4.2. Measures

This research is based on questionnaire. This questionnaire was developed by Mohan which consist of 28 questions. The questionnaire is adapted with minor changes for example smart phone is replaced with smart Products. The selected instrument almost full fills the research objectives. This questionnaire is about the survey upon smart phones. There is very deep relationship between smart phones and smart products even smart phones are the core element of smart evolution and through little enhancement in smart phones introduces smart products. The survey questionnaire is prepared with the help of Google Docs and sends by email and Face book to the Doctorate and M.S student from University of Management and Technology Lahore, Virtual university of Pakistan Lahore Campus and Superior University Lahore.

The Cronbach's Alpha reliability test of the questionnaire is conducted. It is found that Cronbach Alpha is .805 which specifies higher level of internal stability for our scale with this explicit sample. Alpha based on standardized items is 77.9 percent .

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.805	.779	29

FIG3: Cronbach Alpha Reliability

The questionnaire consists of 28 questions. In question no 1 When the respondents are asked about his satisfaction with smart products total 79 respondents respond this question from which 67(84.8%) answers in yes and 12 (15.2%) are not satisfied with smart products and in question no 2 Total respondent for this question were 57 out of 83 among them 50(87.7%) were agreed to buy smart product in future while 7(12.3%) are not willing to buy smart product in future. This indicates that the trend towards smart products is growing rapidly.

From question no 3 to question no 12 it is observed that internal and external influence are the dependent variables which manipulate the purchase decision of customer and from 13 to 24 we analyze the importance of automation among all other factors. In remaining questions the scope of smart devices and customer decision making is evaluated.

5. Conclusion

This study provides the descriptive analysis of data .In this research, the model is designed for smart industry 4.0. The existing models are old and not providing clear frame work to evaluate the upcoming industry of connected devices named as industry 4.0. The existing frame work has dependent variable, independent variable, mediators. The automation is added as moderator variable in exiting model of Best and Coney by Hawkin. To observe the outcomes of model four relevant instruments are gathered. One of them is selected which was from Mohen. After that the questionnaire by Mohen is adapted. The reliability of that instrument is checked through crone batch alpha. The results of reliability for said sample is .805.

The data analysis is done. Through the disruptive study of data it is observed that a majority of age group of 21- 40 is more interested in smart products. The data shows that the most of respondents are students.

The first objective of this research is to find out the customer attitude to purchase smart product in Pakistan. This data also shows that majority of people are satisfied and also planning and willing to purchase smart products in near future. The switching level towards smart products is high and moderate in Pakistan which is very positive for smart products and their manufacturers. The purchase trends of community in Pakistan are multinational company's products.

The second objective of this research is to find out the factors which motivates to customers buying behavior in Pakistan. For this purpose 10 parameters are selected. These parameters are measured in five scales which are strongly influential, influential, Neutral Influential, Not influential, and strongly not influential. It is found that Financing, Quality of Product and Technical aspects of a product are strongly influence the purchase decisions. Whereas friend and family suggestion, well known brand name of product, satisfaction from a previous product of certain brand , position in society , festival promotions , advertisement , after sale services are positively influence upon purchase decisions.

This study also proved that the higher level of automation is very necessary and demanding for smart consumers. The customers like to purchase highly automated devices. This is the basic cause by which automation in devices is increasing rapidly.

The third objective of this study is to analyze the factors which force the consumer to buy smart products. The study shows that there are a lot of factors status, performance, quality of product etc are force consumer to decide to buy smart product. The automation is also a factor which attract smart consumer very much.

The above mentioned realities demonstrate that the smart connected products have significant impact upon society. This positive impact proves that there is a lot of societal development towards the innovation of smart products in coming industry 4.0 evolutions.

6. Limitations

This descriptive study only covers the impact of smart products upon society in Pakistan. Existing model for consumer behavior is further developed by adding automation as moderator. The data is gathered from selected universities. After getting data, efforts are made to observe and analyze the impact of these new technologies upon Pakistani culture and society to collect the expected consumer behavior for smart industry 4.0.

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IMPACT OF ABUSIVE SUPERVISION ON TASK PERFORMANCE: ROLE OF WORK FAMILY CONFLICT AND SELF-EFFICACY

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Abstract

Supervision is the capability through which an individual and subordinate get influenced by supervisors for particular course of action. In any organization, an individual has to work in groups, teams and under the supervision of leader. Abusive supervision in an organization reduces individual level as well as organizational level performance. The purpose of this research study is to investigate the relationship between abusive supervision and task performance along with the mediating role of work family conflict and moderating effect of self-efficacy. Abusive supervision is a multi-dimensional construct that revealed the attention towards organizational performance and individual growth. A survey based questionnaire is used in this research study to collect data from employees of hospitals. It is concluded in this research study that negative relationship exists between abusive supervision and task performance. Work family conflict also reduces the task performance and self-efficacy plays a vital role to overcome the influence of work family conflict on task performance. In order to increase the task performance, managers have to make working environment free from abusive supervision.

Keywords: Abusive supervision, Task performance, Work family conflict, Self-efficacy

1. Introduction

Supervisors are said to be the organizational authorities due to more control over the subordinates, working patterns and outcomes (Burton & Hoobler, 2006; Tepper, 2000). As the supervision is the capability through which individuals / subordinates get influence by supervisors for particular course of action (Bernard, 2005). It is also a skill to handle the human resource in attaining the organizational goals. Moreover, previous researches also explicates that the quality of supervision can be reflected in the subordinates effectiveness in the form of their behaviors and actions (Bernard, 2005). Employee performance refers to an ability of individuals' to accomplish the tasks and fulfill responsibilities, which are assigned to him to attain organizational goals and objectives under effective supervision.

In the leadership paradigm, focus is on the characteristics of effective leadership and the supervision to assign the task (Tepper, 2007). Supervisor behavior with employees' builds the image of organization in the mind of employees' (Shoss, Eisenberger, Restubog & Zagenczyk, 2013). It's a human nature that enable human to live in socialized environment comfortably and prefer to work in teams or under the supervision of any individual. Work place hazard influence the employees' behavioral outcomes, as the employees' has to come across various interactions with supervisor, coworkers and costumers and it triggers the aspects of interactions and conflict of interest directly, which results in the shape of decreasing employee performance (Hogan, Raskin, & Fazzin, 2000). Interpersonal conflicts are extensive in the subordinates and supervisors, which employees' perceive in the shape of abusive supervision and mistreatment (Tepper, Henle, Lambert, Gi acalone, & Duffy, 2008). Abusive supervision is one of the areas

that cover the aspects of mistreatment towards the employees (Mawritzd, Mayer, Hoobler, Wayne & Marinova, 2012). This dysfunctional leadership prevailed in each level of the organization from bottom to managerial groups and towards top management (Hmieleski & Ensley, 2007).

1.1. Significance of the Study

Modern studies on organizational behavior show that in any organization an individual has to work in groups, teams and under the supervision of supervisors (Asad, 2011). Organizations which are operating in service sector having different nature of work as compare to organizations working in the manufacturing sector. Offensive behavior of the supervisor varies in the organization and most of the organizations are not aware of such issues, which are prevailing in the organization and also are unable to identify the causes of such behaviors that results in the shape of poor performance. Therefore the idea of offensive behavior of the supervisor has more importance than the other sectors.

In Pakistan organizations, there is a high power distance culture, which results in the shape of various outcome i.e. absenteeism, workplace deviance behavior and work withdrawal (Singhapakdi, Vitell & Leelakulthanit, 1994). This research help to understand that how hostile behavior and abusive supervision can be minimize in the organization, which results in the shape of decreasing individual as well as organizational performance. Furthermore, this research study is also helpful for the top management to understand the factors due to which performance in the organization decreases and to understand how organizational environment can be make friendly for the employees.

1.2. Research Objective

The main objective of research study is:

- To identify the impact of abusive supervision on employee task performance.
- To identify the role of work family conflict between abusive supervision and employee task performance.
- To identify the role of self-efficacy between work family conflict and employee task performance.

1.3. Research Question

The main research question of research study is:

- 1) How abusive supervision creates an impact on employee task performance?
- 2) How work family conflict impact on employee task performance, when abusive supervision is prevailing?
- 3) Does self-efficacy plays a moderating role between work family conflict and employee task performance?

2. Literature Review

2.1. Abusive Supervision

Abusive supervision is defined as the “employee perceptions about their supervisors that they are engage in continuous exhibition of verbal and non-verbal actions despite of physical contact (Teppers, 2000). Previous researches concluded that there are different outcomes of abusive supervision i.e. subordinate work related attitudes, resistance behavior, aggressive and deviant behavior, performance contribution, psychological distress and family well-being.

- **Work related attitude:** Literature explores the findings that abusive supervision has negative impact on job satisfaction and employees commitment, however, positive associated with attention to quite as because of deviant behavior (Tepper, 2009).

- **Subordinates' resistance behavior:** Literature concluded that abusive supervision leads to refusal of work by the subordinates and also results in the shape of reducing job satisfaction level and commitment of employees towards the organization (Tepper, 2007).
- **Subordinates' aggressive and deviant behavior:** Previous researches identify the relationship among the supervisory and employee behavior (Tepper, 2007). Inness (2005) studied employees (moon lighters) and hostile aspect that signifies that employees that have to come across the aggression when they face hostile attitude from employers (Tepper, 2007).
- **Subordinates' performance contributions:** Previous research concluded that employees performance contributor factors having less impact on employee performance, when employee feel injustice in the organization (Aryee, Chen, Sun, & Debrah, 2007)
- **Subordinates' psychological distress:** Previous research concluded that abusive supervision has negative impact on employee physical and psychological health, which results in the shape of depression, anxiety and exhaustion (Tepper, 2000).
- **Family well-being:** Abusive supervision not only influences the performance outcomes of employees but also having consequences outside of workplace (Tepper, 2007).

2.2. Task Performance

Job performance is a multi-dimensional variable and having two basic types i.e. task performance and contextual performance (Borman and Motowidlo, 1993). Task related behaviors are those behavioral patterns that need the support of organization core technical process, proficient competences, sustainable work environment and clear task explanation (Borman & Motowidlo, 1997; Werner, 2000 & Hatstrup, 2003). Contrary to this view, contextual performance is related to individual efforts that are not directly associated with the responsibilities, however such action plays a vital role in the organization in social, psychological terms (Werner, 2000).

In literature, resource based theory also explains that how the decline of resources can damage the employee task performance (Carlson, 2006). One of the resources for employee is supervision that could be the supply of support or stress. Abusive supervision give the image to employees that they are not receiving the support, which they need for work and ultimately results in the shape of decline in task performance (Vohs & Heatherton, 2000). To retrieve the employee performance, organizations have to maintain the supply of resources in balance manner (Carlson, 2006).

In previous knowledge limited researches found the higher level offensive behaviors lower the citizenship behavior i.e. task performance (Zellars & Duffy, 2002). Only limited valid empirical evidence found that abusive behavior of supervisor is negatively related to employee formal appraisal (Harris et al. 2007). Researcher also illustrates the phenomena through social exchange theory, where employees react against abusive supervision in the negative manner. Employee engaged in unfavorable outcomes i.e. job tensions and emotional exhaustion, when they are abused by their supervisors (Breaux et al., 2008). Therefore, it is hypothesized from the above discussion;

H₁: Abusive supervision has a negative impact on task performance.

2.3. Work-Family Conflict

Work family conflict is the bi-dimensional construct in the perspectives that work related issue not only influences the family but also the family matters can influence the work (Sutton, 2000). Several researches have been done in order to understand the phenomena to hold better perceptive regarding the construct. For this purpose, various researches hold their examination around the comparison and deep understanding of antecedents and consequences of work family conflict. It is concluded from previous researches that work family conflict having a negative impact on individual in the form of job despair, strains and employee welfare (Frone, Russell & Cooper,

1992; Allen, Herst, Bruck & Sutton, 2000; Byron, 2005). There are three major forms of conflicts such as strain based, time based, behavior based conflict (Anafarta, 2011).

- a) **Strain Based Conflict** arises, when stress of one domain affects performance in the other domain.
- b) **Time Based Conflict** is indication, when time demands of one responsibility of a worker avert to give time to fulfill the demands of other role.
- c) **Behavior Based Conflict** occurred, when action patterns that an individual used to reveal in one domain is not mismatched to the requirements of other role.

Work family conflict can be categorized in three ways i.e. work related outcomes (dissatisfaction, strain, less dedication towards work and turnover intentions), non-work related outcomes (low family fulfillment) and stress related outcomes (Allen et al., 2000). Despite of the research on the various forms of conflict, researches also identify various model how the phenomena of work family conflict create the consequences on individual life. There are two basic models that tell us the phenomena of work family (Frone, 2003).

- a) **The Spillover Model:** It claims that action of one domain affects the other one.
- b) **The Resource Drain Model:** It assumes that relationship builds in work or family, whether it is negative or positive because time and energy used by one domain is requisite for other domain.

Now a day, impact of work family conflict is one of the highlighting issues in the field of academic and public research. Its magnitude can be figured out from the fact that business week is rating the firm economic stability from the perspective of how organizations are dealing with the connections of firms and family domain (Beauregard, 2007). Research revealed that imbalance between the two pillars as family and work effect the task performance (Lee & Hui 1999). COR theory also illustrates that devoting more time at workplace ultimately create problematic for individual to fit in both domains (Grandey & Cropanzano, 1999). This possible deficient in of resources leads imbalance of work and family characters (Witt & Carlson, 2006). As the recent researchers also shows that work related constrains and issues negatively impact on family dynamics, which ultimately nurture to enduring significance (Repetti et al., 2009). In addition Carlson and other researchers in (2011) explored that more work family imbalance is the result of greater offensive surroundings at work (Carlson, 2011). Role conflict influences the performance at work as prior research support that commitment of employee significantly down because of the role imbalance phenomena (Ali & Baloch, 1999). This relation has been studied in the pragmatic studies and few researches found conflicting results in addition to the relationship between life conflict and performance of individual (Allen et al., 2000). Work family conflict reduces the job satisfaction level of employees and ultimately results in the shape of reducing task performance (Butler & Skattebo, 2004; Bhuiyan, Menguc & Borsboom, 2005). From above discussion, it can be hypothesized that:

H₂: Work family conflict mediates between abusive supervision and task performance relationship.

2.4. Self -Efficacy

Self-efficacy emerged as a topic that possesses the aspects of social psychology, where it is analyzed in motivational terms and also in cognitive theories as well (Gecas 1989). The initial idea about self-efficacy was introduced by Bandura in the 1970's as "*individual believe that he/she can accomplish the task along with required behaviors to give ultimate result of particular*

task (Bandura, 1977). In the task related construct, self-efficacy defined as a judgmental potential of individual for executing the particular task (Hurter, 2008).

The foundation of construct is embedded in the Social cognitive theory, which illustrates that how the behaviors and actions, other individual factor that encompasses the element of self-efficacy influences the individual's activities. On the bases of such elements self-efficacy illustrate as it's an individual conviction to activate the motivation, cognitive factors and other essential factors to fulfill the current work requirements (Bandura, 1988).

There are four major divisions that are significantly discussed in literature through which an individual can built the ability of self-efficacy through

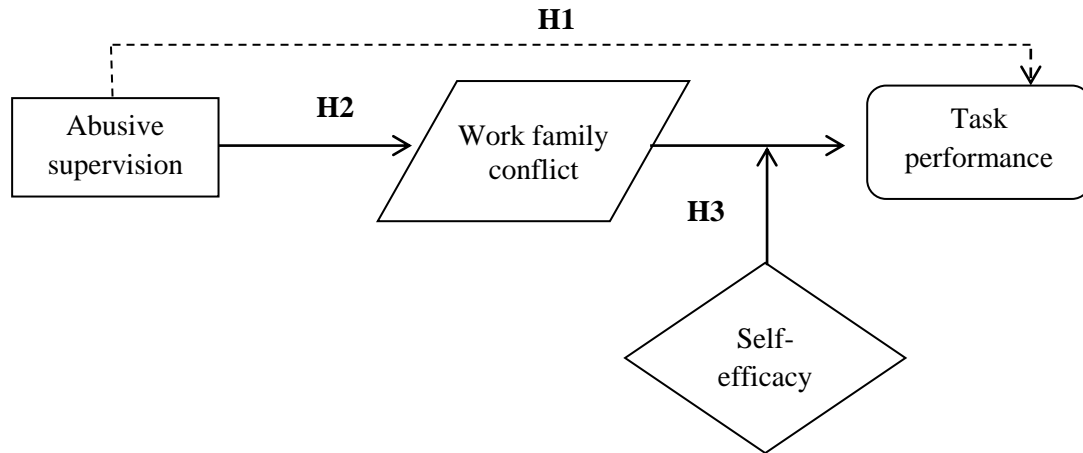
- a) **Mastery experience (enactive mastery)** indicates the aspects of enhancing self-efficacy by repeating the performance of task. Positive mastery experience tends to enhance individuals self-efficacy while negative tends to reduce it.
- b) **Modeling or vicarious experience** is the second aspect to develop the self-efficacy as such individuals tends to find the similarities with other in this way they effectively amplify the degree of self-efficacy, such individuals tends to observe others success and failure and diminish the self-efficacy.
- c) **Verbal persuasion** is the third most effective way to develop self-efficacy. In reference to the Wood and Bandura (1989) individuals seek to progress their attributes, when they receive genuine support. More the sources are genuine and authentic, individuals likely to develop their efficacy elements.
- d) **Perception of individual physiological state:** As in the literature of Bandura and Adams (1977) moods of individual due to stress and negative factors affects individuals' ability to understand about his or her efficacy level, which ultimately create impact on the capabilities of individual towards any particular task. It's verified that efficacy belief of individual can be modified if individual has the capacity to overcome the stress factors (Bandura & Adams 1977).

Another aspect through which we can analyze the phenomena of the efficacy is specific and general form of efficacy (Lu et al., 2011). Specific efficacy can be illustrated as decision about individual personality that he can execute the task in the fruitful way. General efficacy refers to individual reflection of his cognition to exhibit his anticipation towards assignment in context of variety of circumstances (Eden & Zuk, 1995).

Employees that have high degree of self-efficacy, they tend to maintain the essence of higher performance against the challenges of job and environment (Lu et al., 2011). Therefore, according to Bandura (1989), those individuals that have more efficacy element produce positive aspects in the task rather the low efficacy individual (Lu et al., 2011). In the same context, limited research has been done on the aspect of self-efficacy and Work family conflict (Erdwins, Buffardi, Casper, & O'Brien, 2001). Erdwins et al. (2001) examined that there is a logical association among the two construct. The study exhibited that individuals work family conflict tends to reduce, if the individual has elevated level of efficacy (Erdwins, Buffardi, Casper, & O'Brien, 2001). Furthermore, with reference to COR theory, individuals that possess the aspect of efficacy are proactive towards the risk factors. Therefore, balance towards both domains cannot be maintained by individuals, because their tasks are more challenging and consume more skills and knowledge. Therefore, high efficacy individual tend to put more effort (Ford, Heinen, & Langkamer, 2007). From above discussion, it is hypothesized that:

H₃: Self-efficacy moderates between work family conflict and task performance relationship.

3. Theoretical Framework



4. Research Methodology

This research study is quantitative and cross sectional in nature. Data was collected from participants through questionnaire in order to check the influence of one variable on another variable. Population of the research study is public hospitals in the city of Islamabad and Rawalpindi. Convenient sampling was used in order to collect data from participants. Research study integrates operational level employees to collect the data; therefore, unit of analysis is employee level.

This research study explores the impact of abusive supervision on task performance with mediating role of work family conflict and moderating role of self-efficacy. 280 questionnaires were circulated among diverse respondents that are working in the hospitals of Rawalpindi and Islamabad. 196 responses were collected in final data collection from respondents as shown in table 1.

Table1. Demographic Analysis

Demographic Analysis		Frequency	Percentage
Gender	Male	78	39.8
	Female	118	60.2
Age	20-30	55	28.1
	30-40	74	37.7
	40-50	45	22.9
	50 and above	22	11.2
Marital status	Single	90	45.9
	Married	106	54.08
Education	Metric	67	34.18
	Graduation	89	45.40
	Master	40	20.4
Organizations	CMH	41	20.91
	MH	38	19.38
	Family wing	34	17.34
	PIMS	43	21.93
	Fauji Foundation	40	20.41
Experience	1 to 5	52	26.53
	6-10	54	27.55
	11-15	33	16.83
	16-20	35	17.85
	21 and above	22	11.22

To collect data from respondents, questionnaire of abusive supervision was adopted from Tepper's (2000), task performance was adopted from Williams and Anderson's (1991) and Koopmans (2011), work family conflict was adopted from Carlson, Kacmar and Williams (2000) and self-efficacy was adopted from Chen, Gully and Eden (2001).

4.1. Reliability Analysis

Reliability analysis was done in order to identify that either questionnaire is reliable to collect data or not. Result indicates that questionnaire is reliable to collect data as shown in table 2.

Table 2. Reliability Test

Variable names	Cronbach α	Number of items
Abusive supervision	.763	14
Task performance	.741	18
Work family conflict	.692	12
Self-efficacy	.721	8

To figure out the consistency among the factors, Thereon and Donohue, (2007) proposed that Principle component analysis is the most exceptional test and value of KMO should be greater than 0.70 for the factor analysis to determine the stability. Result indicates that there is consistency among factors as shown in table 3.

Table 3. Bartlett's test of Sphericity

Variable	Chi-Square	KMO	Sig
Psychological Empowerment	196.88	.77	0.000
Task performance	286.76	.85	0.000
Work family conflict	184.21	.71	0.000
Self-Efficacy	231.94	.79	0.000

4.2. Descriptive Statistics

To identify whether data is normal or not, descriptive statistical analysis technique is used. Descriptive analysis technique guides the researchers about data trend and provides guidelines about future course of action. Normality of data checked through skewness and kurtosis value. Kurtosis and skewness value indicates that data is normal as shown in table 4.

Table 4. Normality of Data

Skewness	.679	.546	.447	.547
Std. Error of Skewness	.242	.242	.242	.242
Kurtosis	.571	.586	.867	.379
Std. Error of Kurtosis	.410	.410	.410	.410

4.3. Correlation

Correlation test is used to identify that whether there is relationship exists between variables or not. Result indicates that all variables are positively correlated with each as shown in table 5.

Table 5. Correlation

	Psychological Empowerment	Organizational Deviance	Interpersonal Deviance	Transformational Leadership
Abusive Supervision	1			
Task performance	.683**	1		
Interpersonal Deviance	.715**	.736***	1	
Transformational Leadership	.643**	.658**	.644 **	1

5. Regression Analysis

Regression test is used to identify the impact of one variable on other variable. Given regression illustrates the regression examination for the abusive supervision on task performance that demonstrate the value of R^2 shows variation results in task performance due to abusive supervision $R^2 = 0.420$, ($p < 0.001$) that shows 42% variation in the respective variable. Whereas beta's value $\beta = -0.472$, ($p < 0.001$) are also at significant level similarly t statistics $t = 7.031$, ($P < 0.001$) at significant level. This implies that there is negative relationship between Abusive supervision and task performance as shown in table 6.

Table 6. Regression

Model	IV	DV	R^2	Ad R^2	F-stat	t-stats	β	Sign
H1.	ABS	TP	.420	.391	53.68***	-7.031	-0.472	.000

* $p < .05$, ** $p < .01$, *** $p < .001$

To analyze the mediating role of the construct, Baron and Kenny's (1986) method is used to test the mediation. Value of $R^2 = 0.407$, ($p < 0.001$) shows 42% variation in the task performance by abusive supervision and beta's value $\beta = -0.472$, ($p < 0.001$) is also at significant level. Result indicates that there is negative relationship between Abusive supervision and task performance as shown in table 7.

Table 7. Mediation

S.NO.	IV	DV	R^2	Ad R^2	ΔR^2	F-stat	t-stats	β	Sign
1.	ABS	TP	.420	.391	.421	53.68***	-7.031	-.472	.000
2.	ABS	WFC	.446	.423	.419	56.73***	6.453	.317	.000
3.	WFC	TP	.459	.437	.427	89.92***	-9.656	-.395	.000
4.	ABS	TP	.528	.482	.591	121.77***	-11.53	-.582	.002

* $p < .05$, ** $p < .01$, *** $p < .001$

Similarly as according to second condition abusive supervision explain $R^2 = 0.446$, ($p < 0.001$) inform us 44 % variation results in work family conflict because of abusive supervision and beta's value $\beta = .317$, ($p < 0.001$) is also at significant level as shown in table 7. Result indicates that there is a negative relationship between Abusive supervision and work family conflict. Similarly, according to third condition, abusive supervision explain $R^2 = 0.459$, ($p < 0.001$)

variation in task performance and beta's value $\beta = -.395$, ($p < 0.001$) is also at significant level as shown in table 7. Result indicates that there is negative relationship between work family conflict and task performance. When the mediator (work family conflict) was incorporated in the equation, result indicates the significant effect of the mediator ($R^2 = 0.528$ value from $R^2 = 0.420$) on task performance. Result indicates that work family conflict plays a partially mediated role in relationship of abusive supervision and task performance as shown in table 7.

To test the moderation impact of self-efficacy on relationship of work family conflict and task performance, Baron and Kenny (1987) conditions are adopted. To analyze the moderation impact, regression analysis tells us value of $R^2 = 0.459$, ($P < 0.001$), which shows variation of work family conflict on task performance as shown in table 8. Beta value $\beta = -.395$, ($p < 0.001$) at the significant level fulfill the first condition. Second condition for moderation also indicates that value of $R^2 = 0.448$ and beta value $\beta = -.267$ at significant level fulfill the condition as shown in table 8.

Table 8. Moderation

S.NO.	IV	DV	R ²	Ad R ²	ΔR^2	F-stat	t-stats	β	Sign
1	WFC	TP	.459	.437	.427	89.92***	-7.031	-.395	.000
2.	WFC	SE	.448	.434	.433	72.59***	-6.620	-.267	.000
3.	SE	TP	.468	.446	.456	107.66***	7.952	.439	.002
4.	WFC*SE	TP	.684	.682	.636	132.47***	-4.4.77	-1.24	.000

* $p < .05$, ** $p < .01$, *** $p < .001$

In the same reference, when the moderation term is inserted in the equation (Work family conflict *Self efficacy), strong increase can be notice among the relationship of work family conflict and task performance ($R^2 = .459$ to $R^2 = .684$) as shown in table 8. Result indicates that Self Efficacy moderates between work family conflict and task performance relationship.

6. Discussion

This study was conducted to investigate the influence of abusive supervision on task performance of the employee. Research concluded that there is a negative impact of abusive supervision on task performance. Literature also witnessed that interpersonal stressors are the main source to reduce the employees' performance (Shahzad & Malik, 2014.) At work place, supervisors are the main source of information and interaction for employees for compensation, task accomplishments and its orders and feedback. Therefore, they tremendously effect by the supervisor's role (Burton & Hoobler, 2006). Literature also advocates that, abusive supervision is the key resource in reducing the support to his employees through inappropriate behavior, which not only generates the direct impact on the employees but also the indirect consequences can be observed in the form of declined performance (Zellars, Tepper, & Duffy, 2002). The main reason for declined performance is that employee cannot attain supervision in appropriate manner, which immensely affect the task related behaviors like sentiment and actions (Vohs & Heatherton, 2000).

Study implies that employees who are working in hospitals specifically nursing staff are suffered from the work family balance issues and is single resource person of family earning. In such circumstances, they have to hold their self-efficacy to minimize the effect of contextual factors such as work family conflict to sustain their job. Results of this study explore that self-efficacy play significant role to improve the quality of task to ensure the requirements of task and job. Another argument says that most of individuals have quality to take the situation as challenge. Therefore, they might have ability to minimize the factors of work family conflict. In the same

context reactance theory also discuss the same notion that says individual has some capacity to maintain the personal control as ability to overcome the scenario appropriate (Brehm , 1981) and helps the individual to manage the environment .

7. Future Implications

7.1. Academic and theoretical implications

This study made a comprehensive investigation whether abusive supervision is related to performance. To conceptualize that abusive supervision declines employee's performance by reducing their engagement in their work. By using resource theory we came to study that abusive supervision immensely affects the personal resource of subordinates which ultimately drain the capacity of employees to work properly on their tasks which was not observed in the prior studies they directly discuss about other factors such as deviance from work and other factors. Secondly, it gave us idea that how the WFC make contribution while making this relation weaker such that imbalance of role domains also play an important part while taking about the abusive role of supervisor and task performance. New notion that indulged in this research was self-efficacy that can help the individuals to cope with the stressful environment if individual make it focus to enhance the self-efficacy to minimize the tendency of weak task performance

7.2. Managerial Implications

- Findings prove that abusive supervision mostly reduces the efforts of employee and consequently the task performance of subordinates therefore organizations has to take this element as warning to eliminate the abusive supervisory in working climate.
- Correspondingly organization can initiate the program or trainings to be aware of their ethical managerial behaviors. Support systems should be built to give awareness to the managers that how the spillover effect of work domain to the personal domain.
- Similarly nature and personality should be taken in account while selecting an employee for the managerial positions.
- On one grounds when organization has to focus the role and personalities of subordinates, simultaneously supervisor should also made the consideration that reinforcement has more effects on performance that tends to increase performance rather abusive supervision that negatively trigger's the behavior of the subordinate. Which also leads to the reduction in the self-efficacy of the employees
- Authenticity is another realm that also reduces the major role of abusive supervision to boost task performance for such purposes implants the training programs to enhance the self-efficacy that trigger the cognitive strategic abilities to maintain the supervision and performance level.
- Organization should be constructive in nature such that to generate the grievance system for the employees to reduce the level of abusive behavior in the working climate (Boswell &Olson-Buchanan, 2004).
- This research also signifies that supportive leadership should be incorporated in the organizations such that, therefore employees gain value in organization by asking them about the working climate they are receiving in the organization. (Organ, Podsakoff & Mackenzie, 2006). For that rationale organization should pay attention in this aspect.
- Meaningfulness in job can be exhibit while employees gain balance work load in the working environment such that, employee can utilized the aspect of self-efficacy appropriately and depicts willingness and satisfaction towards the job ultimately he can enhance the task performance. Ultimately that produces benefits for the organization.

7.3. Policy implications

This study made the attentions for the policy makers to ensure the establishment of the ethical and pleasant working environment that ensure the organization to make the ethical standards for all the level of employees and make healthy and pleasant working environment that boost the morale of employees and give maximum output in their performance.

8. Limitations and future directions

The most important limitation of this research is the limitation of time and generalization main reason backed by the sample size that can ensure the constructive results of the idea in accurate manner. This research commences the aspect of mistreatment in the form of abusive supervision (verbal aspects of the facets) while non-verbal characteristics (harassment and bullying, victimization) can be integrate as an imperative dimensions of mistreatment. This study encompasses the work family conflict as composite variable further researchers can take the deep mediating effects family and work interference behaviors and work and family domain related aspects or can incorporate types as (time, strain and behavioral conflict). Furthermore the contextual aspect of the job performance can be an important variable for future researches.

While on the other scheme of research various interiors and innerving variables are being control from the research as research support the mediating constructs factors like burn out, perceived organization support (Koopmans et al., 2011), organization justice and cultural factors imperative aspects for further research because reaction towards the abusive supervision not similar across the various cultures as diverse culture highlight dissimilar norms about interpersonal interactions (Vogel, Mitchell, Tepper, Restubog, Hu, Hua & Hunga, 2014). Task performance is employed in the current stud however other performance taxonomies are here that not be take in account as important constructs mentioned in Campbell et al. (1993) model or Bartram's (2005) Great Eight competencies. Prior researches (Burton & Hoobler, 2006; Tepper, 2000) analyze the phenomena by take in account all the facets of abusive supervision beside this, current exploration made its focus that take in account the aspects of verbal facets of the construct except the non-verbal that undertake the features bullying and harassment.

9. Conclusion

The foremost consideration of this study was to examine and understand the philosophy that whether abusive supervision has any particular impact on task performance simultaneously mediating impact of work family conflict on abusive supervision and task performance. Meanwhile, moderating role of self-efficacy is between work family conflict and task performance relationship. This exploration identifies the attention of management that one of the significant factors of less performance in health sector is the brutish behavior of supervisor towards the subordinates. For making healthy working environment it is integral notion to ensure the supervision without abusive in nature which ultimately help to reduce the work family domain imbalance and restore the self-efficacy as well. This exploration opens the new spectrum of knowledge in the field of maltreatment side of leadership.

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IMPACT OF INTELLECTUAL CAPITAL ON ORGANIZATIONAL PERFORMANCE WITH MEDIATION OF KNOWLEDGE SHARING: A CASE STUDY OF PHARMACEUTICAL FIRMS IN PESHAWAR

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Abstract

The aim of the study was to examine the impact of intellectual capital on organizational performance along with the mediating effect of Intellectual capital was used as an independent variable which includes; Human capital, structural capital and relational capital; however Organizational performance was select as the dependent variable. Knowledge sharing was selected to check the mediation effect between intellectual capital and organizational performance. Employees working at Pharmaceutical companies in Peshawar were the targeted population which includes managers and sales representatives. 120 employees were selected as responded by using convenient sampling technique. Likert Scale questionnaire was used for data collection. The analysis includes; reliability of the scale, regression analysis and Baron and Kenny (Mediation effect). The results suggest that there is a positive significant impact of intellectual capital on firm performance and knowledge sharing has also a positive impact on the performance of pharmaceutical companies. The study concludes that knowledge sharing has a positive mediation between Organizational Performance and Intellectual Capital. The study will aid employees as well as an employer in pharmaceutical companies.

Keywords: Intellectual Capital, Organizational Performance, Pharmaceutical Firms, Knowledge Sharing.

1. Introduction

Intellectual Capital (IC) plays an important role in value creation of a firm. It is beneficial like with tangible assets to enhance the competitive advantage. In the modern world, many organizations invest in their intellectual capital to enhance the firm performance through customer relation, research, training and development (Kamukama et al., 2011). Intellectual capital includes creative and skilled employees, knowledgeable employees, a well-defined organizational structure and supportive relations with customers and also with the society; all such elements contribute in organizational success (Santos et al., 2013).

Knowledge Sharing (KS) is also important for the organizations to get their objective (Bontis, 2000). It serves like blood which runs in the organizational veins because in this competitive and dynamic environment organizational survival is very important which can be possible through knowledge sharing. An effective organizational structure is essential through which

knowledgeable employees can share their knowledge with other employees to create soft relations with customers in order to get an organizational goal (Shannak et al., 2012).

IC has an important relation with KS because IC can be defined as knowledge which can be converted to get profit by utilizing the non-physical and non-financial resources of a company (Shah and Shah, 2010). KS include both Internal and external knowledge which can be required for an organization to meet the market competition.

1.1 Problem Statement

Intellectual capital has a very important role in long-run firm performance. Intangible assets are also very important like physical assets but there is no focus on such assets. Therefore it is important for an economy to check the impact of intellectual capital on organizational performance with the mediation effect of knowledge sharing.

1.2 Objectives of the study:

Objectives of the study are:

- To examine the impact of Intellectual capital of organizational performance.
- To find the mediating effect of Knowledge sharing in-between Intellectual capital and organizational performance.

1.3 Significance of the study

The study of Intellectual capital is important to create a firm's value efficiently by using its all components. This study is related to Pharmaceutical organizations working in Peshawar, which is facing a lot of competition. So the survival of such firms is merely based on investment in intellectual capital to increase knowledge sharing which will ultimately increase organizational performance.

Literature Review

Obeidat et al. (2016) examined the different effects which were found between organizational performance and Intellectual capital by using knowledge sharing as a mediator. Employees working at manufacturing companies in Jordan were targeted population and 356 employees were selected as a sample on convenient based sampling techniques. Intellectual capital was selected as independent variable while organizational performance was as dependent, however, knowledge sharing had a mediating role in-between the dependent and independent variable. Baron and Kenny mediation effect model was used to check the mediation effect of knowledge sharing. The results showed that intellectual capital was positively affecting the organizational performance with the strong mediation of knowledge sharing. The results further showed that knowledge sharing has a significant positive association with organizational performance.

According to Baharathi (2010) efficiency in utilizing human & physical resources play an important role to strengthen the firm. Effectiveness measured simply on financial variable does not provide the true image particularly in a segment which is intellectual capital concentrated. The display paper is a challenge to calculate the presentation of bank in Pakistan on new aspect of intellectual capital. The estimated value of the paper added intellectual capital (VAIC) of bank in Pakistan for a 2 year period. the conclusion of the lessons that the private sector bank was doing much improved than all other banks in Pakistan on intellectual capital effectiveness levels. The better presentation is certified to well-organized practice and management of human resources.

According to Sharabati & Jawad (2010) the aim of the study is to find the relationship among the intellectual capital and business performance within the pharmaceutical sector in Jordan. They can perform the survey of 132 top middle-level managers from all 15 members of the Jordanian Association of Pharmaceutical Manufacturers. The finding offers valuable insights into the

generalizing of intellectual capital in a novel research setting. Senior executives of pharmaceutical firms in Jordan intellectual capital is of primary attention. In Egypt, the research reported is between only a few to investigate the issue of intellectual capital and the first to study the pharmaceutical firms.

According to Arabrahmatipour et al. (2015) examine that the relationship among intellectual capital and knowledge sharing among librarians in Tehran University of medical sciences. The population included all university librarians and data was collected through a questionnaire to evaluate the permanency of internal stability between the items, Cronbach's alpha was used (above 70%). To examine the statistical data, the Pearson correlation coefficient was used. The outcome of the analysis showed that there was a positive association, less than the average level, between intellectual capital and knowledge sharing among the librarians in Tehran University of medical sciences.

Sajedi & Nia (2015) investigates the relationship between organizational performance and intellectual capital of the employees in the ministry of sports and youth. The population of the study was 668 individuals out of which 180 were selected on simple random sampling technique. Tools of data collection consisted of a 5-point Likert scale questionnaire. Organizational performance was selected as dependent variable while intellectual capital was selected as an explanatory variable. Reliability of the elements shows Cronbach alpha of 0.82 and 0.86 for organizational performance and intellectual capital respectively. The results of the study show that intellectual capital has a significant impact on organizational performance. The other elements of Intellectual capital with organizational performance were positive and significant (human capital (0.43), structural capital (0.45), and relational capital (0.52). Upon the results, it can be concluded that intellectual capital leads to increase in organization performance.

Research Methodology

1.3 Population, Sample Size

All the Pharmaceutical employees i.e. medical representatives and their managers were the population of the study. In this study population was unknown because there is a high rate of turnover in the pharmaceutical firms. 120 respondents were selected by using convenient sampling technique, however, only 100 responses were received which were included for analysis. The response rate was 83% which was relatively higher than previous studies (Obedat et al., 2016).

3.2 Data Collection

Survey research technique was used to collect data through a Likert scale questionnaire. The questionnaire was adopted from a previous study (Obeidat et al., 2016). Data was collected from Pharma Companies staff at some specific areas i.e. Al-Khidmat Hospital, Hayatabad Medical Complex, Private Clinics (at Dabgari Garden, Saddar Cantt, Arbab Road, Charsadda Road), Lady Reading Hospital etc.

3.3 Variables of the study

3.3.1 Dependent Variable

i. Organizational Performance

It is the actual output which is the result of an organization's productivity, which is intended against the goals and objectives of the organization. Organizational performance can be measured as financial and operational performance. In this study, the elements used for organizational performance were both financial and operational performance.

3.3.2 Independent Variables

i. Intellectual Capital (IV)

a. Human Capital (HC): The *knowledge, know-how, abilities, and creativity* of employees, in many cases, people don't like to be referred to as "capital." Terms such as talent or human resources are common alternatives.

b. Structural Capital (SC): According to Abadulai, Kwon & Moon, (2012), SC can be referred as an information system, Process, policies, patents, procedures, tools, methods, copyright, trademark etc. which helps the organization to retain knowledge and its productive use to get the organizational goal.

c. Relational Capital (RC): A firm's relationship with the external world including stockholders, partners, employees, management, customers, communities regulations and other stakeholders. This can include both informal relationships such as business contacts and formal contracts.

3.3.3 Mediating Variables

i. Knowledge Sharing (MV):

Knowledge sharing is an activity through which knowledge (i.e. information, skills, or expertise) is exchanged among people, friends, families, communities, or organizations knowledge sharing activities are generally supported by knowledge management systems.

3.4 Research Framework

The following figure shows the relationship between IC, OP, and KS:

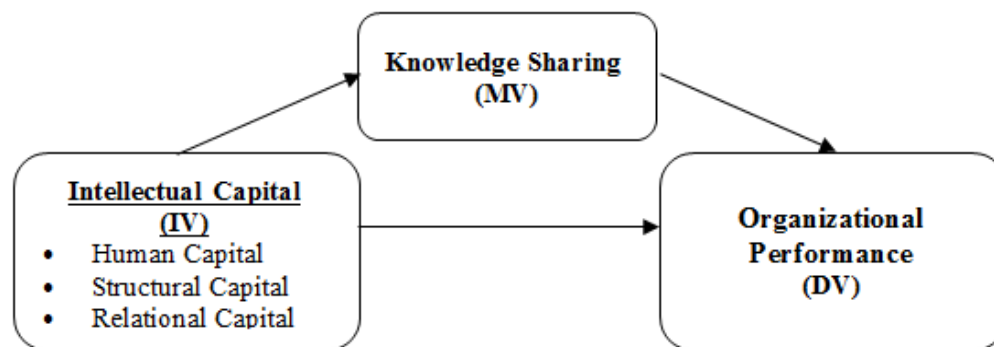


Fig 1

3.5 Hypotheses

H₁: Intellectual capital has a positive impact on organizational performance.

H₂: Knowledge Sharing has a positive mediation between Intellectual Capital and Organizational Performance.

H₃: Intellectual Capital has a positive impact on knowledge sharing.

H₄: Knowledge sharing has a positive impact on organizational performance.

Analysis

1.4 Reliability Test

Table 1: Reliability test

Scale	Elements	Cronbach's Alpha
HC	6	.78
RC	4	.73
SC	6	.82
OP	6	.83
KS	5	.77

According to Uma Sekran (2003) the above table shows the reliability of SC, OP is in a good range and the three of other element HC, RC and KS are in average range.

4.2 Multicollinearity

Table 2: Multicollinearity

Coefficients ^a			
	Model	Collinearity Statistics	
		Tolerance	VIF
1	OP	.728	1.038
	KS	.964	1.038

As the above, the result shows that both values of VIF is less than 10, therefore, the model is free of the problem of Multicollinearity

1.3 Heteroscedasticity

Table 3: Heteroscedasticity

Model	R	R Square	Adjusted Square	RStd. Error of the Estimate	Durbin-Watson
1	.344 ^a	.318	.100	.43066	1.012

As in the above table, the result shows the value of Durbin Waston is less than 1.96 it means the model is free of the problem of Heteroscedasticity.

1.4 Regression Analysis

Baron and Kenny (Mediation Effect Model):

Baron and Kenny (1986) proposed a four-step approach which was used to test the hypothesis. These four steps are used to check the mediation effect in between dependent and independent variables.

In **step one** (x is independent and y is dependent variable)

In **step two** we can conduct the simple regression analysis of x and m (x is independent variable and m is a mediator)

In **step three** we can conduct the simple regression of m and y (m is mediator and y is independent variable)

In **step four** we can conduct a multiple regression analysis of x and y through mediation m (x is independent and y is dependent variable and m is a mediator)

Table 4: Regression Analysis by using Baron & Kenny Model for mediation effect

Variable	Step 1 Organizational Performance	Step 2 Knowledge Sharing	Step 3 Organizational Performance	Step 4 Organizational Performance
(Constant)	3.26***	2.67***	3.98***	2.350***
Intellectual Capital	.394***	.429***		.375***
Knowledge Sharing			.355***	.296***
R ²	.523	.481	.544	.547
Adj. R ²	.515	.476	.531	.541
F- Value	10.883***	8.513***	8.513***	9.735***

***p<0.01

Four steps in the above table show different relations between dependent, independent and mediating variable:

Step 1 shows the relationship between OP and IC; in this step, the value of R² is 0.52. It means that 52% variation founded independent variable due to change in an independent variable. The value of F-Stats is 10.883 and its p-value is less than 1% which represent that the overall model is significant. The results further suggesting the significance of individual variable the p-value suggests that OP is significant to IC and magnitude shows that there will be a positive change of 0.39 units will accrue in OP due to 1 unit change in IC.

Step 2 reflects the relationship between KS and IC; the value of R² reflects 48% variations between the independent and mediating variable. F-stats p-value is less than 1% and suggesting that the overall model is significant. This step further suggesting the significance of individual variable and its p-value suggests that KS is significant to IC and magnitude shows that there will be a positive change of 0.43 units will accrue in KS due to 1 unit change in IC.

Step 3 represents the impact of KS on OP which has 54% variations and a p-value of F-stat is less than 0.01 shows the overall significance of the model used. Further, it reflects the significance of the individual variable; the p-value suggests that KS has a significant association with OP.

Step 4 shows the multiple regression effects between dependent, independent and mediating variable. Intellectual capital has a positive significant impact on knowledge sharing and Organizational performance. 58% variations were found and the overall model is significant at a critical value of 1%. IC is contributing with .38 and KS with .30 units towards OP due to 1 unit change.

2. Conclusion

The study concludes that intellectual capital has a strong association with knowledge sharing and they both had a positive impact on organizational performance (findings are similar to Obeidat et al., 2016; Sharabati & Jawad, 2010; Arabrahmatipour et al., 2015 & Sajedi & Nia, 2015). It

means that knowledge sharing is an important element for human capital which leads to organizational success. Study accepts all the four hypotheses. In pharmaceutical firms, knowledge sharing is very important because if an employee has both internal and external knowledge so s/he would be the king of the market and can help the organization in achieving its goal. The study found that organizational performance is based on intellectual capital along with knowledge sharing therefore focus should be given to investing in intellectual capital. Proper training should be arranged to improve the knowledge sharing process.

3. Future Directions

In future studies, researchers can use other elements of knowledge sharing i.e. Knowledge donating and knowledge collection. Organizational performance can be measured through Operational performance and financial performance separately. Organizational commitment and employee satisfaction can also be used as a mediating variable to better explain the relationship between intellectual capital and organizational performance.

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A REALISTIC APPROACH FOR THE EVALUATION OF GREENSHIELDS AND GREENBERG MODELS FOR HETEROGENEOUS TRAFFIC FLOW

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Abstract

The natural trend of velocities towards densities is given by equilibrium velocity distribution. Greenshields laid the foundation of traffic flow studies and developed the first equilibrium velocity distribution model in which a linear relationship between velocity and density is considered. Following the Greenshields model, Greenberg presented a new equilibrium velocity distribution model, a logarithmic relationship between velocity and density is considered. Both the Greenshields and Greenberg models are widely used in traffic flow Modelling. In this paper a pragmatic approach has been adopted to check the validity of the Greenshields and Greenberg models for heterogeneous traffic flow. The simulation results shows the unrealistic behavior of both the models for heterogeneous traffic flow.

Keywords: Equilibrium Velocity Distribution, Greenshields Model, Greenberg Model, Heterogeneous Traffic, Traffic Flow Modelling.

1. Introduction

The fundamental diagram of traffic flow is referred to the speed-density relationship of vehicular traffic, the speed-density relationships are used widely in traffic flow modelling [1]. The first speed-density relationship was proposed by Greenshields in 1935 [2]. Equilibrium velocity is the desirable velocity in different traffic conditions [3], which is represented by the fundamental diagram of traffic flow. Various equilibrium velocity distribution models are proposed in the literature after the first development by Greenshields. The equilibrium velocity distribution models include Greenberg 1969 [4], Underwood [5] models.

The understanding of speed-density relationship is necessary requirement to characterize the traffic flow and to derive macroscopic traffic flow models. Some of the equilibrium velocity distribution models are based on the assumption that vehicles have natural trend towards the traffic density [6]. The theory that describes the traffic flow are based on the Greenshields

observations [2]. Greenshields considered a linear relationship for speed density relationship for the derivation of equilibrium velocity distribution model and is given as

$$v(\rho) = v_m(1 - \frac{\rho_{avg}}{\rho_m}) \quad (1)$$

Where $v(\rho)$ is the equilibrium velocity, v_m is the maximum velocity, ρ_{avg} is the average traffic density and ρ_m is the maximum traffic density. According to (1), as the density approaches 0, the speeds approaches the free flow speed. The linear relationship of speed-density however is not a realistic relationship, conceivably, this relationship questioned the validity of the model. To comprehend the shortcomings of the Greenshields model, Greenberg in 1969 proposed a logarithmic relation between speed and density and proposed an equilibrium velocity distribution model [1], given as

$$v(\rho) = v_m \log(\frac{\rho_m}{\rho_{avg}}) \quad (2)$$

The Greenberg model predict unrealistic velocities at lower densities which is the shortcoming of the model.

In Pakistan, congestion in many cities is due to heterogeneous and mixed traffic flows which increases the air pollution and travel time [7]. Thus, accurate characterization of traffic is important to mitigate traffic congestion, public safety, and reduce travel time. For the accurate characterization of traffic flows Greenshields and Greenberg models are considered. In developing countries the traffic conditions are generally heterogeneous [8]. In this paper Greenshields and Greenberg models are evaluated for heterogeneous traffic flow. Practical traffic data was collected over a road section of 200 m with heterogeneous traffic conditions, traffic stream characteristics are calculated from the recorded video which were used for the simulations of Greenshields and Greenberg models. Greenshields and Greenberg models are simulated and evaluated for heterogeneous traffic conditions.

In section 2 the methodology of the study is presented, section 3 presents the results and discussions of both the model along with the real traffic data. In section 4 the conclusion of this study is presented.

2. Methodology

Real traffic data was collected on ring road, Charsadda link, Peshawar, to check the validity of the Greenshields and Greenberg models for the heterogeneous vehicular traffic flow. The total length of the road section was 200 m, traffic characteristics such as maximum velocity, maximum density, average velocity and average density were extracted from the recorded real traffic data. The road section is three lane urban road, the traffic conditions on the road section are heterogeneous. The maximum velocity recorded on the section is 20 m/s, the critical density of the road section is 27 veh / 200 m. Two video recording cameras were installed, one on the starting point and one on the end point of the road section. The total travelled time of the vehicles is calculated from the video by which the individual speeds of the vehicles were calculated. The road section for real traffic data is shown in Fig 1.



Figure 1: Arterial view of the heterogeneous road 200 m section on ring road, Peshawar (Google earth image)

3. Results and Discussions:

The Greenshields and Greenberg models are simulated on the same parameters extracted from real traffic data. The simulation parameters are in Table 1.

Table 1: Simulation parameters for Greenshields and Greenberg models

Sr. No	Description	
1	Maximum density	27 veh / 200 m
2	Maximum velocity	20 m/s
3	Average density	1 to 27 (veh / 200 m)

The Greenshields equilibrium velocity distribution model is simulated on the parameters given in Table 1 and is given in Fig 2. The model predicts a linear relationship between the velocity and density. When the density of the road is as low as 1 veh / 200 m, the equilibrium velocity predicted by the model is 19.25 m/s. When the density increases to 5 veh / 200 m, the velocity drops to 16.29 m/s, when the density further increases on the 200 m road section to 15 veh / 200 m, the velocity drops to 8 m/s. When the density reaches to the maximum density such that 27 veh / 200 m, the velocity is 0. However, this behavior is not realistic in heterogeneous traffic flow, the velocity does not approaches 0 as analyzed from the real traffic data shown in Figure 6.

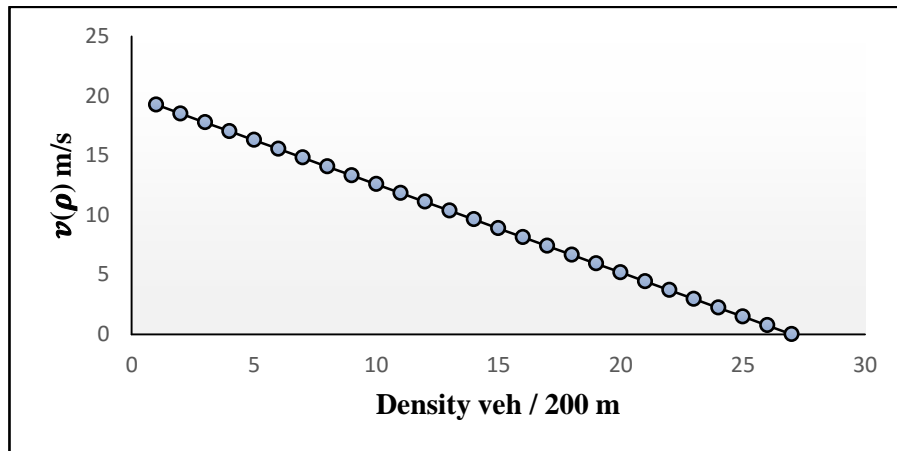


Figure 2: Greenshields equilibrium velocity distribution for heterogeneous traffic flow

Fig 3 illustrates the traffic flow behavior of the Greenshields model. When the density of traffic is 1 veh/200 m, the flow is 19.25 veh/s, as the density increases, the traffic flow increases, when density increases to 13 veh/ 200 m the flow is maximum, such that 134 veh/s. When the density further increases the flow starts decreasing. When the density reaches 16 veh/ 200 m the flow decreases to 145 veh/s. At 27 veh / 200 m the flow is 0. This traffic behavior is not realistic for heterogeneous traffic, traffic flow does not approaches 0 realistically, and the traffic flow behavior of real traffic is shown in Figure 7.

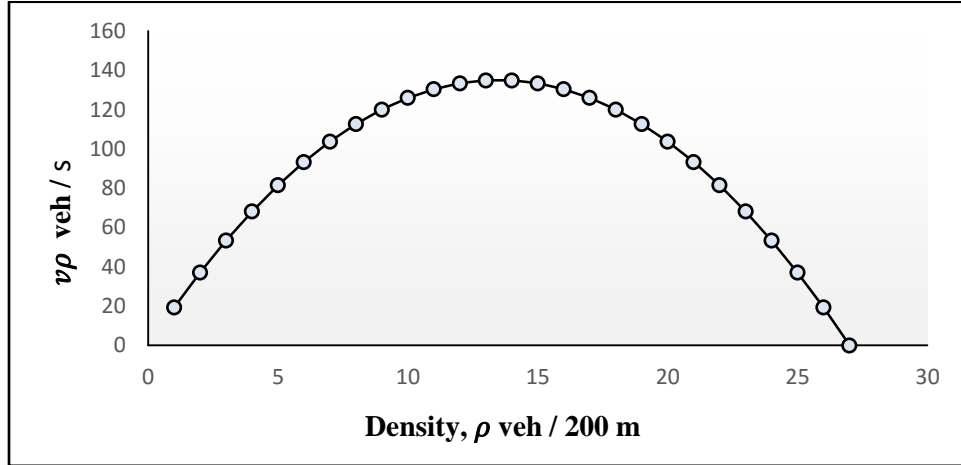


Figure 3: Greenshields model flow behavior for heterogeneous traffic flow

The Greenberg equilibrium velocity distribution is given in Figure 4. When the density of the road section is 1 veh/200 m the Greenberg model predicts the velocity to be 28.2 m/s this velocity exceeds the maximum velocity obtained from the real traffic data which is 20 m/s. As the density increases the velocity decreases, when the density is 5 veh/200 m, the velocity is 14 m/s. When the density increases to 15 veh/200 m the velocity drops to 5 m/s, the density further increases to the maximum density of the road section such that 27 veh / 200 m the velocity is 0, again in heterogeneous traffic this is not a realistic behavior, in heterogeneous traffic flow, the capacity of the road increases due to the gap filling behavior.

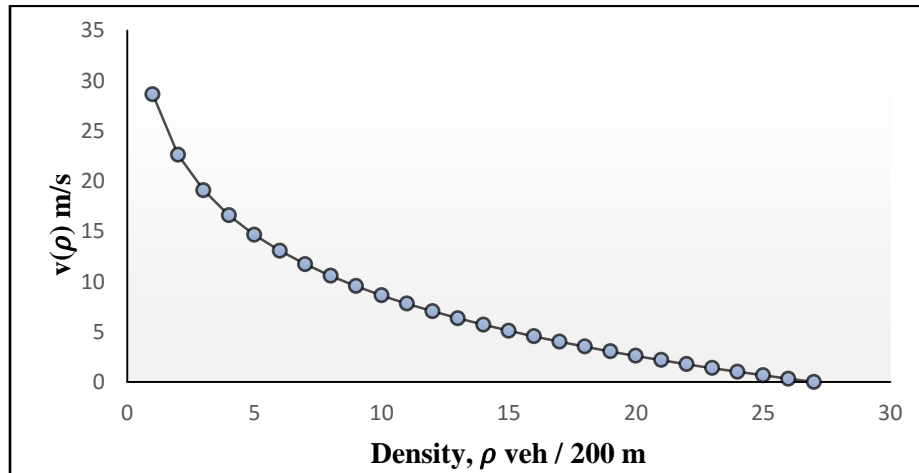


Figure 4: Greenberg equilibrium velocity distribution for heterogeneous traffic flow

The Greenberg model flow behavior is given in Figure 5. When the density is as low as 1 veh/200 m the flow is 28 veh / s, when the density increases to 10 veh / 200 m the flow on the road section increases to 86 veh / s. This is the maximum flow beyond this point when the density increases the flow decreases. When the density is 20 veh / 200 m the flow decreases to 52 veh / s, when the density further increases to the maximum density such that 27 veh / 200 m, the flow is 0. Traffic flow cannot be 0, realistically at 27 veh / 200 m as shown in Figure 7.

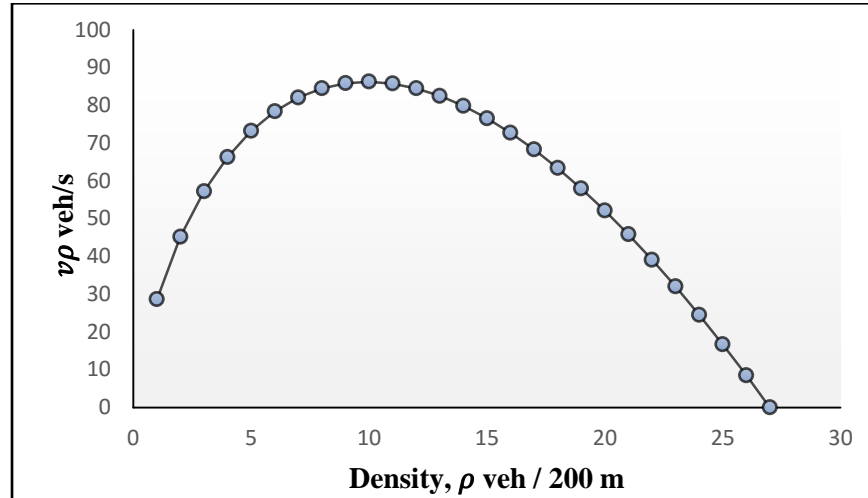


Figure 5: Greenberg model flow behavior for heterogeneous traffic flow

The velocity of the real traffic obtained from the recorded data is plotted against the density and is shown in Figure 6. The maximum velocity is 20 m/s when the density is 1 veh/200 m. When the density is 27 veh/200 m the velocity is 5.89 m/s. The velocity varies according to the increase in density.

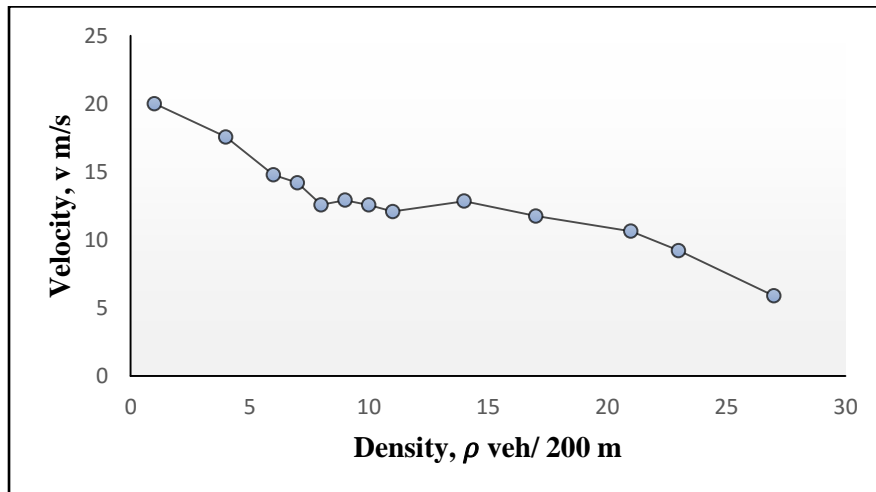


Figure 6: Velocity VS traffic density over a 200 m road section

The traffic flow behavior of the real traffic data is given in Figure 7. The critical flow is when the density is 21 veh / 200 m. When the density is 27 veh / 200 m, the flow is 159 veh / s. This flow behavior is the real traffic flow behavior obtained from the real traffic data at peak hours.

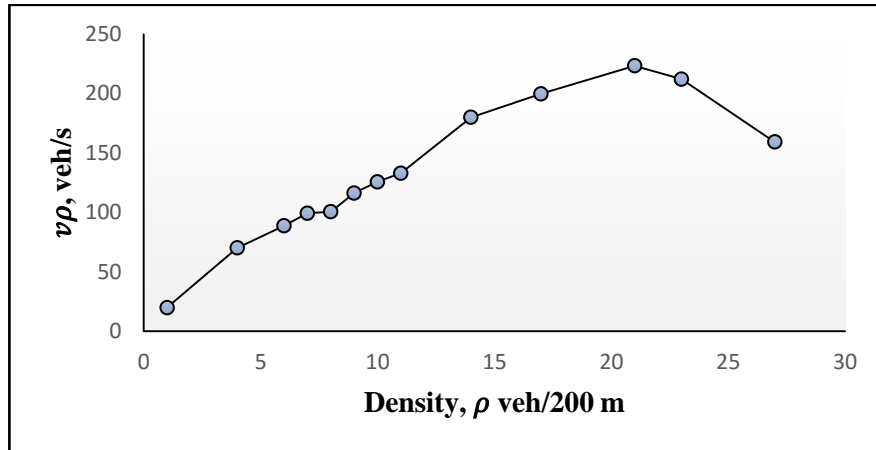


Figure 7: Traffic flow VS traffic density over a 200 m road section

The Greenshields and Greenberg models does not realistically predict the heterogeneous traffic flow. The Greenshields model predicts the velocity be 0 when the density increases to maximum density, a linear relationship between the velocity and density is assumed by the Greenshields model which however is not true for the heterogeneous traffic flow. The Greenberg model predict a logarithmic relationship between velocity and density, the model predicts the velocity to be 0 m/s as the density approaches the maximum density, The results from the real traffic data and from the simulations of both the models are compared, the results obtained from the Greenshields and Greenberg models are unrealistic as compared to the realistic traffic data, the velocities of both the models tends to 0 as maximum density is approached, realistically in heterogeneous traffic flow, due to the gap filling behavior of the vehicles the velocity is not 0, which questions the validity of both the models for heterogeneous traffic flow.

4. Conclusions:

In this study equilibrium velocity distribution models are simulated on real traffic data. The Greenshields and Greenberg models are evaluated for heterogeneous traffic flow. Both models are simulated on real parameters obtained from real traffic data and compared with the real traffic flow. Greenshields model assumes linear relationship between the velocity and traffic density which is not realistic for heterogeneous traffic condition. The equilibrium velocity predicted by the Greenberg model as shown in the results go beyond the maximum velocity which reveals that the Greenberg model does not predicts the velocity accurately for lower densities. Results of both the models questions the validity of the models for heterogeneous traffic flow. New equilibrium velocity distribution models are required to characterize the heterogeneous traffic flow.

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EXAMINING THE EFFICIENCY OF LEATHER PRODUCTS EXPORTS DETERMINANTS: EVIDENCE FROM PAKISTAN

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Abstract

Leather products manufactured in Pakistan is widely accepted in the international market. After detailed literature review, this research paper attempt to identify the major relationship affecting the leather export performance of Pakistan using the monthly time series data over the period of July 2003 to December 2017, released by State bank of Pakistan. The data analysis technique involved in empirical investigation includes (a) unit root test, (b) optimal lags selection, (c) bound test and (d) autoregressive distributed lag (ARDL). The finding of this study indicate that leather import related activities and exchange rate index has positive and significant impact on leather export performance in the long-run whereas export promotion program showed insignificant impact. Result estimates are useful for leather exporters and government of Pakistan in minimizing financial risk.

Keywords: Leather export, leather import, exchange rate index, ARDL model

JEL classification: C12, C22, F18, F31, M21

1. Introduction

Leather products manufactured in Pakistan is widely accepted in international market and have capacity to multiply its demand many times with improvement in quality and diversification in various range of products. Leather sector of Pakistan play vital role in minimizing unemployment, building the relationship between agro and rural economy, lessen the vicious circle of poverty and in collecting foreign exchange. There are six sub-sectors in leather industry of Pakistan named as (i) tanning, (ii) leather garments, (iii) leather gloves, (iv) leather footwear, (v) leather shoe uppers, and (vi) leather products, while the major leather and its related products industries are located in Karachi, Lahore, Kasur and Sialkot (Kazmi, 2017).

Pakistan is the only country, which is facing decline in leather products export performance as compared to its regional competitors namely India, China and Bangladesh. During 2017, the export performance of Chinese leather sector enhanced by 20 percent, India by 63 percent, and Bangladesh got 100 percent increase in its leather industries. On the other side, total Pakistan share for leather goods in international market is 0.5 percent as compared with China 19 percent, Italy 9 percent, Vietnam 4 percent, and India 2.5 percent. (Adnan Khan, 2018).

During 2016-17, Pakistan's export concentration remained in some items named as cotton products, leather, rice and few other items, while these three types of goods contributed almost 71.8 percent (2017), 71.6 percent (2016) as compared to 68.7 percent in 2015 (Government of Pakistan, 2017). Table 1.1- display contribution of Pakistan in leather raw hides and skins to world and top 5 buyers. From 2013 to 2017, overall -37 percent-declined observed in export activities with the world and Italy remain top buyer in buying rawhides, skins and leather followed by Hong Kong, China, Vietnam, Bangladesh and so on.

Table 1.1. List of importing markets for a product exported by Pakistan
Product: 41 Rawhides and skins (other than fur skins) and leather
Unit: US Dollar thousand

Importers	2013	2014	2015	2016	2017	Change
World	529,698	547,508	425,085	349,003	335,345	-37%
Italy	69,380	73,218	57,662	53,091	51,656	-26%
Hong Kong	154,369	130,449	87,500	53,775	39,129	-75%
China	57,057	55,424	42,133	37,120	37,040	-35%
Viet Nam	24,778	31,322	27,845	23,173	25,309	2%
Bangladesh	11,964	12,606	14,031	20,891	22,810	91%

Source: TRADE MAP

Table 1.2 list out contribution of Pakistani articles of leather, saddlery, travel bags etc. to the world and its top 5 buyers. Since 2013 to 2017, Pakistan leather articles export performance decline by -15 percent despite giving export incentive SRO 62(I)/2017. However, its loss in percentage is less as compared with the export performance of rawhides, skin and fur skin and their articles.

Table 1.2. List of importing markets for a product exported by Pakistan
Product: 42 Articles of leather; saddlery & harness; travel goods, handbags and similar Containers.
Unit : US Dollar thousand

Importers	2013	2014	2015	2016	2017	change
World	743,538	742,028	687,621	644,930	631,953	-15%
Germany	144,974	164,282	132,326	123,354	123,459	-15%
USA	119,295	118,714	121,848	112,811	107,217	-10%
UK	52,811	53,447	54,158	46,576	49,973	-5%
Spain	43,791	49,228	51,757	54,652	46,315	6%
Netherlands	42,411	42,321	42,981	37,327	36,509	-14%

Source: TRADE MAP

Table 1.3 list out export of Pakistan fur skins and their articles to the world and its top 5 buyers. Since 2013 to 2017, huge loss of -71 percent observed in export activities of Pakistan.

Table 1.3. List of importing markets for a product exported by Pakistan
Product: 43 Fur skins and artificial fur; manufactures thereof
Unit: US Dollar thousand

Importers	2013	2014	2015	2016	2017	change
World	299	810	560	407	86	-71%
Canada	-	-	-	-	30	-
Japan	12	10	15	6	19	58%
Australia	-	-	22	1	14	-
India	12	29	7	6	10	-17%
Philippines	-	3	22	-	8	-

Source: TRADE MAP

Government of Pakistan took various measures to boost export performance such as zero-rating facility given to major export oriented sectors namely textile, leather, surgical, sports goods and carpets (Government of Pakistan, 2017). Federal government of Pakistan remove custom duty on import of leather raw material such as skins and hides to ensure positive export behavior of leather industry (Adnan khan, 2018). Pakistan Board of investment organized a delegation of 50 prominent Italian and 250 Pakistani businesspersons related to different sectors such as infrastructure, renewable energy, agricultural mechanics and food processing, textile and leather mechanics to join Pakistan business forum in December 2016 to display their products to Italian customers in order to increase their export performance (Government of Pakistan, 2017). To improve the performance of leather industry, Government of Pakistan announced duty drawback incentive etc. for exporters (Government of Pakistan, 2017). The state bank of Pakistan reduced its mark-up rate to 3.0 percent from 9.0 percent on export refinance scheme; for long-term financing facility, the mark-up lessened from 11.4 percent to 6.0 percent to encourage export behavior to move upward and to ensure trade growth (Government of Pakistan, 2017).

Abdul Ghafoor (2012) explained that Pakistan import leather raw materials from different developing countries and convert it into finished form for the purpose of export to developed countries of the world. Haidri (2010) argued that Saudi Arabia, China, Kenya, Sudan and Tanzania are major contributor in import of leather and leather goods in Pakistan. Adnan Khan (2018) pointed out that Pakistan leather sector import 25 percent leather raw material from Middle East, Africa and Australia while export semi-finished products mainly to China.

Despite different remedial measures, leather tanned and leather garments sector could not be able to grow in the international market while leather products also lose their market share against their competitor countries namely China, India, Bangladesh and Vietnam due to their low prices in market (Government of Pakistan, 2017). Increase in cost of production, environmental compliance according to international standards and loss in import of raw materials are major factors, which affect the export performance of leather industry (Adnan Khan, 2018). Kazmi (2017) argued that leather industry of Pakistan seek Government of Pakistan assistance, on the other side export incentives, duty drawback etc. are much larger in China, India and Bangladesh as compared with Pakistan which is completely inadequate for survival purpose of leather sector. Overvaluation and undervaluation of exchange rate also determine the behavior of leather industry. So, this situation of leather sector of Pakistan demand an empirical investigation to find out the impact of import of leather and leather goods, export incentives given only to leather and leather products and exchange rate index on export behavior of leather and leather products.

2. Literature review

The literature pertaining to leather sector of Pakistan is very large but investigating its long-run determinants is new and unique study. Different studies who investigated the long-run relationship between export and import, export incentives and exchange rate index elaborated below.

Sharafat Ali (2013) investigate the long-run relationship between export and import performance of Pakistan using annual data from 1972 to 2012. He used Johansen cointegration and Engle and Granger method. His result indicated that positive and significant association occur between export and import performance of Pakistan both are cointegration together. Tiwari (2011) examined the relationship between export and import of India and China. He used the monthly time series data from January 1992 to February 2010, applied unit root test, and Gregory-Hansen cointegration technique to evaluate relationship among variables. He argued that long-run relationship between export and import exist in India but no significant base found of relationship between export and import in China. Rasheed (2010) explored the relationship between export and import of Pakistan using quarterly data over the period of 1972 to 2006 and used

cointegration technique along with vector error correction estimate. He found relationship between export and import of Pakistan.

Osama Mohamed (2015) studied the effectiveness of export promotion program on export performance of Sudan. He used correlation analysis and regression to estimate the model. He found positive and significant relationship between export incentives and export performance of Sudan. Imtiaz Ahmed (2015) argued that there is direct relationship between export incentives and export performance of Pakistan. He used industry level data over the period of 2001-11 and suggested government to increase the number of incentives for the purpose of survival of textile industry. Haque and Kamal (2007) examined the impact of export incentives such as rebates and refunds on export behavior of Pakistan using annual data over the time 1979-2001. He perform cointegration analysis and found that export incentives have positive and significant impact on export performance but in the short-run.

Adhikary (2012) investigated the impact of foreign direct investment, trade openness, domestic demand and exchange rate on export performance of Bangladesh using time series data over the period of 1980-2009 with the help of cointegration technique and VEC model. However, they did not found any significant evidence of relationship between export performance and exchange rate. Armah (2005) examined the long-run relationship between export and import of Ghana along with exchange rate index. He used annual data from 1970 to 2000 and applied cointegration method while value of error correction confirm the long-run equilibrium relationship exist between variables.

To contribute more knowledge in the above literature, it is necessary to investigate the relationship between export and import of Pakistan, export incentives and exchange rate index to enhance the export behavior of leather and leather goods of Pakistan. Thus, present study fulfill this demand.

3. Data sources and methodology

This research study used export of leather products (LNEXPORT) as dependent variable and import (LNIMPORT), export incentives (LNCREDIT) and exchange rate index (LNCUR) as independent variables. LNEXPORT consist of HS code 41,42 and 43, LNIMPORT involve HS code 41,42 and 43, LNCREDIT taken as proxy of credit facilities given to leather sector of Pakistan, as cash incentive is directly considered as export incentive because it increase export value (Ahmed, 2015), and LNCUR developed by taking average of Dollar, Euro and British Pound. The monthly time series data obtained from economic section of State bank of Pakistan from July 2003 to December 2017.

Econometric model

To investigate the impact of import of leather goods, export incentives and exchange rate index on export performance of leather goods, we specify the equation 3.1:

$$\text{LNEXPORT}_t = \beta_0 + \beta_1 \text{LNIMPORT}_t + \beta_2 \text{LNCREDIT}_t + \beta_3 \text{LNCUR}_t + U_t \quad \text{Equation 3.1}$$

Where LNEXPORT_t , LNIMPORT_t , LNCREDIT_t , and LNCUR_t represent natural logarithm form of export of leather goods, import of leather goods, export incentives given to leather sector and exchange rate index. Parameters β_1 , β_2 , β_3 are the long-run elasticities of LNEXPORT with respect to LNIMPORT, LNCREDIT, LNCUR. Engle and Granger (1987), Maximum likelihood and eigen-value based Johansen (1988), Johansen-Juselius (1990) methods are general techniques to perform cointegration analysis among dependent and independent variables. The condition to apply this technique is that all variables of the model should be stationary at first difference but it provide inconsistent and poor results in case of small sample size. On the other side, Autoregressive distributed lag model (ARDL) provide consistent and robust result of the long run coefficients in case of small sample size. Pesaran and Pesaran (1997) argued that there ARDL does not require that all variables should be stationary at first difference, it can be integrated at

first level or first difference. Pesaran and shin (1999) argues that ARDL approach for examining long-run relationship among variables is better than other general techniques of cointegration. Due to major advantages over Johansen cointegration analysis, we specify equation 3.2:

$$\Delta \text{LNEXPORT}_t = \beta_0 \sum_{i=1}^q \beta_{1i} \Delta \text{LNEXPORT}_{t-i} + \sum_{i=0}^q \beta_{2i} \Delta \text{LNIMPORT}_{t-i} + \sum_{i=0}^q \beta_{3i} \Delta \text{LNLNCREDIT}_{t-i} + \sum_{i=0}^q \beta_{4i} \Delta \text{LNCUR}_{t-i} + \beta_5 \text{LNEXPORT}_{t-1} + \beta_6 \text{LNIMPORT}_{t-1} + \beta_7 \text{LNCREDIT}_{t-1} + \beta_8 \text{LNCUR}_{t-1} + U_t$$

Equation 3.2

Δ is the first difference operator, optimal lags represented by q , and short-run dynamics are in the form of $\beta_1, \beta_2, \beta_3$, and β_4 while $\beta_5, \beta_6, \beta_7$, and β_8 explain long-term parameters. After comparing effectiveness of ARDL model with Johansen cointegration technique, we ensured that all the variables should not stationary at second difference, if any variable become stationary at second difference than we cannot apply ARDL model. For examining stationarity of all variables, we used Augment Dickey-Fuller test. Afterward, to find out long-run relationship as described in equation 3.1; we test the bound test of equation 3.2, using F-statistics with lower and upper bound, if value of F-statistic become greater than all values of upper bound, than we say that cointegration exist between variables. On the other side, error correction term of equation 3.2 is mention in equation 3.3:

$$\Delta \text{LNEXPORT}_t = \beta_0 \sum_{i=1}^{q_1} \beta_{1i} \Delta \text{LNEXPORT}_{t-i} + \sum_{i=0}^{q_2} \beta_{2i} \Delta \text{LNIMPORT}_{t-i} + \sum_{i=0}^{q_3} \beta_{3i} \Delta \text{LNCREDIT}_{t-i} + \sum_{i=0}^{q_4} \beta_{4i} \text{LNCUR}_{t-i} + \lambda \text{EC}_{t-1} + \varepsilon_t$$

Equation 3.3

Where q_1, q_2, q_3 and q_4 are optimal lag lengths, λ is the parameter of speed of adjustment and EC explain the error correction of long-run relationship derived from equation 3.2

Empirical findings

Before empirical investigation, we tested the stationarity of all variables using Augment Dickey Fuller test using 5 percent level of significance at both intercept and trend & intercept. All the variables are stationary at first difference, which indicate sign of same sign of integration. In this stage, we can apply ARDL model to analyze relationship between dependent and independent variables.

Table 3.1. Unit root results

Variable Name	Intercept		Trend & intercept	
	At level	At first difference	At level	At first difference
LNEXPORT	0.09	0.00*	0.12	0.00*
LNIMPORT	0.01*	0.00*	0.00*	0.00*
LNCREDIT	0.50	0.00*	0.52	0.00*
LNCUR	0.37	0.00*	0.67	0.00*

* show significant at 5 percent level of significant

After estimating unit root results, the next important step were to select optimal number of lags length criteria. Bahamani-Osookee (2000) pointed out that long-run relationship results are very sensitive to number of lag length. Table 3.2 exhibit optimal lags length results; AIC recommend maximum 3 lags, SC represent 1 lag and 2 lags are suggested by HQ. In this research process, we selected AIC criteria for number of optimal lags in the ARDL model.

Table 3.2. Optimal lags length criteria results

Lag	AIC	SC	HQ
0	-4.25	-4.16	-4.21
1	-9.61	-9.18*	-9.44
2	-9.83	-9.04	-9.51*
3	-9.94*	-8.8	-9.48
4	-9.86	-8.37	-9.26

* indicates lag order selected by the criterion

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Author calculation

Following Pesaran M. H. (2001) with lag order of 1 using confidence interval of 95 percent level for lower (5.17) and upper bound (6.36). The value of F-statistic (7.58) is greater than all values of upper bound, which indicate that long-run relationship exist between dependent and independent variables. (see table 3.3)

Table 3.3. ARDL bound test

Test Statistic	Value	k
F-statistic	7.58	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.47	4.45
5%	4.01	5.07
2.50%	4.52	5.62
1%	5.17	6.36

Source: Author calculation

We used AIC criteria to select optimal number of lags for ARDL model. Table 3.4 present the results of the ARDL (1, 0, 0, 0) model. LNIMPORT and LNCURINDX is significant independent variables. The coefficient (0.21) of LNIMPORT shows that one percent enhancement in import of leather goods will increase the export performance of leather sector by 0.21 percent in the long-run. The coefficient (0.80) impact significantly and positively, one percent increase in exchange rate index will enhance the export behavior of leather industry by 0.80 percent in the long-run. Export incentive issued to leather sector did not show any significant behavior with respect to leather goods export. This study support the findings of Armah (2005), Haque and Kamaal (2007), Rasheed (2010), Tiwari (2011), Sharafat Ali (2013) and Imtiaz Ahmed (2015).

Table 3.4. Long Run Coefficients of ARDL (1, 0, 0, 0)
Dependent variable = LNEXPORT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMPORT	0.21	0.05	4.20	0.00*
LNCREDIT	-0.14	0.23	-0.59	0.55
LNCURINDX	0.80	0.35	2.29	0.02*
C	6.89	0.95	7.27	0.00*
TREND	0.00	0.00	-0.63	0.53

* show significant at 5 percent level of significant

Table 3.5 exhibits error correction estimate of the ARDL model along with Δ sign coefficient of short-run elasticities. LNIMPORT and LNCURINDX again is the most significant variables in explaining dependent variables. Result shows that one percent increase in import will increase the leather goods export by 0.11 percent while, one percent increase in exchange rate index will improve export behavior of leather goods export by 0.41 percent. On the other side, we did not found any significant ground of effectiveness of export incentive on export performance of leather products. The value of error correction term (-0.51) is significant and negative as per expectation which reinforces the existence of relationship between dependent and independent variables. However, the speed of adjustment from previous month disequilibrium in export of leather products added to current year equilibrium is 51 percent.

Table 3.5. Error correction representation of the ARDL (1, 0, 0, 0)
Dependent variable = Δ LNEXPORT

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ LNIMPORT	0.11	0.02	5.15	0.00*
Δ LNCREDIT	-0.07	0.12	-0.60	0.55
Δ LNCURINDX	0.41	0.20	2.01	0.05*
TREND	0.00	0.00	-0.60	0.55
CointEq(-1)	-0.51	0.10	-5.08	0.00*

R² = 0.63, Adjusted R² = 0.62, Prob (F-statistic) = 0.00, DW = 2.29

* show significant at 5 percent level of significant

Afterward, we tested the stability of ARDL model using cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMQ) to ensure model is structurally stable. (Brown, 1975). The dotted lines represent critical bounds at 5 percent level of significance.

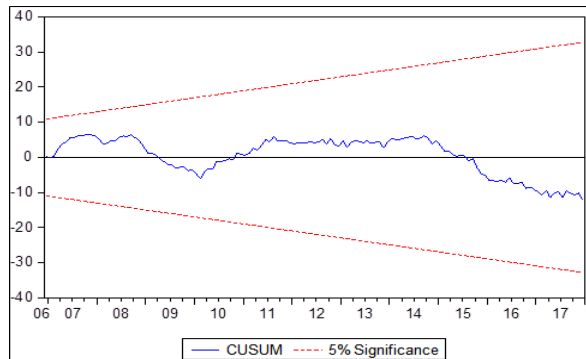


Figure 3.1. CUSUM plot

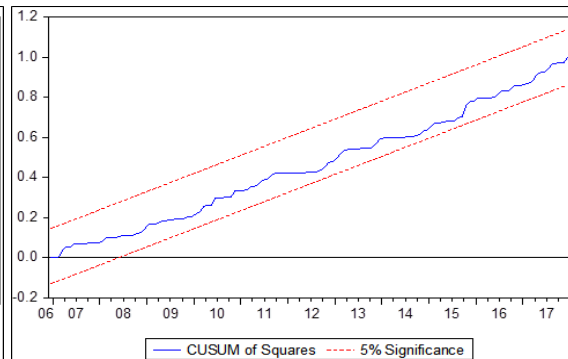


Figure 3.2. CUSUMQ plot

4. Conclusion

The purpose of the study is to investigate the relationship between export of leather and leather goods and import of leather and leather products, export incentives given to leather sector of Pakistan, and exchange rate index. We used the monthly time series data over the time of July 2003 to December 2017. As discussed advantage of ARDL over general technique of cointegration in chapter 3, we applied ARDL way to cointegration and error correction representation. According to estimate, positive and significant long-run relationship exist between export and import along with exchange rate index, however we did not find any significant observation of relationship between leather export and export incentives. The speed of adjustment from previous month disequilibrium in export of leather products added to current year equilibrium is 51 percent.

In the light of above findings, it is highly recommended to Government of Pakistan to decrease duties on import of leather raw materials as it directly influence the export performance. Recently, government gave export incentive to exporters who export under HS code 4203, 4202, 4202.1120, 4202.2100, 4202.3100, 4202.9100 but completely ignore other HS codes 41 and 43; due to this export drastically decline. Thus, government should provide incentives to all HS code 41, 42 and 43, which is necessary for leather industry survival.

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AN EXAMINATION OF THE DETERMINANTS OF CONSUMER LOYALTY IN INTERNET BANKING PERSPECTIVE

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Abstract

With the global brisk development in the field of information & communication technology, banking industry also presented Internet based banking services due to larger interest of consumers in online systems. The consumer e-loyalty to websites for availing services being offered has been a dominant factor in increased profitability for banks. However, there has been limited research conducted in analyzing the impact of determinants on consumer e-loyalty of Internet banking in Pakistan. The objective of this research is to investigate direct impact of consumer e-satisfaction, consumer e-trust, and website quality features on consumer e-loyalty. Data was collected through questionnaires using judgment sampling method from consumers of Internet banking as employees of private/public sector companies of Pakistan. The findings of this research show that all determinants have positive significant impact on consumer e-loyalty of Internet banking. Implications from this research would assist in increasing consumer loyalty of Internet banking.

Keywords: Internet banking, e-loyalty, e-satisfaction, e-trust, website quality, consumer loyalty

1. Introduction:

Information and communication technology has played an important function in the growth of banking industry all over the world. Since the mid-1990s, conventional banking delivery channels shifted toward using self-service channels in the form of electronic banking. According to Nyangosi, Arora, & Singh (2009), a large number of consumers preferred to perform their financial transactions through electronic channels offered by their respective financial institutions.

According to (Gkoutzinis, 2006; Rampur, 2011), Internet banking system allowed consumers to access accounts, check balances and statements, pay utility bills, transfer funds to linked accounts with the same bank, transfer funds to specially selected unlinked accounts, etc. The primary objective of Internet banking was to create such working environment where customers could easily find about the information they require for performing financial transactions. For banks, the main advantages of offering Internet banking services is in the reduction of costs, enhance mass customization, and also to maintain and attract customers (Musiime & Ramadhan, 2011).

Since early 1990s, banks in Pakistan have contributed in different modes of electronic banking services, such as Automatic Teller Machine (ATM), Real Time Online Banking (RTOB), Point of Sales (POS) transactions, as well as Internet based banking through bank's websites. In Pakistan there are more than 40 banks in operation, categorized as Public Sector Commercial Banks, Local Private Banks, Foreign Banks, and Specialized Banks. These banks are providing both informational and transactional based services to consumers through their websites. According to a report by State Bank of Pakistan, Internet/Mobile/Call-Center banking based transactions contributed to smallest 4.1% of the total electronic transactions in the quarter Oct-Dec 2012. The report also highlighted that ATM based transaction contributed largest 61.1% of the total electronic transactions, followed by RTOB with 29.0%, and then POS with 5.7% of total electronic transactions (State Bank of Pakistan, 2013). The electronic banking system has

provided an expansion over the conventional system, and has also enhanced bank/consumer rapport.

The identification of how Internet banking services are perceived by consumers and what determinants influences them to continue exercise such services is the main objective of this present study. As mentioned by (Gommans, Krishan, & Scheddold, 2001; McKnight, Choudhury, & Kacmar, 2002), understanding of how to put up confidence, contentment and ultimately e-loyalty for customers of Internet banking is vital. According to Reynolds & Sharon (1999), the variable consumer E-loyalty effectively increases the profit for online vendor with the lessening of operational costs.

However, researcher has found inadequate empirical research, which examined association of e-loyalty with predictors in context of Internet based banking services offered to customers. In this paper researcher has proposed a wide-ranging model of relationship between e-trust, e-satisfaction, and website quality as independent variables, and e-loyalty as dependent variable in the context of Internet based banking services among employees of private and public sector companies of Pakistan. After introduction, researcher reviewed pertinent literature in section two, which led to development of research hypotheses, presented in section three. This is followed by consideration of research methodology appropriate for this research in section four. The outcomes of this empirical study and discussion have been presented in section five. The last section concluded this research paper with implications on results and suggestions for future research.

2. Literature Review:

2.1 E-Loyalty:

Oliver (1999, p. 34) defined customer loyalty as “a deeply held commitment to re-buy or re-patronize a preferred product/service consistently in the future, thereby causing repetitive same brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior”. Broadly, loyalty development has been an objective traditionally aimed at by managers (Andreassen, 1999), since it enabled higher future purchase intention. The notion of e-loyalty extended the customary loyalty theory to online end user deeds. Sohn & Lee (2004) defined e-loyalty as “customers' behavior to visit and revisit the specific website and make transactions comfortably”. According to Floh & Treiblmaier (2006) e-loyalty has been crucial for electronic banks both in an economic as well as a competitive sense. Internet banking as a means of delivering traditional banking services has become an important way to retain customers, increase market share, and change the cost structure of retail banking (Al-hawari & Ward, 2004). A study performed by Santos (2003) in which empirical evidence was found, which supported the opinion that electronic banking services had an affirmative impact on consumers' e-loyalty.

2.2 E-Trust:

Internet banking services from the marketing perspective is a distribution channel where customers come in contact through banks' websites. With Internet banking customers have the option to conduct interactive retail banking at their own convenience, any time of the day. Lynch, Kent, & Srinivasan (2001) found that the impact of e-trust on e-loyalty mixed across regions of the world and across different product categories. However, as pointed out by Roy, Butaney, & Bhutaney (2009), researchers had established a positive impact of e-trust on e-loyalty among customers of electronic banking. A research study conducted by Cyr (2008) in Germany and China, website trust was found to have strong significant influence on e-loyalty. A longitudinal study conducted in USA by Kim, Donald, & Raghav (2009), online consumer trust also had a strong positive impact on E-loyalty.

2.3 E-Satisfaction:

In many research works, the impact of customer satisfaction has been studied on e-loyalty (Chang, Wang, & Yang, 2009; Overby & Lee, 2006). According to Farris, Bendle, Pfeifer, & Reibstein (2010), customer satisfaction defined as “the number of customers or percentage of total customers, whose reported experience with a firm, its products, or its services (ratings) exceeds specified satisfaction goals”. In a study by Shankar, Smith, & Rangaswamy (2003), loyalty to the service provider is higher when the service is chosen online than offline. Also loyalty and satisfaction are positively related, and this relationship between overall satisfaction and loyalty is more strengthened online. Moreover, Flavián, Guinalú, & Gurrea (2006) found a direct consequence of satisfaction and trust on customer e-loyalty. In a recent study by Ghane, Fathian, & Gholamian (2011), e-satisfaction was found to have strong positive influence on e-loyalty among consumers of Iranian e-banking. A study conducted on university students of Malaysia, e-satisfaction had a significant impact on e-loyalty of Internet banking services (Al-Agaga & Nor, 2012). Also, satisfied customers tend to have higher usage of service, possess stronger repurchase intention, and are often eager to recommend the product or service to their acquaintances than those who are not satisfied.

2.4 Website Quality:

Consumers' perception of service quality is a result of a comparison between what they consider the service should be and their perceptions about the actual performance offered by the service provider (Parasuraman, Berry, & Zeithaml, 1985). Dee (2009) discussed about concept of service quality, which centered on the benefits obtained by the consumer of the service. Kassim & Ismail (2009) found that website quality to online customers in Qatar, contributed in building trust and satisfaction, which enhanced e-loyalty. In a research study conducted on faculties and students from universities of Tehran, Iran, service quality of websites had a strong direct relation on consumers E-loyalty to Internet banking websites (Ghane et al., 2011). According to Yan & Fengjie (2009), study conducted on 200 undergraduate students in Wuhan, service quality dimensions of websites were directly related to e-loyalty. A research conducted by Oliveira (2007) in Portugal, which investigated the relationship between service quality of websites and e-loyalty. The researcher employed Structural Equation Modeling (SEM) methodology, which showed strong significant relation between the variables.

3. Hypotheses:

The following hypotheses have been proposed by the researcher in context of consumer e-loyalty of Internet banking among employees of private/public companies of Pakistan.

H₁: E-trust has a positive impact on e-loyalty of Internet banking consumers

H₂: E-satisfaction has a positive impact on e-loyalty of Internet banking consumers

H₃: Website quality has a positive impact on e-loyalty of Internet banking consumers

4. Research methodology:

The research questionnaire was used as primary data collection method for the purpose of this study. The questionnaire went through a field test which concerned a small sample of employees belonging to researcher's work place. Based on the field test response, the questions were rephrased to finish the formal questionnaire. The data was collected from 505 customers of Internet banking who were the employees of public and private sector companies during the month of January 2013. Questionnaires were distributed to Internet banking consumers through e-mail using judgment sampling method for this study. Subjects of the sample for this study belonged to five cities of Pakistan, which comprised four provincial capital cities (Karachi, Lahore, Peshawar, and Quetta), and also from federal capital city of Islamabad.

This research intended to probe consumers' continued use of Internet banking services, therefore, respondents were required to have used these services earlier in order to fill the questionnaire. The total number of valid questionnaires for this study was 420, and the rest were discarded due to improper filled responses. Section I of the questionnaire mostly consisted questions pertaining to the respondents' demographic details. Section II of the questionnaire contained measures of the focal variables e-trust, e-satisfaction, web site quality, and e-loyalty. The questionnaire items were developed based on the conclusion from associated literature. The variable e-loyalty items were adapted from Gremler (1995), e-trust items were adapted from Mukherjee & Nath (2007), e-satisfaction items were adapted from Sahadev & Purani (2008), and finally the variable website quality (design features, interactivity, and information quality) items were adapted from (Kim & Stoel, 2004; Lin, 2007). All the focal variables were measured with four-item seven point Likert scale ranging from 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neutral, 5 = somewhat agree, 6 = agree, and finally 7 = strongly agree.

Reliability of variables was tested using Cronbach's Alpha in SPSS software version 17.0 for both data collected after field test and after final survey. Afterwards, gathered raw data was aggregated according to dimensions under study and correlation analysis was performed to statistically measure relationships between the variables. Furthermore, multiple regression analysis was also performed in order to test proposed hypotheses for this study.

5. Data Analysis & Discussion

5.1 Demographic Profile of Respondents:

Table 1 summarized the demographic characteristics of the respondents, including, gender, age group, type of service, city of residence, period usage of Internet banking, and salary group. It showed that most of the respondents (78.8%) were male and that 21.2% were female. Almost 62% of the respondents were employees of private organizations, and the rest belonged to public sector. The sample size of 420 respondents from various cities, considered a good representation of the population of Pakistan. More than 64% of the respondents were middle aged (age > 40), 56.1% of respondents were earning over Rs. 40,000 per month, and 51.9% of the total respondents were the users of Internet banking services of more than three years. These results indicated that the middle aged employees of services sector of Pakistan have been consistently using the offered Internet banking services.

Table 1. Demographic Characteristics

Measure	Item	Frequency, (%)
Gender	Male	331, 78.8
	Female	89, 21.2
	Total	420, 100%
Age Group	< 25 years	52, 12.4
	25-40 years	97, 23.1
	41-50 years	191, 45.5
	> 50 years	80, 19.0
	Total	420, 100%
Type of Service	Private	260, 61.9
	Public	160, 38.1
	Total	420, 100%
City of Residence	Karachi	143, 34.0

	Lahore	52, 12.4
	Islamabad	141, 33.6
	Peshawar	46, 11.0
	Quetta	38, 9.0
	Total	420, 100%
Use of Internet Banking	< 1 year	85, 20.2
	1 – 3 years	117, 27.9
	> 3 years	218, 51.9
	Total	420, 100%
Salary group	< Rs. 20,000 per month (pm)	80, 19.0
	Rs. 20,000-40,000 pm	104, 24.8
	Rs. 20,000-40,000 pm	104, 24.8
	Rs. 40,001-65,000 pm	177, 42.1
	> Rs. 65,000 pm	59, 14.0
	Total	420, 100%

5.2 Reliability Test:

The reliability analysis applied the level of Cronbach's Alpha (α) as the criteria of internal consistency, which was at a minimum acceptable level ($\alpha \geq 0.60$) suggested by (Gerrard, Cunningham, & Devlin, 2006; Sekaran, 2003). The following Table 2 showed the results of reliability statistics of the analysis of focal variables, which all were above the value of 0.60.

Table 2. Reliability Coefficients

	No. of Items	Mean	Cronbach's Alpha
E-loyalty	4	3.954	0.892
E-trust	4	3.907	0.683
E-satisfaction	4	3.952	0.929
Website Quality	4	3.943	0.806

5.3 Correlation Analysis:

A correlation matrix analysis was conducted among all the variables to investigate the relationship of these variables. The Bivariate Correlation two tailed analysis was used to judge the relationship of variables. The results in Table 3 demonstrated all the results were highly significant (p -value < 0.01). The predictor e-satisfaction had the most significant positive relation with e-loyalty ($R = 0.810$), followed by web site quality ($R = 0.766$), and closely followed by e-trust ($R = 0.765$).

Table 3. Correlation Matrix

Constructs	E-loyalty	E-trust	E-satisfaction	Website Quality
E-loyalty	1.00			
E-trust	0.765 ^{**}	1.00		
E-satisfaction	0.810 ^{**}	0.812 ^{**}	1.00	
Website Quality	0.766 ^{**}	0.772 ^{**}	0.788 ^{**}	1.00

^{**} $p < 0.01$

5.4 Regression Analysis:

The following Table 4 summarized the output results of multiple linear regression analysis performed using SPSS version 17.0. The research model for this study with three predictor variables had combined coefficient of correlation ($R = 0.844$), and the model explained 71.2% of variance in dependent variable e-loyalty. The Analysis of Variance (ANOVA) results supported overall significance of the model, all the independent variables had collective impact on e-loyalty ($F\text{-value} = 345.523$, $p\text{-value} < 0.01$). The largest un-standardized coefficient was for the variable e-satisfaction (0.403), followed by website quality (0.279), and finally e-trust (0.243). All the predictor variables were found to be positively significant ($p\text{-value} < 0.01$) on the dependent variable e-loyalty.

Table 4. Multiple Regression Analysis

Model	R = 0.844		R-Square = 0.712	Adj. R Square = 0.710	
Model	F-Value = 343.523		Sig. = 0.000		
Model	Un-standardized		Standardized	T	Sig.
	B	Std. Error	Beta		
Constant	0.313	0.128		2.450	0.01
E-trust	0.243	0.055	0.214	4.413	0.00
E-satisfaction	0.403	0.047	0.429	8.589	0.00
Website Quality	0.279	0.049	0.263	5.715	0.00

a. Predictors: (Constant), E-trust, E-satisfaction, Website Quality

b. Dependent Variable: E-loyalty

5.5 Testing of Hypotheses:

All the hypotheses H_1 , H_2 , and H_3 developed for this present study regarding consumer e-loyalty were supported with significant positive impact of the three independent variables. The variable e-satisfaction had a direct strongest positive impact on e-loyalty. The findings of this study are consistent with past studies by Bashar & Wasiq (2013), Eid (2011), and Yang & Peterson (2004). This implied that overall employees of private/public sector companies of Pakistan were satisfied with Internet banking, which resulted in the continuous practice of availing the offered services. The independent variable website quality was found to have second largest positive impact on consumer e-loyalty of Internet banking services. The bank's website quality dimensions selected for this study as predictors influenced the repeated use of Internet based banking services. The findings are consistent with a number of earlier studies by Chang & Chen (2009), Cristobal, Flavián, & Guinalú (2007), and Sousa (2008). This also implied in general that service providers had done a good job in presenting their websites with service quality features appealing to consumers. The predictor variable e-trust also was important in the continuous use of Internet based banking services among consumers of private/public sector companies of Pakistan. This result is also consistent with past studies by Fragata & Moustakas (2013), and Yee & Faziharudean (2010). Overall, consumers considered using Internet based banking services as trust worthy, even though e-trust was measured with privacy and security concerns. This implied that consumers selected for this study belonged to literate white collar class of employees, who were intermediate to expert users of Internet with high level of trust and confidence to avail Internet based banking services.

6. Conclusion:

In conclusion, this study is well thought-out work for the Pakistani banking sector as it provided a distinctive and noteworthy managerial and realistic involvement. This research not only focused

on the consumer satisfaction of Internet banking as the factor influencing consumer e-loyalty and continuation to deal with such services, but it also integrated website quality features and e-trust as major predictors impacting Pakistani consumers' of private/public sector companies. In future it would dig out other issues relating to Internet banking attributes like service delivery effectiveness and security matters. Study should also be in focus in future on prospective and non-users that why they are not using Internet banking.

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FROM CRITICAL SUCCESS FACTORS TO CRITICAL SUCCESS LEVELS FOR TRANSFER OF KNOWLEDGE; A REVIEW OF LITERATURE

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Abstract

Organizations are interested in creation and transfer of knowledge for achieving sustained competitive advantage in the market. Literature has identified several critical success factors (CSF) and critical success areas (CSA) that influence the process of transfer of knowledge i-e either by facilitating/accelerating the transfer process or by creating bottle necks in the process. The identified CSF and CSA are not only overlapping but are wide spread in terms of their scope of applications, e.g some are applied to individuals' others make more sense in organizational or societal context. Thus, it is difficult for managers to pin the areas within the organization that needs more attention for application of knowledge management strategy. Furthermore, like organizational strategies, knowledge management strategy (transfer included) is developed for different levels i-e unit, department and organizational etc. Thus, if managers are planning to design and implement knowledge management strategy to accelerate transfer of knowledge within/among organization/departments/individuals they need to view the critical factors and areas (facilitators + barriers) through the lens of strategy design and implementation levels. Therefore, there is a need to convert the CSF and CSA into critical success levels (CSL) for implementation knowledge management strategy.

In the given (brief) backdrop the study systematically reviewed the literature with the objectives in view; a) Enlist (available in literature) critical success factors and critical success areas for transfer of knowledge with clear distinction (based on theoretical definitions) and eliminate overlapping factors and areas, b) divide the identified CSF and CSA in critical success levels for successful knowledge management strategy implementation.

Keywords: *Critical Success Factors (CSF), Critical Success Levels (CSL), Knowledge Management (KM), Transfer of knowledge (ToK).*

1.1 Introduction

Knowledge Management is not a new concept, managing knowledge for more effective use of things has been the prime feature of human societies (Brelade & Harman, 2006). For hundreds of years, businessmen have passed their commercial wisdom to their children, craftsmen to their apprentices and employees have exchanged ideas at work places (Hansen, Nohria & Tierney, 1999; Smith, 2001). What is new is the development of a separate discipline called "Knowledge Management" (KM) (Brelade & Harman, 2006). Knowledge Management (KM) comprises of knowledge creation/development, knowledge analysis/validation, knowledge transformation, knowledge distribution/transfer and knowledge storage/retention (Civi, 2000; Alavi&Leidner, 2001). With knowledge now being viewed as an asset, knowledge creation and transfer has become an important factor within and between organizations (Wijk, Jansen & Lyles 2008).

Creation of new knowledge is dependent on the transformation process of tacit and explicit knowledge involving individuals (Nonaka & Takeuchi, 1995). Transfer of knowledge is also critical to the performance of created knowledge and its subsequent use for overall organizational knowledge (Szulanski, 1996). The augmented use of joint ventures, strategic alliances, mergers & acquisitions illustrates the importance of transfer of knowledge (Lane et al., 2001). Organizational knowledge transfer facilitates individuals and departments/units in generating new ideas for product development (Tsai, 2001), by encouraging the marriage between newly created and already existing knowledge for developing innovative linkages and associations (Jansen et al., 2005). Empirical evidence from literature indicate that organizations that can transfer knowledge from one department to another are probably going to survive longer than those that are less inclined to transfer ideas (Gupta & Govindarajan, 2000; Alavi & Leidner, 2001).

Given the manifold benefits of organizational knowledge transfer, researchers steered their knowledge thrust towards identification of factors that are critical to successful knowledge transfer. Literature has identified several critical success factors (CSF) and critical success areas (CSA) that influence the process of transfer of knowledge i.e either by facilitating/accelerating the transfer process or by creating bottle necks in the process. The identified CSF and CSA are not only overlapping but are wide spread in terms of their scope of applications, e.g some are applied to individuals' others make more sense in organizational or societal context. Thus, it is difficult for managers to pin the areas within the organization that needs more attention for application of knowledge management strategy. Furthermore, like organizational strategies, knowledge management strategy (transfer included) is developed for different levels i.e unit, department and organizational etc. Thus, if managers are planning to design and implement knowledge management strategy to accelerate transfer of knowledge within/among organization/departments/individuals they need to view the critical factors and areas (facilitators + barriers) through the lens of strategy design and implementation levels. Therefore, there is a need to convert the CSF and CSA into critical success levels (CSL) for implementation of knowledge management strategy.

1.2 Objectives of the study

The study systematically reviewed the literature with two objectives in view;

- Enlist (available in literature) critical success factors and critical success areas for transfer of knowledge with clear distinction (based on theoretical definitions) and eliminate overlapping factors and areas.
- Club/categories the identified CSF and CSA into a distinctive critical success levels.

1.3 Scope of the Literature Review

The literature review is based on a search for the keywords/phrase, "critical success factors for transfer of knowledge", "critical success areas for transfer of knowledge" and "transfer of knowledge" on JSTOR, Google Scholar, Elsevier, Springer Link and web of knowledge online databases. Studies that identified CSF and CSA were included in the review. Since the task was enlisting the identified CSF or CSA for transfer of knowledge therefore studies (empirical and theoretical) that identified/discussed these factors for the first time were included, meaning, all those studies that discussed already identified CSF or CSA were excluded for a crisp list of critical success factors and areas.

2. Literature review

2.1 Critical Success Factor for Transfer of Knowledge

The phrase, critical success factors (CSF), was first used by Rockart (1979) along with Sloan School of Management in the context of information system. Rockart (1979), referred to CSF as

areas of an organization where successful results ensure competitive advantage for an organization. Since these areas need more attention, therefore they are critical areas for managerial action in terms of planning and effective executions (Saraph et al., 1989).

In, project management CSF are the inherent issues/challenges in projects that need to be addressed for effective and efficient team work, thus they require frequent attention in projects operational life time (Jefferies, 2006). However, in knowledge management literature, they are activities and practices that need attention for ensuring successful transfer of knowledge. Wong (2005) demanded their nurture, if these activities and practices existed in an organization, otherwise asked for creation and development. Thus, for this study, CSF is the internal organizational factors that play a vital role of barriers and facilitators for transfer of knowledge.

The following table summarizes critical success factors based on literature search.

Table-1: Critical Success Factors

Authors	Critical Success Factors
Wegner (1986)	<ul style="list-style-type: none"> ▪ Transactive memory systems
Cohen & Levinthal (1990)	<ul style="list-style-type: none"> ▪ Absorptive capacity of an organization and its members
Szulanski (1996)	<ul style="list-style-type: none"> ▪ Personality differences ▪ Openness to new ideas ▪ Fear of losing individual competitive edge ▪ Fear that knowledge may be insufficient or uninspiring ▪ Ambiguous knowledge ▪ Trust between partners
Skyrme & Amidon (1997)	<ul style="list-style-type: none"> ▪ Strong link to a business imperative ▪ Compelling vision and architecture ▪ Knowledge leadership ▪ Continuous learning
Lane & Lubatkin (1998)	<ul style="list-style-type: none"> ▪ Social relations among members of organizations ▪ organizational structural similarities
Davenport & Prusak (1998)	<ul style="list-style-type: none"> ▪ Cultural differences ▪ Friendly organizational culture
Argote, McEvily & Reagans (2003)	<ul style="list-style-type: none"> ▪ Ability ▪ Motivation ▪ Opportunity
Michailova & Husted (2003)	<p>Husted and Michailova (2002) outline six reasons for knowledge senders' hostility towards sharing their knowledge:</p> <ul style="list-style-type: none"> ▪ Potential loss of value, bargaining power, and protection of individual competitive advantage ▪ Reluctance to spend time on knowledge sharing. ▪ Fear of hosting "knowledge parasites". Knowledge senders may be reluctant to share their knowledge with someone who has invested less or no effort in his/her own development. ▪ Avoidance of exposure. ▪ Strategy against uncertainty. Due to the uncertainty regarding how the knowledge receiver will perceive and interpret shared knowledge, knowledge senders may be highly cautious about revealing the relevant knowledge. ▪ High respect for hierarchy and formal power. Knowledge senders

	may be reluctant to share crucial knowledge for fear of losing a position of privilege and superiority.
Cabrera (2003)	<ul style="list-style-type: none"> ▪ Norms that encourage open exchanges of knowledge among organizational members ▪ A strong sense of group identity ▪ Clear benefit (reward) ▪ Reciprocity, the perception that others are willing to share their knowledge. ▪ Personality traits
Wong (2005)	<ul style="list-style-type: none"> ▪ Management leadership and support ▪ Strategy and purpose ▪ Organizational infrastructure ▪ Resources ▪ Training and education
Boone & Ganeshan (2008)	<ul style="list-style-type: none"> ▪ Intra-firm networks
Rhodes et al. (2008)	<ul style="list-style-type: none"> ▪ Motivation and commitment levels of members of organization ▪ Social and perceived expertise ▪ Structured learning strategy ▪ Formal systems, for explicit knowledge and social ties, for tacit knowledge in the context of organizational climate that shapes up the human behaviour

2.2 Critical Success Areas for Transfer of Knowledge

There has been an attempt of clubbing up similar CSF and then dividing them into broader categories i-e Human resource management, organization culture, organization structure, organization strategy, organization learning, information technology and leadership. For this study these areas are labeled as critical success area (CSA). CSA unlike CSF does not point out to a specific factor that facilitates or hinders the transfer process, it talks about a category. CSA refers to the organization's tangible or intangible sub-division/unit i-e HR management rather motivation or organizational culture rather supportive learning. So, instead of a factor the entire sub-division/unit is studied in CSA.

2.3 Critical Success Level- - The Rationale

Though literature has very successfully identified CSF & CSA for transfer of knowledge as well as for knowledge management but very little discussion is available about the right placement of these factors. Identified CSF& CSA are overlapping and distinction among them based on individual, organizational and contextual is difficult to grasp.

The suggested frame divides an organization into CSL (critical success level) i-e individual level, organizational level and social/contextual level and then within each level highlights CSF. The rationale of this division lies in the very process of transfer of knowledge. Individuals are the creators, carriers, receivers and end users of knowledge that is why they are the core of transfer process in specific and knowledge management at large. So, the organizations must focus on the individual level factors (barriers & facilitators) for the creation, transfer, usage and storage of knowledge. Individuals ignite the transfer process but it is not limited to individuals as knowledge is expressed in regularities through which members of the organization interact. Kogut and Zander (1992) very rightly pointed out that if knowledge was held only at individual level then organizations can change by employee turnover. Therefore, analysis of organizational level is required to better understand the knowledge embedded in organizing principles through which people corporate within organizations. Furthermore, individuals require support in terms of

supportive leadership, strategy, formal structures, rewards and supportive leadership etc. to carry, sustain and successfully implement the transfer of knowledge process. This support is given by the organization; therefore, at the mantle level lays organizational factors affecting (barriers & facilitators) the transfer process. Organizations are open systems and cannot operate in isolation therefore, they affect and take effect from the environment. So, at the outer crust are the contextual/social factors affecting the transfer of knowledge process. All the three levels are critical for a successful transfer of knowledge.

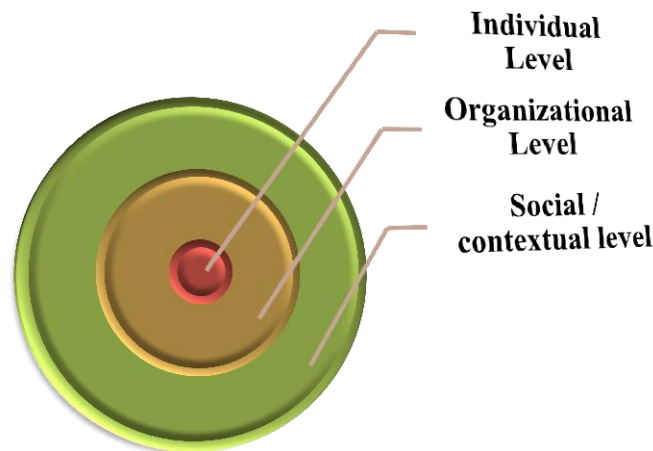


Figure: 1: Critical Success Levels

2.3.1 Individual Level - The Core

Knowledge exists within two ears (Druker, 2003) thus organizations should focus on their employees for creating new knowledge by transferring existing knowledge (Tacit & explicit). The study extracted the following factors from literature that can assure successful knowledge transfer at individual level.

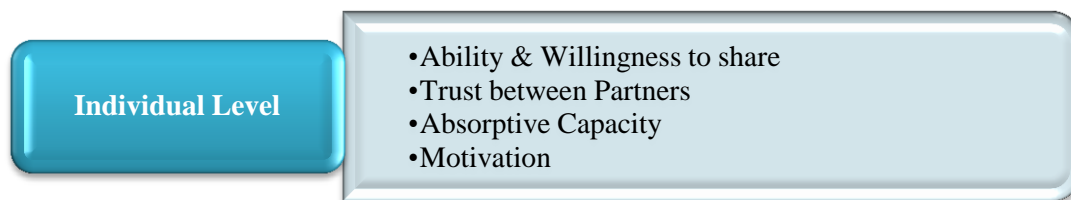


Fig: 1: Elements Individual Level - The Core

a. Ability & Willingness to Share

The sender must have the ability to share knowledge. Having said so, however it should also be kept in view that transfer of knowledge is a personal decision of the sender and is subject to two behavioral factors; ability to transfer knowledge and willingness to transfer knowledge (Minbaeva & Michailova, 2004). Ability and motivation are the pre-requisitions for high performance (Baldwin, 1959). For successful knowledge transfer, the sender of knowledge need linguistic skills and knowledge competencies (Cabrera, 2003). Experience affects ability too. Individuals and organizations tend to understand knowledge in their experienced areas as they learn and absorb knowledge by developing a connection to their previous understanding (Cohen

& Levinthal, 1990). Minbaeva and Michailova (2004) empirically tested the ability and willingness of knowledge transfer to the subsidiary. Data was collected from 92 subsidiaries of a Danish multi-national located in 11 countries. Ability of knowledge sender to transfer knowledge proved to have a strong positive effect on the degree of knowledge transfer. Experience builds ability. Prior knowledge in an area help individuals and organizational units to better understand knowledge as they have the capacity to absorb and connect it with their previous experiences (Cohen & Levinthal 1990).

b. Trust Between Partners

Trust between individuals facilitates knowledge transfer in organizations (Szulanski et al., 2004) as it increases willingness of a partner to commit to make the other understand new knowledge (Lane et al., 2001). Rich literature supports the presence of trust for transfer of knowledge yet there are studies that show ample trust creates mutual carelessness and can prevent knowledge transfer and amalgamation (Lane et al., 2001).

It creates dependency among strategic alliances without a fear of being susceptible (Das & Teng, 1998). Whereas, in inter-firm collaborations, trust strengthen inter-partner ties and reduce conflicts (Fichman & Levinthal, 1991; Ring & Van de Ven, 1994). Interpersonal trust or trust between partners is an essential characteristic for creating a knowledge sharing culture. Individuals require the presence of trust to express freely and share knowledge (Gruenfeld et al., 1996).

c. Absorptive Capacity

Absorptive capacity was initially presented by Cohen and Levinthal (1990) but has gained a lot of focus, over the years, in knowledge transfer literature. Absorptive capacity in its primitive nature is the capacity of an individual to understand, integrate and apply new knowledge (Cohen & Levinthal, 1990; Zahra & George, 2002; Lane et al., 2006). The role of receiver's absorptive capacity has been widely recognized in literature, with few exceptions. Researchers like Lane and Lubatkin (1998) were of the opinion that absorptive capacity is a dyadic level concept and it cannot be generalized to firm level. Yet, Mowery et al., (1996) and Lane et al., (2001) proved that absorptive capacity assists inter-organizational transfer of knowledge.

d. Motivation

Motivation is the key for transferring knowledge. Unfortunately, when implementing knowledge management plans organizations focus more on investing in infrastructure and technological gadgets. All this investment can prove to be ineffective if individuals working in an organization are not motivated to transfer knowledge. Thus, along the lines on physical structural investments, attention should be given to working out an appropriate incentive/reward system. An appropriate reward system reinforces positive behaviors and helps in building a knowledge sharing culture.

Wong (2005), advocates criterion based incentives system for building a knowledge sharing culture and enterprise. He supports that incentive criterion be based on knowledge sharing, team work, contribution and creative solutions.

2.3.2 The Organizational Level - The Mantle

Supportive conditions are not embedded in the knowledge holders or receivers rather they are provided by the organization to support the transfer process. Thus, the supportive conditions highlight the importance of organizational assistance in the transfer process by providing supportive environment that is healthy enough to nurture and groom the transfer process.

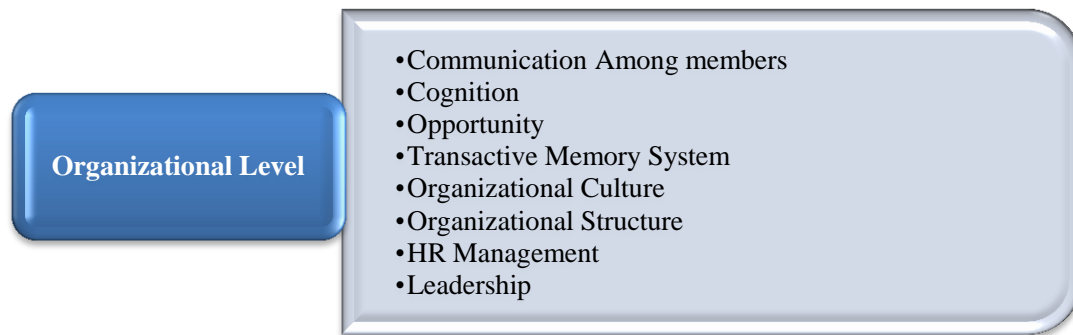


Fig: 2: Elements of Organizational Level - The Mantle

a. Communication Among Members Through Strong Ties

The nature of relationship between the sender of knowledge and the receiver of knowledge can affect the transfer process, e.g. in long distance relationships or where communications between partners is difficult, transfer of knowledge will be turbulent (Goh, 2002). The relationship between sender and receiver depends upon their communication, its frequency and intensity and social ties (Allen, 1977). Cohen and Levinthal (1990) believed innovation is possible when individuals with different knowledge level interact and share knowledge. Such interactions are more critical in organizational alliances that are located overseas or in various geographical locations (Tsang, 2002).

Social network theorists highlight the importance of interaction, frequency of interaction, emotional passion and intimacy of interaction. They identify two kinds of social ties: string ties and weak ties. Strong ties take place when individuals meet regularly while in weak ties individuals are distant and have infrequent interactions (Rowley et al., 2000). Both kinds are accredited with TOK. Weak ties provide non-redundant information, access to public information and also help job seekers (Uzzi & Lancaster, 2003). Whereas, in strong ties more complex and private knowledge is transferred (Uzzi & Lancaster, 2003). Product innovation literature support the close and frequent interactions of operational subunits, research and development (R&D) teams and other functional teams for successful projects because of the timely incorporation of knowledge across organizational boundaries (Szulanski, 1996).

b. Cognition

Cognition means thinking, it provides a shared meaning to relationships in terms of representations, understandings and context (Nahapiet & Ghoshal, 1998). It is personified in attributes of individuals e.g. shared visions and values that are essential for understating collective goals and socially accepted ways of being a part of the social fabric (Tsai & Ghoshal, 1998). Literature has proved shared vision, cultural distances and systems as significant cognitive elements, paving way for the role of social relations in transfer of knowledge. Shared vision and system develop bonding among individuals that help them promote mutual understanding and integrate knowledge. TOK inside organization is facilitated by organizational compensation practices and structures (Lane & Lubatkin, 1998). Though norms and values differ broadly, yet studies have proved cultural similarities to be vital for successful TOK. Literature proves that cultural distances hinder firms' ability to transfer knowledge across borders because of increased cost of entry (Palich & Gomez-Mejia, 1999). Along the entrance costs, the differences in values and norms in different culture increases operational difficulties as well (Mowery et al., 1996). Misunderstandings between overseas partners due to cultural differences can limit transfer of organizational knowledge (Lyles & Salk, 1996).

c. Opportunity

Effective knowledge management is the result of providing opportunity to individuals to generate, retain and share knowledge. Individuals can gain direct and indirect experiences from such opportunities. Reduction of distance: physical or psychological by an organization, gives its members an opportunity to interact and thus learn from one and other. A good example of such an opportunity is indirect learning through observations. An individual can accumulate knowledge via indirect ways by watching others do it (Nadler et al. 2003). Proximity facilitates individuals in learning from each other, thus knowledge seekers know where to look for information and knowledge (Borgatti & Cross 2003). Within organization the transfer of procedures and expertise across departments benefit the recipient department of the knowledge gained by the first department (Epple et al., 1996, Winter & Szulanski 2001). Informal, social networks aid similar drive i-e making knowledge more accessible. Informal interpersonal ties support indirect learning. They also facilitate people in taking benefits of the resources of their close contacts (Hansen 1999, Uzzi & Lancaster 2003).

d. Transactive Memory System

Transactive memory system is a shared system for encoding, storing and retrieving information (Wegner, 1986). As knowledge can be embedded in individual members, in the organization's rules, routines, cultures, structures and technologies (McGrath & Argote 2001). Transactive memory systems facilitate knowledge retention and knowledge transfer (Borgatti & Cross, 2003). Organizations must develop transactive memory system in the organization so that members of the organization know where to find what knowledge. The presence of transactive memory system will support the sender and receiver for the smooth transfer of knowledge.

e. Organizational Culture

Organizational culture plays a vital role in transfer of knowledge (Davenport et al., 1998). It defines the core beliefs, values, norms, and social customs that govern the way individuals act and behave in an organization. On the basis of a survey, Chase (1997) affirmed that culture is the biggest hurdle in the face of creating knowledge based enterprises. Culture is a multi-layered concept and effects TOK via different facets. Collaboration is one of the aspects of organization culture and Goh (2002) emphasized that collaborative culture is the pre-requisite for transfer process to take place among individuals. This is because TOK require people to come together, exchange ideas and share information and knowledge. Trust is yet another very important aspect of a friendly and collaborative culture (DeTienne & Jackson, 2001; Lee & Choi, 2003). Along with collaboration and trust and support for innovation and new ideas in an organizational culture is crucial for TOK. An innovative culture is a culture that nurture and nourish new ideas, out of the box thinking and experimentation. In such a culture individuals are motivated to challenge existing practices and processes by empowering them and providing them with opportunities to create new ideas and explore new possibilities (Stonehouse & Pemberton, 1999). Equally important is the part of openness whereby mistakes are responsively shared without the fear of punishment.

f. Organizational Structure

Organizational structure provides a formal shape to organization by developing reporting mechanism. Organizational structure is generally divided into three components: formalization, centralization, and integration (Robbins & Decenzo, 2001). Formalization is the standardization of jobs within an organization and the degree of standard guidelines for directing employees via rules and regulations (Robbins & Decenzo, 2001). Centralization shows the centrality of decision making authority at the top of the hierarchical relationship (Tsai, 2001) whereas integration is the inter-relatedness of various departments or units within the organization (Sciulli, 1998). Sharratt and Usoro (2003) proved that organizations with centralized, bureaucratic management style

repress the knowledge creation process through transfer of knowledge. However, a flexible, decentralized organizational structure encourages knowledge-sharing, particularly of knowledge that is more tacit in nature. Similarly, results of Chen and Huang (2007) study indicate that less formalized organization structure along with more decentralization and integration provides a nurturing habitat for social interactions and through social interaction individuals share their experiences and thus share knowledge. Empirical studies like the afore-mentioned advocate process-orientation in organizations that facilitate social interactions and play the mediating role between organizational climate, structure and knowledge management.

g. Human Resource Management

As stated earlier, transfer process ignites from individuals (HR). The organization must provide a sound strategy for managing their HR. Chen and Huang (2009) proved that training, compensation, performance appraisal, staffing and participation are able to contribute to successful KM implementation. Whereas, Collins (2006) empirically tested the relationship between commitment based HR practices and organizational social climate. Commitment-based human resource practices were positively related to the organizational social climates: trust, cooperation, shared codes and language. The dimensions of social ties were also related to firm's capability to transfer and combine knowledge, this relationship help in predicting firm's revenue from knowledge products and services.

h. Leadership

Transactional and transformational leadership are the two main types of leaders as per Burns (1978). Transactional is from transaction and is rooted in exchange e.g. accomplish a task and claim the reward. Transformational on the other hand stems from transforming entities, giving them another shape and has internal locus. Transformational leaders believe in social interaction with followers for creating organizations collectively. Politis (2001) proved a strong positive relationship between transformational leadership via charisma, individual consideration and intellectual stimulation, transactional leadership through contingent reward and consideration and knowledge acquisition via communication, personal traits, control, organization and negotiation. Similarly, Crawford (2005) showed a significant relationship between transformational leadership styles (i-e charisma, individual consideration and intellectual stimulation and inspiration) and KM processes (acquisition, creation & application).

Singh (2008) argued that directive as well as supportive styles of leadership are significantly and negatively associated with the art of knowledge management practices. The study shows that consulting and delegating styles of leadership are positively and significantly related with managing knowledge in software organizations whereas delegating mode of leadership behaviors was significant (only) in predicting creation as well as management of knowledge for competitive advantage in software firms in India.

2.3.3 The Contextual/Social Level - The Outer Crust

The turmoil in the environment (Sorenson 2003), competition, and the proportion of customers with attributes affect the success of organizational learning strategies and designs. These abrupt changes in the external environment affect the transfer process e.g. if an organization replaces already established technology with that of a new one, in the earlier stages knowledge transfer will be at a lesser speed as sender of knowledge will need to gain experience about the new technology and at the same time the receiver may not trust the sender for the knowledge transferred.

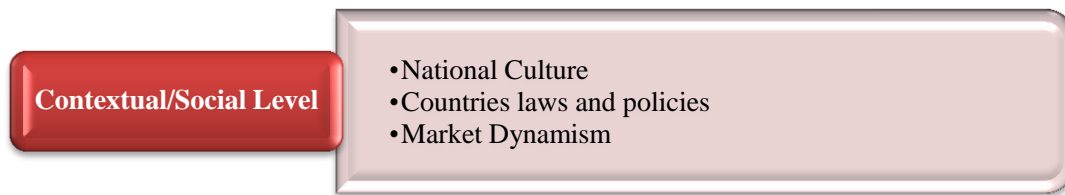


Fig: 3: Elements of Contextual/Social Level - The Outer Crust

a. National Culture

In examining the external environment, national culture is regarded as one of the most important contextual variables that have an impact on the knowledge transfer process in MNCs (Li & Schullion, 2006). Chen, Sun, and McQueen (2010) were of the view that, when a provider and a recipient are located in different individualism/collectivism, power distance, and uncertainty avoidance cultural dimensions, there will be a reduced likelihood of successful knowledge transfer in a structured knowledge transfer process. Lucas (2006) used Hofstede's cultural dimensions: individualism vs. collectivism, uncertainty avoidance, power distance and masculinity vs. femininity. It was advocated that location of subsidiaries against the aforementioned dimensions significantly impact transfer of knowledge between subsidiaries. Transfer of knowledge efforts are more fruitful in culturally aligned organizations. In absence of such alignment, subsidiaries are dependent of home office directives and support.

b. Countries' Laws and Policies

Little is written about the countries' laws that directly or indirectly affect the organizations that are involved in transfer of knowledge. Countries' laws and policies can affect the transfer process to a greater extent e.g. the tax policy, trade & investment policy, mergers and acquisition policies, policies related to expatriates etc. The most important law pertaining to knowledge transfer directly is the Intellectual Property Right (IPR). Though there has been a substantial discussion in literature on whether the developing world countries decision of tighter intellectual property rights will increase or otherwise their access to technologies invented by technologically advanced countries (Yang & Keith, 2003). In addition, Yang and Keith (2003) further argued that if inventing firms choose to act more monopolistically and offer fewer technologies on the market, stronger IPRs could reduce international technology flows. However, to the extent that IPRs raise the returns to innovation and licensing, these flows would expand. Further empirical studies are required to shed light on the role of countries laws and policies in transfer of knowledge.

c. Market Dynamism

The ever-changing market also affects the organizations as organizations operate in an open system. Internal organizational knowledge appears as a determinant aspect under more dynamic environmental conditions. This is an indication that higher levels of environmental dynamism require higher levels of organizational knowledge (Paiva & Gonalo, 2008). To cope up with the market development organizations must focus on the internal transfer of knowledge for creating new knowledge.

Managerial Application and Final Word

The study reviewed the existing literature related to CSF and CSA to develop a theoretical framework. The framework focuses on the importance of individual, organizational and

contextual factors that affect the transfer process. Such a division will enable the organizations to assess the transfer process in two ways; first to pin down the levels where they are performing well in terms of benefiting from the process and secondly to mark the weaker slots that need more focus and attention.

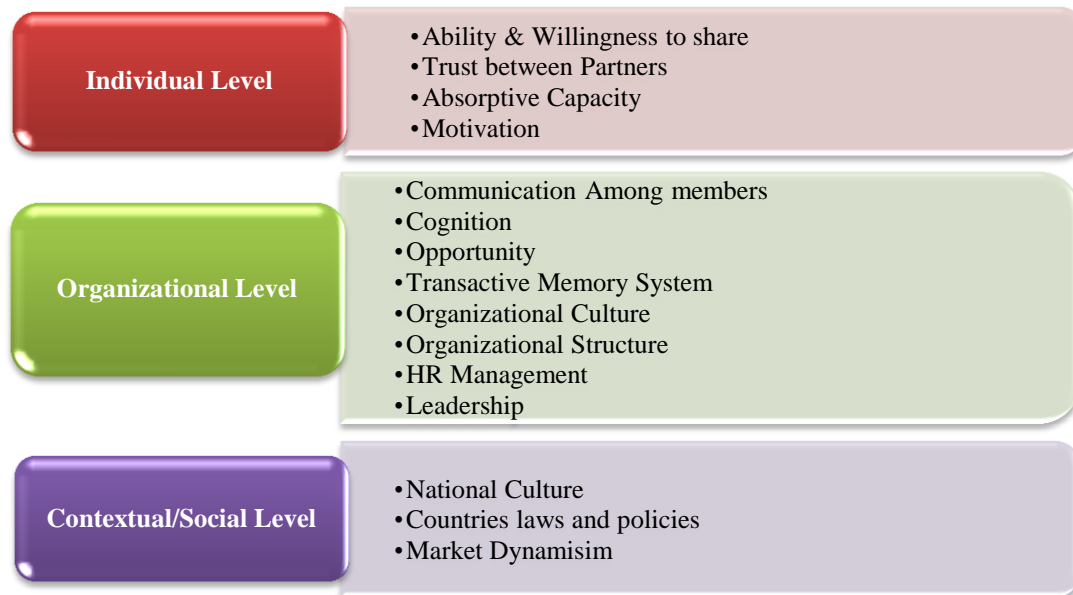


Fig: 4: Elements of Critical Success Levels

If individuals are motivated, willing and experienced to share their knowledge, given they have the ability/skills to share, there exists trust among them and receiver have the absorptive capacity to use the received knowledge for creating new knowledge, knowledge transfer process will begin. But if the organization does not support the individuals by giving them the opportunity and well developed communication network, this process cannot sustain for a longer period. The organization needs to provide a supportive leadership style, cognition and structure that facilitates learning; a learning culture, where cost of asking is not high; Transactive memory system and supportive HR management strategy and systems. Since the organizations operate in an open system therefore external environment factors e.g. national culture, country's policies& laws and market dynamism should not be ignored.

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FACTORS AFFECTING IT IMPLEMENTATION SUCCESS IN SMALL AND MEDIUM ENTERPRISES OF PAKISTAN: THE MEDIATING ROLE OF USER INVOLVEMENT

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Abstract

Although the recent boom in information technology (IT) has provided many benefits for Small and Medium Enterprises (SMEs), successful implementation of IT in SMEs requires them to adopt certain changes to remain competitive in the market. The key objective of this study was to assess the impact of top management support (TMS), customer networking (CN), supplier networking (SN) and individual information technology capital (IITC) on IT implementation success (ITIS) through user involvement (UI) in specific context of Pakistan. Using a cross-sectional survey design, data was collected on modeled variables through a structured questionnaire. Data was collected from a random sample of 112 registered SMEs reported in SME Development Authority and Lahore Chamber of Commerce and Industry database. Multiple regression analysis was performed using structural equation modeling (SEM) in AMOS 24. Results indicated that top management support, customer networking and supplier networking were significantly correlated with IT implementation success and user involvement partially mediated the relationship among independent and dependent variables. Individual IT capital was uncorrelated with IT implementation success. We conclude that top management support for involvement of internal users in IT implementation process and customer networking and supplier networking process involving internal users of IT increases the chances of IT implementation success in SMEs.

Keywords: Top management support, customer and supplier networking, Individual IT capital, user involvement, IT implementation Success.

1. Introduction

Modern society and economy has not only encouraged the level of the globalization but it has also enhanced the level of competition among the organizations. Information technology (IT) is one of the many significant factors that have revolutionized the processes of the organizations (Pavic, et al., 2007). Information technology implementation and its success has been long an important concern for both large organizations as well as for small and medium enterprises (SMEs). According to Premkumar (2003) both small and large organizations have to face many problems in this competitive environment and they always tend to appreciate the concern of the IT and its features. IT systems help organizations in achieving efficiency, effectiveness and better organizational outcomes (Kosalge & Ritz, 2015). Due to recent trends of IT around the world,

SMEs have been assessing and implementing IT and its tools to facilitate their need of information acquisition. According to the Thong (1999) implementation of IT is a decision regarding adopting hardware or software. However, Hattink et al. (2016) asserted that successful IT implementation is an outcome estimated through the user need-fulfilment accomplished by the application of IT systems. Previous studies have contributed to the existing knowledge by identifying the factors that are important for success of IT implementation (Bhagwat & Sharma, 2007; Riemenschneider et al., 2003; Thong, 1999) however, few studies have considered the factors regarding environment of the SMEs viz a vis internal and external environment.

SME's contribute to a large chunk of GDP of Pakistan and though it may not be suggested that implementation of IT is specifically beneficial to the SMEs, organizations at large generally benefit from the successful implementation of IT (Galy & Saucedo, 2014; Loeser et al., 2017). In Pakistan 90% of the establishments are SME's while 80% of the non-agricultural workforce is employed in this sector. 40% of exports are also contributed by this sector to economy. Current study has tried to appreciate the concern of both internal (Top management support, user involvement, individual IT capital) and external factors (Customer networking and supplier networking) reading the IT implementation success in SMEs of Pakistan.

The study aims to systematically present factors that aid in successful implementation of IT systems in SMEs that may be a useful collection of information translatable to action for managers seeking convenience of task performance. In addition to that, the findings of the study enable managers of SMEs to encourage resourcefulness and efficiency in their organizations through the use of IT systems by emphasizing the attendance of IT facilitating workshops and trainings that may be advocated to the regulatory body SMEDA. The study also makes useful theoretical and academic contribution to the field of IT usage and successful implementation in organizational studies.

2. Literature Review

a. IT Implementation Success

With emergence of low cost computers and hardware, IT and its adoption became a matter of inquisition in 1980's for Small and medium enterprises. But to gain the understanding of the IT adoption in SMEs, it is important to understand IT as a concept. Previous literature shows that there is no generally accepted definition of IT adoption and implementation. It can be defined as use of information through technology (Boar, 1997), use of computers (Sarosa and Zowghi, 2003), having access to internet (Sin Tan et al., 2009) or technology that can open networks with suppliers (Carr & Smeltzer, 2002). IT can also include Computer Aided Design (CAD), Computer Aided Manufacturing (CAM), Electronic data interchange (EDI), and Enterprise Resource planning (ERP) systems and many more. Information Technology has been researched in context of acceptance and usage of innovation by organization (Premkumar and Roberts, 1999; Tan et al., 2009; Thong, 1999), full use of designed innovation by organization (Bøving and Bødker, 2004), extent of usage of IT by individuals in organizations (Grandon & Pearson, 2004), implementation success (Thong, 2001) and acceptance and satisfaction of users with IT (Al-Gahtani, et al., 2007). According to DeLone and McLean (1992), user information satisfaction "is the most widely measure of IS success". For this study, IT implementation is defined as the user's satisfaction with the IT systems. Even though IT is widely developed phenomena SME's have to deal with different barriers and difficulties while implementing IT and therefore adoption rate of the IT is relatively low in SMEs (MacGregor & Vrazalic, 2005).

b. Top Management Support

In literature, top management support (TMS) and CEO support is almost one or the same thing. According to previous IT adoption literature, high level of IT success and satisfaction with IS/IT

adoption is dependent on top management support and commitment towards IS/IT adoption in SMEs (Ghobakhloo et al., 2010). As most of the decision making is being done by Top management in SMEs therefore it directly impacts the IT adoption in SMEs (Nguyen, 2009). As compared to large businesses, SMEs have more centralized structures as in most cases the chief executive officers (CEOs) or Chief Manager and owner are the same person (Ghobakhloo et al., 2011). Top management support is critical to SMEs because their decisions affect the SMEs at all levels (Smith & Collins, 2007). Many studies have contributed to literature about top management (CEO's) characteristics and their decisions related to implementation of the IT in SMEs (Fuller & Lewis, 2002).

According to Thong (2001) top management or CEO's have less time to invest on IT implementation. However, if the CEO is more involved in IT implementation process, probability of the success is higher than SMEs having no or less support. Resistance to IT implementation can be reduced if CEO is more aligned to the overall IT implementation in SMEs. Ghobakhloo et al. (2010) also posited that positive attitude of CEO will result in acceptance of IT and its success in organization. An IT supportive CEO is more likely to invest resources and see the long-term benefits to the IT implementation are organization. Top management support in SMEs, leads to more IT implementation success in both large and small businesses (Nguyen, 2009). However, this support can be of different forms such as technical, managerial or financial. It can take the form of planning, design or development of IT implementation in SMEs as well as other activities that are related to implementation of IT. Leadership factors can impact IT implementation in SMEs such as top management's perception of and attitude toward IT, support and commitment, IT knowledge and experiences, innovativeness, perceived behavioral control over IT, desire for growth, and familiarity with administrative personnel (Qureshi & York, 2008). Top management commitment to the IT project and change of top management can differentiate between successful and unsuccessful IT implementation in SMEs. Thong (2001) also signified that Top management support and its commitment towards IT implementation is one of the critical factors of IT implementation and Success in SMEs.

Although user involvement have diverse definitions however generally it can be defined as the participation of user in IT development process (Barki & Hartwick, 1989). User involvement is quite fuzzy concept ranging from the informative to informative and consultative behavior of users. For this study, user involvement is participation of users in IT development process. Other than managers/ owners and their support, employees are known as one of the significant assets or resources that not only contribute to the success of the IT implementation but also to the firm's success and functionality (Nguyen, 2009). According to Caldeira and Ward (2003), users of IT within SMEs are precious resource for firms. If top management supports involvement of users in IT implementation process, it not only encourages positive attitude of user toward use of the IT in organization but also leads to a smoother conversion from the existing work procedures (Calderia & Ward, 2003). To ensure the proper implementation of IT in SMEs and to avoid IT adoption failure SMEs should also provide proper education and training relating to the IT knowledge to potential users of IT in organizations (Thong, 2001). However, again such leverage is on part of top management. Hence, it can be assumed that support of top management through user involvement might be more significant.

H₁: Top management support has significant influence on IT implementation success.

H₂: User involvement mediates the relationship between top management support and IT implementation success.

c. Networking Relationship

One of the core competences of SMEs is their relationship networks (Fletcher, 2002). These networks are established by interactions between stakeholders of SMEs such as business partners, suppliers, vendors and customer etc. (Nguyen, et al., 2015). These networks are used by SMEs

for sharing, collaboration and exchange of knowledge and information and can be personal and professional in nature (Taylor & Pandza, 2003). As said earlier SMEs are generally resource deficient firms and network relationships can be a good factor that can provide SMEs with sufficient resources for IT implementation (Fletcher, 2002). These interactions or relationships can provide SMEs necessary or at least sufficient resources to better implement IT in the firm. SMEs rely more on personal networks than professional networks. Network relationship can generate access to scarce resources needed by SMEs.

i. Customer networking

According to Levy et al. (2003) small and medium enterprises are prone to customer pressure. SMEs adopt IT in result of demand of customer to increase or enhance the effectiveness of the organizations and as well as its decision making. Also, collaboration with customers develops and improves products and/or services in firms. Nguyen (2009) explained that customer pressure is one of the many reasons that SMEs adopt IT as it will lead to accommodate customers and enhance the effectiveness of the SMEs. Another study by Mehrrens et al. (2001) discussed the issue of credibility as one of the significant factor because it will provide due motivation for implementation of IT. This credibility can be achieved through building relationship with customers by fulfilling their pressures and need for better services. In European SMEs, IT is implemented and used for delivering better customer services as well as for better communication with other partners (Dutta and Evrard, 1999). According to Caldeira and Ward (2003), success and adoption of IT/IS in SMEs significantly depend on customer's pressure to adopt IS/IT. De Burca et al. (2005) also suggested that customers are significant factors that affect the IT adoption and its success in SMEs.

Company's ultimate goal is to retain and enhance the number of customers to have strategic advantage over competitors. Customer based IT systems brings out positive results for consumers and company alike, especially in case of SMEs (Nguyen et al., 2015). Customer relationship and user involvement are indicated to be the predictors of IT Implementation success (Ghobakhloo et al., 2010; Newby et al., 2014; Sappri et al. 2016) however, literature on mediation of any is scarce. As users of IT in organization are mostly at receiving end of request and suggestions, it can be hypothesized that customer networking will strengthen the need to implement IT in SMEs especially given the need to retain the customers.

H₃: Customer networking has significant influence on IT implementation success.

H₄: User involvement mediates the relationship between customer networking and IT implementation Success.

ii. Supplier networking

SMEs' networking with external stakeholders such as suppliers or vendors not only directly influence the performance of the SMEs but also its routine management activities (Fuller and Lewis, 2002). Such networks deliver SMEs with knowledge and information that are sometimes necessary for the routine activities of the firms. Also, they can generate sufficient resources for SMEs that are not otherwise available to managers/owners in individual firms (Taylor and Pandza, 2003). Supplier networking (SN) in SMEs can include vendors, partners, and competitors etc. that are part of the external environment (Premkumar and Roberts, 1999). External environment can exert competitive pressure on SMEs to adopt IT, especially those IT systems that are showing positive trends in other competitors (Nguyen, 2009). Just like customer networking, supplier networking can also pressurize the SMEs to adopt and implement IT systems. On the other hand, supplier networking also provide the SMEs with necessary information, knowledge and skills that can help the towards the product and Service development (Levy et al., 2003; Taylor & Pandza, 2003). To better implement IT in SMEs, it is evident that managers/owners should harness suppliers, vendors or any other network that are deemed

necessary. Consequently, it is hypothesized that supplier networking impacts the IT Implementation Success. Literature on relationship between supplier networking and user involvement is dearth. Suppliers need for the IT or the resources for its success will generally impact the perception of employees about the involvement for IT implementation. Supplier networking and it is presumed here user involvement will mediate the relationship between supplier networking and IT implementation success.

H₅: Supplier networking has significant influence on IT implementation success.

H₆: User involvement mediates the relationship between supplier networking and IT implementation success.

d. Individual IT Capital

Many previous studies have focused on the internal IT resources or expertise in SMEs and acknowledged that lack of IT resources or expertise generates the problems and complication for SMEs regarding IT implementation success (Caldeira & Ward, 2003). A rigorous longitudinal study by Cragg and Zinatelli (1995) comprised of eight years also explained that IT implementation is greatly repressed by internal IT expertise held by SMEs. In this study, instead of finding out the IT expertise and its resources, the major concern was to measure the IT capital held by an individual in SMEs. For this study, Individual IT Capital represents a composite of IT skills held by a person and the extent to which these various skills are employed on task performance by the IT professionals. Researchers have hypothesized that Individual IT capital impacts the IT Implementation Success. There was no literature cited on the relevant variable as no previous study has conceptualized it before. It is also presumed that more the IT capital in SMEs, more the employees/users will be involved in IT Implementation. As the IT capital is based on the perception of employees about the skills of IT about themselves, it is can be asserted that there interest in SME's IT implementation success will be higher as the IT capital enhances.

H₇: Individual IT capital has significant influence on IT implementation success.

H₈: User involvement mediates the relationship between Individual IT capital and IT implementation Success.

e. Level of Computer Experience

Previous studies have explained that user's IT knowledge does affect the IT implementation as Caldeira and Ward (2003) mentioned that other than internal IT expertise, another major factor that influence the IT sophistication in IT implementation is user level of knowledge regarding IT. Another study by Sarosa and Zowghi (2003) also endorsed the same findings. However, for this study computer experience, which is actually part of the user IT knowledge, has been considered separately. As the experience of the organization can bias the results, it was considered as control variable for the study.

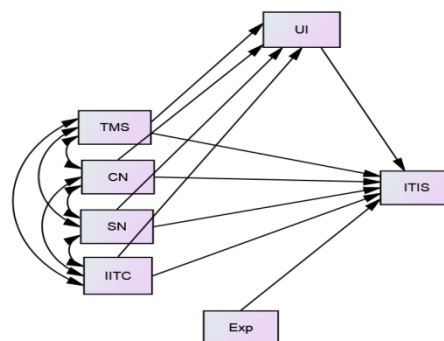


Figure 1: Theoretical Framework

3. Research Methodology

For meticulous research methodology, research onion strategy was pursued as provided by (Saunders et al., 2016). It explains the data collection process through five stages that are research philosophy, research approach, research strategy, research choice, time horizon and data collection methods. Ultimate outcome of the research philosophy is to create knowledge while remaining specific to philosophical school of thought which for current study is positivism as it searches for truth and consider that, knowledge exist out in the reality and that it is objective in nature (Bishop, 2007). It is also aligned with the quantitative research as it is more in synchronization with the natural sciences (Bryman, 2015). Deductive approach is usually used to check already developed knowledge to understand whether the new knowledge is in accordance with the previous one or not (Bryman, 2015). Model was constructed by going through different existing theories of knowledge of the field and then quantitatively tested using the statistical measures. Survey method is used for this study to gather the information from the respondents through self-administered questionnaires and then that data was further processed through some statistical techniques (Bryman, 2015). Individual units are selected from the population using some sampling techniques and some data collection techniques are used (Bryman, 2015). Fourth layer in research onion is research choice which examines the number of research approaches for the study (Saunders et al., 2016). This study has mono method choice as the data collected was through single technique as the relevant statistical techniques are used in data analysis phase. Using a cross-sectional survey design, data was collected on modeled variables through a structured questionnaire generated using 'Google Forms' application. A sampling frame of 2400 registered SMEs for the study was obtained from the databases of SME Development Authority (SMEDA) and Lahore Chamber of Commerce and Industry (LCCI). 448 individually filled questionnaires were received back from 112 randomly selected SMEs (4 responses per SME). As the unit of analysis was 'organization', responses from individuals from any single SME were summated and considered 'facts' reported on the organization by the individual members. In this way, responses from IT professionals were converted into data on modeled variables at organizational level. As Green (1991) mentioned that for regression analysis sample size should be $\geq 50 + 8*m$ where m is the number of indicators rule for the sample size.

$$\text{Sample Size (N)} = \geq 50 + 8*m$$

$$\text{Sample Size (N)} = \geq 50 + 8*6 \text{ (Number of Indicator in the Study)}$$

$$\text{Sample Size (N)} = 50 + 48$$

$$\text{Sample Size (N)} = 98$$

a. Instrument Reliability & Measures

For, top management support, user involvement, supplier and customer networking, individual IT capital and level of computer experience, a structured questionnaire was developed for testing the hypothesis. Top management support and user involvement's scale has been adopted from (Yap et al., 1994). Both top management support and user involvement were measured on 1-5 Likert scale which ranged from 'never to always'. For supplier and customer networking scale of (Clarkson, 1998) has been considered which was also measured on five point Likert scale from 'strongly disagree to strongly agree'. Another contribution of the study was scale that has been developed for individual IT capital which was again measured on 5-point Likert scale. Level of computer experience was asked on the years of computer experience that respondent had. For face validity, the developed questionnaire was scrutinized by linguistic and psychological experts to check whether the questionnaire was giving the proper sense or not. For all the variables, Cronbach's alpha value was higher than 0.7 (Table: 1).

4. Data Analysis

The following table: 1 shows descriptive statistics and correlation between different variables. The values of Cronbach's alpha are given diagonally in parenthesis. The correlations of ITIS with all variables are statistically significant.

Table 1: Correlation Matrix

	Mean	Std. Deviation	TMS	UI	CN	SN	IITC	ITIS
TMS	3.721	.624	(.817)					
UI	3.583	.826	.311**	(.751)				
CN	3.761	.571	.371**	.347**	(.796)			
SN	3.672	.743	.305**	.360**	.216*	(.807)		
IITC	2.714	1.181	.314**	.286**	.102	.424**	(.747)	
ITIS	3.818	.426	.523**	.486**	.492**	.447**	.323**	(.786)

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Multiple regression analyses is performed through structural equation modeling (SEM) using Amos 24. The model 1, explains 46.7% variation in the dependent variable ($R^2 = .467$). All variables have statistically significant influence on ITIS & $p < .05$ except IITC, $p > .05$. For TMS, H_1 is supported, $\beta = .304$ & $p < .05$. For CN, H_3 is supported, $\beta = .332$ & $p < .05$. For SN, H_5 is supported, $\beta = .257$ & $p < .05$. For IITC, H_7 is not supported, $\beta = -.005$ & $p > .05$. The results of multiple regression analysis are shown in the table 2.

Table 2: Multiple Regression Analysis

			R^2	β	S.E.	C.R.	P
			.467				
ITIS	<---	Exp		.201	.019	2.904	.004
ITIS	<---	TMS		.304	.053	3.848	.000
ITIS	<---	CN		.332	.055	4.410	.000
ITIS	<---	SN		.257	.044	3.265	.001
ITIS	<---	IITC		-.005	.028	-.061	.952

Model 1 was over identified but presents poor fit of indices and standardized factor loading of IITC on ITIS was also insignificant in multiple regression analysis in table 2. To improve the model fit indices, the variable IITC was removed in model 2. Model 2 is over identified and model fit indices were also improved than model 1. In model 3, the mediating variable UI were included. Model 3 was over identified and the fit indices were further improved than previous models (Bentler, 1992; Browne & Cudeck, 1993; Byrne, 2016; Fan et al., 1999; Hu et al., 1995; Hu & Bentler, 1999; Joreskog, 1993; MacCallum et al., 1996; Steiger, 1998). The values of the model fit indices are shown in table: 3.

Table 3: Model Fit Indices

	Variables		
	Model 1	Model 2	Model 3
	TMS, CN, SN, IITC, EXP	TMS, CN, SN, EXP	TMS, CN, SN, EXP, UI
χ^2	28.256	4.813	5.155
d.f.	4	3	4
p	0	0.186	0.272
χ^2 /d.f.	7.064	1.604	1.289
RMR	0.193	0.063	0.062
GFI	0.930	0.983	0.985
NFI	0.821	0.995	0.964
AGFI	0.634	0.917	0.922
CFI	0.831	0.981	0.991
RMSEA	0.234	0.074	0.051
HOELTER (.O5)	0.38	181	205

The model 2, explains 46.6% variation in the dependent variable ($R^2 = .466$) after exclusion of insignificant variable IITC. All variables have statistically significant influence on IT IS, $p < .05$. The results of multiple regression analysis are shown in the following table: 4.

Table 4: Multiple Regression Analysis

			R^2	β	S.E.	C.R.	P
			.466				
ITIS	<---	Exp		.200	.019	2.877	.004
ITIS	<---	TMS		.303	.052	3.936	.000
ITIS	<---	SN		.256	.041	3.490	.000
ITIS	<---	CN		.332	.055	4.420	.000

The model 3 explains 50.3% variation in the dependent variable ($R^2 = .503$) and adjusted $R^2 = .036$, which means that this model explains 3.6% more variation in the dependent variable after inclusion of mediating variable UI. For TMS, H_2 is supported, $\beta = .274$ & $p < .05$. For CN, H_4 is supported, $\beta = .280$ & $p < .05$. For SN, H_6 is supported, $\beta = .199$ & $p < .05$. The β values of TMS, SN & CN i.e. .303, .256 and .332 in model 2 reduced significantly to .274, .199 and .280 in model 3 respectively. It shows that UI partially mediates the influence of TMS, SN & CN on ITIS. The results of multiple regression analysis are shown in the table: 5.

Table 5: Multiple Regression Analysis

			R^2	R^2 Change	β	S.E.	C.R.	P
			.503	.036				
ITIS	<---	Exp			.189	.018	2.819	.005
UI	<---	TMS			.142	.123	1.524	.127
UI	<---	CN			.237	.131	2.613	.009
UI	<---	SN			.265	.098	2.998	.003
ITIS	<---	UI			.220	.038	2.893	.004
ITIS	<---	TMS			.274	.050	3.643	.000

			R^2	R^2 Change	β	S.E.	C.R.	P
ITIS	<---	CN			.280	.055	3.742	.000
ITIS	<---	SN			.199	.041	2.711	.007

UI partially mediated the influence of TMS on ITIS and indirect effect size is .031 and it is significant, $p < .05$. UI partially mediated the influence of SN on ITIS and indirect effect size is .058 and it is significant, $p < .05$. UI partially mediated the influence of CN on ITIS and indirect effect size is .031 and it is significant, $p < .05$. The total, direct and indirect effects of TMS, SN & CN on ITIS are given in table 6.

Table 6: Total, Direct & Indirect Effects

		TMS	SN	CN
Total effect	ITIS	.305	.258	.332
Direct effect	ITIS	.274	.199	.280
Indirect effect	ITIS	.031	.058	.052
Sig.	ITIS	.036	.008	.005

5. Discussion

Data analysis shows that Top management support does influence the IT implementation success significantly. Top management support has long been an important factor for success of IT implementation. As SMEs, have relatively smaller structure and hierarchy which tend to enhance the level of decisions made by top management (Nguyen, 2009). For IT implementation success and adoption, top management make decisions almost at all levels from planning phase to implementation stage (Fuller & Lewis, 2002; Huang, 2015). Some studies also show that technological change in SMEs move in the direction of the decisions that are based on the knowledge of top management (Johnson, 2015). Cragg and Zinatelli (1995) also asserted that top management support is one of the key factors that influence IT implementation success. According to Thong (2001) top management support is significantly related to the IT implementation success in SMEs and is also an important factor for the satisfaction of users with information system. Usability of any IT system is dependent on users and such system may fail because of lack of involvement of users in development and implementation process (Majid et al., 2012). In order to properly attain benefits from the IT implementation, SMEs should consider training, knowledge sharing and potential benefits of the IT success for organization and employees as well (Milovanović, 2015; Thong, 2001) Interaction of such involvement is always to be authorized by Top management. Our study also showed the same results.

Just like large organizations SMEs also are susceptible to the competitive pressures in dynamic environment. Customer, suppliers, networking, change, growth and innovativeness are some of the factors that SMEs consider to remain competitive (Nguyen, 2009). According to Levy et al., (2003), SMEs consider the customer demands as an important factor to retain their customers and to remain viable in the environment. Many SMEs consider that customers focus strategy is vital for growth and to remain competitive in the environment (Premkumar and Roberts, 1999; Zhang et al., 2016). Nguyen et al., (2015) also mentioned that the most influential reason to adopt IT was customer networking. However, H4 was also supported. This shows that user involvement does mediate the relationship between customer networking and IT implementation Success. Interaction of customers and users is necessary and it may be the case that customer's demands are actually met through the involvement of users in IT implementation meeting.

Another reason that SMEs consider for competitive advantage is supplier networking. SMEs consider networking to fulfill the needs of pressure by collaborating with the suppliers to receive the better services at lower cost (Mehrtens et al., 2001; Wachnik, 2015). According to Afshan (2013) and Dutta & Evrard (1999), one of the main use of the IT for SMEs is to synchronize their information sharing with their suppliers for better communication. Caldeira and Ward (2003), Cai and Dang (2015) also endorsed this finding that suppliers pressure is an important factor that impacts the degree of IT implementation in SMEs. Similar findings were recognized by De Burca et al. (2005) and Mole et al. (2004). Suppliers networking can enhance improvement in organization's products and pressurize SMEs to Implement IT. Suppliers not only provide resources but also enhance the level of learning and experience for IT implementation process. Current study also endorses such finding by finding a significant effect of supplier networking on IT implementation success. User involvement again mediates the relationship between supplier networking and IT Implementation Success. It can be presumed that external environmental factors interact through internal environmental structures. Supplier's propense the users to meet the demands regarding the IT implementation process wither in development meetings or through business interactions just like customers.

Internal IT resources are an important consideration for Success of IT implementation (Bergeron et al., 2017). Previous study has also considered internal IT resources (Opoku et al., 2016) however current study have considered Individual IT Capital as the predictor of IT Implementation Success. It was a multiplicative indicator of skills of users and its intensity of use. Results showed that Individual IT Capital was not significantly related with IT Implementation Success. As SEM didn't indicate any influence of Individual IT capital, no mediation can be assumed. SMEs generally have less hierarchical structures and smaller size as compared to large organizations. Due to lack of resources, once a project is initiated chances are low to disagree with the trend. So once SMEs move towards IT Implementation process, whether employees have low IT capital or high it will not influence IT implementation success.

6. Conclusion and Practical Implications

Although the topic of IT implementation and its success is new in Pakistani SMEs, there have been many studies that have studied the impact of different factors on IT implementation success. Organizations tend to follow the policies that are driven from the top management as SMEs have dynamic and flat structure due to the lack of hierarchy. Although this structure fulfills the needs of the SMEs by being more open and responsive to the problems and decision making but on other hand gives power to some specific position holders. For successful implementation of IT systems, managers/owners of SMEs must be supportive towards such change while also collaborating with the users. Study shows that user involvement can be the most important factor and if not properly managed might fail the whole process. Governmental bodies can organize seminar especially SMEDA for such purpose as IT implementation is a strong competitive pressure and can lead to reduction in customers. Results of the study are shown in the following table: 7.

Table 7: Results of the Study

H ₁	Top management support has significant influence on IT implementation success.	Supported
H ₂	User Involvement mediates the relationship between top management support and IT implementation success	Supported
H ₃	Customer networking has significant influence on IT implementation success	Supported
H ₄	User involvement mediates the relationship between customer networking and IT implementation success.	Supported
H ₅	Supplier networking has significant influence on IT implementation success.	Supported
H ₆	User involvement mediates the relationship between supplier networking and IT implementation success.	Supported
H ₇	Individual IT capital has significant influence on IT implementation success.	Not Supported
H ₈	User involvement mediates the relationship between individual IT capital and IT implementation success.	Not Supported

a. Limitations and Future Directions

Although current study has contributed towards the body of knowledge few limitations and directions are given below. Firstly, although data was collected from the SME's through availing the services of outside governmental agencies such as SMEDA and LCCI, more data can be obtained through using other methods such as using data from the Pakistan Stock Exchange (PSE). Secondly, for this study, convenience sampling was adopted as proper list of SMEs' was not available. For better inferential statistics and findings, it might be better to get a response based on Random Sampling. Thirdly, cross sectional research design has been used for examining the influence of different factors such as Top Management Support, User Involvement, Customer Networking, Supplier Networking and Individual IT Capital with Level of Computer Experience was control variable on IT Implementation Success. However, longitudinal study might help explain the relationship of these variables as IT implementation unfolds over time. This study was quantitative in nature i.e. data was collected through structured questionnaires for generalizability. There were insignificant relationships that are in itself findings and researchers may adopt qualitative approach to explore the reasons behind such findings. Interviews or focus groups may be used for such purpose. Many other variables can be considered for predicting the dependent variables such as organizational financial resources, training of the users, external vendors or government. These predictors can be considered by future researchers as some literature also quotes them to be indicators of the IT Implementation Success.

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REVISITING ORGANIZATIONAL LIFE CYCLE (OLC)

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Abstract

Organizational Life Cycle (OLC) is a concept to discuss the life pattern of an organization as a life of a living being explained over the time period. As the concept is derived from the biological life cycle, it is assumed that OLC is a generalizable, sequential and predictable phenomenon that can be applied to every organization regardless of its type and existing differences. This study has targeted these assumptions to suggest contingent models of OLC representing different types of organizations, operating in different environments by pursuing variety of strategies. As organizations vary in their goals, strategies, systems, operations etc, therefore a traditional model of OLC is no more applicable. Therefore, concept of OLC is described in the light of organizational environment, change and strategies in this study to propose contingent OLC models despite of a single OLC model. The proposed OLC models are derived conceptually in this study which still needs to be tested empirically. The study indicates the future researches to see OLC as a contextual domain rather than a traditional one and predict the organization's life cycle on the basis of their actions rather dictating their actions. According to the study organizations operating as closed systems may experience simple and stable environment. While in dynamic environment OLC movement is not smoother, rather steep slopes represent abrupt growth and decline of organization. Similarly incremental changes show a smooth trajectory while radical changes indicate the steepness in the OLC curve. Organization's approach to deal the market also defines the OLC movement. Competitive and portfolio strategies define identifiable OLC for organizations. All such possibilities have altered the traditional movement of OLC and proposed new OLC models in this study. The study suggests future researches to see OLC in a contextual domain rather than a traditional one and predict the organization's life cycle on the basis of their actions rather dictating their actions.

Keywords: Organizational Life Cycle (OLC), Organizational environment, organizational change, organizational strategy.

1. Introduction

Concept of "Life Cycle" is used to explain the phases of evolution of any entity. This phenomenon is applied in the field of biology, psychology, technology, system sciences and business. This study considers the life cycle in the domain of Business. The well-established life cycles in the business includes the "Product Life Cycle", "Industry Life Cycle", "Business Life Cycle" and "Organizational Life Cycle". Each of these established business related life cycle models explains the evolution of the particular entity (product, industry, business, organization) describing the changes occurred from existence (birth) till its decline (death). The emphasis is given to organizational life cycle (OLC) in this study. Organization is considered as an entity

similar to a living entity which moves through different stages throughout its life span (Lester, Parnell, & Carraher, 2003). Theory of organizational life cycle is based on this concept which suggests that like a living being which grows, matures, declines and ultimately dies throughout the life span, an organization also passes through such stages (Daft, 2015; Samuel, 2011). Multiple models present different stages of life cycle in different manner. Daft (2015) proposed OLC as a pattern of four stages titled entrepreneurial, collectivity, formalization and elaboration. Greiner's model (Greiner, 1972) of organizational life cycle explains the organizational evolution through five phases; entrepreneurial, collectivity, delegation, formalization and collaboration. Life cycle of an organization is explained on the continuum of time evaluated against its progress explained through different phases. At the start-up phase organization grows incrementally, reaching at top in the middle with stabilize growth and then starts declining in the end which may lead to either disclosure or to revival (Quinn & Cameron, 1983). According to Quinn and Cameron (1983) multiple models describing OLC by different authors show consensus on factors like each phase describes a change in terms of different aspects (structure, development, market growth, business expansion, organizational activities etc), occurs in a sequential manner which is difficult to reverse. Organizational progress with respect to OLC has been described in terms of its size, profitability, revenue, market strategy, cost efficiency, competitiveness etc. Lester et al. (2003) propped that OLC of an organization can be determined through situation, structure, decision making style and strategy. Existing literature shows a significant contribution of OLC in different domains of management and organizational studies. Multiple studies explain the Small & Medium Enterprises (SMEs) and entrepreneurial deeds according to the OLC stages depicting birth, growth, maturity and decline (Kamunge, Njeru, & Tirimba, 2014; Pryor & Toombs, 2014). OLC has been used by the researchers as a predictor of organizational change, effectiveness (Quinn & Cameron, 1983), capacity (Connolly, 2006), structure, management practices, transaction costs (Gurianova, Gurianov, & Mechtcheriakova, 2014), strategic decision making (Campos, Rubio, Valenzuela, & Ato, 2014), growth and profitability. All these studies explain the change in organizational actions with respect to different stages of its life cycle. In the early stages of life cycle structure is informal, main purpose is survival, revenues and profits are limited and highly influenced by external environment. As the organization moves towards next stages of OLC, organization's control over internal and external environment exceeds resulting into formalized systems, improved profits and revenues, adequate market shares and better control over external factors like suppliers, customers etc. If the phenomenon of OLC is considered deeply, it can be inferred that criteria used to differentiate phases of OLC are based on organizational goals and respective actions. The goal to emerge, grow, sustain and windup dictates the birth, youth and decline phases of OLC respectively. Stage of OLC if contains factors like small size, informal management, centralized control and main goal of survival, then is labeled as "Birth" or initial phase of OLC. But all these organizational situations may exist in time duration other than the birth. For instance, in an extensive turbulent environment a well-established organization suddenly downsize to minimize expenditure, centralized the control to avoid risks/ambiguities and shifts to informal mechanism for quick correspondence to the dynamic environment. In such a manner w.r.t time frame an organization which is at its growth or maturity phase responding like a newly born organization. Similarly, mature organizations when abruptly hit by an external factor and fail to respond timely, may vanish instantly without following the smooth trajectory of OLC. If the declining organization reestablishes control over environment, the declining slope of OLC starts shifting upwards. Therefore, it is not the time that explains the phases of OLC rather organizational objectives, strategies and actions are defining the progress. Organizations emerging from a parent organization already have a well-defined and formalized system and an adequate setup even at their birth stage. In such conditions such organizations cannot follow a traditional life cycle in which birth stage is always labeled by informal and random structures. Similarly, organization during their life span showing a stagnant growth and avoiding risks has relatively a straight line rather than a traditional curve in OLC.

These possibilities challenge the generalizability of OLC model existing till now. Therefore, the concept of OLC is interrelated to organizational goals and practices as it not only serves as a predictor but is also an effect. Therefore, theories explaining OLC as predictor to organization's progress needs to be revisited by defining it through different actions of organizations which are not necessarily the same for every organization. The existing model of OLC proposes a generalized progression to explain every type of organization. However, organizations are unique entities with distinguished goals, systems and actions; resultantly OLC cannot be taken as a generalized model. Moreover, such possibilities strike the basic assumptions of OLC like sequential and predictable progress. This study focuses on describing OLC as an outcome of organizational deeds and proposing OLC models representing distinct organizations. For this purpose different concepts describing organizational evolution defined through its external and internal environment are used to propose contingent OLC models.

Organization is composed of multiple interlinked components and operates like a system. There are two schools of thoughts regarding system of an organization; organization is mostly considered as an open system as it interacts with its environment to get input and further deliver its outputs. While the other school of thought believes that organization concentrates on its internal processes and do not consider the external environments and known as close systems. Although it is almost impossible for an organization to be a closed system, but few are operating relatively as closed systems with limited interaction with the environment. Existing OLC model does not explain this difference. Moreover, formation stage of an organization also directs the initial phase of OLC; company emerged as a result of acquisition or merger or of a subsidiary company is different from the newly emerged one. All such factors indicate the inability of the OLC model to explain the life cycle pattern of every organization. In addition to this, economic situation in which a particular organization operates cannot follow a generalized life cycle pattern. OLC pattern of an organization experiencing economic boom will be different from the one operating in recession. The economic forces put pressure on organizational goals, strategies and ultimately actions. In order to deal with external factors, organizational internal processes will be altered affecting the change in OLC pattern. Organizations respond to environmental conditions through different change patterns and competitive strategies depending on the degree of uncertainty in the environment. Change can either be smooth or abrupt depending on the situation causing the change, therefore affecting the OLC model. Similarly, environment can be certain or dynamic, in response to which organization follow strategies to sustain. Multiple competitive strategies including Porter's Competitive Strategy and Miles and Snow's Strategy are used in this study to explain the variation in OLC. The OLC model available in the literature does not address all such types and needs of the organizations; rather it proposes OLC as a sequential stage model which can be easily predicted (Daft, 2015). While practically organizations are surrounded by an environment which is hard to predict and a large amount of accurate information is required to get control over the dynamic environment. Moreover, depending on the variation in circumstances organizations face, it is not possible to follow the sequence in OLC model as discussed above. This highlighted the need to revisit the concept of OLC so that the existing weaknesses can be removed and life span of an organization can be truly demonstrated by the OLC model representing the variation in organizational systems and conditions. Studies conducted in the domain of OLC are found in the era of late 1990s and early 2000s. And most of them followed the traditional OLC model to explain SMEs progress, entrepreneurial interventions (N. R. Smith & Miner, 1983), human resource practices, significance of stake holders (Jawahar & McLaughlin, 2001) and top-management priorities (K. G. Smith, Mitchell, & Summer, 1985). This study proposes the contingent model which is currently missing in the existing literature to describe the life span of an organization truly represented by its identifiable environment, goals and actions.

Research Objectives:

This study is guided by the following objectives:

1. To examine the existing model of OLC to identify its weaknesses
2. To identify the factors that affect the OLC pattern
3. To propose the contingent models of OLC demonstrating the organizational differences

2. Methodology

This study is a conceptual paper based on the literature on OLC. Previous studies are taken as a source to understand the model existing till now to explain organizational progress. To indicate the domains which can alter the OLC model, literature on organizational environment, change and strategy is consulted. The concept is overall studied to gain insight about its emergence and the form in which it is existing now, no particular time span is considered while collecting and analyzing the data. Relevant data (mostly traced in the era of late 1990s and early 2000s) is considered and analyzed to identify the shortcomings and to propose the contingent model of OLC. The content of the relevant literature was analyzed to construct the theoretical model in this study. Hermeneutic approach is used to interpret the available text in the form of literature on OLC, organizational environment, change and strategy. Hermeneutic approach is a technique in qualitative research to interpret the text (Philip, 2011).

3. Propositions

Organization is an open system which interacts with its environments by taking inputs and delivering outputs to the external world. As its major stakeholders (customers, markets/competitors, suppliers, regulatory bodies etc) exist in external environment, the influence of external environment imposes pressure on organizational internal environment (structure, processes, human resource, systems etc). This possible influence of external environment comprises of politico-legal, economic, technological and socio-cultural factors (Thill, Bovee, Wood, & Dovel, 1993). All these factors influence the organizational progress throughout its life span from existence to decline. These factors of external environment are subject to change therefore organizational responses cannot be predicted. This dynamic environment adjusts the organization's movement along traditional OLC pattern (i-e sequential movement from birth to decline). Based on this logic following proposition is proposed in this study:

Proposition 1: Organizational Environment alters the traditional OLC pattern

It is essential for the organizational survival to efficiently respond to the external forces by inducing change in its internal environment. Whenever a change is introduced in the organization, incremental as well as radical alterations are initiated in the organizational factors like its structures, processes, resources and systems (Daft & Noe, 2000). Movement along OLC pattern displaying organizational growth is also described through these internal factors (Greiner, 1972), therefore change in these factors will direct the change in OLC pattern. Hence, rather than time duration, changes in organization's internal factors determine the pattern of OLC and resultantly following proposition is proposed:

Proposition 2: Organizational Change alters the traditional OLC pattern

Change is a deliberate activity of an organization to deal with certain or uncertain circumstances. For successful initiation of goal (change), organization should develop particular plans and strategies to implement goal/change and to deal with the external pressures (Daft, 2015). Strategies itself includes the initiation and adjustments in organizational moves to address the change (forced or intentional). Therefore, organizational strategies to meet the objectives direct

the organizational actions, influencing the OLC pattern. This possible influence of organizational strategies suggested the following proposition:

Proposition 3: Organizational Strategy alters the traditional OLC pattern

4. Discussion

Organizational life cycle (OLC) is a concept derived from natural sciences to consider organization as a living entity and explains its progression throughout the life span similar to the living beings. Organizations emerge, grow, mature and decline with the passage of time as a living organism takes birth, grows, matures, declines and dies. These major stages of OLC are explained through multiple phases of different models proposed in literature. Daft (2015) has explained the concept of organizational life cycle through four stages of evolution based on characteristics like organization's structure, control systems, innovation and goals. According to this model organizations pass through the entrepreneurial, collectivity, formalization and elaboration phases during its life span. At the startup stage organization encounters entrepreneurial phase in which organizational size is small and control is centralized to a single entity (owner/top management). No formal or bureaucratic structure exists and organization's sole focus is on its survival. With the passage of time organizational growth increases its pace and employees become more excited about goal achievement. This phase of OLC is termed as "collectivity" in which most of the structure is still informal while few main procedures are defined clearly and openly. Here focus is shifted from survival to organizational growth. Afterwards organization enters into the stage of "formalization" with increased size. As scope of operations has increased in this phase, more staff support is indulged into the organization facilitating more formalized structures. Formalized structures lead to clear hierarchies and division of labor. At this stage emphasis is on sustaining the current growth level through continuous development for which innovation initiatives are taken at organizational level rather than as individual effort. In order to ensure sustainability organization needs to enhance its control over its environment, therefore, goes for vertical integration. Uptill now organization becomes fully bureaucratic and formalized therefore, the next stage to enter by an organization is "elaboration". In this stage organization emphasizes on its image and reputation in the market. Extensive bureaucracy hinders the efficiency through lengthy chain of commands and lack of interaction. To overcome this issue organization promotes team coordination within its bureaucratic structure. Main objective of this stage is to maintain its image for which a well-established R&D (research and development) department is desired to keep products updated. Continuous efforts are made to enhance the value of product through customized products and support services. Organizational actions are the distinguishing moves at each stage of OLC. Greiner Model (Greiner, 1972) explains the organizational evolution through five phases; entrepreneurial, collectivity, delegation, formalization and collaboration. All these phases are distinguished from each other on the basis of organization's main focus and the encountered crisis. Each stage is initiated by a particular focus and which comes to an end by an encountered issue of critical nature. This issue leads to the initiation of the next stage and this process continues throughout the organizational life span. Entrepreneurial stage describes the organization as a small setup in which organizational people are directly connected and work collectively on the development and selling of its core product. The owner/entrepreneur is a center of authority and directly controls the basic organizational activities. Here the entrepreneur is a technical expert of the field, and not a proper manager. Specific skills are required to run an organization smoothly; this need leads to a "crisis of leadership". Therefore, organization moves from the entrepreneurial stage to "collectivity stage" to address the issue of leadership crisis. "Collectivity stage" arrives with the increased complexity of the organizational activities where integration of activities and clear goals for direction are of importance along with major

production and marketing of products/services. In order to provide clear directions throughout the organization, decisions are centralized which are trickle down in the hierarchy to align the efforts. This phase is highly concerned about the management and organization of activities through a centralized rules and orders. But with the organizational expansion centralized decision making cannot be proceed, in order to respond to frequent organizational changes, efficient responses are desired. To achieve efficiency in decision making, it requires some extent of delegation. Overemphasis to centralized decision making stimulates the "crisis of autonomy" in which centralized decision makers are reluctant to delegate their powers to others. In response to this crisis of autonomy, organization shifts from centralized to decentralized decision making which is known as the "delegation stage" of life cycle. In order to delegate the authorities, interpersonal interactions are further required to develop a trust level between hierarchies. In few cases the increased delegation becomes uncontrollable and leads to "crisis of control" when organizational rules and procedures become unclear and ambiguous. To re-attain the necessary control over management of activities organization is pushed towards the "formalization stage". In this stage bureaucracy again emerges to keep decentralized decision making aligned with the organizational goals through formally drafted rules and regulations. Integration of organizational activities is formally controlled through well-defined rules and regulations. With the passage of time this bureaucratic control stimulates the emergence of "red tape crisis". This crisis is a result of extensive bureaucratic control which hinders organizational efficiency. Excessive control mechanism make organization's internal environment boring and inhuman. In order to survive in the red tape crisis, organization enters into the phase of "collaboration phase" of OLC. This phase emphasizes the importance of team work in order to personally indulge employees with the organizational activities. Tasks are grouped and assigned to a group of people with delegated authorities to develop a sense of responsibility among the group members. This approach weakens the task monotony and inhuman feeling associated with the organizational activities. To promote teamwork among the workforce, mutual trust and healthy interaction need to be promoted. To initiate this sense of mutual cooperation, a significant change in organizational structure and culture is desired. Skills like leadership and interaction need to be promoted among the organizational people so that employees are motivated and guided to perform their work responsibilities rather than ordered by to do so. At this stage of OLC employees are involved in the activities rather than controlled or ordered, therefore, attitudinal change among human resource is a main focus of this stage. This stage also ends with the "crisis of renewal" which occurred due to the work burdens, employee burnouts, confusion of dual authorities (within group and outside the group) and work experimentation. This crisis either results into new form of organization or to its decline or even death. According to this model organization enters to the new phase of its life cycle when encountered an issue. This shows that if organization works smoothly then there are very limited chances to step into the next phase of its life regardless of the time and the sequence is predictable. Adizes model (Adizes, 1979) explains the organizational progress through ten stages; five explaining the growth pattern while five stages targeted the organizational decline (Nazzari & Foroughi, 2007). These ten stages are labeled as Courtship, Infancy, Go-Go, Adolescence, Prime, Stable, Aristocracy, Early Bureaucracy, Bureaucracy and Death. In the beginning stages influence and involvement of the owner/founder is high and the goal progresses from existence to grow further (Courtship, Infancy, Go-Go). Once the scope of organizational goal expands to long term approach, organizations gets detached from its owner and emerged as a separate entity (Adolescence). The maximum growth is attained at "Prime" stage where organization is able to control the environment and tries to maintain the position. This attempt to attain status-quo pushes the organization towards decline where resistance to change due to structural rigidity is high (Aristocracy, Early Bureaucracy, Bureaucracy). That rigidity results into inefficiency, late responses and short-term focus of organization. Here organization defensively reacts to maintain the position and if not handled cautiously will lead to organizational death. In this model again the sequence in the stages is obvious depicting

generalizable characteristics for every organization in a particular stage. Quinn and Cameron (1983) conducted a study to integrate the nine OLC models existing in literature. The considered models describes the OLC patterns on the basis of characteristics including growth intentions, management's concerns, strategies, pace of organizational change (evolution and revolution), interpersonal interactions, functions performed to pursue goals, organizational structure and routine activities. All the OLC models show a similarity in characteristics of the life stage, for instance, initial stages of each OLC is concerned about startup giving emphasis to innovation, developing an idea to market, taking risks and working on prerequisites to initiate a business. This stage is labeled as "entrepreneurial", "birth" and "forming" stage. Once a venture is initiated it leads to the "growth" stage depicting the informal structures, coordination, cohesion and extensive communication among the organizational people required for the organizational performance. Then comes the stage of "maturity" where things are organized and managed formally (properly), emphasis is given to bring stability into the systems and procedures. OLC ends with the "declining" stage where an organization moves towards the closure due to increasing inefficiencies, failures to sustain and inability to respond timely. Figure 1 represents the traditional pattern of OLC based on the already existing models showing a sequential and predictable movement from organizational birth to decline.

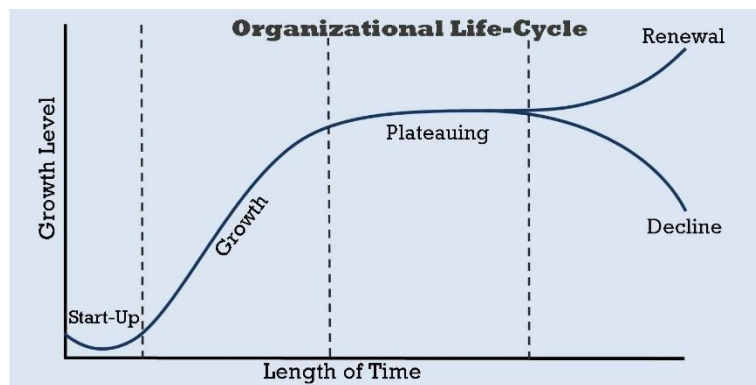


Figure 1: Traditional pattern of OLC

Despite the characteristics on which OLC is explained, the movement of OLC against time remains same. Organizational actions in one stage are distinguishable from the ones of another stage (Quinn & Cameron, 1983), therefore organizational deeds are the ones that define OLC rather than OLC defining organizational deeds. As OLC stages are defined through organizational actions, then by altering the organizational actions one stage can be transformed into the other; a birth stage will no more be a birth stage if a company emerged as a result of acquisition or merger or of a subsidiary company. In such situation emerging company does not encounter informal structures, centralized decision making and small-sized simple structures. This alters the normal trajectory of OLC. In order to observe the influence of organizational environment, change and strategies on OLC it is prerequisite to prove that OLC is no more generalizable, predictable and sequential. Levie and Lichtenstein (2008) questioned the interrelatedness and sequence in growth stages of OLC. It is argued that no consensus on number of stages is yet developed in the literature; moreover, organizations display different characteristics in different time instances therefore it is hard to generalize OLC stages for every organization. "Young, small firms, unlike youngsters and trees, do not necessarily grow. And not all large, old firms decline." (Levie & Lichtenstein, 2008, p.20). Hence, it is illogical to predict the actions of organization and generalize it with reference to a particular stage of OLC. As OLC stages are not generalizable, therefore, no single model of OLC is applicable to every organization and in every situation. To

enhance the model fit of OLC contingent models of OLC are proposed in this study to accommodate influence of external environment, organizational change and organizational strategies.

4.1 Influence of external environment

Organizational environment in this study is considers the external environment only, as to encompass internal environment organizational change and strategies will be used latter in this study. Organization's external environment is composed of factors like politico-legal, economic, technological and socio-cultural (Thill et al., 1993). The changing trend in environment directs the organizational goals and actions. Therefore, OLC trend should be altered representing the complexity of the environment. Stable-unstable environment represents the pace of environmental change. If the frequency of change is low in the external environment, organization is able to predict the change and can gain control over it. But if the frequency of change is high, situation becomes more uncertain and organization is unable to forecast. Hence, it is concluded that if the environment is simple or sable organization will progress according to the traditional OLC model. However, in complex and/or uncertain environment traditional OLC model is not sufficient enough to describe the organizational progress. Model showing organizational progress in stable environment is shown in figure 2.

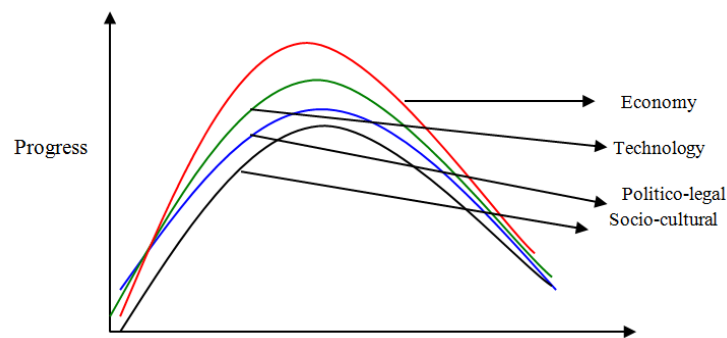


Figure 2: Organizational progress in a stable environment

In figure 2 multiple lines show the influence of each external factor influencing organization in a traditional curve of OLC. As in stable environment organizational moves are more dependent on internal processes, the external environment are not able to alter the normal organizational progress. A boom in economy, technological advancements, support from regulatory bodies and encouraging social trends increment the natural growth trend of an organization. In stable environment all such changes are occurred in an incremental way and therefore, organizational progress along time is smooth as represented in the figure 2.

When the environment is volatile the changes occurring in external factors are more abrupt and radical which rapidly disturb the smooth progress of an organization. An immediate rise and unexpected decline in organizational life span is prospected in accordance to the boom and decline in the economical, technological, politico-legal and socio-cultural factors. For instance when economy is in boom chances of organizational failure are decreased and majority of the organizations experience a growth even as a revival after decline. Similarly if the economic conditions are discouraging, it becomes difficult for the organization to operate, enforcing growing and mature organizations to decline. This influence shifts OLC curve downwards (either in sudden or a smooth manner) regardless of the exiting stage of the organizational growth. Similarly when frequent technological advancements are in progress it leads to providing efficient means to organizational operations shifting an upward movement in OLC. Organizations which

are struggling to survive also find stability or even growth if supported by a relevant technology instantly. But if technological innovations are not occurring in a fast pace, chances of obsolete technology increases that makes organizational operations inefficient and resultantly a decline in OLC is obvious even among the growing and mature organizations. It is essential for growing organizations to get advantage of new technology for continuous improvement, but if environment is not facilitating the technological growth becomes stagnant or even stop the improvements within organizations. Political situation, rules and regulations provide the framework of organizations to operate. Within the particular geographical boundaries, it is essential for the organizations to abide by the rules and regulations of that region. Any type of radical change in policies instantly affects the organizational actions. Socio-cultural factor defines the taste of masses who are the customers or beneficiaries of the organizational operations. The change in their trends influence the organization to take instant measures to respond accordingly, else it will lead to loss of market share.

The impact of this factor is significant but the change in social and cultural trends is relatively incremental. The new proposed OLC model to represent the influence of complex-unstable environment is shown in figure 3.

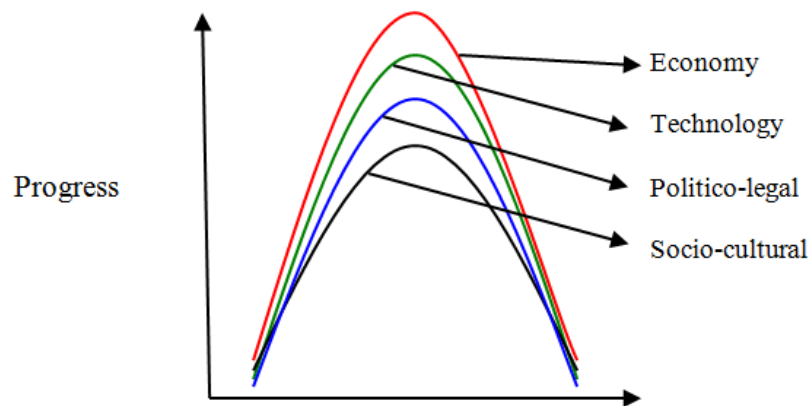


Figure 3: Organizational progress in a dynamic environment

The steepness in figure 3 shows organizational growth in a fast pace if provided with the encouraging environment. Similarly if the environment facing economic recession and political instability, organizations decline instantly without showing any smooth move. This shows that if environment is unstable and organization is unable to control the environment organizations start declining even when operating successfully.

The above models show the overall effect of external environment on OLC. If individual effect of each external factor is considered, the movement in OLC will be similar to the Greiner's Model of OLC. This model describes the organizational progress in an evolutionary manner which gets disturbed through a crisis, revolutionary in nature. When the revolutionary crisis is managed properly it again leads to a phase of smooth growth. Similarly, each external factor influences the organizational progress. Initially the external environment acts smoothly which when gets disturbed creates a phase of revolutionary crisis. Organizations which handle such crisis successfully succeed in controlling the environmental instability and start progressing in an incremental way. Economic recessions slows down the business activity, in order to handle this crisis which has disturbed the current working, organization can take steps to enhance internal efficiency. Such internal adjustments revive the evolution phase of organizational growth after a crisis. As long as an organization is able to effectively and timely respond to this crisis it will grow. According to economic cycle each boom is followed by a recession which transforms into

boom after a particular time and the process continues in a cyclic manner. This means that organization has to face economic crisis again and again after an evolution phase of growth and only those organizations manage to survive which cope with the crisis successfully. Similarly, all other external factors influence the organizational growth along OLC in a cyclic manner between growth and crisis. Figure 4 represents OLC model showing individual influence of each external factor on organizational progress.

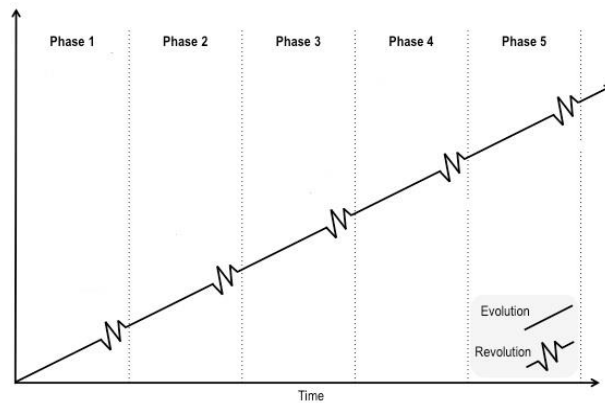


Figure 4: Individual influence of each external factor on organizational progress

Existing Greiner Model explains the crisis encountered internally. In this study the similar model is used to demonstrate the influence of external environmental factors interpedently dictating the growth pattern of the organization.

At the birth stage organization is more vulnerable to environmental forces and chances of decline are high. If at the time of birth organization is encountered with the uncontrollable environment it leads to organizational decay without reaching to any growth or maturity. This movement of OLC is demonstrated in figure 5.

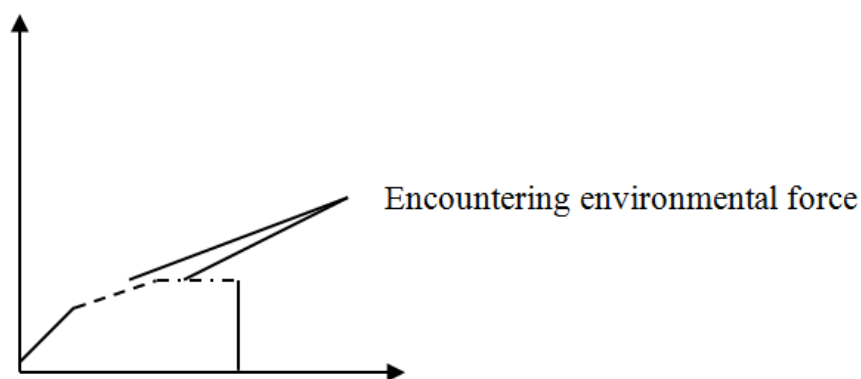


Figure 5: Organizational decline due to environmental forces

Environmental changes direct the movement of organization along OLC curve and organizational respective responses counter those environmental forces to stabilize the organizational position as represented in figure 6.

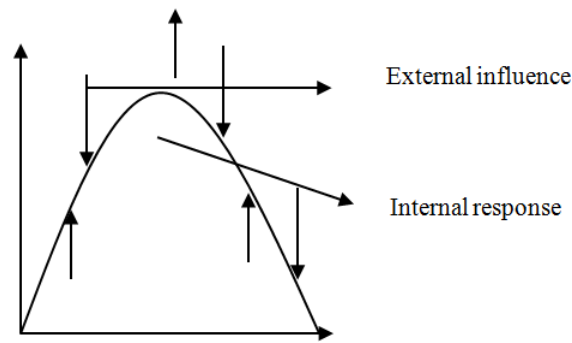


Figure 6: Organizations countering external influence

External forces provide inertia in the OLC movement, if organization grabs control over the external environment at any particular stage the movement will resume in unchanged manner. This phenomenon is described through figure 7.

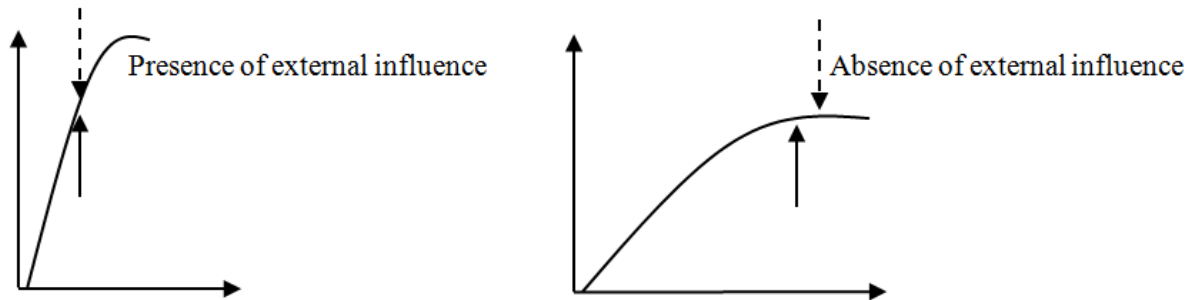


Figure 7: OLC movement in response to external environment

With this discussion proposition 1 is met that external environment alters the OLC pattern.

4.2 Influence of organizational change

Organizational evolution is also evident in the concept of organizational change which describes the transformation as a change process. This change process is either smooth/predictable or it is abrupt/massive. The smooth change is well defined and introduced stepwise therefore termed as "Incremental change", while sudden change driven by environmental factors is known as "Radical change" (Daft, 2015). Incremental change is graphically represented through a relatively flat straight line showing a bit by bit change over the time span. Comparatively, radical changes are depicted through steeper straight line representing considerable change in shorter time period. Daft (2015) has declared change as mandatory for organization's survival; stagnant and unprogressive organizations decline and ultimately disappear from the market. Environment is the main source which stimulates the change in organizations. Environment which is relatively stable and predictable initiates the incremental change in existing structure and management. The turbulent environment, over which organization has no or least control, facilitates the radical change requiring new organizational structure and management mechanism. According to Daft the environmental factors (internal and external) stimulating organizational change include technology, products/services, strategy, structure and culture. The change drivers define the type

of change to be introduced. Organizations change in response to technological breakthroughs and therefore require planned modification in their existing structures and processes. This planned change is an incremental change. Similarly products and services are modified in an incremental manner; but in order to attain competitive advantage, radical change is desired. Changes in structure and strategy are well-defined and manageable, leading towards incremental change. Cultural change can be implemented effectively if it is massive and introducing overall new values and belief systems indicating it as a radical change. The concept of organizational change indicates the life cycle in a straight line which can either be flat or steep depending on the environment to respond. Organizational decline is assumed to take place with stagnant organizations where organizational change becomes constant over a long time span.

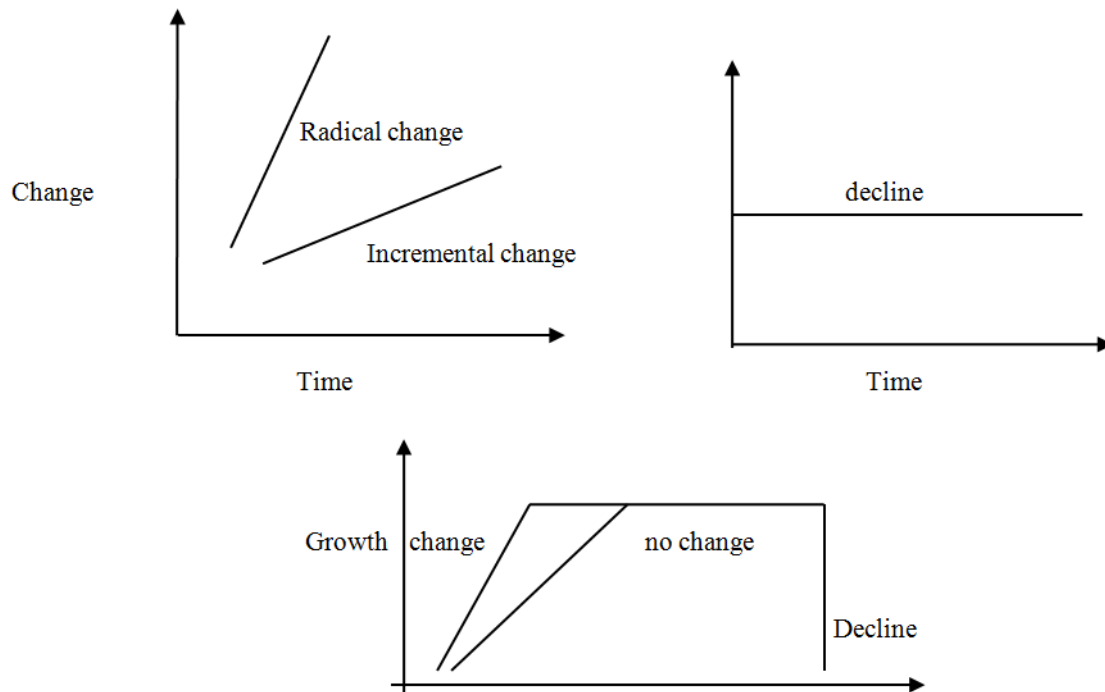


Figure 8: Organizational growth w.r.t incremental and radical change

Figure 8 shows the movement in OLC depending on the type of changes; incremental and radical changes. The movement shows that the initially the growth is upward either incremental or radical movement at a point it becomes stagnant (straight line). A gradual stagnancy leads to an organizational decline represented through a vertical line showing decline.

Organizational change is a process which operates in a stepwise manner. Change model presented by Lewin (1947) demonstrates the process of bringing change. According to this model change is initiated by disturbing the status quo labeled as stage of “unfreezing” in which existing situation is disrupted which may involve promoting the loopholes, weaknesses and inappropriateness in the existing situation. This assists in realizing the need of change. Once the exiting status is interrupted it is time to inject the required “change”. The actual transformation is occurred in this phase by introducing the new and changed mechanism, systems, processes, resources etc. When the new setup is injected it is now desired to ensure its existence so that no further action can disturb the newly introduced change. To ensure the stability in the newly developed phase, steps are taken to “refreeze” the situation by integrating the new patterns in the routine matters, cultural values, behaviors, practices etc. Frequency, with which new systems and mechanisms are practiced, indicates the sustainability of the newly introduced change. Without refreezing,

introduced change cannot be observed and get advantage of. Merging this process of change into OLC, it is suggested that change can be introduced at the decline stage of OLC, where situation is no more favorable for the organization and increased dissatisfaction simulates the need for change in the organization. At the decline stage of OLC, unfreezing is implemented to alter the existing situation which is no more favorable for any organization. When the status-quo at decline stage is unfreezed, a change as per requirement of forces (external, internal) is introduced in the organization by altering its structure, tasks, resources, processes and systems. A successful change pushes the organization from decline to revival-growth. This revival is not successful unless the introduced change is re-frozen. Therefore, revival of OLC is ensured through a sustainable change as represented through figure 9.

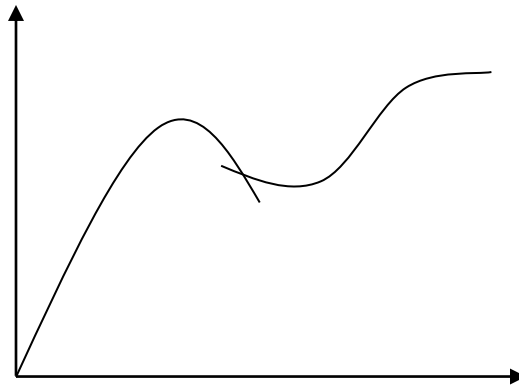


Figure 9: OLC in accordance to Lewin's Model of Change

Elaboration stage" of Greiner Model (Greiner, 1972) "involves the steps to dismantle the bureaucracy and formal structures causing red-tapism, work inefficiency and organizational stagnancy. All the steps taken to alter the existing systems and structures are implemented in the refreeze stage of Lewin's Model. Therefore, it is inferred that unfreezing takes place at the last stage of OLC of Greiner Model. OLC is a cyclic process in which organizational decline is replaced by its revival leading to another cycle of organizational life. According to change process "elaboration stage" of OLC leads to "Collectivity stage" in which goals are developed and clearly communicated among the organizational people. Task are further planned and divided among the employees mostly in informal manner. This is the phase in which actual change is introduced through new goals and work structures. Finally refreezing takes place in the "formalization stage" where instructions took shape of rules, procedures, policies so that the introduced change becomes part of routine. This shows that Lewin's model of change elaborates the organization's revival in OLC which initiated at last stage of OLC.

Similar to Lewin model, McKinsey 7-S Model also explains the change process as an integrated network of seven major elements of organization including strategy, structure, system, shared values, skills, style and staff (Tools, 2015b). This model labeled these elements as "hard" and "soft" elements. Hard elements are the ones which are developed and managed formally throughout the organization and easily detectable like organizational strategy, structure and system. Whereas, soft elements are more informal in nature, based on individual preferences and intangible enough to be observed and controlled like shared values, skills, style and staff. According to McKinsey 7-S Model a successful change can be injected only if all these elements are altered in a holistic manner in the presence of particular value system. Involvement of value system and interconnectedness of elements enhances the stability of change and new system, within the organization and improves the refreeze stage. Therefore, OLC can be explained through McKinsey 7-S Model. As it is a deliberate organizational move to bring change through

hard and soft elements in a well-organized manner, therefore, the emerged OLC in response to change will be predictable and sequential, depicting the incremental change in the organizational growth. Figure 10 shows OLC curve in response to the incremental change as guided by McKinsey 7-S Model.

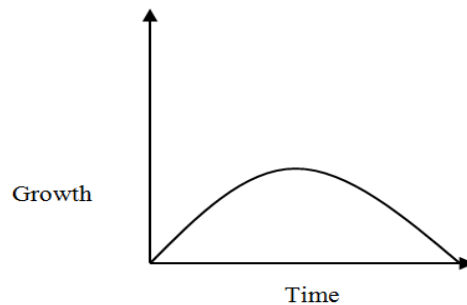


Figure 10: OLC defined by McKinsey 7-S Model depicting incremental change

Change process is also explained through Kotter's 8 Step Change Model (tools, 2015a) where change is initiated by identifying the issues needing immediate solutions. As per this model sequence of change process is indicated as; creating urgency to change, forming a powerful coalition, developing a new vision, communicating the new vision, removing the obstacles encountered by empowering people, celebrating short term wins to keep employees motivated, consolidating the change, realignment of structure, strategy, staff, policies and finally formulize the change by establishing its link with organizational success and inject it into organizational culture. All these steps of the change model describe the OLC in which organizational maturity is transformed into its growth. The need of urgency is created by forecasting the threats and opportunities which becomes essential when organization achieves maturity and act stagnantly. Once the urgency need is identified, organization starts identifying its new vision through participation of every internal stakeholder. This activity is performed by organizations at its birth stage, therefore this change re-invents the OLC at the maturity stage and organization passes through the same trajectory of traditional life cycle after reaching maturity. This change hence explains the organizational revival in a smooth and incremental way which is obvious in figure 11 of OLC:

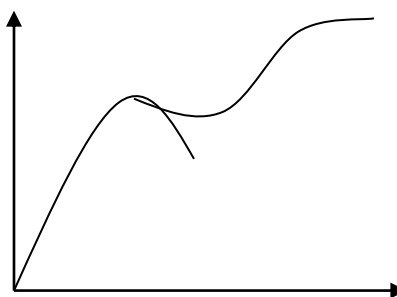


Figure 11: Organizational revival at maturity stage

According to above discussion Proposition 2 that change alters the OLC pattern is also met.

4.3 Influence of organizational strategies

In order to pursue set goals, organization develops strategies which involve structure, system,

processes, resources etc. Therefore, strategy development and implementation influence the OLC pattern by altering the internal environment of an organization. In order to incorporate the influence of strategy on OLC, different types of strategies are explained w.r.t OLC in this study. Strategies are mainly developed at three levels; corporate, business and functional level. Corporate-level strategies describe the organization's overall strategy dictating the organization's operations; therefore OLC pattern is more influenced by it and supported by the functional strategy used to implement the corporate-level strategy. Business-level strategy describes the strategy of a single business unit rather than of whole firm, therefore OLC do not solely influenced by business-level strategies rather a synergic effect of all business-level strategies is evident in OLC. SWOT Analysis is a tool used to scan the environment in order to draft strategies (Thill et al., 1993). The outcomes of SWOT analysis describe OLC in a way that internal strength and external opportunities define the organizational growth phase while threats and weaknesses describe the reasons of organizational decline. Michael Porter proposed competitive strategies for an organizational sustainability. (Daft, 2015; Thill et al., 1993) According to Porter's model organization responds to market competition either by lowering the cost or by developing differentiated products. Low-cost strategy focuses on maintaining the market share by avoiding risks and ensuring stability. While differentiation strategy where organization focuses on offered products to differentiate, pursue a substantial moves and high risks, indicating radical changes. Therefore, organizations following strategies for sustainability and risk avoidance follow a flat OLC pattern showing least change in internal systems. Main focus is on decreasing costs through internal efficiency which is attained in an incremental way. Organizations focusing on developing and promoting its differentiation among competitors follow a steeper OLC pattern due to radical changes. To develop differentiation, organization needs to focus on multiple areas in minimum time. A prolonged activity may leads to organizational losses. For timely changes of radical nature organization takes high risks and therefore high returns, which is represented through a rapid growth along OLC. "Concentration strategy" and "Diversification strategy" at corporate level demonstrates the similar attributes of cost-leadership and differentiation strategy (Thill et al., 1993). Figures 12a and 12b represent the OLC pattern in accordance to cost-leadership/concentration and differentiation/diversification strategy.

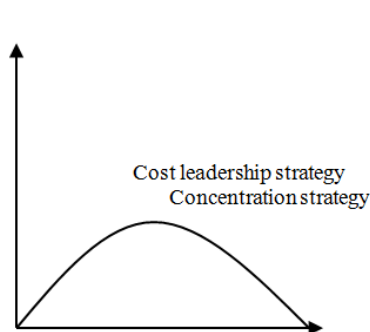


Figure 12a: Cost-leadership/concentration strategy

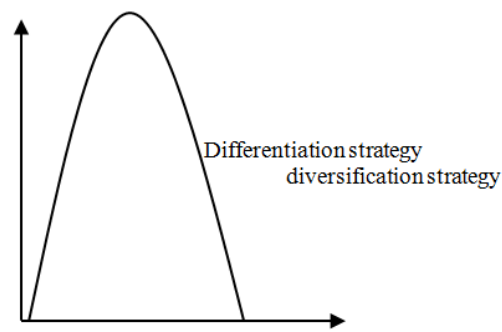


Figure 12b: Differentiation/diversification strategy

(Daft, 2015) Miles and Snow's Strategy differentiates organizations as "prospector", "defender", "analyzer" and "reactor" while responding to environmental (external) forces. Prospector organizations are more dynamic towards environment. Such organizations respond through innovation, high-level risks and radical changes and perceive its environment as instable, uncertain and ever-changing, requiring abrupt organizational moves. These characteristics of prospector define OLC's growth phase as a radical movement; represented through figure 13:

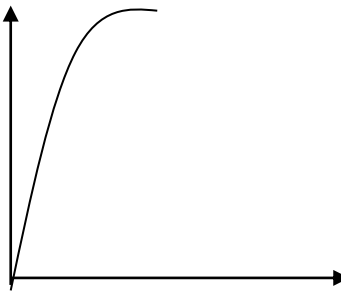


Figure 13: Prospector's growth

The other approach to deal with environmental forces is “defender” in which organization focuses on stability and try to control the environment by maintaining the market share. As focus is on ensuring stability, environment is considered as certain and stable. Here, the organizational moves are more predictable and sequential; resultantly growth is incremental as represented in figure 14:

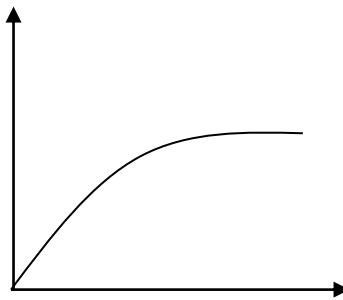


Figure 14: Defender's growth

Organization which not only stabilizes its operations but also focuses on development through continuous innovation is termed as “analyzer”. Rather than pursuing a single approach of prospector or analyzer, it offers a balanced approach to follow both contingently. Therefore, the OLC pattern of analyzer is somehow between prospector and defender as shown with solid line in figure 15:

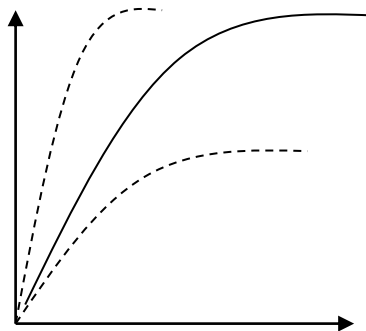


Figure 15: Analyzer's growth

The last type of organization is “Reactor” which reacts to environmental changes after they

occurred. All the above organizational types proactively respond to environmental changes while reactor organizations react after the environment's influence. In this approach the focus is to survive in this turbulent environment by any possible means to ensure its existence. This type of strategic approach does not result into organizational growth rather it elaborates the decline phase either slowing down the decline or reaching maturity/stability. The reactor strategy is short termed; long term approach to react only pushes organization to its decline showing its inability to cope with environmental changes. Therefore, organizational decline in OLC is represented through reactors. Retrenchment strategy explains the organizational move to avoid decline by reducing its operations (Thill et al., 1993), therefore reactors and retrenchment strategies both describe the organizational decline by slowing down the decline phase to regain maturity and ensure organizational survival as shown in figure 16.

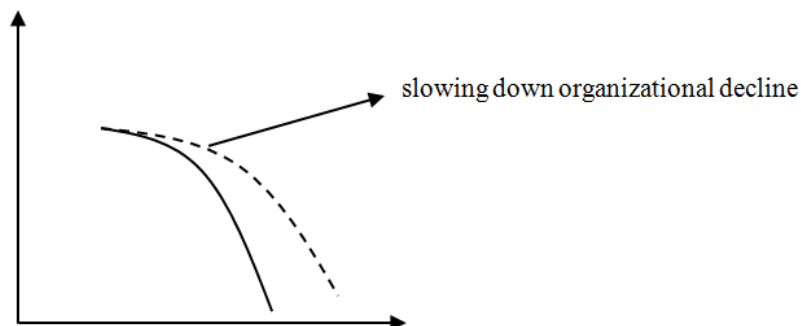


Figure 16: Reactor's growth

BCG growth matrix demonstrates the portfolio strategy of an organization in which products are categorized as stars, cash cows, question marks and dogs. Stars, question marks are the products facing rapid market growth while cash cows and dogs are the products of low-growth market. Therefore, OLC w.r.t stars and question marks show steeper OLC movement in a way that stars depict growth phase while question marks depict the decline phase requiring careful attention. Organizations dealing with cash cows and dogs are experiencing smooth OLC movement where cash cows indicate the growth phase, specifically at the maturity level while dogs indicate the organizational decline. Figure 17 represents OLC according to BCG Matrix.

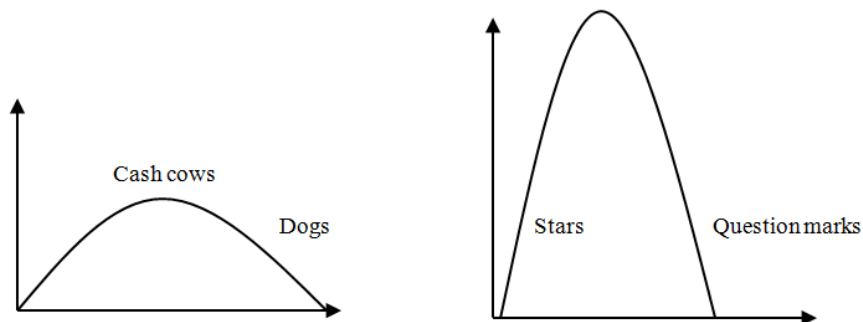


Figure 17: OLC w.r.t BCG growth matrix

The other factor that may alter the traditional model of OLC includes strategy at formation stage of an organization. If organization is emerged from a parent organization, which is well established with defined structure, adequate resources and formal mechanisms, is not initiated

from the scratch at its birth stage. Rather the birth stage is initiated from a well-established setup directing the OLC movement as shown in figure 18:

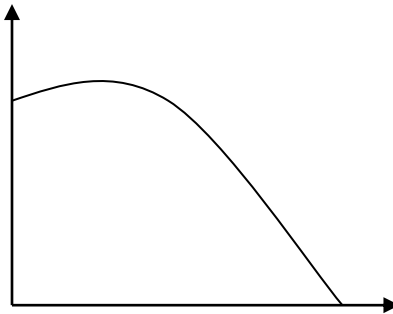


Figure 18: OLC of a subsidiary organization

Figure 18 shows an obvious variation in birth phase from traditional OLC. Here the organization does not follow the prescribed life pattern. For subsidiary organization birth stage is not as struggling, rather advantages of parent organization are imported in order to compete in the environment.

This concludes the acceptance of proposition 3 that organizational strategies influence the OLC pattern.

5. Conclusion

The above discussion elaborates the effects of environment, organizational change and strategies on life cycle pattern of organization. This study has proposed contingent models of OLC w.r.t environment, change and strategies which have altered the traditional OLC pattern in terms of its sequence, predictability and generalizability. It is evident that OLC is not a generalizable phenomenon to demonstrate every type of organization. Every organization experiences different types of circumstances, environments, issues, therefore have distinct OLC pattern. As it is no more generalizable therefore, single model of OLC depicting organizational birth, growth, maturity and decline is no more applicable. The traditional OLC model is based on the assumption that life cycle of an organization is sequential and predictable as of living beings. However, the environment in which organizations operate is not simple enough to be predicted. The turbulence in an environment pressurizes the organization to act in a way which is not predictable, because environmental forces are above the organizational control. Organization cannot control factors like customer trends, technological advancements, political instabilities and economic cycles. In order to adjust in such a complex environment organization needs to respond in particular ways. As organizations focus is to remain aligned with the environment, the organizational progress cannot be described in a well-defined manner. The uncertain and complex environment results into organizational actions which are not performed in a sequential manner as prescribed by traditional OLC model. Every decline is not followed by a maturity phase; organizations decline in the birth and growth stages as well if a significant environmental factor like government policy, political turmoil, geographical disasters etc. influences the organization. To discuss this shortcoming of traditional OLC, influence of environmental forces is analyzed in this study. OLC pattern is more generalizable, predictable and sequential in the simple and stable environment where environmental constituents are few which are relatively stable. Organization faces this situation for a very short time as mostly the environment is neither simple nor stable. Organizations considering themselves closed systems may experience simple and stable environment. While in environment with complex structure and uncertainty OLC movement is not smoother any more, rather an abrupt growth and decline is identified in OLC. All such

possibilities have altered the traditional movement of OLC and proposed new OLC model in accordance to the situations created by external environment. In the same manner change occurring within the organization alters the OLC pattern. Organizational change is either rapid or incremental; rapid changes result into deeper shifts in OLC while incremental change leads to smooth transitions. While no change means stagnant growth that identified as organizational death depicting organizational inability to cope with the change. Therefore, phase of organizational decline comes instantly at the maturity level, displaying stagnant growth (no change). The process of change is explained through models like Lewin's model of unfreezing-refreezing, McKinsey 7-S Framework and Kotter's 8-Step Model. All these models indicate the need to change at the maturity and/or decline stage and explain the organizational revival as a new life cycle. These models indicate the importance of deliberate move in a coordinated manner to inject timely changes, therefore, resulting into OLC which is more sequential, predictable and controllable. In order to induce change, organizations develop multiple strategies which direct their actions, indicating the influence of strategies on OLC. Mainly strategies are categorized as concentration and diversification. Concentration strategy focuses a single domain to plan and implement strategies while diversification takes a complex organizational model to pursue strategies. Like a simple and complex environment, these two strategies affect OLC. Concentration, cost-leadership, defenders and cash cows are the strategic moves which prefer stability, well-defined directions, gradual approach and risk avoidance which indicate the smooth trajectory of OLC. While strategies to differentiate, diversify as prospectors and analyzers through fast growing products like stars resulted into abrupt OLC movements. These strategies indicate organizational growth by highlighting the reasons embodied in strategies. Similarly there are strategies to avoid or slowing down the decline in order to survive in the market. Retrenchment strategies of reactors to innovate the products (question marks and dogs) all emphasize the decline stage focusing to slow down or stabilize the decline to avoid organizational decay. Organizational strategies define the OLC stage of an organization and indicate the possible outcomes of their adopted strategies in the long run. Moreover, the circumstances in which organizations are formed and the environment at its birth stage strongly dictates the life pattern of an organization. Organizations formed through parent organization, as a result of mergers and acquisitions do not experience the birth stage of traditional OLC, rather the initial phase starts with the existence of formal structures, adequate resources, well-developed plans and strategies. Organizations which initiate its operations from the scratch require more efforts to cope with the environmental forces. At birth stage organizations are more vulnerable to the environment and may decay at this stage, if fail to control the environment. In such situations organization does not follow a traditional OLC pattern; birth, growth, maturity and decline. Therefore, existing OLC model which is assumed to be generalizable to organizations is no more a valid model, it only explains the organizations operating in a stable environment or acting as a closed system less influenced by the external forces which is a rare case. Moreover, deliberate strategies by the organization in order to gain control on the environment indicates the smooth transition in OLC which is only possible in the well-established large corporations, but small organizations are unable to follow the traditional OLC pattern. OLC is a phenomenon which is more reactive to demonstrate the organizational actions when they occurred. This study has proposed OLC as a forecasting tool by aligning it with different types of strategies and change mechanisms which show that if these strategies continued it may lead to organizational growth, maturity or decline. Top management can predict the OLC of the respective organization through the strategies and changes they are currently pursuing. This linkage of OLC with external environment, organizational change and strategies has assisted in developing contingent models of OLC meeting the differentiating needs of the organizations, after verifying that OLC is no more a generalizable, sequential and predictable phenomenon.

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ROLE OF LEADER SECURE BASE SUPPORT ON EMPLOYEE'S PROACTIVE WORKPLACE BEHAVIOR WITH THE MEDIATION OF AUTONOMOUS MOTIVATION AT WORK AND MODERATION OF ISLAMIC WORK ETHICS: A STUDY OF BANKING SECTOR OF PAKISTAN

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Abstract:

The Leader Secure Base Support in the terms of (leader availability, encouragement and non-interference) positively supports employee's workplace behavior. The current study examines the impact of Leader Secure Base Support (availability of leader, encouragement to growth and non-interference) on proactive workplace behavior of employees with the mediation of autonomous motivation and moderation of Islamic Work Ethics. Data from 286 employees were collected from the banking sector of Pakistan through convenience sampling technique. Later the data was tested through SPSS and one-way ANOVA and different tests were performed. The results show that the leader secure base support has positive significant effect on the proactive workplace behavior of employees. Autonomous motivation also proves a significant underlying mediation between leader secure base support and proactive workplace behavior. Furthermore, the Islamic Work Ethics does not moderate the relationship of leader secure base support with autonomous motivation. It is concluded that leader secure base support is very helpful to enhance the proactive workplace behavior of employees in banking sector which leads to banking growth. The other outcomes of the leader secure base support can be discussed in the future study of IT industry.

Keywords: Leader Secure Base Support, Proactive Workplace Behavior, Autonomous Motivation, Islamic Work Ethics

1. Introduction

In today's global economy, organizations face complex environment that required rapid responses to changing external environment (Campbell, 2000). According to Griffin, Neal, and Parker (2007), employees must learn to proactively respond to environmental challenges to succeed within these increasingly uncertain operating environments. The employees can change the environment and compete with the complex and uncertain conditions through several kinds of leader's behavior in the organization with subordinates.

According to Janssen (2000), work environment can be changed by leader's support in the form of secure base leadership where the leaders are available to employees in case of any obstacle and they empower them to make little decisions at workplace which brings creativity and innovation. The employees perform accordingly when they receive positive feedback from peers and supervisors that they are moving on right track. The relationship is built between supervisor and subordinates who helps them in taking initiatives and shape their careers in advance. According to Bindl and Parker (2010), such supportive behavior of leader leads to proactive behavior which is self-initiated and future oriented actions.

Leader secure base support is “showing general support for the efforts of followers, encouraging their autonomy and empowering them to take on more responsibility” (Avolio & Bass, 1995). The leader secure base support consists of three components (availability of leader, encouragement for growth and non-interference). Leader support is very important in any organization by providing supportive environment to subordinates like “showing general support for the efforts of followers, encouraging their autonomy and empowering them to take on more responsibility” (Avolio & Bass, 1995). According to Koopman and Wierdsma (1998) when leaders support their employees by encouraging them to participate and join in decision making and support them in taking actions, they are motivated and actively participate at workplace. The employee perceived that their participation is valued and they are doing something which is worthwhile. According to Khuong and Hoang (2015), with the help of empowerment, autonomy, availability of leader, noninterference in minor actions and variety, leaders are basically enrich the subordinates job which provides then intrinsic motivation and they come up with innovative ideas which is very beneficial for the success of an organization. With the leader support, employees try to reach at maximum performance because they feel connected with the organization as they perceived that their ideas are respected by leader and they participate in decision making. In leader secure base support, the leaders show concern for the personal goal attainment of employees as well, express appreciation and support for their good performance and innovative ideas and respect their employees.

Proactive behavior at workplace is “behaviors such as searching ways to change the current circumstances, problem-solving, planning and anticipating” (Parker, Williams, & Turner, 2006). According to Bindl and Parker (2010), proactive behavior in the form of taking charge, innovative ideas, voice, future oriented actions and self-initiatives play very important role in the outcomes of an organization but these proactive behaviors are possible with the help of leader secure base support where employees feel that in case of any risk or obstacle, leader is available to help us and in case of innovative idea, leader will appreciate and encourage us. It creates a sense of motivation in employees that they are important in the organization and leader will regard them for initiatives to solve the problems in organization. According to Parker, Bindl, and Strauss (2010), it is very difficult to bring change in the organization, in the form of proactive workplace behavior where leader prefers the status quo but if the leader show supportive behavior then this issue can be resolved in the organizations. The same argument is supported by (Morrison & Phelps, 1999).

Autonomous motivation at work is “motivation regulated by personal enjoyment, interests or pleasure” (Lai, 2011). In the challenging work environment, leader support is very important as it contributes to the proactive behavior of employees at workplace. Wu and Parker (2017) conducted a research on the leader secure base support and proactive behavior at workplace, many other researcher conducted research on the same topic but the findings are different. They found the mixed results, some researchers found that there is no relationship between leader secure base support and proactive behavior and others found that there is positive relationship between them. These findings propose the need that there should be deep research on the question of whether and how leader secure base support facilitates proactive work behavior. Secondly, Wu and Parker (2017) conducted research on leader secure base support to facilitates proactive workplace behavior with the moderation of different attachment styles but this relationship is not tested before with the moderation of Islamic Work Ethics as Work ethics induce employees to be highly involved in their jobs. This gap indicates that the researcher should conduct research that how leader secure base support in the terms of (Availability, Encouragement to growth, Noninterference) facilitates the proactive behavior at workplace in the terms of (taking charge, voice, innovation, problem prevention) with the moderation of Islamic Work ethics. Third, Wu and Parker (2017) used self-efficacy as a mechanism to facilitates proactive behavior at workplace but in this research focus on the autonomous motivation at work as mechanism to facilitates the proactive behavior at work. Fourth, Wu and Parker (2017) in their research only

focused on the antecedents of proactive behavior but did not provide implications on the effectiveness of proactive behavior which will explore in this research. In their research, they suggested that supportive leadership contributes to the self-efficacy and self-concept but this research will explore the long-term implications of leader secure base support. Social exchange theory presented by Blau (1964) is used in the current research.

This study will inform the management of banking sector that how Islamic Work Ethics or religious perspective and leader support influence the attitude and behavior of employees. This study will greatly aid the organizations to improve the effectiveness of employee's productivity. This research serves as the guideline for those who are not familiar with the leader secure base support and ethical behavior at the workplace and they will understand that how important the beliefs and leader support are. It also will help the policymakers to design policies in such a way that ethics and leader support should be considered in every decision making process and operational level as well. The main purpose of this research is to find out the impact of Leader Secure Base Support on Proactive Workplace Behavior of employees with the mechanism of Autonomous Motivation and moderation of Islamic Work Ethics.

2. Literature Review

Leader Secure Base Support and Proactive Workplace Behavior

In several studies the role of supportive leader in promoting proactive workplace behavior seemed very prominent. According to Parker and Wu (2014), leader secure base support in the terms of availability (means leader is available to subordinates or employees when they feel any problem) of leader when needed develop a sense of willingness to initiate steps towards innovation and develop a sense of competency and determination that how to solve the problems within organization to increase productivity and effectiveness (Oldham & Cummings, 1996). Social exchange theory Blau (1964) also support in this argument in the terms that when leader provide support to the employees by removing risks and obstacles in the way of accomplishment of the targets and encourage them for their personal career growth then in turn the employees feel sense of liability towards organization and they proactively participate in the problem solving process and come up with greater innovative ideas to benefit organization. The employees can access help and take advice from the attached figure to deal with adverse consequences of exploration and potential obstacles and confidently master their environment by taking different kinds of initiatives like taking charge, innovations and coming up with great ideas which shows that employees are satisfied and they are proactively participating in the organizational tasks to achieve the organizational targets. Similarly, Sheldon and Elliot (1999) proposed that noninterference means at extent to which leader refrain from unnecessary interference in actions, decision makings and other activities. This provides an opportunity to the individual that he can use environment and resources regarding his/her own interest and can take routine decisions confidently due to leader's support.

H1: Leader secure base support is positively related with proactive workplace behavior. **Leader Secure Base Support and Autonomous Motivation at work**

The positive and friendly relationship of leader with employee is powerful element in employee motivation at work. It creates respectful, positive and professional attitude in employees and they enjoy work by adopting similar attitude with coworkers. It is clear that secure base leader support effect the motivational level, job satisfaction and morale of employees. According to Bussey and Bandura (1999), when employees get secure base support from leaders in the form of availability, encouragement of growth and noninterference then they cultivate the trust, self-efficacy and motivation at work because they perceive that they have competency to achieve their goals and they can perform better. According to Fisher, Nadler, and Whitcher-Alagna (1982), leader secure base support also helps the employees to believe that they are competent enough to face the

obstacles. Leader noninterference sends the signals of competency and their efforts and change in the organization in the form of new ideas will be appreciated by leader. Such kinds of believe cultivate the motivation in employees due to which they feel passionate, satisfied and perform their tasks effectively.

H2: Leader secure base support is positively related with autonomous motivation at work. Autonomous motivation at work and Proactive Workplace Behavior

According to Greguras and Diefendorff (2010), motivation at work leads individual to set challenging goals as well as devote more efforts to achieve those goals which are very important for fueling proactive behavior. No doubt sometimes it is very risky to take actions and bring innovations because if the actions become unsuccessful then it damages the reputation but the availability of leader's render these potential obstacles. The importance of autonomous motivation at work is stated by Parker et al. (2010) "when goals are imposed or prescribed via some external regulation, there is already a reason to carry out the goal—it is expected or necessary. For self-initiated goals, however, the 'reason to' element cannot be taken for granted". Zhang and Bartol (2010) also supported the argument that motivation brings proactivity at workplace.

H3: Autonomous motivation at work is positively related to proactive workplace behavior.

Leader Secure Base Support and Proactive Workplace Behavior with mediation of Autonomous Motivation at work

When leaders provide secure base support in the form of non-interference, encouragement of growth and availability then it creates a sense of motivation and self-efficacy, which in turn promotes the proactive workplace behavior in the form of problem preventions, taking charge, innovations and voice rising. According to the (Fisher et al., 1982), with the help of secure base leadership support, employee believes that their leader will not interfere in unnecessary things but will be available in any obstacle they will face due to supportive leadership behavior of the leader. The employees believe that they are able to take important daily routine decisions as they are capable. It helps them in career growth which creates self-efficacy and motivation in them that they should respond positively as leader is supporting them. In the positive response they shows proactive workplace behavior and takes charge in problem prevention. They come up with innovative ideas for the effectiveness of task completion because they believe that their efforts will be regarded and encouraged by the leader. In this way, the autonomous motivation mediates the relationship between leader secure base support and proactive workplace behavior.

H4: Autonomous motivation mediates the relationship between leader secure base support and proactive workplace behavior.

Islamic Work Ethics and Autonomous Motivation at work

Islamic Work Ethics is "the set of moral principles that distinguish what is right from what is wrong in Islamic context" (Beekun, 1997). Lipset (1990) historically proved that for the adequate performance of task, cultural norms and beliefs are very important and internal value of work lies in its performance. Chye Koh and Boo (2004) argued that the relationship between work ethics with organizational commitment, turnover, job performance and job satisfaction can better explain with the help of organizational justice theory. It explained that justice perception of employees effect the organizational performance, job performance and job satisfaction of employees. When employees perceive that their organization work ethically and control all operations through Islamic perspective then it becomes easy for them to trust it fairly and become committed and loyal.

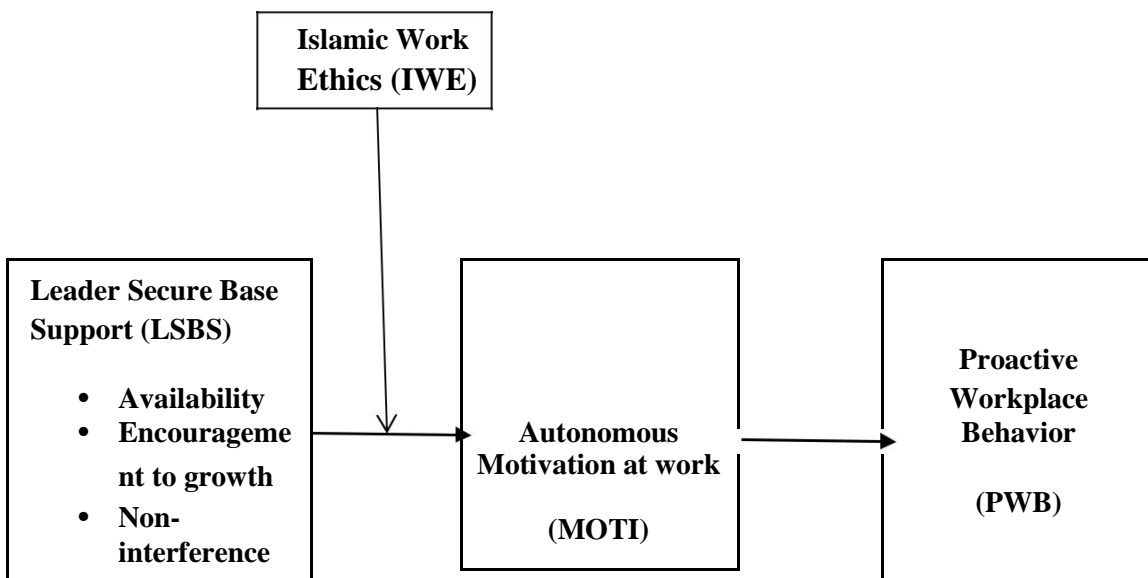
H5: Islamic Work Ethics has direct relationship with autonomous motivation at work.

Moderating role of Islamic Work Ethics between Leader Secure Base Support and Autonomous Motivation at Work

The motivation, self-efficacy and employee engagement depends upon how effectively leader becomes successful to motivate and satisfy the subordinates and how employees perceive about the leadership behavior of the leader either supportive or directive. Employee's perception is very important in nourishing their attitude and positive behaviors. Islamic Work Ethics (IWE) moderates the relationship between leader secure base support and autonomous motivation at work because when employees perceive that leader provide them support in the terms of availability, encouragement of growth, non-interference, career development, attaining personal goals, consider their interests as well and along all these things organization uses ethics in every practices either training related to career development, or performance appraisal which shows organization treat their employees fairly and in turn employees become committed and loyal towards organizations and show autonomous motivation at work.

H6: Islamic Work Ethics moderates the relationship between Leader secure base support and autonomous motivation at work such that this relationship is stronger when IWE is high.

Research Framework



3. Material And Methods

This is a causal study where impact of Leader Secure Base Support on Proactive Workplace Behavior with mediation of Autonomous Motivation at work and moderating role of Islamic Work Ethics was measured on such basis as self-reported perception involving respondents with regards to these variables. This study based on sector or field where banking sector employees are contacted on their jobs to fill the questionnaires in their natural work environment including both males and females. Cross sectional data has been collected in this study. The reason of using self-administered questionnaires as survey was primarily that in the past, most researches have used this technique for data collection in case of leader secure base support and proactive workplace behavior. Moreover, being cost effective it has advantage of less interference of researcher, hence reduces the possible bias from the respondent. This technique helps the respondents to respond in the questionnaires at ease and allows them to take their time for

justified and well thought response. The 400 questionnaires are distributed to respondents. The cover letter is also attached with questionnaire which explains the purpose of study to respondents, assured them of the strictest anonymity and confidentiality of the responses and mentioned that participation was voluntary. Each respondent reported his/her designation, gender, age, experience, marital status, and employment. The 340 questionnaires are returned back and only 286 questionnaires were completely filled and useable. Response rate was 70%.

The nine items scale of leader secure base support are is used in the current research developed by (Wu, Parker, & De Jong, 2014). The 5 point Likert scale is used in the current research ranging from 1-5 in which 1= strongly disagree, 2= disagree, 3= neutral, 4= agree and 5= strongly agree. The Cronbach's Alpha reliability of these items (leader secure base support) is .703. Twelve items are selected for Autonomous Motivation at Work from (Gagné et al., 2010). The Cronbach's Alpha reliability of these items is .806. The Proactive Behavior will be measured by eight (8) item scales incorporate all the particular variables of the proactive behavior that was used to conduct the bi-variant correlation analysis (Delery & Shaw, 2001). The Cronbach's Alpha reliability of these items is .706. The Islamic Work Ethics was measured by seventeen (17) item scales taken from (Ali, 1992). The Cronbach's alpha reliability of this scale is 0.846 which indicates the satisfactory measuring reliability.

4. Results Analysis

Table 1: Correlation Analysis

	LSBS	MOTI	IWE	PWB
LSBS	1			
MOTI	.576**	1		
IWE	0.03	.120**	1	
PWB	.166***	.407***	.140**	1

Results of correlation analysis presented in table placed above, revealed that our independent variable i.e. SBL was significantly positively correlated to our dependent variable, PAB ($r=.166^{***}$, $p\leq 0.001$). This provided initial support to hypothesis one, which is "There is a positive association between SBL and PAB". Similarly our independent variable LSBS is significantly positively correlated to our mediating variable, motivation ($r=.576^{***}$, $p\leq 0.001$). This provided initial support to hypothesis two, which is "There is a positive association between SBL and Motivation". Our mediator, motivation has been found significantly associated with PWB ($r=.407^{***}$, $p\leq 0.001$). Similarly, our moderator i.e. IWE has been found significantly correlated with mediating variable motivation ($r=.120^{***}$, $p\leq 0.001$), thus providing initial support to our hypothesis five which is "There is a positive association between IWE and Motivation". Overall correlation analysis provides initial support to all the proposed hypotheses. The correlation analysis shows that direct hypothesis are supported by the result.

Regression Analysis

Table 2: Mediation Regression Analysis

Predictors	Motivation			Proactive Behavior at Work		
	B	R ²	ΔR ²	B	R ²	ΔR ²
Main Effect: LSBS						
Step: I						
Control Variables		.082***			.037**	
Step: II						
SBL	.533***	0.389	.307***	.144**	0.064	.027**
Mediation: Motivation						
Step: I						
Control Variables					.037**	
Step: II						
Motivation				.424***	0.241	.204***
Step: III						
SBL				.012ns	0.255	.014ns

Results from regression analysis (Table above) revealed that SLBS has positive significant relationship with dependent variable i.e. PAB at $\beta=.144^{**}$ and $\Delta R^2=.027^{**}$, $p \leq .01$. Thus supporting our first hypothesis i.e. "There is a positive significant association between SBL and PAB". Further it has been revealed that SBL has positive significant relationship with mediating variable i.e. Autonomous Motivation at workplace $\beta=.533^{***}$ and $\Delta R^2=.307^{***}$, $p \leq .001$. Thus supporting our 2nd hypothesis i.e. "There is a positive significant association between SBL and motivation". Moreover, it has been found that motivation has positive significant relationship with PAB at $\beta=.242^{***}$ and $\Delta R^2=.204^{***}$, $p \leq .001$ and supported our third hypothesis i.e. "There is a positive significant relationship between motivation and PAB. At the end (step-III) mediational role of motivation between SBL and PAB has been analyzed and found insignificant $\beta=.012ns$ and $\Delta R^2=.014ns$, $p > .05$. Which support our hypothesis four which is "Motivation mediates the relationship between LSBS and PWB". The mediation analysis shows that the direct hypothesis and mediation effect are supported by the result.

Moderation Regression Analysis

Table 3: Moderating Regression Analysis

Predictor	Motivation		
	B	R ²	ΔR ²
Main Effect: LSBS			
Step I:			
Control Variables		.082***	
Step II:			
SBL	.535***		
IWE	-.001ns	.393	.310***
Step III:			
SBL x IWE	-.154ns	.398	.005ns

Cohen et al., (2013) suggested that if the β value of interaction term is significant, moderation will be supported or otherwise. Results revealed that IWE has direct influence on motivation as the $\beta = -.001ns$ and $\Delta R^2 = .310ns$, $p > .05$, which do not fall in acceptable range. Furthermore its interaction term with SBL has been also found non-significant at $\beta = .154ns$ and $\Delta R^2 = .005ns$, $p > .05$ (which is again unacceptable range). On the basis of these moderation analysis results it has been concluded that our hypotheses five and six which are "Islamic Work Ethics has direct relationship with Follower's motivation at work." and "Islamic Work Ethics moderates the relationship between Leader secure base support and autonomous motivation at work" are not being supported by our collected data.

5. Discussion

The above results of correlation show that the first hypothesis (Leader secure base support is positively related with proactive workplace behavior) is supported by the result as ($r = .166^{***}$, $p \leq 0.001$). According to Rousseau and Greller (1994); Bhatnagar (2007); Whitener (2001); leaders play very important role in shaping the attitude, cognition and behavior of employees. When leader provides support to their employees in the terms of encouragement to come up with new innovative ideas, availability of leader when employees are in any obstacle and non-interference create a comfortable environment for the employees where they can learn, share knowledge and proactively participate in decision making and problem solving activities at workplace. The employees feel very obligatory towards leader and they show positive behavior in the terms of proactive workplace behavior which is very helpful for the organizational growth.

The second hypothesis (Leader secure base support is positively related with autonomous motivation at work) is also supported by the correlation result ($r = .576^{***}$, $p \leq 0.001$). The past studies are also supporting the above result. The positive and friendly relationship of leader with employee is powerful element in employee motivation at work. It creates respectful, positive and professional attitude in employees and they enjoy work by adopting similar attitude with coworkers. It is clear that secure base leader support effect the motivational level, job satisfaction and morale of employees.

The third hypothesis (Autonomous motivation at work is positively related to proactive workplace behavior) which is supported by the above correlation result ($r = .407^{***}$, $p \leq 0.001$). According to Greguras and Diefendorff (2010), motivation at work leads individual to set challenging goals as well as devote more efforts to achieve that goals which is very important for fueling proactive behavior. No doubt sometimes it is very risky to take actions and bring innovations because if the actions become unsuccessful then it damages the reputation but the availability of leader render these potential obstacles. Zhang and Bartol (2010) also supported the argument that motivation brings proactivity at workplace.

The hypothesis four (Autonomous motivation mediates the relationship between leader secure base support and proactive workplace behavior) is also supported by the above results ($\beta = .012$, $R^2 = .255$ and $\Delta R^2 = .014$, $p > 0.05$). When leaders provide secure base support in the form of non-interference, encouragement of growth and availability then it creates a sense of motivation and self-efficacy which in turn promotes the proactive workplace behavior in the form of problem prevention, taking charge, innovations and voice. According to the (Fisher et al., 1982), with the help of secure base leadership support, employee believe that their leader will not interfere in unnecessary things but will be available in any obstacle they will face due to supportive leadership behavior of the leader. The employees believe that they are able to take important daily routine decisions as they are capable. It helps them in career growth which creates them self-efficacy and motivation that they should respond positively as leader is supporting them.

Above result shows that the fifth hypothesis (Islamic Work Ethics has direct relationship with autonomous motivation at work) is not supported by the results but there are many past studies that show the significant results. Similarly, the sixth hypothesis (Islamic Work Ethics moderates the relationship between Leader secure base support and autonomous motivation at work) is also

not supported by the results. As this study based on the field study of banking sector where both conventional and Islamic banks are taken as population for data collection and demographics show that the 67% data is collected from the conventional banks and only 37% data is collected from the Islamic banks. It can be said that the major portion of the data is collected from the conventional banks. The ethical practices and Islamic Work Ethics are considered in Islamic banking where every business transactions are held according to the Islamic Shariah but in the conventional banking the interest is considered the basic source of income. Their basic purpose is to facilitate general public by providing economic facility and to earn profit by charging interest by providing lending facility. If they considered the Islamic Work Ethics or Islamic rules to run their business operations according to Islamic Shariah then it is not possible to consider the factor of interest which is the source of income. That is the reason the Islamic Work Ethics has no significant relationship with the autonomous motivation and did not moderate the relationship because the employees do not have much concerned with the Islamic practices.

Managerial Implications

The current study is very important in leadership point of view and it has both theoretical as well as practical implication. The current study has practical implications along with the theoretical implications because this study provides the important predictor in the form of leader secure base support which has importance in banking sector along with other sectors like IT sector, Service sector and many others. The banking sector can take this research as guide to design the policies regarding the leadership that how leaders can promote the proactive behavior of employees by providing them secure base support from leader. The top management of the banking sectors can implement the leader secure base support to facilitates the proactive behavior of employees to solve the different issues because Pakistan have high power distance economy where the leaders are focusing on the implementation of formal relationship with subordinates but the innovations, creativity and proactive approach of the employees cannot be originated without providing them leader secure support. The proactive approach of the employees is needed in all levels of the organization to survive in the competitive environment where every organization is working to become globalize. The proactive behavior of employees can only be promoted through positive and secure base supportive leadership because leader has the authoritative position to shape the attitude and behavior of employees towards work and organization.

The future study can be conducted in any other industry with different mechanism and moderation effect. There is a need to take large sample size and the study should be based on longitudinal design. In future study, the demographics of the leader can also be considered to check their impact on the follower's behavior. The psychological empowerment can be taken as a mechanism to facilitate the proactive behavior of employees through leader secure base support.

Conclusion

In the present study the impact of leader secure base support on proactive behavior of employees is checked in the banking sector of Pakistan. The three dimensions; availability, encouragement to growth and non-interference are considered to evaluate the leadership behavior in the form of leader secure base support because when employees perceive that leader is always available in every obstacle and encourages them for their career development by empowering them in decision making activities and avoids unnecessary interference in the routine activities then employees feel motivated and they engaged themselves in work activities by showing proactive behavior in the form of innovation, problem prevention and coming up with new ideas. The leadership support is very important in shaping the attitude and behavior of employees in all levels of the organization. When leader show supportive behavior in the terms of encouragement for growth, leader availability at the time of need and non-interference, it provide the career development opportunities to employees which is the source of

autonomous motivation at work setting to show proactive behavior to solve problems. The employees feel self-esteem, self-efficacy, autonomous motivation, job responsibility and they show proactive behavior in the terms of problem solving.

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EQUANIMITY, A SOLUTION TO INVESTORS' BEHAVIORAL BIASES

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Abstract

The focus of behavioral finance is to explore the reasons of investor's irrational investment behavior that may leads towards losses and inability of investor's aim to maximize wealth. These biases are outcome of the way people collect and process information (cognitive and social biases respectively) while taking investment decisions. Investment world is not free of volatilities, uncertainties and producing unexpected outcomes for the investors; in such a situation investors need an approach that can help them to accept the investment outcomes without having any bad feelings about their losses. Decisions involving emotional or cognitive biases may not produce desired and may lead towards undesired results. Considering the volatile nature of financial markets, today's investor needs more vigilant, clarity and control over emotions that can be attained through even minded mental state termed as equanimity. Equanimity is considered an important characteristic for successful investment, a prized quality for investors to keep themselves calm during phase of low returns and even in negative returns. Although all behavioral biases are not controllable but equanimity can address many of these. Using equanimity in investment provides a right investment strategy, a key to success and its impact can be seen in long term success of the investment decisions. In existing literature on investor behavior, and studies on behavioral finance has not addressed the significance of equanimity for the investors; considering this gap the study aims to explore this concept. The study will propose a comprehensive definition of equanimity as an important investment skill; and the factors that can stimulate equanimity in investors' behavior. Moreover, the study will also suggest implications of this characteristic for rational decision making that will help investors to be a market winner.

Keywords: Equanimity, Behavioral biases, investment decision, Emotional and cognitive biases

1. Introduction

Behavioral finance mainly addresses investment behavior and the reasons of why investors take irrational decisions that can produce undesired results for them (Aziz & Khan, 2016; H. Shefrin, 2005). Investor behavior in financial markets and their decision making is mainly explained by efficient market hypothesis, modern behavioral portfolio theory and prospect theory. There theories presented two perspective one assuming markets as efficient, investors as rational decision makers (ASAD, KHAN, & FAIZ, 2018; Fabozzi, Gupta, & Markowitz, 2002; Fama, 1965; H. Shefrin, 2005; Hersh Shefrin, 2002) and the other contrary view assumes that investors are not rational in the financial markets and they follow their emotions while taking investment

decisions(Tversky & Kahneman, 1992). Factors affecting investment decision making are mainly categorized into four classes based on emotional, social, economic and demographic(Saleem, Usman, Haq, & Ahmed, 2018; Shafi, 2014). These behavioral biases cause market anomalies (ASAD et al., 2018; Nigam, Srivastava, & Banwet, 2018; Saleem et al., 2018) and lead towards market inefficiencies. The control of these behavioral biases is significant for efficient working of financial markets. Some of these behavioral biases can be either controlled or reduced through cultivating an ability to accept the outcome with an attitude of not avoiding or minimizing the unpleasant experience. This ability or mental state is termed as equanimity. Equanimity is defined as even minded mental state, an attitude of openness(McRae, 2016; Nauriyal, Drummond, & Lal, 2006; Smith, V. Richards, & M. Shelton, 2016); acceptance cultivated purposefully(Hadash, Segev, Tanay, Goldstein, & Bernstein, 2016), an impartiality level, tendency of one's mind to disposition all experiences irrespective of valence attached with them, a strongest form of balanced reaction towards events(Hersh Shefrin & Statman, 1985; Zeng, Oei, Ye, & Liu, 2015). Equanimity can be proved as an ability to keep the investors' mind calm and in an even state during uneven situations. (McRae, 2016; Nauriyal et al., 2006; Zeng et al., 2015). Considering the emotional and cognitive behavioral biases explained by prospect theory this study has explored the role of equanimity as an important ability to overcome behavioral biases. The study aims to propose equanimity as mediating factor in investment decision making involving behavioral biases. Further the implications of cultivating equanimity an individual ability for rational decision making has also been discussed.

1.1 Objectives of the Study:

1. To study the concept of equanimity in the context of investment decision making
2. To identify the role of equanimity to control behavior biases
3. To provide bases for future research on role of equanimity in decision making

1.1 Significance:

This study aims to explore the concept of equanimity in context of investment decision making and further proposing its role as moderating factor in relationship of behavioral biases and rational decision making. Investors are bonded by available information, market fluctuations and their emotional and cognitive factors while taking investment decisions. This study will help investors to understand the role cultivating equanimity as an ability to attain a state of mind with acceptance attitude towards events irrespective of the outcomes. It will also help investors to minimize the impact behavioral biases on rational decision making. The attainment of equanimity is significant for investor because investing with emotional and cognitive biases may lead towards inappropriate selection of investment or even wrong buying and selling decisions. The proposed conceptual model will also guide investors how they can decouple desire from hedonic tone of their anticipated or current experience.

2. Literature review:

Investor behavior determines the behavior of stock market and the pricing of assets and securities(Ahmad, Ibrahim, & Tuyon, 2017) and this behavior is directed by emotions and cognition of individuals. Behavioral finance assumes investors as normal but irrational decision makers(Kahneman, 1979; Tversky & Kahneman, 1992; Tversky, Kahneman, Kahneman, & Tversky, 2014) in contrast to efficient market hypothesis and modern portfolio theory of investment (Fama, 1965; Malkiel & Fama, 1970; H. Shefrin, 2005). Proponents of behavioral finance believe that market anomalies are the result of emotional and cognitive biases (overconfidence, loss aversion, anchoring, representative bias, information bias etc.)(ASAD et al., 2018) Rational investment decision making is critical to maximize profit, the ultimate aim of the investment. Investors are bounded by non-availability of information, cognitive and emotional

biases that may leads towards irrational decision making(Mahina, Muturi, & Florence, 2017) which can be controlled if investors overcome their emotional and cognitive biases(Gross & Thompson, 2006). Investors' experinece either past or present defines the reaction of investors in response to market sitimuli. The inability of investors' to evaluate the available information and investment options leads towards ignorance, over-weightage or under-weightage of investment options (Kahneman & Tversky, 1979). These biases are more prominent in case of losses, initiating loss aversion behavior of the investors (Rehan & Umer, 2017); un-even mental stage of investor can be balanced through equanimity that allows investors to disposition the tendency toward previous experiences regardless of their outcome and affective valence(Hadash et al., 2016; Zeng et al., 2015). This quality of individual behavior can help investors in time of market noise by enabling them to create balance towards outcomes and their sentiments for outcomes(Smith et al., 2016).

An equanimous investor may achieve a level of impartiality by managing unexpected outcomes without involvement of self-judgments and aversion of a specific outcome(Seo & Barrett, 2007). Equanimity once achieved by an individual can create a solid and flexible state of mind where investor can detach his/her emotions whatever the outcome is(Hadash et al., 2016; McRae, 2016; Wallace, 2006). The attainment of equanimity is significant for investor because investing with emotional and cognitive biases may lead towards inappropriate selection of investment or even wrong buying and selling decisions.

This study will help understanding concept of equanimity in context of investment decision making, its identification as individual behavior and understanding its role in moderating relationship between behavioral biases and investment decisions. Investors having equanimity in their reactions towards investment outcomes may have better approach of decision making in volatile markets. Investment world is not free of volatilities and uncertainties producing unexpected outcomes for the investors and in such situation, equanimity help investors to accept the investment outcomes without having any bad feelings about their losses(Gross, 1998; Hadash et al., 2016). Decisions taken with equanimity will also help investors to be compatible in such competitive and rapidly changing economic systems. Moreover, selecting a portfolio with clarity and equanimity is important because it assists investors in making wise decisions in the face of adversity and market noise.

2.1 How equanimity helps in avoiding behavioral biases?

Equanimity is a state of mind neither to avoid unwanted event not to stick with a wanted result(Olendzki, 2006); it is an attitude of accepting an unpleasant or pleasant event without any reflexive action(Desbordes et al., 2015; Hadash et al., 2016). Equanimity in investment decisions can be helpful in showing an attitude of intentional acceptance of every type of outcome and the reduction in the reactivity towards bad situations (Hadash et al., 2016); investors reflecting equanimity in their decisions can overcome loss aversion the survivors of behavioral traps. Equanimity also cultivates an attitude of not avoiding or minimizing the unpleasant experience as an outcome of experiential avoidance. Reduction in the automatic reactivity towards future and current experiences is also an outcome of practicing equanimity; this reduction in automatic reactivity in response to mental or emotional experiences may release investors from trap of intentional wanting and un-wanting of an event. A mindful investor practice equanimity during phases of uncertainty and loss and avoid rash decisions without considering whole situation(Gonzalez & Byron, 2010a, 2010b). Mindfulness allows investors to react calmly in situations of crunch and even in boom of the market. Investors fall prey of behavioral biases and take irrational investment decisions when they are not able to control and manage their emotions arising in a stressed or relaxed situation(Gonzalez & Byron, 2010a; McRae, 2016). Considering the available information and the emotional biases; investor take self-satisficing decisions rather than rational ones(Kahneman, 1979). Investors show behavioral biases in their decision making because mostly investors follow their emotions; experiences, attachments and market trend

leading towards irrational decisions (Mahina et al., 2017). Practicing equanimity can help in losing and untying the knots of behavioral biases (McRae, 2016) leading towards a sensible investment choice and constructing a profitable portfolio. In the uncertain and continuously fluctuating financial markets; this ability to accept the pleasant and unpleasant situations keeps the investors away from a hasty reaction or the avoiding behavior towards a certain event.

3. Methodology:

Addressing the main objective of the study (defining equanimity as an investment skill) needs an in depth analysis of investor behavior while taking investment decisions. As it is a new domain of behavioral finance, therefore, this study has conceptually proposed a model for equanimity with respect to investment decisions. For this purpose existing literature on equanimity, behavioral biases, investment decisions and prospect theory is consulted. Research studies are consulted without defining any time frame, rather openly accessed literature is referred in this study to propose the model. The text of the referred studies is analyzed through Hermeneutic approach.

4. Propositions:

Considering the definition of equanimity, its role in changing the attitude of individuals in the literature following propositions has been identified:

4.1. Equanimity can reduce disposition effect (a behavioral bias in investment decision making process)

Shefrin and Statman (1985) explained disposition effect as an individual behavior in which investor sells profitable or healthy securities and hold loss bearing or unhealthy securities. This is also known as loss aversion and prospect theory, regret avoidance and mental accounting (Hersh Shefrin, 2002; Hersh Shefrin & Statman, 1985). Under this effect investors are showing the behavior of sticking to one act (wanted event with a profitable or desired outcome) and avoiding the other (unwanted with loss or undesirable outcome). Based on the definition of Olenzki 2006 equanimity can help investors in stimulating a state of mind in which individuals neither avoid unwanted event nor stick with a wanted result. Practicing equanimity in such situations will help investors to think other way round and they can convert their losses into profits by holding the profitable securities and selling the losers (Odean 1998). Equanimity can act as mediator in reducing the disposition effect by decoupling the desire from hedonic tone of anticipated or current experience (Hadaash et al., 2016).

4.2. Equanimity can control Self-serving bias

Another cognitive bias among investors is self-serving bias that is characterized with investors' attitude of taking credit of positive actions and putting negative actions to external factors (Bradley, 1978; Heider, 2013; Mahina et al., 2017; Mishra & Metilda, 2015). Self-serving bias leads towards overconfident behavior of the investors in financial markets. Investors' behavior of blaming external factors for negative outcomes and actions and taking credit of positive actions also create market anomalies (Odean, 1998; Schneider, Hastorf, & Ellsworth, 1979). This self-serving or self-attribution bias is because of limited information processing and it also leads towards overconfident behavior of investors (Mishra & Metilda, 2015). Investors who fall prey of self-attribution bias misconceive their capabilities and it also hinders their ability to consider past experiences in investment decision making (Kafayat, 2014). This inequitable behavior of investors towards pleasant and unpleasant outcomes can force investors to take irrational decisions. Creating equity among the two (wanted and unwanted event) is important for the efficient working of financial market and to achieve the ultimate objective of investment i.e. profit maximization.

Here again decoupling model (Hadaash et al., 2016) can help in creating equity in taking credit of

wanted and unwanted events and outcomes. Under this model equanimity can be manifested through developing an intentional attitude of acceptance toward experience regardless of its hedonic tone (pleasant or unpleasant); once this intentional attitude is stimulated among the investors they can be able to control this self-serving bias of taking credit of only pleasant events and outcomes. So it is proposed that equanimity can help in reducing the self-serving bias among investors.

4.3. Equanimity can reduce over-optimism bias

Over-optimism bias occurs when investors overestimate the frequency of a favorable or pleasant outcome and underestimate the unpleasant or unwanted outcome (Sharot, 2011; H. Shefrin, 2005). This occurs when investors are giving more weightage to past experience (Kafayat, 2014; Mahina et al., 2017). Having this bias in investment decisions, investors excessively trade and to believe that they are experiencing negative events less as compared to others (Mahina et al., 2017; Weinstein, 1980). This believes lead then to be over-optimistic about certain decisions and the underestimation of others. The victims of this bias assign high probabilities to positive outcomes than negative and are stick to following the past experience that has caused favorable results (Kafayat, 2014). The over or under weight assigned to favorable and unfavorable events cause market anomalies and the ultimate result is irrational decision making in the financial markets. Equanimity can act as a solution to this bias also by developing an intentional attitude of acceptance toward experience regardless of its hedonic tone (pleasant or unpleasant), as well as by reducing the automatic reactivity to the hedonic tone of current or past experience (Hadaash et al., 2016). So it can be proposed that cultivating equanimity can reduce the over-optimist bias and can help investors in achieving equity in assigning weights to positive and negative events.

Prospect theory (Kahneman & Tversky, 1979) also supported the existence of biases in the investmnet decision making i.e. investors assign weights to an event on the basis of likelihood of an event. These assigned weights are affcted by ambiguities and considerations. Vaguness and ambiguities leads towards subcertanity of an event or assigning overweight to others. Certainty effect contributes towards loss aversion behavior of the investors. Investors correct behavioral anomaies on realizing the inconsistency of their dcisions but in most of cases investors are unable to realize (Kahneman & Tversky, 1979) this realization can be initiated with the help of eqanimity.

Based on these propositions following conceptual model has been proposed:

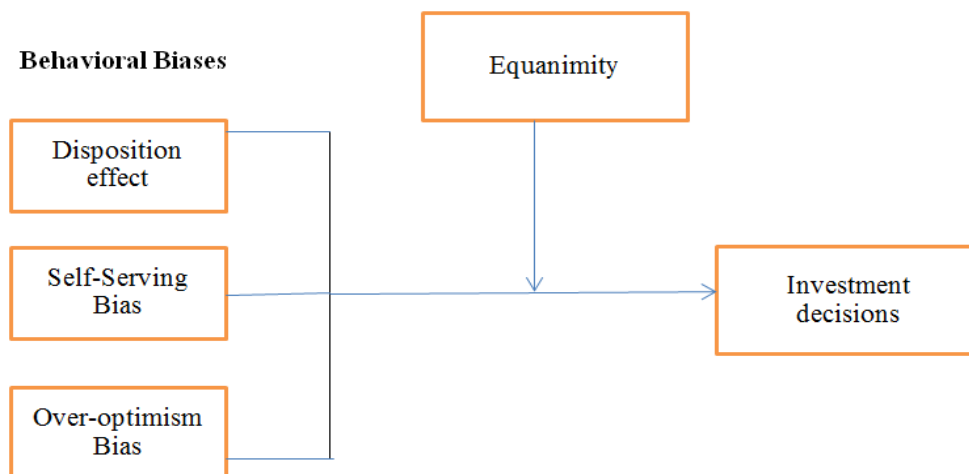


Figure1: Conceptual Model: Equanimity moderating the effect of behavioral biases on investment decisions

5. Conclusion:

Financial markets are not free of uncertainties; price bubbles and market fluctuations dominate investors' decisions and leads towards hasty and irrational investment choices. Investors are not rational enough to take optimized decisions that can earn abnormal returns for the investors. The availability of incomplete information, market noises and emotions attached with different situations force investors to take self-satisficing rather than optimal and rational decisions. Investment decisions are not free of behavioral biases because of investors' own rationality about the choice of an investment option. These behavioral biases if not controlled or reduced they can not only produce unwanted results for the inventors but they can also hinder the efficient working of financial markets. Market anomalies resulting from these behavioral biases if prolong can affect functioning of financial markets and the investment decisions of investors as whole. One solution to these behavioral biases can be the achievement of such a state of mind where investors are mindful and cultivate an ability of acceptance about every kind of outcome. This state of mind is named as equanimity; an even minded mental state, an attitude of openness and acceptance cultivated intentionally to disposition all experiences irrespective of valence attached with them. Considering the importance of this ability in investment decision making and controlling the behavioral bias; this study has proposed equanimity as a solution to reduce three behavioral biases i.e. disposition effect, self-serving bias and over-optimism bias. Literature on these behavioral biases has proved a negative relation between investment decisions and these three biases. This negative relationship can be improved by cultivating equanimity as ability among the investors. To propose the role of equanimity in moderating the impact of behavioral biases on rational decision making; the decoupling model of equanimity has been used. This model explains the role of equanimity in decoupling the desire of outcome from the hedonic tone investors' anticipated or current experience. This model also explains the role of equanimity in reducing automatic reactivity towards outcome of the experience. Based on proposed model of Hadash et al. (2016) three propositions have been suggested. The propositions of study can help investors to understand the role of equanimity in minimizing the impact of behavioral biases on investment decisions. The cultivation of equanimity through mindfulness can also help investors to better perform in the good as well as bad situations. This can also save investors from hasty decisions and other behavioral traps that can lead towards loss of money. Future research can be conducted to test the role of equanimity in moderating the relationship between various behavioral biases and rational decision making.

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IMPLEMENTATION OF FAMA AND FRENCH FIVE FACTOR MODEL: A CASE OF PAKISTAN STOCK EXCHANGE

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Abstract

The continuous development in the asset pricing is providing new empirical models and techniques to check the relationship between risk and return on stocks but it might be challenging to pick one model to use for the users. Investors and investment portfolio managers are always in search of such financial models that may quantify risk in an appropriate manner and can translate the risk into expected returns on equity investment options. Different models and techniques have been applied by the researchers and analysts from time to time to analyze this relationship; among them CAPM is the most famous and widely used technique. Later on, Fama and French (1992) extended the CAPM by adding two more factors in it; Size and Value. Subsequently, Fama and French (2016) introduced Five-Factors Pricing Model (FF5F); which is a development of the earlier models, by adding two new factors; investment level and profitability position. This study is intended to investigate whether a Fama and French five factor asset pricing model (FF5F) can explain average returns of stocks on Pakistan stock exchange (PSX) in a better way than the three factor model (FF3F) and CAPM or there is a need to include more factors in it. The study will be conducted on a sample of all listed non-financial firms' stock with persistent trading on the PSX by constructing portfolios based upon basic factors identified by Fama and French (1995). The analysis will be performed by regression analysis. This study will be helpful to the investors, investment advisers and fund managers to entrench their operating strategies and methodologies by adding the expounding power of size, beta, and value along with the momentum of portfolio returns to allow them to devise some trading policies to minimize losses and to maximize returns. In addition to this, policy makers can ensure that some proper measures are already in place to improve market liquidity and viability to improve the breadth and depth of the whole market.

Keywords: CAPM, Risk, Return, Beta, Size, Value, Investment, Profitability

1. Introduction

The relationship between risk and return has been a topic for discussion since 1960s. The main purpose of a portfolio manager is to create a balance in opted securities in terms of risks and returns. Portfolio theory of Markowitz (1959) was the first theory in determination of risk and return relationship of stocks. According to this theory the risk of the securities can be calculated with mean and variance of returns. Later on, the work of Markowitz has been extended by Sharpe (1964) and Lintner (1975) through the presentation of financial model which is currently being used by the financial managers known as Capital Asset Pricing Model (CAPM). It is found that through this model around 70% of actual returns of the portfolio are explained by the market risk

factor which has been identified by CAPM. Jensen, Black, and Scholes (1972) also noticed a linear relationship between systematic risk (beta) and expected return for the assets, particularly in stocks. Risk taking investors usually expect to receive a high rate of return along with risk free rate as compensation to the additional risk which they are ready to entail in securities (Lintner, 1965; Sharpe, 1964). The major drawback of CAPM is that it only discusses one factor of systematic risk but there are numerous other factors that are that may collectively affect the stock return variations (Banz, 1981; Rosenberg, Kenneth, & Ronald, 1985).

Many more explanations and theories came afterward, yet, none of the existing asset pricing models have become truly fundamental, as investors keep finding certain strategies that offer superior performance to one predicted by the model. But with the passage of time, different methods and models of pricing securities and thereby determining expected returns on capital investments has been improved and developed over the years. In this regard, Fama and French (1995) pointed out the factors which may influence the stock returns. According to their findings, small companies and value stocks tends to outperform big companies and growth oriented stocks so consequently they proposed a three factor model by incorporating size, book/market equity (value) into beta model.

Researchers discussed in detail that this three factor model of Fama and French is able to predict the anomalies in much better way than CAPM. But it is not a complete model and there are many more factors that should be accounted for while discussing the pricing strategies of stocks. So to tackle the insufficiency of the existing models for asset pricing, Fama and French (2016) presented the reviewed version of three factor model. They proposed operational profitability and investment along with the three already explored factors to capture the variations in assets' returns. But again this model has been criticized for describing the trends of long term securities only and failing to identify the effects of these factors on small stocks. It is proved now by researchers that F5-FF model is best to explain the variations in stock returns as compared to single factor and three factor models presented by Sharpe (1964) and Fama and French (1995).

But this model is again criticized for not catering all the market anomalies that may affect the stock variations. Recently a new factor has been introduced by Roy and Shijin (2018) as an important determinant of market variability to estimate the expected returns of stocks in addition to all factors that have been discussed by Fama and French. This factor is human Capital and they considered it as a sixth factor which can enhance the predictability of the stock return in a much better way.

There are set accounting standards and regulations which are required to be followed by the companies while formulating the financial statements (Healy & Palepu, 2001). These standards required to show some of the intangible assets in the financial statements like goodwill, patents, and other legal rights under some strict recognition criteria. Whereas; brands, knowledge, R&D, human capital and customer relationships are also the intangible assets but there are no certain parameters to show these in financial statements (Collins, Maydew, & Weiss, 1997).

This study will compare the F5-FF model and six factor assets pricing models. In this study it will also be proposed that whether or not the other dimensions of intellectual capital (structural capital and relational capital) will contribute to the determination of asset pricing models. This study is specifically catering the stock behavior of non –financial sector of Pakistan stock exchange. This is the first study in Pakistan which is going to test the six factor model in a growing economy. It will expand the literature by adding robustness to the existing model proposed by Fama and French (2016)) and Roy and Shijin (2018) in case of an emerging economy and will also test the six factor asset pricing model by including related dimensions of intellectual capital in it.

1.1 Research Objective

The study is intended to identify the best model which can predict more accurate stock returns in an emerging market like Pakistan.

1.2 Research Question

How do CAPM, Fama-French and Roy-Shijin proposed models perform empirically and which of these perfectly capture the market anomalies according to the models?

1.3 Significance of Study

In this study, the investigation will focus on whether the empirical findings found on the USA stock markets for the five-factor 5F-FF model (Fama & French, 2015) and six factor model (Roy & Shijin, 2018) also can be found on the Pakistan stock exchange. The study will also contribute to the literature that some more dimensions of market factors can be incorporated in it or not. This study will be helpful to the investors, investment advisers and fund managers to entrench their operating strategies and methodologies by adding the explanatory power of size, beta, and value along with the momentum of portfolio returns to allow them to devise some trading policies to minimize losses and to maximize returns. In addition to this, policy makers can ensure that some proper measures are already in place to improve market liquidity and viability to improve the breadth and depth of the whole market.

2. Literature Review

From the beginning of the development of theoretical foundations of the Capital Asset Pricing Model, researchers started to look for the empirical proofs of the developed theory. Sharpe (1964) worked on the theory presented by Markowitz and eventually he proposed the first model (CAPM) for evaluation of securities (stocks) in terms of risk and return. This model was based upon a factor which is an indicator of systematic risk which is used to measure the sensitivity of stocks' return to the variations in market return. Following is the equation of CAPM:

$$E(r) = E(R) = R_f + \beta_1 (R_m - R_f)$$

However, beta was not the only factor influencing realized returns of a security or a portfolio, so instead of proving it fruitful researchers persistently found the cases where CAPM failed to explain. Ball (1978) pointed out the relationship between stock prices and public announcements regarding company's earnings. Particularly, he presented the evidence that after the announcement, securities are priced in such a way that they yield systematic excess returns. Basu (1977) doubted the efficient market hypothesis and showed empirically that portfolios with low P/E ratio yielded more as compared to CAPM predicted returns even after the adjustment for risk. Companies' specific betas also do not fully account for difference in return between small and large firms (Banz, 1981; Reinganum, 1981). Yet, some other researchers, such as Roll (1981) attributed this not to CAPM failure, but rather to inability of correct measurement of beta for small firms' securities.

Wide range of various CAPM anomalies triggered further research in this area. Fama and French (1992) proposed a three factors based model, in which they explained that expected returns of securities are widely influenced by the following three factors; the market return (CAPM), company size and market to book value. Even though their model performed much better in different empirical tests than CAPM, but still it lacked a solid theoretical foundation. Fama and French developed a three factor model as below:

$$E(r) = E(R) = R_f + \beta_1 (R_m - R_f) + \beta_{SMB} * SMB + \beta_{HML} * HML$$

SMB is a proxy of size, and can be computed as the difference between small and big companies and the HML is a proxy used for value, and computed as the difference between high and low.

However, the three-factor model has received a lot of criticism. Many academics claimed that model is still incomplete and further extensions are needed as it cannot completely explain the various capital market anomalies. Jegadeesh and Titman (1993), Asness (1995), and Chan, Jegadeesh, and Lakonishok (1996) proved that three factor model is failed to capture the true effects of short term returns. Bernard and Thomas (1989) discovered similar phenomenon, showing that stocks with unexpected high earnings perform better than those with unexpected low earnings over the next six months. Later, Fama and French (1995) themselves admit that above mentioned issues remain unaccounted by their model. Ikenberry, Lakonishok, and Vermaelen (1995) presented an updated version of the Fama French three factor model adding momentum as the forth factor to control for the expected returns. However, this extension was further criticized that adding a momentum factor increases the abnormal returns to the accrual anomaly.

Lee and Swaminathan (2000) further developed the research and pointed out a positive relation between stock trading volume and momentum effects. There were also many studies i.e. Lakonishok, Shleifer, and Vishny (1994), Kothari, Shanken, and Sloan (1995), Campbell, Hilscher, and Szilagyi (2008) proving that three-factor model overstates the average returns. Titman, Wei, and Xie (2004) and Novy-Marx (2013) identified that variation related to profitability and investment are ignored by F3FF model. So, on the basis of these points, Fama and French (2016) have recently revised their model by adding two additional factors profitability factor (the difference of the returns on portfolios of stocks with robust and weak profitability, RMW) and investment factor (the difference of returns on portfolios of the stocks of "conservative" and "aggressive" investment firms, CMA). Studies proved that this model can explain about 94% variation in returns of stock portfolios of the cross sections. Hence, the five-factor model is a big improvement and it indeed captures a great amount of variation unexplained by the former models.

A recent study by Roy and Shijin (2018) explored another dimension of asset value predictability which is human capital. According to them, this is a new dimension which subsumes the predictive power of stocks in terms of value and size strategies. The importance of human capital is also discussed by Kim, Kim, and Min (2011) and Campbell (1996). Mayers (1972) has defined the important role of human capital while predicting the assets returns and explained that major portion (almost 75%) of consumption of labor income encompasses human capital which is considered as priceless factor of cumulative wealth of an economy. Belo, Li, Lin, and Zhao (2017) have worked on the missing link of labor market dynamics and proved that financial variables provides rich content on the significance of human capital component. They also proved that lack of empirical research is found in case of role of human capital in determining the capital asset pricing models. Similarly, Shijin, Gopalaswamy, and Acharya (2012) proved that human capital is an important determinant of variation in asset returns. Hence, depending on the theoretical justification relating to human capital (it owes almost 90% of aggregate wealth of a nation) given by Lustig, Van Nieuwerburgh, and Verdelhan (2013) and Roy and Shijin (2018) have introduced this factor into five factor model presented by Fama and French (2016). So this study is going to check the impact of sixth factor along with five factors; size, profitability, value, and investment, proposed by Fama and French (2016). This is only one dimension of Intellectual capital there are other dimensions as well which are structural capital and relational capital. In previous researches conducted to test the capital asset pricing models, organizational size is always measured in terms of market capitalization but the basic infrastructure of the organization and its relationship with outside the geographical boundaries has not been catered till now while determining the variation of stock prices. So it is aimed to test all these dimensions in the study to explore about more factors which can contribute to the maximization of assets returns and minimization of risk associated with them.

3. Methodology

Addressing the main objective of the study (defining the best model for asset pricing in Pakistan) needs an in depth analysis of market while taking decisions regarding investment in securities. Although lots of work has been done from time to time to find out the one best model but still there is need for improvement in it therefore, this study has conceptually proposed a model for asset pricing. For this purpose existing literature on CAPM, three factor, five factors and six factor models is consulted. Research studies are consulted without defining any time frame rather openly accessed literature is referred in this study to propose the model. The text of the referred studies is analyzed through the hermeneutic approach.

3.1 Propositions:

It is very difficult to define the term intellectual capital as there is no particular definition of it but generally it is defined as an intangible asset which includes employees, stakeholders, organizational processes, suppliers and customers etc. (Bontis, 1998). A more comprehensive definition of intellectual capital is given by Brooking (1996) that is "Intellectual capital is the term given to the combined intangible assets which enable the company to function". So there are three important dimensions of intellectual capital in literature; Human capital, Structural capital and Relational capital (Roos, Pike, & Fernstrom, 2007). Human capital includes knowledge, skills and abilities of employees. Structural capital is a supportive infrastructure which makes human capital to work.

On the basis of theoretical framework following propositions have been suggested in five factor model for asset return variations:

- Structural capital of organizations should also be accounted for risk and return calculations:

Structural capital is a broader term which includes all supporting facilities for the human capital of an organization. Generally, the term structural capital includes buildings, organizational processes, patents, trademarks etc. Development of structural components helps to reduce the cost and improve the profitability of the organizations (Mondal & Ghosh, 2012). According to Bontis (1998), structural capital and human capital both supports each other to achieve maximum intellectual performance.

- Relational capital of an organization can play an important role in building the market image of the organization and thus will impact the stock return variations.

Relational capital of an organization includes social networking, partnerships, alliances, customer loyalty, customer engagements, joint ventures, distribution agreements etc. (Roos et al., 2007). This is also called customer capital dimension.

Chen, Zhu, and Yuan Xie (2004), proved that intellectual capital has strong positive relationship with the organizational performance. And from a strategic perspective, intellectual capital is a variable which can enhance the value of an organization. Moreover, to be successful organizations should consider this scarce resource very efficiently (Petty & Guthrie, 2000).

By considering the previous literature on relationship between intellectual capital (human, structural and relational) it is proposed that remaining two dimensions of human capital should also be checked in order to find the relationship between organizational preferred return and risk associated with securities.

3.2 Conceptual framework:

On the basis of literature review the following model is proposed by keeping in consideration the propositions:

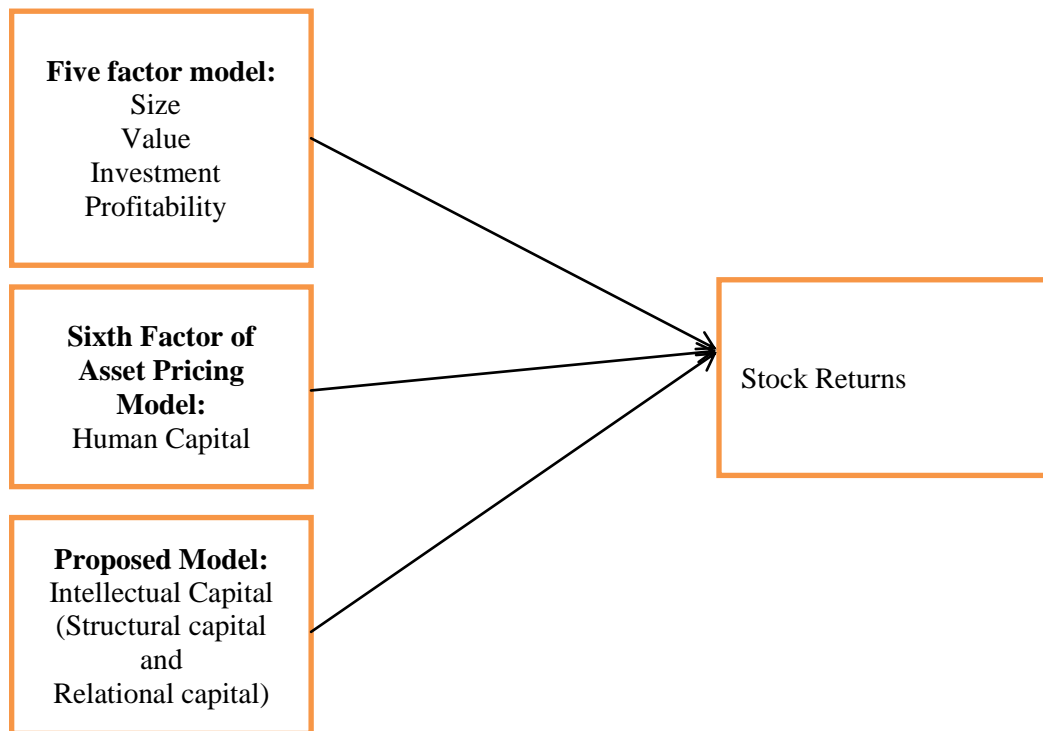


Figure 1: Proposed Model for Assets Pricing Model

4. Conclusion and Discussion

CAPM is the model which is devised to check the risk and return relationship of securities. But with the passage of time this model proved to be insufficient to cater the market risk factors as it was based only on beta. To remove the inefficiencies of CAPM, Fama and French (1992) introduced two more factors in this model which proved to be significant effort put by them. These factors were size and value of the firms. Even after addition of these factors the need was felt to explore more factors in it as this model was able to cover only 70% variations in the stock returns. By considering the criticism and gap in the research, Fama and French explored two more factors to enhance the three factor model which were profitability and investments of the organizations. According to the previous studies conducted by the different researchers, although Five factor model is outperformed the CAPM, three factor and four factor models but recent study by Roy and Shijin (2018) has opened a new avenue for asset pricing models. In five factor models, Fama and French (2016) has already admitted that there are certain more factors which can be identified to cater the stock return volatility. The empirical studies on implementation of five factor model proved that it is unable to explain the stock return variation of small stocks (or stocks invested for shorter period of time) in developed markets. And the sixth factor model given by Roy and Shijin (2018), proved that sixth factor is a part of intellectual capital of an organization which also has some other

elements which can be tested empirically to know the impact of these on stock return volatility. It is expected that if one factor of intellectual capital has proved to be a significant factor to predict the stock market return then other two dimensions of intellectual capital may also prove to be fruitful in this regard.

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THE IMPACT OF SOCIAL DEVELOPMENT ON ACADEMIC ADJUSTMENT OF STUDENTS AT SECONDARY LEVEL IN KHYBER PAKHTUNKHWA

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Abstract

The present study focuses on the important aspect of human development known as social development and its impact on the academic adjustment. A successful social development of the student in and out of school is helpful in his academic adjustment. The study takes into account the factors of Self-Concept, Total Adjustment which include aspects of adjustment at school, parents, society, teachers, peers, Affective Adjustment and Socio-Economic Status which help in process of social development. The sample comprised of 120 male and 120 female students from 10th class. A questionnaire was adapted from Rogers Self-Concept Scale (1951) having 9 items, 11 items were adapted from Zahid Scale of Total Adjustment (2003), 7 items were adapted from E K Sinha and RP Singh adjustment Inventory for School (AISA) (1993) and 8 items were adapted from Index of Self Esteem ISE by Khurshid (2003). Mean, one sample t-test and regression tests were applied to the collected data. The findings show a significant effect of social development on academic adjustment of the students at secondary level. The results of regression test showed that where the explanatory variables Self-Concept (SC) Total adjustment (TA) and Affective Adjustment (AfA) showed statistically significant contribution towards the dependent variable Academic Adjustment (AA), the Socio Economic Status of Parents (SES) variable did not contribute statistically towards the dependent variable AA.

Keywords: Social Development, Academic Adjustment, Social development process, social development indicators.

1. Introduction

1.1. Social development

Social Development is an overall life long process in humans where they develop certain skills by means of which they are able to spend a life which is full of life. A study made by Bilance (1997) defines social development as the promotion of a sustainable society which ensures human dignity by backing every segment of the society especially the vulnerable to develop, improve their social and economic status and be able to acquire their due position in that society. According to Monroe (1990) social development which helps in social adjustment is often used as synonym to adaptation and accommodation and it is a kind of state of equilibrium which can be affected by these processes of accommodation and adaptation. Social development is multi-disciplinary and cross-sectional field of practice that seeks to improve the social and material wellbeing of an individual everywhere (Estes, 1990; Jones, 1981; Minert, 1987 and Paiva, 1977).

1.2. Process of social Development

According to Pal, B.O (2011), in his book Sociological Foundations of Education, following is systematic process of the social development.

a) Child Rearing

The child rearing is the divine and emotional duty of parents. This behavior of parents helps socialize the baby.

b) Sympathy

The new born child is at the mercy of his parents and siblings. They all show sympathy towards the child which leaves mark on his future character.

c) Cooperation

The child is helped by his siblings and this cooperation is printed on his mind and helps him extend cooperation in his future life.

d) Guidance and Counseling

Guidance and counseling by parents, elder, teachers and society also help child develop socially.

e) Identification

The child identifies his parents, relatives and well-wishers when he gets help and love. This helps him understand his friend and foe in future life.

f) Social Teachings

Social teaching if directly or indirectly, leave its mark on the individual to develop socially.

g) Reward and Punishment

Reward and punishment are the stimulus factors keeping an individual socialized.

1.3. Indicators of social development

The social development of a student is evident from his behavior in all specters of life. Following are few indicators which show the social development of a student.

a) Positive Self-Concept

A socially developed student will always portray positive self-concept and always look at things and challenges positively and with a confidence.

b) Ability to Control Emotions

When a student is socially developed, he/she understand the value of emotions. His/her emotions and its expression is controlled and within the expected norms.

c) Ability to Understand Emotions of Others.

A socially developed student has an ability to understand not only his own emotions but also to understand the emotions of other students. It helps him to adjust easily in the community of school.

d) Ability to Communicate with Teachers and Peers

When a student is socially developed he/she will have a meaningful understanding and communication with his teachers and peers. Both these abilities will help him/her in learning.

e) Ability to participate in and out of Class Activities.

A socially developed student has ability and capability of interaction in the class and out of class activities.

1.4 Indicators of Academic Adjustment

Adjustment with school and school activities is a sign of academic adjustment. It is the off-spring of social adjustment of a student. Following are some indicators of academic adjustment.

a) Attentive Participation during Lecture.

When a student is academically adjusted to his course and environment, he/she will feel a great sense of participation. He/she will actively participate in class lectures and feel learning attractive.

b) Deep Learning with satisfaction.

Learning depends upon complete absorption in the process. When a student is adjusted to his academics he/she have deep learning and a sense of satisfaction.

c) Adherence to Rules and Regulations of School.

A student who is academically adjusted finds it easy and internally motivated to follow rules and regulations of the school.

d) No bullying at school.

A student who is having adjustment with his/her academic situation will have no unruly behavior with his peers and school staff. He/she will avoid bullying other students.

e) Elimination of Absenteeism

The most important indication of academic adjustment is elimination of absenteeism by the student. The school and course create attraction for him/her and it becomes a source of enjoyment.

f) Timely Completion of task

A student who is academically adjusted will find it easy to complete task in time. He /she will need less help and guidance to do task.

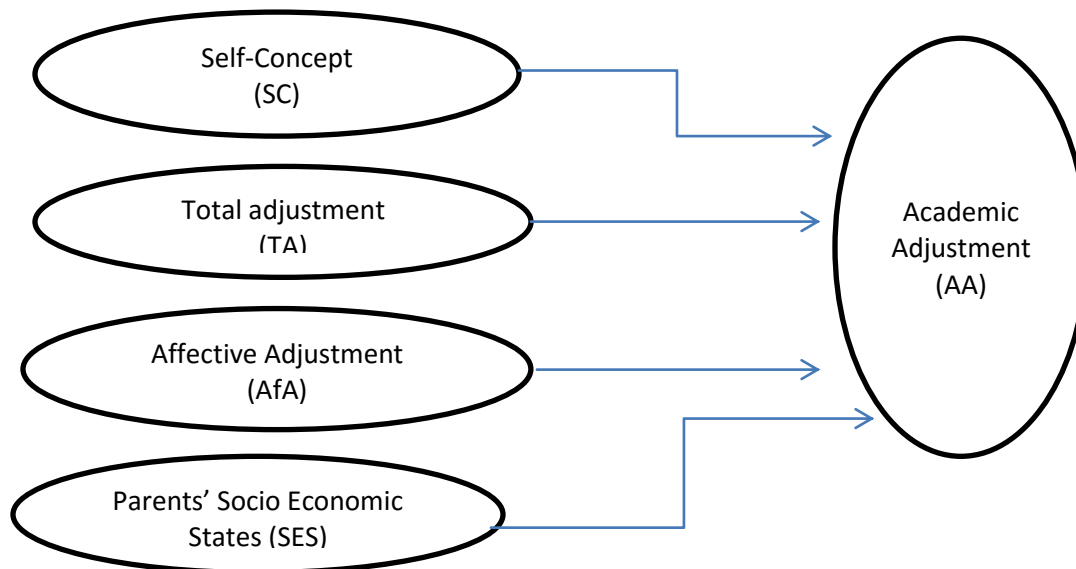


Figure 1. Conceptual Model Based On Social Learning Theories

1.4 Research questions

The study revolved around the following questions.

1. Whether social development affects the academic adjustment of students?
2. Whether the students at secondary level are aware of the indicators and factors of social development and its impact on academic adjustment?
3. Whether the schools provide assistance in social development?

2. Method and Material

The retrieved data on variables Self-Concept (SC), Total Adjustment(TA), Affective Adjustment(AfA), Parents Socio Economic Status (SES) and Academic Adjustment(AA) was tested for reliability test. The Cronbach's alpha was found in the range of .76 to .83 which is in the range of good(70 to 80) to very good(80 to 90)

Table 1. Reliability test of variables.

Variables	Cronbach's Alpha
Self –Concept	.761
Total adjustment	.837
Academic Adjustment	.822
Affective Adjustment	.832

Source . Estimated by researcher

3. Results and Discussion

3.1 Results of One sample t-test

Our mean value of all the variables in question was above the mid-point (here estimated as 3) showing positive response to the questions asked but to find out the statistical significance of responses by respondents the variables were given one sample t-test. The t-test for variable in question gave two tail significance for Self-Concept (SC) .000. Total Adjustment (TA) .000, Academic Adjustment (AA) .000 and Affective Adjustment (AfA) .000 respectively. It shows that the response of the majority respondents have significance of agreeing to the questions raised.

3.2 Results of Regression test.

We have made the assumption that students having higher relative social adjustment will show better academic adjustment and which will lead to better performance. To find out exact statistical contribution of variable SC, TA, AfA and SES towards Academic Adjustment (AA), we applied Regression test which gave following results , tabulated below.

Table 2. Result

AA =	.027 +	.422 SC	+	.369 AfA	+	.171 TA	+	1.056E- 006 SES
(.332)	(.068)	(.060)		(.064)		(.000)		(Std. error)
(.080)	(6.240)	(6.110)		(2.685)		(2.333)		(t-statistic)
(.936)	(.000)	(.000)		(.008)		(.020)		(p- Value)
F = 48.141 (p = .000) R = .671 R ² = .450 R ² _{Adj} = .441								

The estimated model is statistically significant ($F = 48.141$; $p = .000$) and explanatory variables SC at ($t = 6.240$; $p < 0.01$) is found statistically significantly contributing towards the dependent variable AA. These results help us to accept hypothesis that Self-concept (SC) positively contribute towards academic adjustment (AA).

Explanatory variable AfA at ($t = 6.110$; $p < 0.01$) is found statistically significantly contributing towards the dependent variable AA. These results help us to accept hypothesis that affective adjustment (AfA) positively contribute towards academic adjustment (AA).

Similarly, variable TA at ($t = 2.685$; $p < 0.01$) is found statistically significantly contributing towards the dependent variable AA. These results help us to accept hypothesis that Total Adjustment (TA) positively contribute towards academic adjustment (AA).

The above estimation expresses that SES at ($t = 2.333$; $p < 0.05$) is found statistically insignificantly and not contributing towards the dependent variable AA. These results help us to accept hypothesis that SES is not contributing towards academic adjustment.

4. Conclusion

The results of the above carried out statistical tests show that variables self-Concept(SC), Total Adjustment (TA), Affective Adjustment (AfA) positively contribute towards the variable Academic Adjustment (AA). However, variable the parents socio economic status (SES) have shown contribution towards academic adjustment of students at secondary level.

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Computer Science

AN ONTOLOGICAL CASE BASED REASONING AND LEGAL CASE REPRESENTATION

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Abstract

There are two concepts of the study; one is to perform *case based reasoning* by means of deciding matters via relating them with the decisions; the decision, which are made earlier in the same area. Whereas, the other aspect is to explore the idea behind easiness for representation of *legal cases*, by interpreting them in an ontological interface as well as the computational strategies to represent *legal cases*. The study is designed to be implemented in judicial system, whereas, the sample of practices is taken from judicial district Sukkur and observed that the Cases are the major factors of the study. The strategies for implementing the said study will start by fetching the idea of current processes adopted by the department, later on going through the identified problems along with their proposed solutions, then sketching an ontological interface and in the last to come up with a fully ontological operational environment.

Keywords: Court Ontology, Perceived Data, Reasoning, Pattern Matching, Judiciary

1. Introduction:

In supporting view of the study, as presented through the abstract level, we followed some of the earlier studies conducted over the same nature of areas from the literature, reviewed thoroughly and gone through the expert opinions to whether which study suits to this nature of work. The literature review papers are referenced at the end of the paper for creating a potential of strength in the study.

The concept behind the ontological *case based reasoning* is that all the matters with whole scenario are to be available on the record in the shape of a backlog system or repository, so that the specified ontology can enumerate best results by accessing user oriented terms to generate the results. The basic idea of this ontological *case based reasoning* is to provide easiness to judicial officers for deciding matters in a short time with effective reasons; which are actually collected from the previous decisions made along with citations to them. The ontology contains different concepts like; *case, judge, court, person*, etc., where these entities are referring to the major contribution of the study which perform in operating interface.

It is pertinent to mention here that the traditional approach towards the said domain is full of wasting time in finding records from the huge amount of backlog and deciding cases as there is none precedent strategy to trace out cases or to decide cases by enumerating reasons from the

earlier decisions made over the same nature of matters. The current process of case search is a traditional process, which emphasizes the use of manual registers to encapsulate a backlog of the cases i.e. regulating the manual cases process into backlog system, so that the current study can modify the process and improve the strategies. Herein forth, in the initial phase, the study elaborates some real problems which are identified during data collection and analysis in the premises of judicial department and solutions proposed against to these real problems are also suggested collectively. For the purpose of data collection, sampling and generating results, we follow the processes which are adopted in the judicial department district Sukkur for acquisition of proper ways to come up with a fully ontological interface.

Besides it, we must know; ontology is the explicit description of a domain of interest in respect of concepts and the relationships among them, so also the properties and constraints on properties to make them more specific. There are many tools for practicing and modeling ontology i.e. Protégé, NeOn, etc and also some of the tools are there to design sketches i.e. Grafoo, etc. In continuation to support the current study, we lately discuss the earlier ontology modeling, which actually resembles to our study. As there are huge number of studies conducted in the same domain of judicial department, so we are going to pick some of the best of them for elaborating their strategies and giving a good enough comparison to the current study level. As per literature review, some of the facts need to be cited, give as under;

“In law, the ontological assumptions reflect an underlying view of what law is made of, what legal knowledge is which knowledge category play a role in law and how they interrelate [1]”. According to the cited fact, the current study interprets real aspects found from the domain of judicial department into the ontological interface and enumerates results for case based reasoning on the basis of user oriented terms, which actually provide easiness to the users. An ontology needs input keys to process terms for the purpose of fetching optimal data/results, after that the reasoning from the backlog is chosen for deciding cases.

“From the point of view of knowledge representation, an ontology delimits what is to be seen in the world and how [1]”. This aspect focuses on representation of knowledge in an ontological aspect, through which, the current study maps legal case representation into the ontological interface, which points out a factor by delimiting terms and enumerating results from the wide range of choices, not only that but the process of fetching optimal results is also mapped with the case based reasoning from its repository/data backlog.

In recent years, it is learnt that the judicial department throughout the province of Sindh has come-up with the idea of converting manual processes into digitalized or computerized form, only for the sake of finding easiness while working in the domain of judiciary. Nevertheless, much of the processes have been found converted from manual processes into computerized and the significance of these processes have also been identified during data collection and analysis.

It is found that the judicial department of Sindh province has developed and managed the cases (of all type i.e. Criminal, Civil and Family type cases) and their backlog/repository on a Case Flow Management System (CFMS), which highly emphasizes a click away easiness to the users, judicial officers and staff of the domain to make the most of this application. It cannot be avoided that the current efforts taken by the I.T department of judiciary is much enough to remove the barriers of such factors which causes wastage of time, correctness of processes with the easiness and reasoning about cases towards the nature of matter by means of capturing viable circumstances but there is the need of refining them with the help of effective modeling approaches.

It is elaborated in the section of *concepts of law and legal documents* that justification –which is derived from the term ius (law)– is the domain of epistemology; the study of what we can know and believe. Epistemology is about reasoning, argument and evidence, while ontology is concerned with modeling (understanding) and explaining the world [2]. So, the structure of the case based reasoning ontology, which is added in the current study, is much better to extract the reasoning from the backlog with the help of some specific parameters which are accessed through

user oriented keywords, after extraction, the simplest formatted data will be provided to the user for performing or making decisions by means of citing earlier decisions made on the same sort of data.

2. Ontologies and Types of Ontologies

“The term ontology was borrowed from Philosophy, where it meant a description of the nature of being a theory of existence”. “The meaning of the term in AI is not quite the same and is closer in many ways to an epistemology”[1]. “The most frequently quoted definition is a specification of a conceptualization [1], which are rather vague”.

“To do so, we will introduce in this section some basic dimensions through which we can interpret and explain different types of ontologies and their uses[3]”. Notice that while in this article we will apply these concepts to legal applications, concepts apply to all work with ontologies in AI in general.

2.1. Applications of Ontologies

- Used in structuring/organizing information
- Suitable for problem solving and reasoning
- Used for searching and semantic indexing
- Necessary to understanding the domain

2.2. Ontologies as Knowledge Mangement Tool

“Within Knowledge Management ontologies are primarily used for establishing a common vocabulary and consequently common understanding of a certain knowledge domain”[4]. In other words the primary function of the ontology is to serve as a shared conceptual model. “In the process of shared conceptual modeling a group discussion is organized in which the members are invited to express their ideas, beliefs and knowledge about a system is held”[4]. “This representation allows the members of the group to easily adapt their ideas, beliefs and knowledge together”[5]. Applied ontologies within Knowledge Management are built with the aims of;

- Knowledge Management ontologies are used for establishing the mental models of the participating individuals[6];
- It is used for creating a representation or conceptual model[6];
- Main aim is to “creating a situation in which information about the mental models of participating individuals can be exchanged[6]” (i.e. creating a shared conceptual model);

2.3. Roles and uses of Ontologies in Law

We propose five main uses or roles for ontologies can be recognized[3];

- Organizing and structuring information;
- Problem solving;
- Searching and semantic indexing;
- Semantics integration and interoperation;
- Understanding of the domain.

Table 1: Summary of legal ontologies in the literature, their types and roles

Ontology or Project	Application	Type	Role
"Valente and Breuker's Functional Ontology of Law"[6]	"General architecture for legal problem solving"	Knowledge base in Ontology, highly Structured	Understand a domain, reasoning & problem solving
"Mommer's Knowledge based Model of Law"[7]	General language for expressing legal knowledge	Knowledge base in English, very lightly structured	Understand a domain
"Van Kralingen and Visser's Frame Ontology"[7]	"General language for expressing legal knowledge, legal KBSs"	Knowledge representation, moderately structured (also as a knowledgebase in Ontology)	Understand a domain
"Benjamin et. al.'s ontologies of professional legal knowledge"[3]	"Intelligent FAQ system (information retrieval) for judges"	"Knowledge base in Protégé, moderately Structured"[8]	Semantic indexing & Search
"Lame's ontologies of French Codes" [2]	"Legal information Retrieval"	"NLP-oriented (lexical) knowledge base, lexical, lightly structured"[8]	Semantic indexing & Search
"Leary, Vanden berghe & Zeleznikow's Financial Fraud Ontology"[5]	"Ontology for representing Financial fraud cases"	"Knowledge base(schema) in UML, lightly structured"[8]	Semantic indexing & Search
"Gangemi, Sagre and Tiscornia's Jur-Wordnet" [1]	"Extension to the legal domain of Word net"	"Lexical knowledge base in DOLCE (DAML), lightly structured"[9]	Organize & structure Information
"Asaro et. al.'s Italian Crime Ontology"[5]	Schema for representing crimes in Italian law	"Knowledge base(schema) in UML, lightly structured"	Organize & structure information
"Boer, Hoekstra & Winkels' CLIME Ontology" [2]	"Legal advice system for maritime law"	"Knowledge base in Protégé & RDF, moderately structured"[9]	Reasoning and problem solving
"Zeleznikow and Stranieri's Argument Developer" [1]	Several legal knowledge based systems"	"Knowledge representation, moderately structured"[9]	Reasoning and problem solving.

3. Research questions:

- Consuming less time by avoiding lengthy manual processes
- Avoiding extraordinary efforts while deciding matters by extracting the depth of reasoning

To defend the above RQs, there are three structures i.e. *Fig-1 (Case with its' attachments)*, *Fig-2 (Case based reasoning)* and *Fig-3 (case representation)* presented and elaborated by means of all attachments to each of the entity with their properties and relationships among them. Whereas, an ontology i.e. '*The Ontological Model*' is also presented, which encapsulates theses three structures, their properties and relationships.

During data collection, analysis of practices for easiness and capturing real life scenario, it was noticed that there is acute need of adopting technical activities and *case based reasoning* in the

judicial department, besides it, some of the general problems were identified within the premises of judiciary, which are discussed with their proposed solutions, as below;

4. Problems & Solutions

4.1 Problems (Identified In The Domain)

1. The Judicial Officers (also referred to as Judge) of judicial department face a lot of challenges while deciding matters, as there is no any reasoning available which is made earlier to follow the situation by keeping in mind the same circumstances
2. The rank system of the judicial officers; the performance of the judicial officers (officers working as Judge in the judicial department) is measured by the help of units earned by them on cases, instead of collecting major factors of all other necessary parameters
3. There is the big problem with the parties of cases, as they even don't know their particulars of the cases. Their matters are actually managed by Advocates from initial to the last stage, which also emphasizes the need of adopting effective processes to remove the barriers affecting them

4.2 Solutions (Proposed For The Domain)

1. An Ontology modeling to enumerate the reasoning from backlog with the same scenario along with the resembled circumstances is the best way to come-up with the reasonable decision, which can easily be decided without any challengeable aspect
2. There must be an authentic ranking system for judicial officers, as the current ranking system is based upon units earned by them, i.e. drawback is that if a judicial officer having less major cases to earn more units then he may not be ranked well
 - a. There must be a feedback system for public through which they may rate a judicial officer after their matter gets decided

Thumb identification system for parties of cases; this system may show their appearance along with their bio-data in the cases and lead them towards the desired Court. The attachment of complete log of the cases is mandatory, as it will elaborate all stages of a case and will lead parties with easiness by providing information via prompt response.

5. Entities for Ontology Development

A *Legal case ontology* encompasses entities brought-up from the domain of judicial department during data collection, discussed as below;

The purpose of the *Legal case ontology* to retrieve and extract information alongwith *case based reasoning*[9]. The ontology contains the elements representing the cases i.e. Case (decided and undecided cases), Judges (judicial officers), and Public (parties of case).

a) *Case*

- i. Criminal, Civil and Family cases pertaining to Undecided/pending and decided/disposed

b) *Case elements*

- ii. Dates of institution, hearing, diary (detail of case), and disposal[9]

c) *Judges/Judicial Officers*

- iii. D.J (District Judge), ADJ (Additional DJ), CJ (Civil Judge) and SCJ (Senior CJ)

d) Advocate

- iv. Public Prosecutors:(*advocate engaged through Govt. sources, freely defends cases of public*)
- v. Advocates:(*advocate engaged privately by the public*)

e) Public

- vi. Plaintiff, Defendant, etc.

The *Legal case ontology* may also encompass the backlog of cases from a certain period of time for the purpose of tracing them to catch the precedent matter and earlier information related to the tasks arising out of the current research study. The representation of Legal cases is helpful to extract the *case based reasoning*.

6. Methodology:

The proposed study is designed and structured by means of ontology development tool i.e. Protégé and graphically diagram sketching tool i.e. Grafoo. Nevertheless, these both the tools are referred commonly for designing diagrams and creating ontology based models for implementing structures in an ontological environment i.e. semantic web. So, the research study is sketched by Protégé, Grafoo tools and in addition of Ontology Requirement Specification Document (ORSD), which is used for making it meaningful for the readers and to give an easy way to initiate it for the future work.

It is more explained that the ontological structure of the current study is based on advanced information retrieval; a single ontology structure is not enough to enumerate results from the backlog as a whole and to satisfy in all aspects, so we have sketched many ontologies, each of which maps a part of the research study. It is learnt that law is highly entangled with common sense views, so we include specific terms to describe the structures for avoiding any incorrect information being fetched and enumerated by the system. For the purpose of above, Ontology Requirement Specification Document (ORSD), ontological model in protégé, diagrams showing case attachments, case based reasoning and legal case representation are structured through Grafoo (a UML based graphical representation) and presented afterwards with their detail for catching sense of each structure.

a) Protégé:

It is a tool for ontology development; it contains concepts, relationships between the concepts, properties on them and constraints over the properties (for making them more specific)[9], not only that but SPARQL queries are also implemented to fetch the meaningful and useful data from the said domain.

b) Grafoo:

It is an interface, which is used to draw UML based graphical representation of ontology. It is an open source tool that can use to presents class, properties and restriction with OWL ontology. The advantages of using such a Grafoo diagram are thus that it displays the logical relationships between elements of an ontology, or a sub-section of an ontology, in a manner that is relatively straightforward to understand, once one has grasped the meaning of the different elements of a Grafoo diagram. We use this tool for implementing the design of ontology skeleton of research paper.

c) NeOn ORSD document:

NeOn methodology presented an ORSD document to specify the slots of an ontology for fetching its' detail in a narrow way, it means there is a neat and clean way to explain each sprint like phase of ontology[10]. An ORSD comprises of purpose, scope, level of formality, intended users,

intended uses and pre-glossary terms (terms and objects). So, herein forth, to make research study more authentic, it is interpreted in Neon methodology ORSD document, as under;

Table 2: Research study representation through an ORSD document

1	Purpose: The purpose of the study is to make sense of case based reasoning in the domain of judicial department and also to suggest interchanging and adopting computational strategies against the manual processes, which are time wasting and headache in tracing out in the meantime.
2	Scope: The study is designed to be implemented in the judicial department (also referred to as judiciary), whereas, it followed the practices reflected in the judicial district Sukkur.
3	Level of formality: The aspects of the study are developed by using the Protégé(an ontology development tool) and Grafoo(a model designing tool)[10].
4	Intended users: Judicial officers(Judges), Staff members (working in judicial department), and the Public (having matters for decision or else)
5	Group of competency questions: What cases are treated situation based? Which decisions are made potentially? How to adopt easiness in processes?
6	Pre-Glossary of terms: <i>Terms:</i> Court ontology; perceived data; reasoning; pattern matching; judiciary; <i>Objects:</i> Computational devices

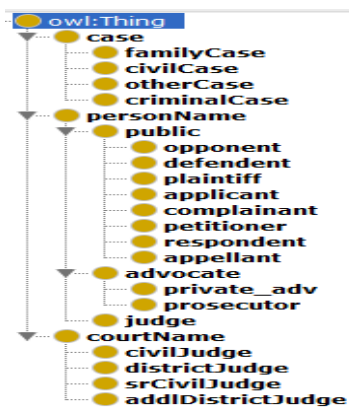


Figure-1 Ontological Model in Protégé

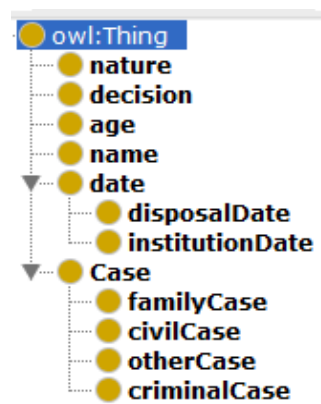


Figure-2 (Case based reasoning)

Fig.1 presents a case-based reasoning study, which not only interprets concepts but fetches the useful data through some of the specific parameters (which are referred to as constraints over the properties of concepts in an ontology).

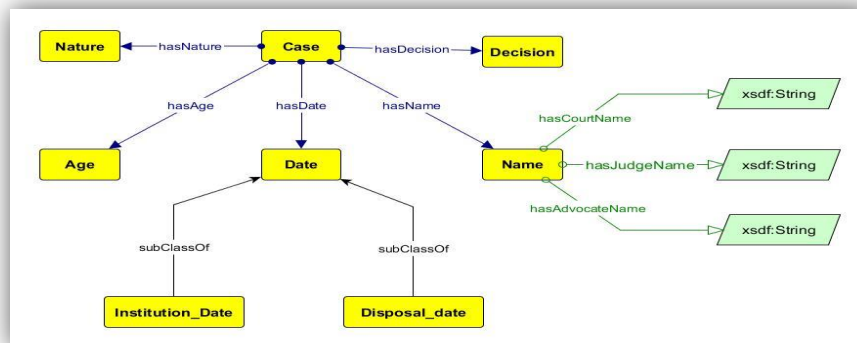


Figure-3 (A general diagram presenting Case with its' attachments)

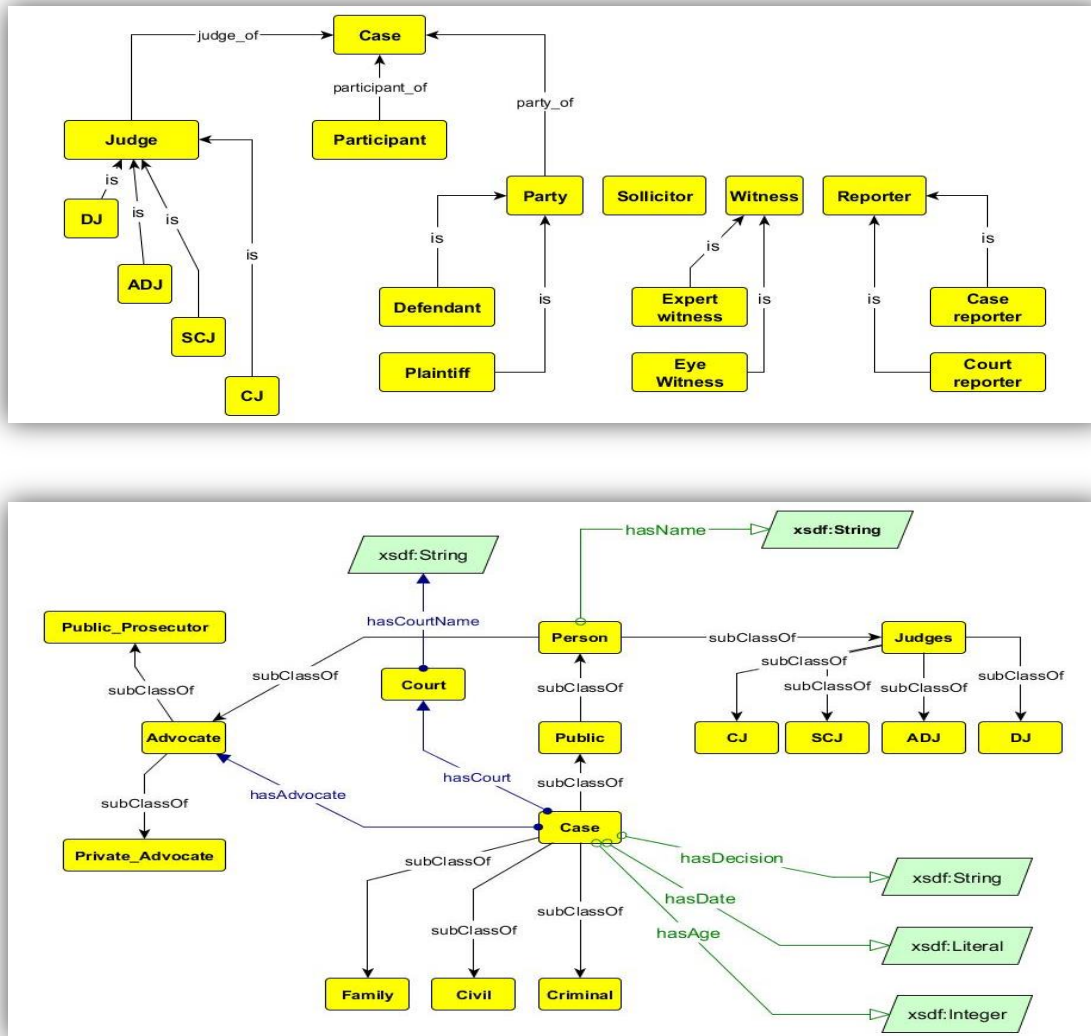


Figure-4 (A diagram presenting case representation)

For contributing easiness to the readers, the diagrammatical aspects of the study paper are best way that ontology concepts and the attachments will be a basis of following the strategies as presented. The shareable thing regarding this research paper and attachments shown in both the figures is that, I.T department of Sindh High Court has initiated to convert manual processes into the computerized format, for that purpose, the data is being inputted and collected in a repository form but is still under process.

Therefore, the current study will get populated and implemented on the basis of such repository available in the record of judicial department.

7. Conclusion

The study presented in this research paper is based upon the strategies reflected in the real environment of the judicial district Sukkur and pointed out some of the real problems and after that proposed solutions towards each of the problem along with their possible aspects of the computational strategies.

There were two discussion-based aspects; the case-based reasoning, in which a case (matter) of the court is traced by its' nature and some other parameters and replied by some type of same situation-based results in terms of detail or information, whereas the other aspect reflects the case search by means of its' backlog[10]. There is no doubt that a backlog in the shape of big data with having un-mannered storage policies will cause to occur sensitive problems.

8. Future Work

The study can be extended with some more aspects by means of keeping in mind that all the cases heard in the Court room are not of same nature and sometimes are referred to be perused by different ranked judicial officers i.e. sometimes referred to the Additional District Judges rather than Senior Civil Judges or else. So, there must be a sensing environment which automatically generates good enough reasons to address and/or locate the cases towards the optimal Court room.

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A REVIEW: BIG DATA CONCEPTS, CHALLENGES AND TOOLS

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Abstract

Now a day big data is very hottest topic in research. Many companies face problem to store, analyze and visualize the huge amount of data because data is increasing day by day. Big data have different characteristics like variety, volume, and velocity. Big data is useful for companies or organizations because it help them in gaining more profit and deep understanding and taking a lead over the competitor. When we are adopting or accepting this technology it becomes essential to know that different issues and challenges. In this paper, we highlight the fundamental concept of big data, characteristic, challenges, technique and technologies for handling of big data.

Keywords: Big data, HAMR, IN memory Analytics, Hadoop.

1. Introduction

Today, the advancement of sciences, technologies, engineering, the human endeavors and the economical and social activities have collectively generated the torrent of data in digital form; the world is officially entered the era of big data. Growing of data at a titanic speed making it hard to manage such a huge amount of data (Exabyte). The major difficulty in managing such massive datasets is because of the fact that the volume is increasing swiftly as compared to the computational sources. In a wide scope of utilization territories, information is being collected at uncommon scale. As point out by IBM Big data flood info graphic study, there are 100 terabytes data is flooded or uploaded everyday through facebook, and a meditated measure of movement on this prompting an appraisal of 32 Zetabytes of information generated yearly by 2020. Big data refers to massive data sets with the problem of searching, obtaining, analyzing, storing, and Visualizing. Because the complexity and volume of data is huge and growing swiftly, we are facing the confront of what has been recognized as big data.

1.1 Types of Big Data

Big data representative comprises the following types of data:

1.1.1 Conventional Enterprise Data

Contains information about client received from CRM systems, general ledger data and transactional ER, data web store transactions.

1.1.2 Machine generated data

Contains call detail record (CDR), trading center, web logs, sensor and smart meters data.

1.1.3 Social data

Contains data from micro blogging sites such as twitter and social media sites e.g. face book etc.

1.2 Properties of Big Data

1.2.1 Variety

As data being produce is not of only one kind as it not only encompasses the conventional data but also partially ordered data from diverse possessions such as log files and log web pages, email, documents, sites of social media and sensor devices. Structure data introduces a data ware house previously labeled and stored easily but unstructured data is arbitrary and hard to evaluate. Semi structured data is not sorted into predetermined fields but encompasses labels to detach data element. It is hard to handle such a great variety of data by existing conventional analysis system. How to merge, integrate, and fusion of diverse data becomes challenging particularly streaming data. For example, during traveling, pictures and blogs upload by tourist have strong association with their tourism location and travel information.

1.2.2. Volume

The volume of big data is depicted by the “Big” word in big data. In present days data comes in Petabytes and is predicted to augment to zeta bytes in years to come. The sites of social media network generating data in terabytes every day.

IBM points out that daily 2.5 Exabyte’s of data is created, 90% of data created during last two year. The splendid rise in scale of data out strips conventional store and analyzing techniques.

1.2.3 Velocity

Velocity refers to speed of received data as well as speed at which the data travel. Big data grow swiftly which produce exceptional quantities require to be stored, processed and transmitted hastily. Compare with conventional business intelligence applications and data ware house; big data Become challenging to handle in real time, and high performance computing resources and amenities are immediately required.

1.3 Challenges And Issues Of Big Data

1.3.1 Challenge of Expression

Now a day’s, the internet data is develop in an unstructured and heterogeneous fashion. On the internet the percentage of unstructured data has augmented in the big data. The speed of growth of unstructured data will become 10 to 50 times of those of structured ones. From the data management viewpoint, the unstructured data cannot be analyzed in unified it is much hard to process the structured data. Due to this proportion of unstructured data it is intricate for companies to deal swift growth of information. So effective expression of data is one of the major confront.

1.3.2 Challenge Of Processing And Storage

Now a day the data scales expands swiftly and exceeds the contemporary processing and storage competence of computers. The storage available is not sufficient for storing massive data sets which are generating by nearly everything. Social media sites along with the sensor devices are themselves a great contributor.

The data transportation from storage and processing perspective can be evaded in following two ways:

(I) Data is processed in storage place and only result can be transport.

(II) Only significant data is transfer for computation.

Processing of such huge amount of data is also time consuming. To discover appropriate elements entire dataset requires to be scanned that is fairly not feasible. Hence structure up index preliminary while obtaining and sorting of data is a good practice that significantly minimize the time of processing.

1.3.3 Privacy And Security Issues

Big data executive system faces trial in the worth of input and output data because of the openness of the internet. The data of existing conventional data base is notorious, while the acquirement of data and distribute of internet is stretchy. It may escort large amount of diverse uncertain data fed into system and lead a variety of errors and divergence, which reflects the data is erroneous, incomplete, inaccurate, repeated or obsolete. According to the figures of the global fortune, important data of more than 25 of 1000 companies is not accurate or correct. Users not only enjoy the value of data but at the same time they also face the progressively more severe privacy and security threats. We can mine precious data to accomplish efficient management of data eminence through data redundancy, KDD (knowledge discovery from data), cleaning and other technology, at the same time it is needful to attain privacy protection and protected data access.

1.3.4 Information Sharing And Access of Data

In time when data is used to make a precise decision than it becomes needful. Data should be accessible in absolute, precise, and suitable manner. Because of this reason data governance and management procedure becomes little complicated count the obligation to make it unwrap and accessible to government agencies in consistent way with regular APIs, thus Meta data and formats leads time proved decision making, productivity improvement and business intelligence. Because of the requirement of acquire an advantage in business it is clumsy to thought that companies share data about their operation and client, this type of sharing also menace the environment of competitiveness and secrecy.

1.4 Analytical Challenges

We face various challenges when analyze the massive data sets. Basic challenging questions are as follow:

- How we deal with massive and varied values?
- Is it requires that all that is store and analyze?
- How we recognize the precious data sets?
- How we get advantage from the massive data sets?

We require various advance skill to determine the type of Analysis that is done on structured, semi structured and unstructured data. Which type of analysis is performing on massive data sets is rely on the acquired result e.g. Decision making, and it is determined through two techniques:

1. Incorporate the large data volume in Analysis
2. Determine the relevancy of upfront of data

1.5 Skill Requirement

Big data requires magnetize youth and organizations with new varied sets of skills because it is up-and-coming technology. Technical skills should not be restricted but it should also expand to analytical, interpretive creative and research skills. Organizations should held training programs to build up these skills in folks. Moreover universities should introduce set of course on big data to fabricate skills recruits in this domain.

2. Technical Challenges

2.1 Error Tolerance

With the emerging of big data and cloud computing it is desired that damage from collapse should be minimum. Fault tolerance computing is tremendously difficult because it comprises complicated algorithms. It is merely not probable to contrive 100% reliable, utterly perfect error tolerant software/ machines. So the key challenge is to diminish the chance of breakdown to a suitable level. But unluckily, cost will be higher as much we endeavor to diminish the chance of failure. We enhance the fault tolerance of Big data through following two methods:

(I) Dividing the intact tasking to chunks and allot these chunks to multiple nodes for processing. One node is allotting the task to watching that all the nodes are working accurately. If failure occur than only work of affected node is restarted.

(II) Sometimes it is quite probable that the entire computation cannot be alienated in to independent tasks. There are some tasks that are recursive character and output of the prior task is the input to the next task. So restart the entire calculation becomes the cumbrous procedure. We can avoid this by applying check point. If any types of failure occur, the task can resume from last checkpoint.

2.2 Scalability

Now a days, technology of processor has been greatly changed. The clock speeds have chiefly mired and now processors are constructed with multiple cores. Concern of the processing systems has been changed from parallelism in cluster of nodes to parallelism within a solitary join. Existing techniques are failed to handle parallel processing within a solitary node, because mostly hardware resources are shared across a core within a solitary join.

Cloud computing is one of the solution of scalability issue of big data, that combines various incongruent workload with varied performance objectives in to hefty clusters. This needs an advanced sharing of resources that is costly and also leads towards several challenges such as efficiently handle the system failure and also deal how to execute and run diverse jobs so that we accomplish the objective of all work load cost effectively. All these factors collectively lead towards the problem of how to state the programs and even complicated machine learning tasks. The technologies being use for data processing are greatly changed such as HDD are replaced by phase change technology and SSD, whose performance is not same between random and sequential transfer of data. Thus which type of storage devices are deploy for the storage of data is still a big question [1].

2.3 Data Quality

Storage and group of massive data sets is costly process. Organizations will get more competitive advantage if they use a large amount of data is used for predictive analysis and decision. Business leaders always willing large data storage to add values to their business while the IT leaders keep technical aspect in mind prior to data storage. Big data mainly putting attention on storing quality data instead of storing huge extraneous data sets so that we can draw better results and conclusion.

This auxiliary leads to multiple questions such as:

- How we can ensure the relevancy of data?
- How we estimate the appropriate amount of data for decision making?
- How we ensured the precision of data for drawing conclusion?

2.4 Hetero Genus Data

Unstructured data comprises about all sort of data being created such as social media exchanges, to managing of PDF documents, email and more. Structured data all the time ordered into

extremely automated way and it can be managed easily. It exhibit well assimilation with database. However, unstructured data is utterly unorganized and raw. Handling of unstructured data is not only cumbersome but also costly. Conversion of all unstructured data in to structured one is also not feasible.

3. Tools and Techniques Available

3.1 HAMR

Heat-assisted magnetic recording (HAMR) technology, shows promise to increase the capacity of hard drive. In HAMR laser is used to heat high stability storage media. The technique uses disks made that are made with platinum iron and other alloys that enable higher storage densities than currently used material. However this material must be heated so that they are sufficiently magnetically malleable for the storage of data. Today's drives provide maximum densities of 620 gigabit per square inch, drives areal storage densities increases to 1 terabytes per square inch by using HAMR.

Seagate said HAMR could produce hard drives that store 6 terabytes of data in the near future and finally a maximum of perhaps 60 Terabytes[9].

In-Memory Analytics

In-memory technique focuses on the velocity part of the big data. It significantly improve the time needed to get the job done ,sometimes even 10000 time faster as compared to traditional techniques. IN-Memory technique can make real time analytics possible, even when dealing with large data sets. This in turns mean that insights are more valuable, considering the fact that some knowledge loses values when it become "old", especially when also known by competitors. To perform analysis, IN-Memory technique uses a so called "IN-Memory database" (IMDB). Although this is not a new technique (it originate from 1980's) it become possible to utilize more data[5].

3.4 Cloud Computing

Cloud computing is a portable storage and paramount shift in current ICT and services for venture application and becomes a prevailing architecture to execute complex and hefty computing. The advantage of cloud computing comprise parallel processing, security, virtualized resources and data services amalgamation with scalable storage of data. Cloud computing not only curtail the cost and limitation for automation by venture and individuals but also offers efficient management, user access and reduced infrastructure maintenance cost.[3,12,2]

Big data employ distributed storage technology that relies on cloud computing instead of local storage affix to an electronic device or computer. Evaluation of big data is provoked by upward cloud-based application developed through virtualized technologies. Hence, cloud computing not only offers amenities of the processing and computation for big data but also serve like service model.

3.5 Deep Learning

Algorithms of **Deep** knowledge are one of Potential opportunity to discover that provides programmed removal of intricate high level abstraction by hierarchical learning process. Intricate abstractions are trained at certain level on the basis of comparatively simpler abstraction devise at prior level in hierarchy. The hierarchical architecture of deep learning algorithm is inspired by the layered deep learning procedure of neo cortex of human brain. Which in voluntarily extract abstraction and features from principal data.

Deep learning technique can be applied on both labeled and unlabeled massive data sets, making it remarkable for extracting patterns and momentous representation from big data. Deep learning

architecture and algorithms are quite suitable for addressing issues associated to variety and volume of big data analytics. Deep learning intrinsically exploits the accessibility of massive data sets, e.g. volume of big data where conventional hierarchical algorithms are failed to understand and explore the elevated intricacy of data patterns. Deep learning deal with data representation and abstraction, so it is quit suitable for analyzing unprocessed data presented in diverse format or from diverse sources e.g. variety of big data. it may also decrease the need of input from human expert to values and features from new data type detected in big data

Deep learning technique offers a solution for data analytics practitioners and experts. For instance the extracted representation through Deep learning can be meditate as convenient sources of knowledge for information retrieval, semantic indexing, decision making and further purpose in big data analytics. Simple linear modeling methods can be meditated for the analysis of big data when multifaceted data is embody in elevated abstraction.

3.6 Hadoop

It is java based frame work and heterogeneous open source project hosted by apache software foundation. It is not a substitution of database warehouses or ETL strategy [14]. It comprises of numerous sub projects related to the class of infrastructure for distributed processing. Hadoop basically comprises of:

- Hadoop Distributed File System
- Map Reduce

The supplementary sub projects are constructing on the core and they give complementary services. There occur man problems in commerce with storage of massive data sets.

Although drive's storage capabilities improved swiftly but the rate of writing and reading of data is not enhance, it is still a time consuming process. We can diminish this time by reading from several disks at ones. If not allow the shared access to them use of multiple disk may seems worthless.

Use of multiple hardware leads to various problems as it increases the probability of failure. We can avoided this problem by replication e.g. generating the multiple copy of same data and place them at different devices so that if any type of break down occurs backup of the data is available.

The major problem which we face is integration of data that is read from multiple devices. Numbers of techniques are presented in distributing computing to deal with this problem but it is still quite challenging. All these problems are manipulated easily through Hadoop. Problem of combining data is manipulated by Map Reduce programming framework and problem of failure is manipulated through the HDFS.

3.6.1 Hadoop component in detail

3.6.1.1 Hadoop distributed file system

It is a extremely Error tolerant distributed file system THAT IS constructed for storage OF bulky files with access patterns OF streaming data ,running across the cluster of commodity hardware. Its Block size is very large as compared to normal file size i.e. 64 MB by default, so that number of disk seeks can be diminish.

HDFS cluster comprises of following types of nodes;

- (I) Name node or master node
- (II) Data node or slave node

The name node saves Mata data and accepts the request of application and bestows the response, while data node takes accusation of storage data. Whenever users access the data just instructions intermingle with name node. It is not possible to access the files without the name node, so it becomes paramount to make name node resilient to failure.

The areas where HDFS requires to be improved are:

- Lots of small files
- Low latency data access
- Multiple writers
- Arbitrary file modifications

3.6.1.2 Map Reduces

Map reduce is a indoctrination frame work for distributed computing allowing large scalability. It was created by Google by using the divide and conquers technique to break down intricate problem of big data in to tiny work unit that are process at the same time.

A MAP Reduce computation can be divided in to two tasks e.g. Map task and Reduce task that performs as follows:

The Map task takes input from HDFS, and generates key value pair's series from it. This process relies on the code that is written for the map function. Master controller accumulated these values and sorted them by key and divide amid reduce tasks. That coalesce each value with key on the basis of code that is write for reduce task. MAP WORKER handles map task and REDUCE WORKER handles reduce task but both task cannot be handled by the same worker.

User program determined how many map and reduce task are created by master controller. Master controller assigns the task to worker node. Master process keep the track of the status (executing, idle, or completion) of the each map and reduce task. When the assign work is accomplishing worker reports to master that reassign it new task. Master node detects the failure of worker as it sporadically pings the computation node. Entire map tasks allotted to the failure node are started again although it had accomplished because the result of their calculation would be accessible on that specific node just for processing of reduce tasks. Master process reset the status of all of these nodes to idle. Master process scheduled them on worker only when one becomes available. Each reduce task must also informed by master that the locality of input from corresponding map tasks has altered.

The advantage of map reduce is availability and expansibility, especially for hybrid processing of heap of structured, unstructured, and semi structured data. Because of the ability of distributed processing map reduce has high parallel processing ability. We can enhance the speed of data processing through the map reduce parallel processing. As a basic parallel programming paradigm, map reduce makes the management of parallel application readily.

4. Conclusion

In this paper we have presented the concept of big data along with issues and challenges we have to face in accepting and adapting this technology. These issues and challenges require being point out in the commencement before it's too late. Hadoop tools for big data to tackle them are also discussed specifying the areas where it requires being developed. So that big data will serve as a technology as well as skill in future.

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CRITICAL SUCCESS & RISK FACTORS OF AGILE SOFTWARE DEVELOPMENT: A SYSTEMATIC LITERATURE REVIEW

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Abstract

In software industry, success and risk factors play important role in the development of software. The productivity and performance of software is dependent upon these factors which are crucial for all those projects using Agile software development (ASD) methodologies. Most of the current researches are limited to risk and success factors of ASD which are available in scattered form. This motivated the researcher to conduct a research comprised of detailed SLR in order to highlight the risk and success factors of ASD. On the basis of this the current research divided the success and risk factors into four different classes. i.e., People, Process, Technology and Organization. However, further classification and detail about these factors are also part of this research.

Keyword: Motivators; risk factors; success factors; systematic literature review; barriers; agile, ASD

1. Introduction

A. Motivation

Agile software development (ASD) has a self-organized team which tends to follow a particular set of rules and regulations that enables them to develop efficient software in effective way. In order to enhance the technical and personal skills of team members in software development, motivators play crucial role. It is one of the critical factors in clarifying the goals of business and achieving the desired project scope. The effect of motivators and demotivators has been analyzed by Melo *et al.* (2012) September on three agile practices. For this purpose, qualitative analysis has been carried out. The knowledge regarding motivators and demotivators has been covered by the systematic literature review.

Due to iterative incremental nature of ASD, the failure ratio is reduced as compared to SDLC, but when technical and personal skills are considered, there comes the need of motivators and demotivators. In a project's life time, motivators and demotivators act as the top and leading activities, due to which it is necessary to control and manage the demotivator factor in order to accelerate the motivator factors. According to the literature studied the success of project lies in the effective management which reduces the development cost by 70%.

B. Why Systematic Literature Review is necessary to conduct?

Software development in the past 15 years displayed a drastic change in software industry due to the adoption of the new software development methodology (ASD). It is thought to be one of the leading techniques in the coming era due to its success stories and flexible environment. Current literature is mostly limited to SDLC and there is a need of systematic literature for ASD in order to cover up the gap. This research focuses on the existing study of motivator and demotivator for

making the detailed list. As the data shown by literature is in scattered form and it can only be organized properly through systematic literature review (SLR).

This type of literature review helps in managing and organizing teams by giving them confidence and support. According to Ghayyur *et al.* (2017) incentives and rewards come in the most common motivators list, whereas literature study revealed stress as a demotivating factor. ASD enhances the satisfaction level of stakeholder and yield success in software development.

For better software development, the first contribution of researcher is to identify the key challenges that include success and risk factors. Secondly, researcher will categorize these motivator and demotivator factors into people, technical and organization background. A detailed study of relevant papers is carried out which is then classified accordingly.

The remaining paper is divided into further sections including Literature Review as section 2, Methodology as section 3, where section 4 up to 7 describes the classification, finding and output. Discussion is carried out in section 8 and section 9 illustrates the conclusion.

2. Literature Review

This section focuses on the literature study which is close and relevant to the study: High smith and Cockburn (2001) have discussed certain factors of motivators in ASD. MOCC was proposed as a model of motivation of software engineering which covers several factors of software engineering. They have carried out their work by identifying factors in technical aspects of the development Ghayyur *et al.* (2017) discussed how agile can be implemented again traditional software development. The critical factors of scrum were identified by Akhtar *et al.* (2010) in native software industry who recommends certain changes in order to enhance the productivity. In Pakistan, the challenges faced in adoption and implementation of scrum was studied by Conboy *et al.* (2011). The success factors of ASD were done by Petersen *et al.* (2008) a detailed study of agile techniques was done by researchers who classified the extracted elements in people, process, technical and organizational as four different classes. Maryam *et al.* (2017) conducted empirical study on systematic literature review and the results of 109 agile teams were analyzed through regression analysis. Baddoo and Hall (2002) in their study consider reward as a most motivating factor. Wagener (2012) conducted their study on motivators and demotivators.

3. Research Method

a) Systematic Literature Review

The relevant literature is assessed through snowball process Sach *et al.* (2011). The literature studied is passed through an evaluation process, after that a list is generated which comprised of motivators and demotivators that include a detailed description of classification and sub-classification of these factors.

b) Planning of Mapping

Systematic literature review is conducted for evaluation of relevant data about motivators and demotivators of ASD. Most of the existing data is in dispersed and scattered way so there is a need to collect such distributed data through SLR.

c) Research Questions

The research questions of current research are shown in Table 1.

d) Search Strings

The search strings which are used for the extraction of relevant studies comprised of:

((({{SUCCESS}} OR {{SUCCESES}}) OR {{RISK}} OR {{RISKS}} OR {{DEMOTIVATOR}} OR

{DEMOTIVATORS}) OR {MOTIVATORS}) OR {BARRIERS}) OR {AGILE} OR {AGILITY} OR {ASD} OR {AGILE SOFTWARE} OR {AGILE SOFTWARE DEVELOPMENT}

e) Databases

Every search engine is searched and targeted by researcher in order to get more and more papers. Majority of the papers are from IEEE, ACM, and Springer and the duration of their publication ranges from 2000 to 2018.

f) Factor Mining

Although researcher found many research papers for motivators and demotivators, therefore a selection criterion is mentioned in Table 02 in order to select most appropriate and relevant papers.

g) Data selection for conducting Primary Study

For selection of paper, title of paper, abstract and conclusion has been studied. For all papers that have ambiguous objectives, they were eliminated.

1) Inclusion Criteria

For inclusion criteria, the points given below are considered:

- Journal or conference paper.
- English should be the medium of language.
- Studies must have solid accessible link.
- All those papers which are published after 2000

2) Exclusion Criteria

The exclusion criterion for this research study comprises of :

- "Editorials", "Tutorials", "posters", keynotes, "slides", and other non-peer reviews are excluded.
- Blogs and books are excluded,
- Publications in non-English language.
- All the studies which are unable to E-access.

h) Performing SLR

For conducting SLR, all those papers are studied that have a strong background to agile. They are shown in Table 3. The impact of the study is strengthened by including Conference and Journal papers. Thirty nine (39) primary sources are selected. However, the list is given which shows the most relevant papers in correspondence to our research string.

i) Study Countries

Table 4 shows the different countries where the selected paper's research was conducted. Different countries have their own count which is clearly visible in the table.

Table I: Questions of the Research

SN	Research Questions	Motivations
1.	What are the success & Risk Factors in Agile Software Development?	It will help to develop a detailed list of Success and Risk factors of Agile.
2.	How Success and Risk Factors can be mapped with the factors?	Its purpose is to map success factors into procedural, individuals and firm's factors.
3.	How Success and Risk Factors can be subclassified?	Aims to sub factorized the Success and Risk Factors.

Table 2: Document Selection Procedure

Step 1	Extraction of Relevant Paper: <ul style="list-style-type: none"> Read all the Paper's title and Abstract and then select the relevant paper.
Step 2	Intro and conclusion based selection. Selection of Papers: <ul style="list-style-type: none"> Selection of paper on basis of Intro and conclusion.
Step 3	Removal of Redundancy: <ul style="list-style-type: none"> Detailed study of all the Papers. Remove the duplication if any.
Step 4	Quality: <ul style="list-style-type: none"> In order to compile better results a form for Quality Assessment is developed.

Table 03: Paper Filtration

	Total Results Found	Filtration on basis of Title	Filtration on basis of Abstract	Final Selection
IEEEExplore	914	174	23	11
ACM	38	15	11	03
Science Direct	35	13	12	03
Research Gate	42	22	14	06
Scopus	15	9	04	03
SpringerLink	87	54	21	04
Google Scholar	874	223	65	05
Others	197	54	42	03
Total	2202	564	192	38

Table 04: Research Countries

Country	Count	Country	Count
China	6	South Africa	2
Australia	2	Finland	1
USA	3	Malaysia	2
Canada	2	Sweden	1
India	3	Norway	1
Germany	2	Thailand	1
Poland	1	UK	2
France	1	Netherlands	2
Japan	2	Korea	1
Switzerland	1	Ireland	2

j) Success Factors In Rq1

To answer RQ1, SLR was carried out to which helps the researcher to extract all the possible Risk and Success factors. Table 5 shows its description.

Table 05: Success Factors

S. No	Success Factors	Frequency out of 38	Percentage
1.	High Performance	2	6%
2.	Within Budget	9	24%
3.	Balanced Work	1	3%
4.	Individual Interest	3	8%
5.	High Quality Work	1	3%
6.	Life Cycle to be followed	4	11%
7.	Economic & Technology Feasibility	2	5%
8.	Award for Quality work	2	5%
9.	Teamwork and Top management Support	4	11%
10.	Task Identification & Work Flow	1	3%
11.	Good Knowledge of Domain	3	8%
12.	Exclude repetition	1	3%
13.	Quick & Valuable Feedback	6	16%
14.	Change Management	4	11%
15.	Uniqueness & Atomicity	5	14%
16.	Rules, Regulation & Laws	2	5%
17.	Tolerance level of work	4	11%
18.	Efficient, accurate and in time	2	5%
19.	Quick Communication Channels	4	11%
20.	Training & Development	2	5%
21.	Risk Minimization	3	8%
22.	Simplicity	1	3%
23.	Strong Executive Support	1	3%
24.	Face to Face Meetings	2	5%
25.	Team competency	2	5%

k) Risk Factors

Table 6, shows specific Risk (Demotivators) factors mined through SLR.

Table 06: Risk Factors

S. No	Risk Factors	Frequency out of 38	Percentage
1.	Working Location & Environment	5	13%
2.	Less Reward & Incentives	4	10%
3.	Huge Documentation	3	8%
4.	Unpredictable Working Environment	1	3%
5.	Frequent Variations in Priorities	2	5%
6.	Lack of Commitment	2	5%
7.	Lack of ownership	3	8%
8.	Lack of Resources	1	3%
9.	Lack of Executive Support	3	8%
10.	Traditional Process Models	3	8%
11.	Lack of Training & Development	1	3%
12.	Lack of Vision & Mission	2	5%
13.	Lack of Project Management Skills	4	10%
14.	Lack of Agile Experts	1	3%

l) Categorization of Success & Risk Factors (Rq2)

The researcher has classified the success and risk factors into firm, procedural and stakeholder's factors as shown in fig 1.a.

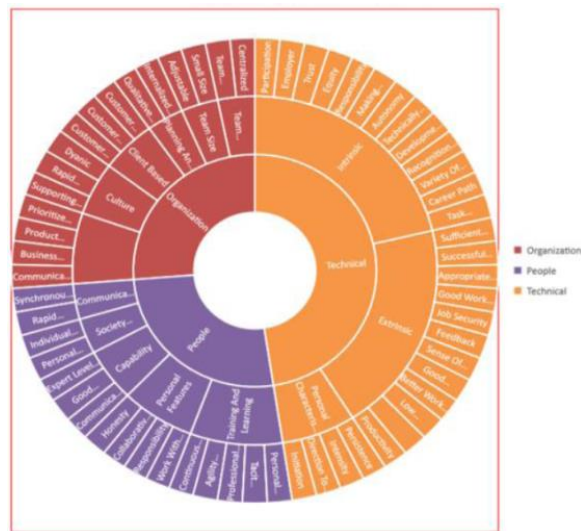


Fig 1.a

The figure depicts the success factors and their factorization which includes customer oriented, team dissemination, scope, judgment, overall cultural and organizational mechanism. Similarly classification of risk factors has also been done and shown in fig 1.b.

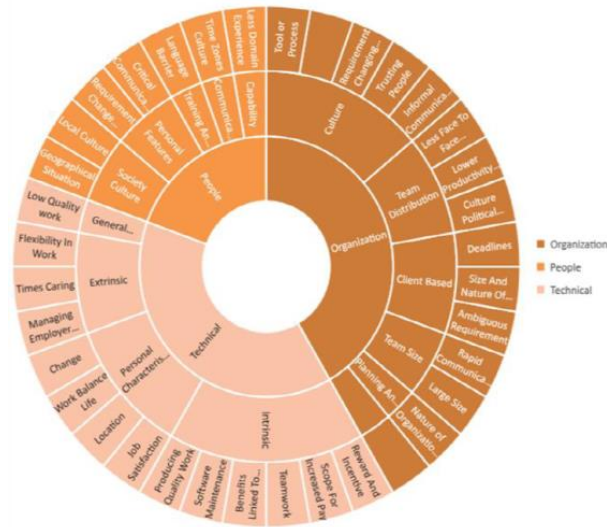


Fig 1.b

The most common factors in any organization can be: ambiguous requirements, type and scope of change in requirement, deadlines, poor and early decision making, political situation, less productivity, lack to face to face meetings, informal communication channels, inadequate team size, trust of people and nature of organization. On the other hand people's factor includes: little domain knowledge, different time zones, native culture, geographical conditions, critical communication channels and linguistic difficulty etc.

m) Factorization of Success Factors (Rq3)

This part of the research addresses the answer of RQ3. Subfactorization was done on success factors (Fig 1.c). The researcher has done categorization of success factors such as Recognition, Sense of belonging, Variety of work, Clear identification with tasks and Employee Participation. Following figure depicts all the factorization and its further sub-factorization, like Sense of belonging can be Intrinsic & Extrinsic etc.

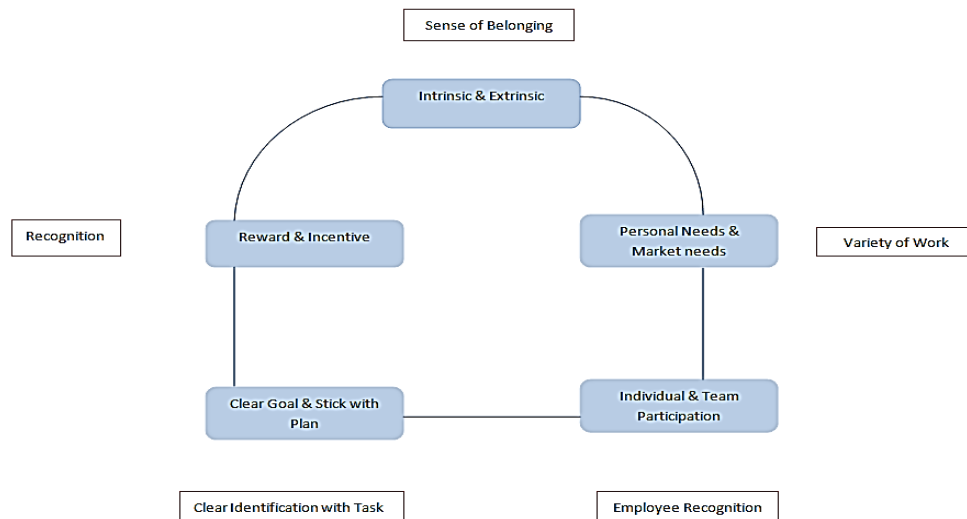


Fig 1.c

4. Conclusion

This study of SLR shows a detailed description of the success and barriers of ASD in several search engines. Researcher named these success factors as motivators and risk factors or barriers as demotivators.

A comprehensive list of success and risk factors is provided by the researcher and factorization is done on different basis like: people, technical and organization in order to provide a detailed overview accordingly. Keeping in view the strings, most relevant and best papers were extracted which satisfy the assessment criteria. All those papers which were selected were briefly described in this study. For more detailed study about success and risk, sub-categorization was conducted.

5. Future Work

In future, empirical study will be conducted to find more precise and accurate results of success and risk factors of ASD. Further plans will be to develop a risk effect model for Agile practitioners which will be useful enough for increasing the overall productivity.

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COMPARATIVE ANALYSIS OF EPIDEMIC AND SPRAY & WAIT ROUTING PROTOCOLS IN DELAY TOLERANT NETWORKS OWING TO DIFFERENT MOBILITY MODELS

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Abstract

Delay Tolerant networking is an approach that pursues to report the problems which reduces communication in disrupted networks. DTN works on Store-Carry and Forward mechanism in such a way that a message may be stored by a node for a comparatively large amount of time and carry it until a proper forwarding opportunity appears. To address these issues different routing protocols are functioning. DTN routing protocols are majorly categorized in two groups on the basis of their nature. One group has quota based nature while the other one has flooding based nature.. The present study aims to compare epidemic routing protocol (Flooding based nature) with spray & wait routing protocol (quota based nature) by deploying it on two different mobility models i.e Random Way Point (RWP) and Shortest Path Map Based Mobility Model (SPMBMM). To evaluate the efficiency and efficacy of said protocols following parameters were considered to calculate the best . a) delivery probability, b) message relayed ratio, c) buffer time average, d) overhead ratio and e) hop count with respect to varying size of buffer. For simulation purpose ONE simulator was used to analyze the performance of both routing protocols.. After simulation the results depicted that delivery probability of spray & wait protocol is higher than epidemic protocol with buffer size of 5 MB in SPMBMM. While epidemic has a higher message relayed ratio with buffer size 5 MB in SPMBMM. The major hitch of epidemic protocol is its high overhead ratio in SPMBMM. Research work further investigated that buffer time average of both the epidemic and spray & wait protocol is almost same for 3MB buffer size and 5MB buffer size respectively in RWP. The Hop Count average of epidemic routing protocol having buffer size of 3MB has a high rate as compared to spray and wait protocol in SPMBMM.

Keywords: DTN, AODV, OLSR, RWP, SPMBMM.

1. Introduction

The sizable nature of wireless communications in the current era communication scenario has realized a quick growth in heterogeneous networks. A heterogeneous network is defined as a network that connects computers and different devices which run numerous working systems and work on miscellaneous conversation protocols or access technologies. For example, a Wi-Fi network that offers a facility over wireless LAN and is capable to preserve its service while switching to a cellular community is a decent example of a wireless heterogeneous network. Some heterogeneous networks that function in movable or extreme global surroundings absence unceasing network connectivity. DTN is a tactic that follows the issue that minimizes verbal exchange in heterogeneous networks. DTN architecture is initially presented by Kevin Fall in the year 2003. In his work he introduced the store-carry and forward mechanism for the successful transfer of a messages in DTN frame work.(Fall, 2003).

2. Delay Tolerant Networks

DTN furthermore known as sporadically related mobile networks, are wireless networks in which entirely coupled direction from end to end doesn't exist. Therefore, in those networks, message shipping is depended on opportunistic routing wherein nodes use store-carry-and-forward pattern to send the messages. Yet, to set up the actual route on a basis of less information of interaction among nodes is tough. The great to efficiently ship information from a source to a vacation spot is a major Property preferred in every communication protocol. DTNs are taken into consideration by their loss of connectivity, consequently a deficiency of immediately source to destination paths. Traditional routing protocols like Optimized hyperlink kingdom Routing Protocol (OLSR) and ad-hoc on demand Distance Vector Routing (AODV) depend upon the existence of quit-to-quit paths among source and vacation spot. Those protocols used deterministic routing tactics which carry out properly while the routes are regarded a priority. They first set up an entire path after which forward the real information.

In a disconnected network like within the case of DTNs, give up-to-cess paths are hard or impossible to set up. This hooked up a need for a brand new method to routing that works across the challenge of a loss of on the spot end-to-end paths.

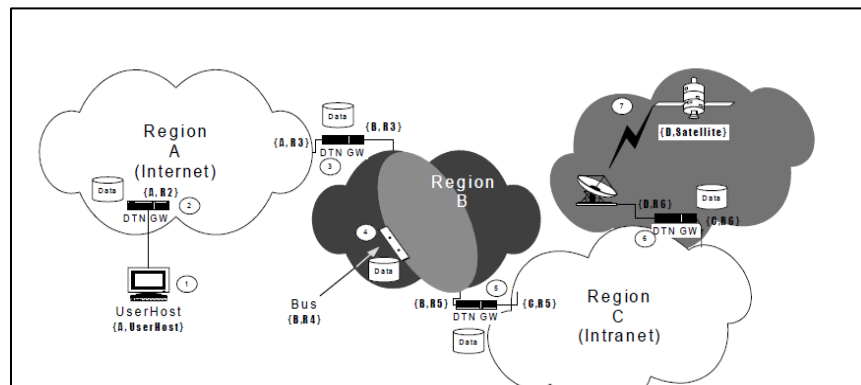


Figure 1: DTN Architecture (Fall, 2003)

3. Related Work

Ayub *et al.* (2011) Proposed the buffer scheduling policy "Message Drop Control which optimizes the single copy routing protocol first contact. In this paper they examine the proposed policy by comparing it with MOFO, DOA and LIFO. Results shows that proposed policy performed well and maximize the router performance in terms of delivery probability, message drop, overhead and buffer time average.

Li *et al.* (2013) Give a new mechanism cross layer data queue management to identify the data priority. Delivery scheme is used for fast communication of data and priority based interaction is used to identify data priority. Data priority is measure by three protocol which are priority dimension (PD), priority measure (PM), priority class (PC) to manage the data queue. Results show that it avoids priority collision problem and give high data delivery ratio. This gives better performance as compared to direct data transmission.

Chawla (2013) Discussed that DTN is mobile adhoc network which is known for intermittent connectivity, high error rates and long delay. In this research work author compare all well-known protocol of DTN i.e Epidemic, Spray and Wait (SAW), PRoPHET and MaxProp. Delivery ratio is nearly equal for MaxProp and SAW, while overhead ratio for SAW is much less than MaxProp. Average delay of SAW is higher for large buffer size. In small network and small

buffer size the average delay is minimum for SAW and with large buffer size MaxProp give better delay as compared to SAW.

Rashid *et al.* (2015) DTN is known for low connectivity, Unreliable links, topology change and network Partition. To overcome this issue each nodes try to multiple copies of messages to other nodes for higher delivery ratio. This approach makes network congestion due to which earlier stored message should be dropped. The buffer management policy is to determine which message should be dropped when buffer over flow happens. Author proposed the message drop policy named weight based drop policy. They dynamically adjust message weight criteria based on message properties which are message size, remaining time to live, message stay time in queue, hop count and replication count. To utilize the buffer efficiently they use weight criteria for finding the most appropriate message to drop. When the buffer of node is full their buffer management scheme WBD can determine which message to discard to achieve goal such as maximizing the delivery, buffer time average and minimize drops, overhead and transmission failure.

Das *et al.* (2016) DTN overlay on regional network including internet. Due to large delay time and high error rates TCP/IP protocols of internet does not work properly in DTN environment so a bundle layer is add in which messages are stored in buffer. It lay on the top of the transport layer where delay is tolerated which works like a bridge between incompatible networks. In this research work author Compare routing protocols of DTN under delivery probability, overhead ratio, average latency and average hop count. Delivery probability Maxprop give better result. In overhead spray and wait is best option it utilizes very less network resources but direct delivery has zero overhead ratio because it uses direct route to destination.

Cuka *et al.* (2017) Compare different protocols of vehicular DTN in different scenarios using average Packet delivery ratio (PDR), average Relay delivery ratio (RDR), Average hop count and average delay parameters. Simulation is done in ONE simulator and mobility model is Simulation of urban mobility (SUMO). Direct delivery, epidemic, energy aware epidemic, first contact, PROPHET, and spray and wait protocols are comparing on the basis of above parameters. Results show that for average PDR and in delay, performance of epidemic is better than other protocols. For average RDR and average hop count, direct delivery protocol give better results.

Kim (2017) DTN is proposed for intermittent communication of data packets by store and carry technique because it has large delay time because opportunistic contact is made by source to destination. Author compare spray and wait protocol and its variants like spray and focus, spray and fuzzy base forwarding in different parameter like number of nodes, velocities and deadlines. Simulation is carried out in Matlab to compare the behavior of spray and wait and its variants like spray focus spray and fuzzy base forwarding. The mobility model is STEPS because it is similar to human kinesis.

Hom *et al.* (2017) DTN is comprised of portable wireless devices and so they do not have end to end connectivity. To overcome the delay they introduced store and carry feature and many routing protocols. Due to intermittent connectivity of nodes DTN needs revolution in routing techniques. The study suggests the protocol currently the protocol in use utilize social features for routing efficiency. Among the current routing protocols its practices the social features of node to assist the process. Protocols are categorized by the number of message generated by node, to destination they delivered the message and further the process of selecting a relay node.

4. Simulation Environment

Opportunistic Network Environment (ONE) is used to simulate the parameters and scenarios in DTN.

We use simulation for performance optimization. The simulation is useful when the real world systems can't be accessible or engaged. The main characteristic of the ONE simulator which makes it appropriate for Delay Tolerant Network evaluation and analysis are given below.

- It consists of DTN protocols and also offers some simple frame work for user.
- The ONE simulator provides collaborating visualization and post- processing tackles sustenance for the protocols presentation assessment which creates an important component of the actual biosphere.
- The simulation is run on the basis of these settings and then the simulators generate the results.
- The ONE simulator works phase by phase using well configured interface.
- The ONE simulator has the ability to combine real life traces and feed from other mobility originator having comfort by stretchy I/O interfaces.

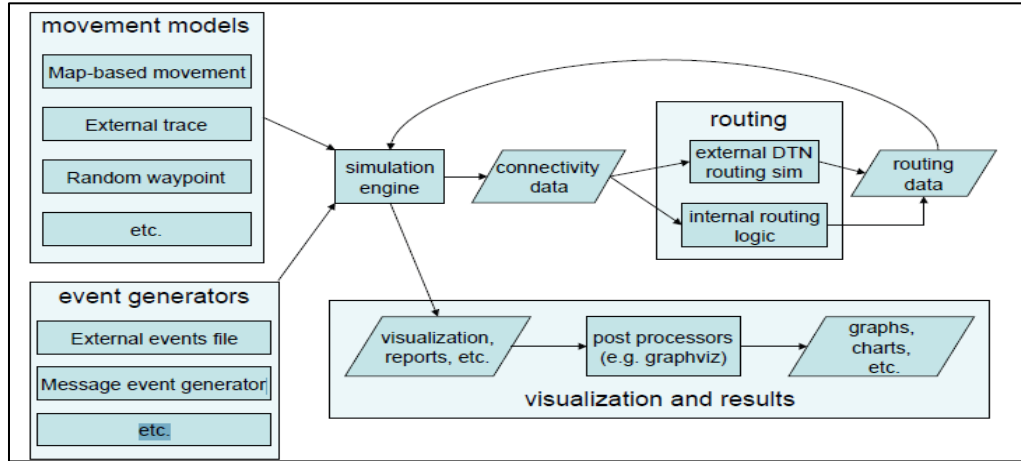


Figure 2: The ONE Simulator (Keranen *et al.*, 2009)

4.1 Simulation Setup

In order to compare the performance of said protocols the simulation setup has been done by selecting 100 nodes with varying buffer sizes between 3MB and 5MB. Blue tooth medium is used as a group interface.

Table 1: Simulation Parameters

Parameters	Values
No of nodes	100
Mobility Models	Shortest Path Map Based Mobility Model and Random Way Point Mobility Model
Routing Protocols	Epidemic Protocol and Spray & Wait Protocol
Buffer Size (MB)	3MB, 5 MB
Group Interface	Bluetooth
Communication Speed	250 kbps
Communication Range(m)	15m
Speed of Nodes in (m/s)	1-3(m/s)
Message Time-To-Live (TTL)	3600 sec

Time of message	15s-25s
Message Size	200kB-2MB
Simulation Area	1600m x 1600m

5. Results and Discussion

To evaluate and compare the results of said protocols following parameters are considered for simulation purpose.

5.1 Delivery Probability

Delivery probability basically the ratio of number of messages delivered over number of messages created.

$$\text{Delivery Probability} = \frac{\text{Total Messages Delivered}}{\text{Total Messages Generated}}$$

Figure 3 shows that Spray & Wait protocol with 5 Mb buffer size using shortest path map based mobility model have high delivery probability ratio of 0.372. While the same protocol with 3Mb buffer size using Random waypoint has lowest delivery probability value of 0.0222. But overall impact of buffer size on both protocols we see that with increase in buffer size the value of delivery probability show incremental approach.

Delivery probability is high in case of S&W in shortest path map based mobility model because of its forwarding based routing strategy and also with map based movement of nodes in simulation area. On other hand delivery probability have very low values in epidemic and S&W in random walkway point because of its irregular movement of nodes in simulation area.

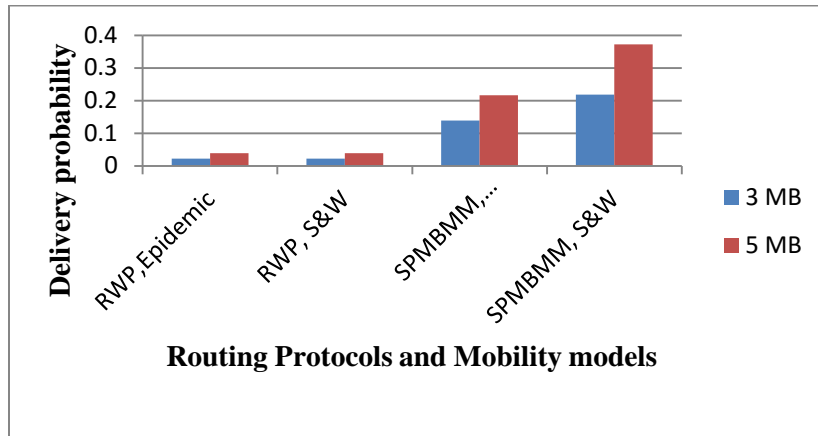


Figure 3: Comparision of Protocol & Mobility models w.r.t DP

5.2 Overhead Ratio

Overhead ratio determines the cost of network resources consumed during communication.

$$\text{Overhead Ratio} = \frac{\text{Total Messages Communicated} - \text{Total Messages Delivered}}{\text{Total Messages Delivered}}$$

Figure 4 shows that Epidemic with less buffer size using shortest path map base mobility model has higher overhead value of 59.3061. While on other hand Spray & Wait with buffer size of 5

Mb shows good result of having low overhead ratio value of 12.2981. Overall impact of buffer size is that with increase in buffer size overhead ratio goes down.

Overhead ratio is much higher in Epidemic routing protocol with shortest path map based mobility model because of its flooding nature. Epidemic consumes a lot of network resources which is not good for smooth communication while in same scenario S&W have low overhead ratio which show is better from epidemic w.r.t overhead ratio.

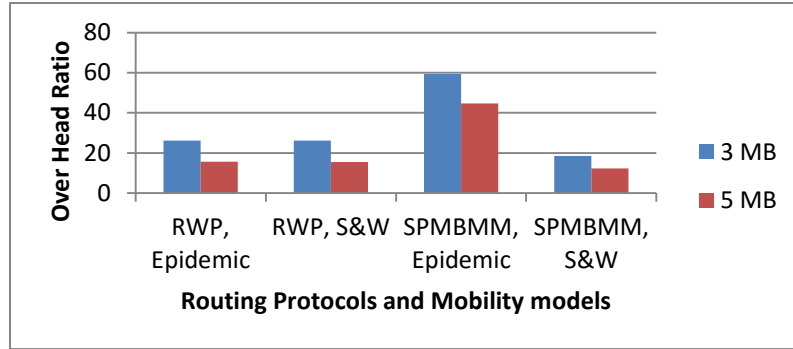


Figure 4: Comparison of Protocol & Mobility models w.r.t Overhead Ratio

5.3 Buffer Time Average

Normally time taken by the message in buffer at every node is referred to as Average Buffer Time.

$$\text{Buffer Time Average} = \frac{\sum_{i=1}^n \text{Buffer Stay Time of Message}}{\text{Total Messages in the Buffer}}$$

Figure 5 shows that buffer time average has high value of 7048.7209 and 6990.2608 for spray & Wait and Epidemic in Random Way Point with 5 Mb of buffer size. While Epidemic has less value of 716.6536 in shortest path map based mobility model with 3 Mb of buffer size. Overall impact of buffer size on buffer time average is that it increases with increase in buffer size. Buffer time average is abnormally high in both Epidemic and S&W routing protocols because in RWP node move in irregular fashion and path establishment to destination take more time that's why message stay time is high in RWP, while in SPMBMM nodes using Dijkstra's algorithm to use shortest path to destination with this feature message stay time is minimum.

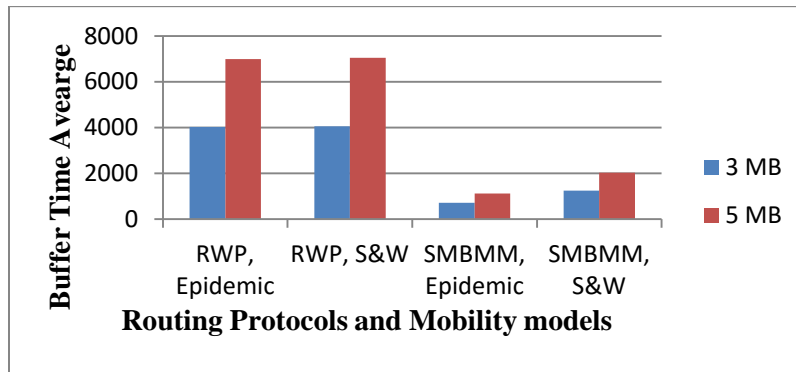


Figure 5: Comparison of Protocol & Mobility models w.r.t Buffer time average

5.4 Message Relayed

It is the average time taken by message which is successfully delivered to destination.

Figure 6 indicates that Epidemic with 5 Mb buffer size and shortest path map based mobility model have higher value of 565744 and 479916 value with 3 Mb buffer size. While Spray & Wait with Random Way Point and 3 Mb buffer size has least value of 34547.

In RWP both routing protocols have minimum value of message relayed which shows that in RWP message take less time to reach to destination while using epidemic in shortest path map based take more time because of mapped movement. In message relayed parameter RWP is much better than shortest path map based mobility model.

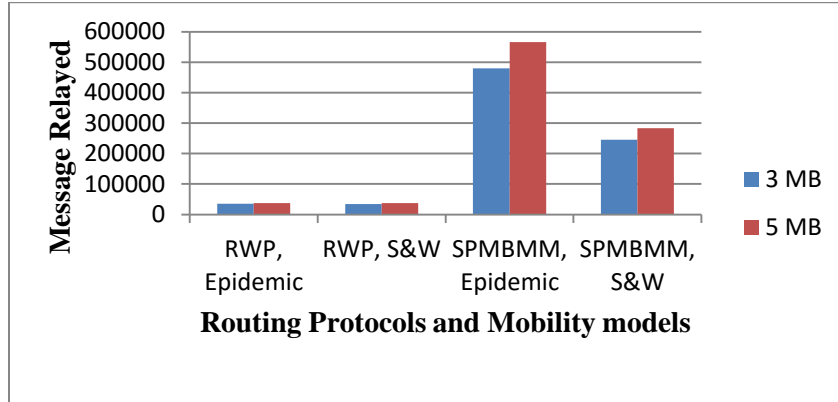


Figure 6: Comparison of Protocol & Mobility models w.r.t Message Relayed

5.5 Hop Count

Hop count is the average no of nodes, which the message has to pass from source to destination.

Figure 7 shows that Epidemic having both 3 Mb and 5 Mb with shortest path map based mobility model have high values of 4.3064 and 3.8686 respectively. While on other hand Spray and Wait having both 3 Mb and 5 Mb with Random Way Point having least hop counter value of 1.4423 and 1.4373. Except Epidemic with Shortest path map base mobility model in all other cases hop counter value are slightly change.

Hop count average value is much higher of epidemic routing protocol using shortest path map based routing protocol because of its flooding nature while S&W have less hop count average in shortest path map based mobility model because it forward message to limited $L > 1$ number of nodes because of this feature hop count average is minimum in S&W.

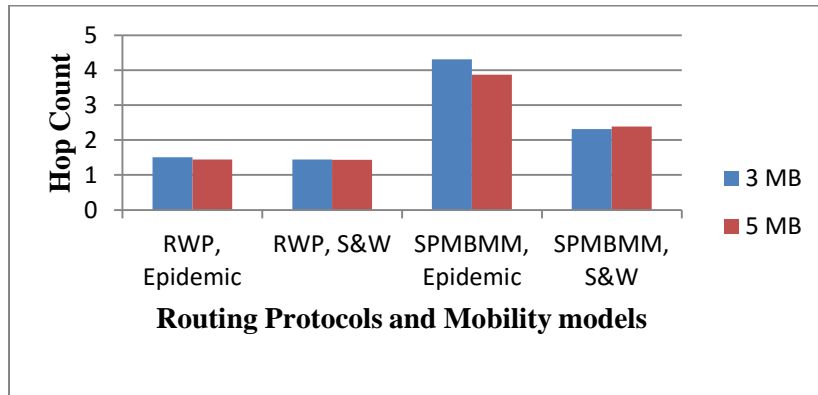


Figure 7: Comparison of Protocol & Mobility models w.r.t Hop Count

6. Future Direction

As discussed earlier that rare work has been done on the comparison of epidemic and spray & wait routing protocols with mobility models RWP and SPMBMM. This area has a strong potential and can be very effective in future. PROPHET protocol and Maxprop protocol can be evaluated on the same parameters i.e delivery probability, overhead ratio, message relayed, buffer time average and hop count. For future research work these protocols can also be compared on other parameters like message drop and latency average.

The routing protocols and mobility models are still in building stage. So the present study can contribute in future work for the betterment of routing protocols and mobility models.

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MOTIVATION TOWARDS COTS BASED SOFTWARE DEVELOPMENT FOR SMALL AND MEDIUM ORGANIZATION

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Abstract

COTS (Component off the shelf) based software development is an approach to build up new system using the commercial products. It is the assortment of the best possible components/modules/units that best satisfy the user requirements. COTS components can be built in-house, while some may be developed by a third party (organization or programmers) identified as (COTS).

Through this research the researcher had agreed to the following major success factors of COTS such as time, cost, and effort reduction. Additionally, it is highly componentized, secure software, speed up production, reliability and prior testing[Success factors can be defined as activities, functions, artifacts or business practices that bring benefits to organization (economic and social benefit) and customer (requirements satisfy)]. The purpose of this research is to highlight the importance of COTS based software development in KP region.

The researcher has executed her research in the KP geographical area (software house in dean trade center) and was able to find out the benefits, costs and security of these Commercial off the shelf components by distributing different research paper in different software housed of KPK. Moreover, a systematic literature review was conducted as a research methodology.

Keywords: COTS, Reusability, Component based development

1. Introduction

This research focus on one of the major initiatives of component based software development that is COTS and reusability and highlight their success factors (time, cost, effort reduction and it increases the overall productivity, highly componentized, secure software, speed up production, reliability, prior testing). The research also discusses COTS as one of the major cause towards the success rate of software industry.

1.1 Method

Systematic literature review (SLR) was conducted and the major success factors (cost, time, effort reduction, productivity and reliability increases) were agreed by the researcher. The research questions and sub questions were answer through SLR, and empirical research was done by distributing the research questions at 41 registered software houses in deans trade center KP. The research questionnaire was filled by programmer, CEO and project managers, the answer validity were forward to experts including my supervisor, and other PhD scholars of computer

science. The reliability of research questions (given by different experts) was 0.78 which was sufficient for additional analysis.

The following research questions were to be answered by SLR.

RQ1. How widely reused components are common assets in software?

RQ2. Do developers prefer to build from scratch or to reuse the COTS?

RQ3. What are the actual benefits/success factors of using COTS?

RQ4. Will COTS leads to better organization quality?

1.2 Search strategies

The total databases collected were 1954 out which the number of relevant paper was 171. The research papers were distributed continent wise, yearly wise, study strategies wise. In organize the appropriate literature there is a proper method required. The overall search consists of two components.

- Primary Search Phase
- Secondary Search Phase

1.3 Primary Search Phase

The primary search phase contains the search of the relevant literature in Online Databases, Search Engines, Individual Journals, Conferences, PhD/MS Dissertations and Theses.

1.3.1 Online Databases

- ACM Digital library
- IEEE Xplore
- Science Direct
- Springer

1.3.2. Online Search Engines

- Google scholar
- CiteSeer

1.3.4 Individual journals

- International journal of computer application
- International Journal of Software Engineering & Applications (IJSEA)
- International Journal of Informative & Futuristic Research (IJIFR)
- International Journal of Engineering Science and Technology
- Journal of Theoretical and Applied Information Technology
- Journal of Applied Environmental and Biological Sciences

2. Primary Search Exclusion & Inclusion Criteria

RQ1. How widely reused components are common assets in software?

The table below show the number of publications searched, relevant and irrelevant databases

Table 1

S.no	Database Name	Total number of Publications found	Relevant	Irrelevant
1	IEEE	104	6	98
2	ACM	127	8	119
3	Google scholar	105	3	102
4	Science direct	107	1	106
5	Springer	16	2	14
6	Elsevier	14	3	11
7	others	51	14	37
	total	524	37	487

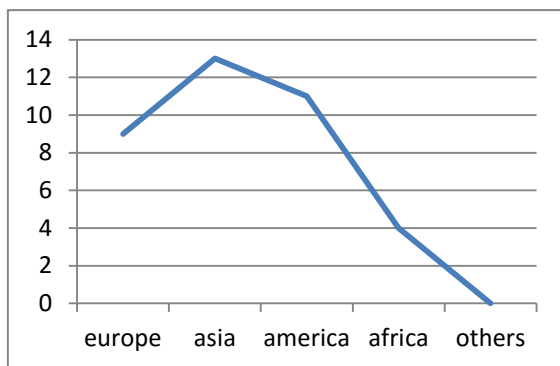


Fig 1 Continent Wise Distribution

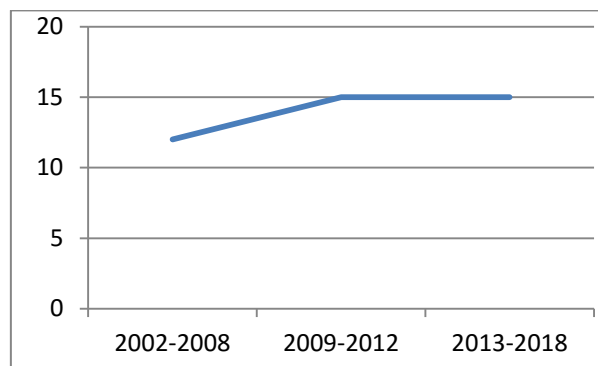


Fig 2 Yearly Wise Distributions

RQ2. Do developers prefer to build from scratch or to reuse the COTS?

Table 2

S.no	Database Name	Total number of Publications found	relevant	Irrelevant
1	IEEE	115	10	105
2	ACM	19	5	14
3	Google scholar	59	4	55
4	Science direct	117	5	112
5	Springer	20	6	14
6	Elsevier	25	2	23
7	Citeseer	15	1	14
8	Others	72	11	62
	Total	442	42	400

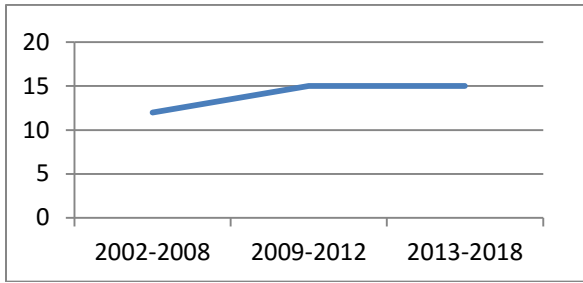


Fig 3 Continent Wise Distribution

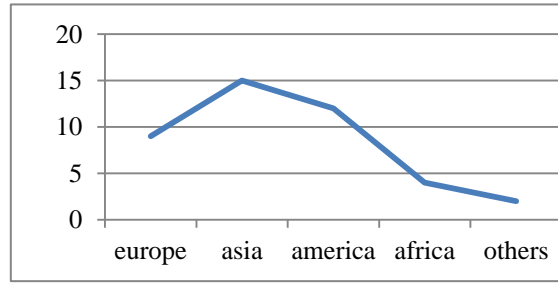


Fig 4 Yearly Wise Distribution

RQ3. What are the actual benefits/success factors of using COTS to software industry?

Table 3

S.No	Database Name	Total number of publications found	Relevant	Irrelevant
1	IEEE	98	15	83
2	ACM	177	10	167
3	Springer	119	5	114
4	Elsevier	12	9	3
5	Google scholar	100	5	95
6	Science Direct	16	3	13
7	Others	35	5	30
	Total	557	52	505

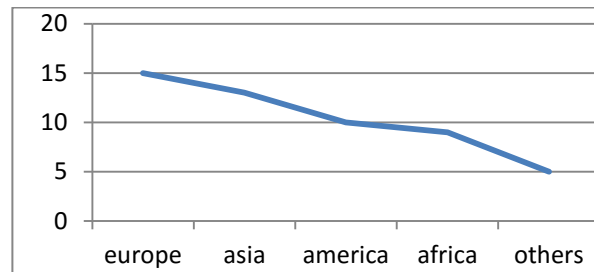


Fig 5

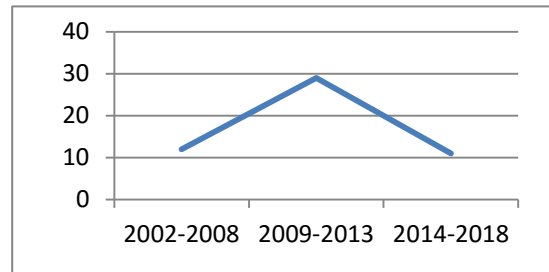


Fig 6

RQ4. Will COTS leads to better organization quality?

Table 4

S.No	Database Name	Total number of Publications found	Relevant	Irrelevant
1	IEEE	112	7	105
2	ACM	90	5	85
3	Springer	86	4	82
4	Google Scholar	19	8	11
5	Science direct	75	6	69
6	Elsevier	18	3	15
7	Others	31	7	24
	Total	431	40	391

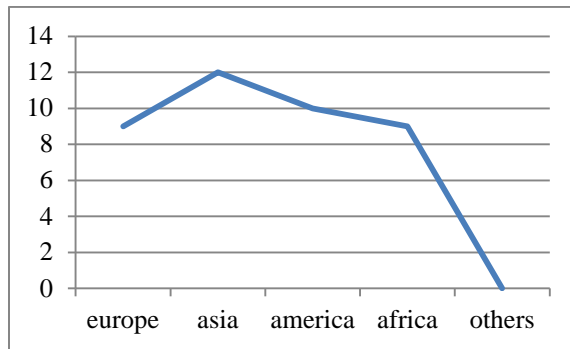


Fig 7 Continent Wise Distribution

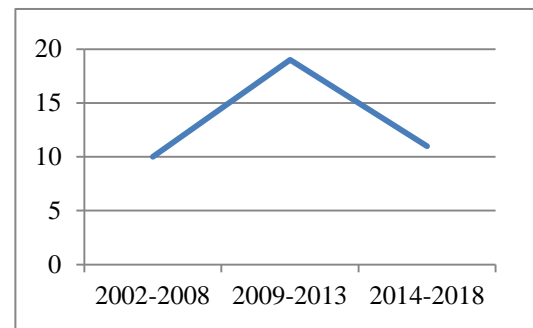


Fig 8 Yearly Wise Distribution

3. Discussion on Research Question

3.1 RQ1. How widely reused components are common assets in software?

As the name indicates software reusability is the process to develop new software systems from reused components (components that are already been developed and have been use in various software system). The reused components are highly componentized as they follow a well-planned and organized approach. The major advantages of reusability are more secure system, easier maintainability and higher portability.

3.2 RQ2. Do developers prefer to build from scratch or to reuse the COTS?

most of the software developers prefer to build software from reuse components because it save time as the components are already tested moreover Component based software is defined as an approach in which software is developed by integrating components that are already developed and have been reused and tested again and again, the best component is selected from repository of components to be integrated into the developing system to give the best possible artifacts and customer satisfaction towards the developed software system.

Component is defined as a piece of code that is design with intent to be reused in different software developing system accordingly. Component based software development brings benefits to organization like reduces cost, time and effort as the component are already developed and have been tested. It also increases the reliability and productivity.

3.3 RQ3. What are the actual benefits/success factors of using COTS?

COTS is defines as a software package that is accessible in market for the reason to incorporate with a system that is already defined in advance. COTS is describe as a product that is Vend, planed, or certificated to the public Advisee by a seller trying to revenue from it Offered in abundant, alike replica Used without interior modifications

3.3.1 Cots Based Software Development Success Factors

3.3.1.1 Highly componentized

In developing software from COTS components the developer must select the best possible component from the available components in organizations repository. With the selection of best component COTS is easily maintainable in future. Highly componentized components are easily maintainable.

3.3.1.2 Reduced cost

As the system is build from already reused and tested component it reduces the overall cost of system. Cost can be reduces by conducting a proper market research and carrying out a

preliminary cost estimation which include the cost of hardware resources, license and certificate charges, upgrade and maintenance cost.

3.3.1.3 Reduces time to market

The COTS products are already tested and reused again and again the time to make develop new product is reduced, and the final product is delivered on time. To reduce time to market the developer must select the COTS product at suitable time in dimensions to assure that the most up-to-date technology is selected, if COTS component is selected too early then the success of the final system might be at risk.

3.3.1.4 Increased reliability

Reliability is defines as if a certain process fail to executes within some specified time then the system is not reliable. If the reliability of a system is 1 then the system is highly reliable and if the reliability is 0 then the system is not reliable. Reliability of a components is measured by following factors like component dependency, operational profile, reusability and complexity of component.

3.3.1.5 Increases productivity

The use of COTS component has increase the overall productivity of many international organizations like NASA (National Aeronautics and Space Administration). Productivity can be increase by conducting regular meetings with customer and establishing business terms with seller, Because of increase productivity and other advantages of COTS today's software industry prefer COTS over traditional approaches to develop software.

3.3.1.6 Increase portability

COTS documents are complete and can be easily transfer from one situation to another situation without internal modification. Higher the portability better will be reusability.

3.3.1.7 Prior testing

COTS components are already tested as they have been use in various software system. Prior testing reduces error and bugs and the software system is more reliable and secure.

3.3.1.8 Speed up production

As the cost and time is reduces so productivity is increase. The developer have to spend less time and efforts on COTS component. Reusability also speed up production as the software development time and validation and testing time is reduced. Software productivity can be increase through user feedback.

3.3.1.9 More time for important goals

COTS components are already tested and have been reused in different system, so the developer can utilize their time on other important goals like integrating, reliability and security, maintenance and upgrade.

3.3.1.10 More secure software

COTS components are secure but this security can lack in case of not proper initial analysis, not selecting appropriate component and not using proper standards methods to integrate COTS component.

4. Conclusions

In our research we concluded that COTS (Commercial off the Shelf) based software development is an approach that develops software from already reused components. The COTS components are commercially available in market. COTS components brings following benefits towards organization 'highly componentized', 'reduced cost', 'reduced time to market' and thus that time can be use in important tasks, COTS 'increase reliability' and 'increase productivity' of overall system 'portability' and 'prior testing', 'speed up production' and 'more secure software' brings more benefit to any organization adopting COTS.

Data collected from various regions indicated that 82% of developers prefer COTS because it reduces cost and time and increases reliability and productivity.

5. Future Work and Recommendation

It is recommended that future researchers should work on risk factors of COTS and it is also recommended to have practical implementation of COTS in future

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UTILIZATION OF FINGER BASED SENSORS IN GENERATING ECG REPORT TO PROVIDE EASE TO PATIENTS

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Abstract

Electrocardiogram (ECG) plays vital role in diagnosing large number of diseases and disorders related to heart. ECG devices are able to perform multiple parameters by analyzing the patterns of bio-signals. The state-of-art ECG machine uses electrodes attached to human body using gel. The whole process agitates the patient resulting in disturbed ECG report by producing noise due to movement, imbalanced electrodes, and heavy objects. The proposed ECG system is portable finger-based system that generates ECG report in minimum time duration with providing ease to users. The system replaces disturbing electrodes by a single bio signal identification sensor. It takes signals from one finger of patient through sensor in 7 seconds. The sensor is followed up by combination of various capacitors and buffers in order to enhance signals. The signals are then transferred to software using USB port for several medical required filtrations and overall noise removal. The result of the process is an ECG signal representing heart condition of patient. The results can be stored for future medical investigations like improvement or decline in health of patient. The proposed prototype is deployed in several hospitals for testing. The system evaluated through comparison method with current system and results are satisfactory.

1. Introduction

An electrocardiogram (ECG) machine evaluates the heart condition by interpreting the electrical impulses. These electrical impulses activity is recorded by ECG machine (Dr.Roger Henderson 2017). It is a medical that detects the abnormalities of the heart. It checks symptoms of the heart disease such as shortness of breath, dizziness, fainting, rapid or irregular heartbeats. Currently the ECG process consists of several wired electrodes that are attached to the patient's body and are connected by wires to the device. ECG signals are recorded on paper chart and tracing are described by wave components or segments (Joshi, Tomar, and Tomar 2014). During ECG process patients have to lie down on bed and the wired electrodes with gel are attached to patient's body that may harm human skin tissues. Also, imbalance electrodes or little weight effects the result of ECG and the whole process will be repeated again. The proposed finger-based ECG system generate the ECG report of patients, that recurs to Infra-Red sensor for taking bio-signals from one finger and hardware setup for data acquisition through micro controller chip. Signals filtration and normalization must be performed to obtain the required ECG waveform. Filtration of bio-signals are performed by polyester capacitor and potentiometer at hardware level. Further filtration and normalization performed by Engelese Zeelenberg algorithm at software level to get invariant ECG waveform. The motive of system is to provide ease to the users without time consumption in ECG process and its result. ECG reports are saved into database as well and two ECG reports comparison is also provided through Euclidean distance.

2. Literature review

A wearable ECG device is designed, which is small, sensor based three lead electrocardiographs. Patient data can be track also sent to hospitals. Support software is under development, which gives alert sound when patient's ECG is abnormal after completion. Also gives patient's history with medication. Secure database will be introduced which save patient's data (Chung et al. 2007). A 3-lead wire sensor electrodes, two sensors electrodes placed on the chest and one on the left hand. These sensors electrodes take electrical signals and send to Arduino device. Pan Tompkins QRS algorithm used for ECG analysis in cell phone application. Arduino device having wireless sensor which send signals to cell phone and the application shows ECG result (Pantelopoulos and Bourbakis 2010). A survey has been conducted for wearable sensor-based systems which are used for health monitoring. Study highlights the challenges which are still faced by most of the wearable devices i-e less user friendly, more obstructive (A. Lourenço, Silva, and Fred 2011). An ECG system placing both hands on hardware mount. Hardware mount have signal sensors with silver/silver chloride as electrodes on it. Both hands finger placed on these sensors which takes electrical signals and send these signals to software system through Bluetooth. Software system remove noise from signals through Engelese Zeelenberg algorithm, then features are extracted and ECG resulted wave provided on system screen (Trobeć and Tomašić 2011). Synthesis of the 12-Lead Electrocardiogram, An ECG system which provides the condition of heart having wired 12-leads electrodes which are placed on chest, arms and legs. Roman Trobec and Ivan Tomasic used gel on electrodes for interface with skin. More time is required for performing ECG, people faces problems with electrodes placement and gel interface with skin (Gradl et al. 2012). In 2012, an android based application that monitors real time ECG and arrhythmia detection using Pan-Tompkins algorithm with QRS detection. Selection of heartbeats is automatic with simple algorithm which only took first 10 high quality heartbeats. Also consume more computational resources. Only works better in home or ambulatory setting, long term ECG monitoring of patient is not done in this android device (Chen and Wang 2011). An ECG system on android platform which monitors and diagnose patient heart condition. The patient has to wear a sports shirt having compact ECG sensors in it, it provides the signals to the android application. The also provides automatic emergency call system (Cao et al. 2011). Huasong Cao, Leo Stocco and Victor Leung provide ECG system having 12-lead wireless pads and providing the record and result of heart condition, they discussed the criteria for pads placement. The 12-lead pads are wireless but are place on the chest using gel for interface with the skin (Ning, Jiang, and Kang 2015). Guochen Ning, Fanhfang Jiang, Yan Kang designed and realized a system to analyze and record the ECG signals based on virtual instruments, which can provide visual interface to comfort the user to monitoring heart. But they just provided the software system which generates the result, signals will be taken from another hardware (Kang et al. 2016). A system had been designed for the authentication of ECG signals collected from smartphones or wearable devices. An algorithm is proposed for fast authentication and effective results and implements it in watch type prototype. Also, to remove noise from wearable devices new algorithm is proposed (Shokouejinejad et al. 2017). An ECG system shows heart rate variability and its analysis using LabView technique. ECG signals acquisition based on filtration of signals and feature extraction. ECG signals taken through electrode cable place on chest and connected with Arduino device. Arduino device have plugin for USB cable to computer for ECG results (Barbagelata et al. 2018). Smartphone application provided for obtaining ECG reading from 12-leads standard ECG system. 12-leads ECG system connected with heart matrix medical device hardware, which takes ECG signals from standard 12-leads system and transfer to smartphone device (Android, iPhone, iPod). Application in smartphone shows the reading of ECG on screen (a Lourenço et al. 2012).

3. Methodology

The system framework is shown in Figure 1. At the hardware level, sensor is used to take bio-signals from subject finger, amplify and filtrate the signal and transfer it to software by USB data cable. MATLAB is used for the implementation of software. At software level normalization, filtration, mean subtraction, pattern recognition and classification are held for signal. Database is also implemented to store or retrieve the data. Group of functions are implemented to retrieve data from the database.

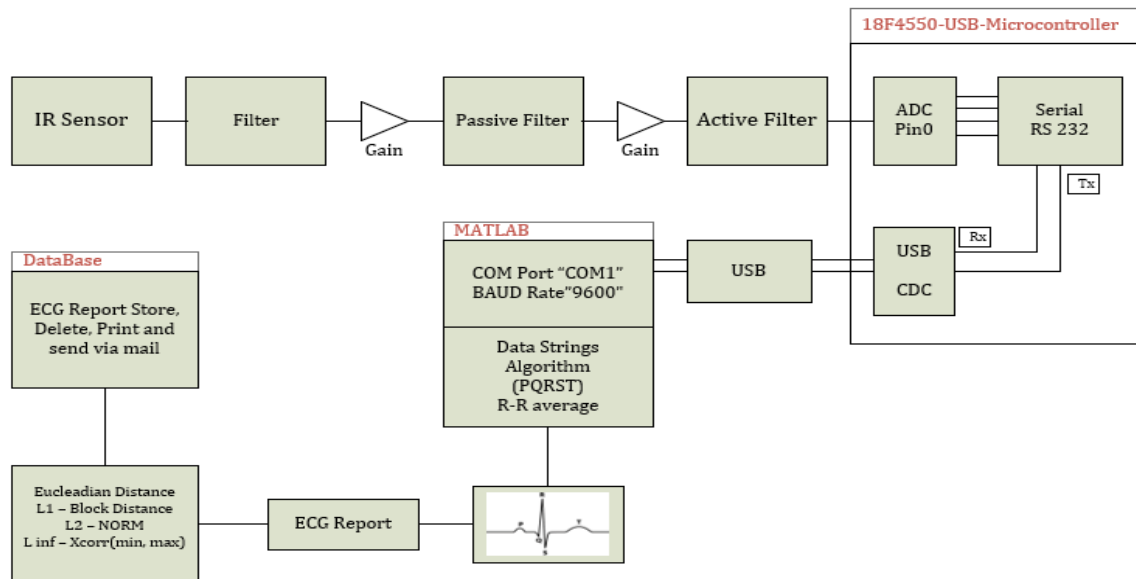


Figure 1 Block Diagram of the System

3.1. Proposed prototype hardware

Advancement in bio-signal sensors leads to wearable, wireless technologies for gathering ECG signals (Cunha et al. 2010; Leonov et al. 2009; a Lourenço et al. 2012). Still, current systems are used in many medical hospitals for ECG process. In these systems subject's body contact is needed i-e hands, legs and chest area for pasting gel to stick wired electrodes. We proposed a system to which takes signal from finger through sensor and generate an ECG report on screen. That report can be store in database as well as in other format, also it can be print and send to others through mail.



Figure 2 Finger placed on IR sensor

The system is depicted in Figure 2, which shows Infrared sensor (IR) for receiving signals from the finger. Received signals are transferred to two passive filters and one active filter for filtration of noise from the signal. As signal is very minute ranges from 5Hz to 25Hz is amplified by potentiometers and buffer. Then signals are transferred to USB-Microcontroller chip (PIC 18F4550) for digitizing the signal by analog to digital converter (ADC) and transmit it to processor to transmit it to internal USB handler convert signal into serial data. External USB is connected to software for transmission of data.

3.2. Proposed prototype software

When data is transmitted by hardware device to software system, software ask for its port name, baud rate and samples. Once the information is delivered, start capturing data from hardware device. Now it goes through different phases of the algorithm which are discussed below:

3.2.1. Normalization and filtration

First a raw signal is captured and plotted. This noisy signal is normalized through amplitude normalization. The amplitude normalized signal is plotted and send it for digital filtering of the signal through low pass filter. This results in remove of high noise (50 Hz) from signal. Raw signal and filtered signal are depicted in Figure 3.

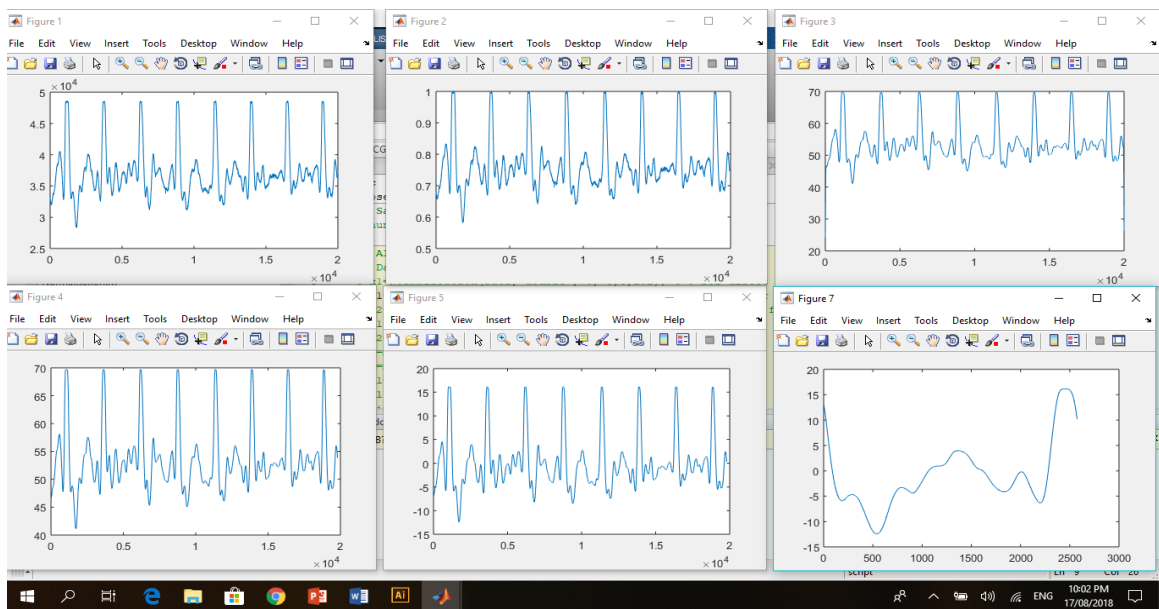


Figure 3 Noisy signals are normalized

3.2.2. Mean Subtraction

The filtered signals are resized by throwing first 100 samples and last 100 samples for better signal wave. The original signal is subtracted from the mean of the signal for defining a line.

3.2.3. Pattern recognition

In this step, find first R peak of the first signal and declare it first index then find another R peak and declare it second index. Full first signal is formed after finding indexes. Now process is repeat for second signal. When two waves are formed, R to R average of both signals are taken and show result in a single wave which is rearrange to be in P-QRS-T signal form.

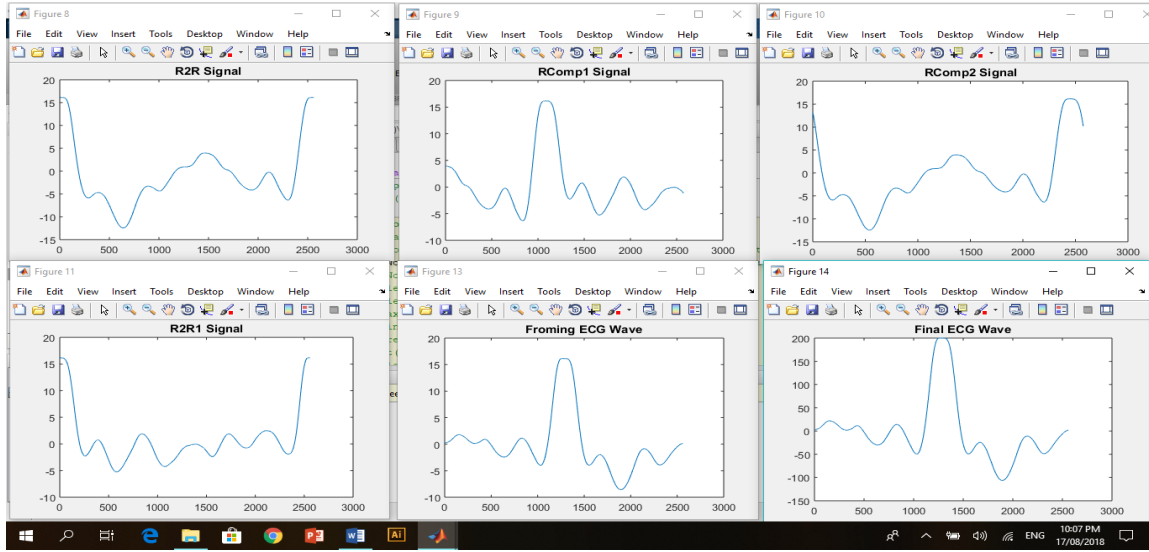


Figure 4 Forming of P, Q, R, S, T wave form from average of R-R peak waves

3.2.4. Classification

Classification is performed using Euclidean distance, which takes two reports from the database and classify the distance between those reports. A real time ECG report is also classified with the available ECG report from database. ECG reports are pass through the following classifier for distance calculation:

```
ED = (ED/length(x1)).^(.5);
L2 = norm(abs(x1-x2),2);
L1 = norm(abs(x1-x2),1);
Linf = norm(abs(x1-x2),inf);
XCorrMax = abs(max(xcorr2(x1,x2)));
XCorrMin = abs(min(xcorr2(x1,x2)));
```

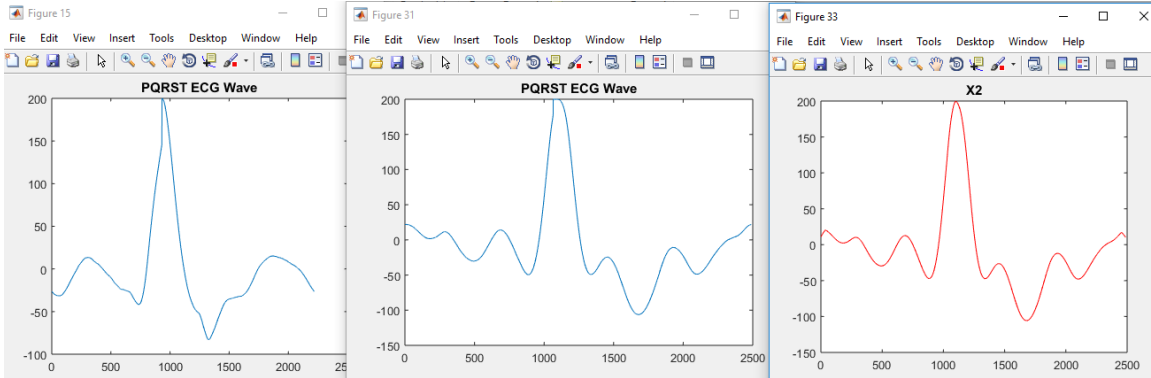


Figure 5 Euclidean distance ECG wave result of two reports

4. Experimental Results and Discussion

The evaluation of the proposed system is done by taking ECG of 33 subjects from the existing electrode-based system and the proposed system. Compare the results of proposed system with existing system which shows that 28 reports are same and 5 reports are different. On the basis of these results, we can determine the accuracy and performance of the proposed system. The proposed system is 85% accurate to generate an accurate ECG report.

Table 1 ECG results of patients

Patient No.	ECG1 (Hospital System)	ECG2 (Finger-based System)	Comparison Result
1	Time taken: 6 minutes Report: Normal	Time taken: 10 seconds Report: Normal	ECG report results are same
2	Time taken: 5 minutes Report: Normal	Time taken: 8 seconds Report: Normal	ECG report results are same
3	Time taken: 7 minutes Report: Normal	Time taken: 9 seconds Report: Normal	ECG report results are same
4	Time taken: 5 minutes Report: Abnormal	Time taken: 10 seconds Report: Abnormal	ECG report results are same
5	Time taken: 5.5 minutes Report: Normal	Time taken: 8 seconds Report: Normal	ECG report results are same
6	Time taken: 5 minutes Report: Normal	Time taken: 11 seconds Report: Normal	ECG report results are same
7	Time taken: 6 minutes Report: Abnormal	Time taken: 9 seconds Report: Abnormal	ECG report results are same
8	Time taken: 7 minutes Report: Normal	Time taken: 8 seconds Report: Normal	ECG report results are same
9	Time taken: 10 minutes Report: Normal	Time taken: 9 seconds Report: Abnormal	ECG report results are different
10	Time taken: 5 minutes Report: Normal	Time taken: 9 seconds Report: Normal	ECG report results are same

5. Conclusion

This system provides ECG report in real time through taking bio-signals from finger. Our goal is to provide ease to users by eliminating gel electrodes. We devised a framework that only needs contact with the patient's finger and show ECG result on system screen that can be store, print and sent to others through email. Moreover, system is evaluated through comparison method and confusion matrix which shows that 85% of ECG reports are correctly identified. Future work is focus on introducing classification of ECG results as well as making fully mini portable system. It will be easy operable by users without any guidance.

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A SURVEY ON MACHINE LEARNING ALGORITHMS FOR QUERY BASED TEXT SUMMARIZATION

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Abstract

Extraction of relevant information on specific query from rapidly growing data is a concern for quite time. A reasonable amount of work is done in this area to overcome extensive searching and to reduce time required. Time consumption on large scale is certain in order to scan and analyze data from all the documents for provided query. Therefore, text summarization is paramount research area these days. Text summarization is about to find most relevant information from single or multi documents. The knowledge-based and machine learning are the two methods for query-based text summarization. Machine learning approaches are mostly use for calculating probabilistic feature in Natural Language Processing (NLP) for both supervised and unsupervised learning. The goal of this survey is to identify and analyze machine learning approaches for query-based text summarization to reduce time and effort in finding a useful summary for the users as specified by their need. The most used machine algorithms are implemented in a programming language. The algorithms for implementation are selected on literature survey. Further a comprehensive discussion is done to present the internal working mechanism of machine learning approaches used for query-based text summarization.

Keywords: Query based text summarization, Natural language (NLP), Machine Learning, Information Retrieval (IR), Text Mining.

1. Introduction

Natural Language Processing (NLP) is a field of computer science that provides interaction between computer and human language. It is difficult to retrieve related information according to the user demand due to increase in digital data and information (Asthana et al. 2017). The data scientists worked in the area of machine learning approaches to automate the information retrieval process. Machine Learning techniques are closely related to the fields of Information Retrieval (IR) , Artificial Intelligence (AI), Data Mining, Statistics , text mining and as well as Psychology which has immense impact in the area of Automated Text Summarization. It has variety of applications like summaries of newspapers, articles, books, magazines, scientific paper, weather forecasting, stock marketing and news headlines (Das et al. 2016). Text Summarization depends upon the understanding of languages according to the context. Language is different for different genres. It may have different writing styles, semantic meaning and sentence structure i.e. Research papers, blogs, twitter, single or multiple documents, emails and search engines. A strong framework is required for considering the data in human way which is a key factor to define a summarizer's task in automated text summarization (Sankarasubramaniam et al. 2014). In single or multi-documents the purpose of summarizer can be either generic, query-based or

domain specific. Text Summarization involves extraction of central information from the original text document. The extracted information is a condensed description acts as a concise summary to the user. It is difficult for humans to understand and interpret the content of the text in shortest time (Das et al. 2016). This is why the need of automatic tools for information retrieval is required for user. It is very difficult to utilize all the relevant information available online without using such advance tools. It produces a summary from a simple or multiple documents which allows the user to obtain the relevant information. The progress made by researchers in NLP and Information Retrieval (IR) have shown a great interest for automatic text summarization (Jaoua et al.). Machine learning techniques have various benefits. It provides an easy way to incorporate a wide range of features. It also uses such learning models that can be learned over a rich function space. Text summarization is categorized as Abstractive summarization Extractive summarization and Query-based summarization (Zhai et al. 2008). The goal of this survey is to identify and analyze machine learning approaches for query-based text summarization to reduce time and effort in finding a useful summary for the users as specified by their need.

2. Literature Review

The large amount of data these days are available on different resources such as World Wide Web, news articles, books and emails. The shortage of time user wants to excess data and information according to their need. The automatic text summarization is one of the techniques that enables the user to access the most important information timely. the query oriented summarization techniques by extracting the most informative sentences (Afsharizadeh 2018) discussed. Query-focused multi-document summarization (MDS) methods have been proposed as one such technique that gains the attention in recent years. The query-focused MDS (Zhai et al. 2008) is used to synthesize a brief, fixed-length and well-organized summary from a set of topic. different sentence compression techniques are discussed for query-focused (Wang, Raghavan, Castelli, et al. 2016) MDS. Three types of approaches to sentence-compression are discussed i.e. rule-based, sequence-based and tree-based. Query-focused MDS framework consisting of three steps: Sentence Ranking, Sentence Compression and Post-processing. Linguistic probalistic and Machine learning techniques are also these days being used for Query based text summarization. Language model is a probalistic model which is an important part of Text summarization (Zhai et al. 2001). Query likelihood works on Maximum likelihood between the query and the document. Maximum Likelihood is extremely important for the information retrieval from single document. The explosion of Internet encourages the development of techniques for organizing and presenting information to users in an effective way. The rapid increase of online information, the query-based summarization plays a vital role in information retrieval process (Varadarajan et al. 2006) presents a structure-based technique to create query-specific summaries for text documents. In this model first to create the document graph of a document to represent the hidden semantic structure of the document. Then perform keyword proximity search on this graph. Natural text can be represented as language network. Language network is form by considering the words or concepts as nodes. The relation between them is represented as edges of network. Once a text is represented as a network a variety of techniques can be implemented over it for different analysis from different prospective. Data and information increasing day by day and moving ahead toward big data. The need of automatic text summarization is required that can summarized text (Das et al. 2016). The information in the compressed and summarized form having semantic meaning is needed. The problems with multi document summarization i.e redundancy, identifying difference among documents and summary coherence. The main focus is on Abstractive Text Summarization. The objective of abstractive summarization is to produce a generalized summary. It conveys information in a precise way that generally requires advance language generation and compression techniques. The key challenges mentioned by the authour is still a research area for researchers i.e.; there is no generalized framework for parsing and alignment. Extraction of the important sentences and sentence ordering according to the original

text different techniques are proposed by different researchers i.e one of the technique is Support Vector Machine (SVM). Regression model are also use for query focused multi document Summarization (Zhao et al. 2008) . The support vector regression (SVR) is used to calculate the importance of sentence in a document. It summarized through a set of pre-defined features in the paper. The learning model used is based on fixed set of feature-based approach to search for an optimum composite scoring function. Sentences are scored according to their feature values. Features play an important role in sentence scoring and ranking. The experiments have shown that regression models are preferred over classification models or learning-to-rank models for estimating the importance of the sentences. The use of regression-based machine learning techniques, such as support vector regression (SVR) and gradient boosted decision trees (GBDTs), is used for the sentence selection task, which is an important sub-task of constructing query-based abstracts and summaries (Metzler et al. 2008). The logical Structure feature which has been successfully applied for multi document summarization. Documents are cluster into local topic after sentences similarity is calculated which are sorted later based on score. Sentences from all local topics are selected by computing the word frequency. The proposed method improves the information redundancy of each local topic is reduced. The local topic identification author proposed the vector space model (Achananuparp et al. 2008). Query-based text summarization is very important as it gives information as required by the user. The user does not need to spend a long time for searching or browsing for the required information Performed query based text summarization on Arabic language. The system produces a query-oriented summary for a single Arabic document. The use of traditional vector space model and cosine similarity to extract the relevant passage and produce its summary due to the lack of public-domain tools for Arabic as compare to English Language (El-Haj et al. 2008). The redundancy problem is one of the major problem in text summarization that cannot be totally resolved and still have research area to be explored to (Jaoua et al. 2008) describe a model or detailed of determining the criteria that can be used to extract sentences from multiple documents. The proposed method by the author in the paper uses a genetic algorithm to generate a population of extracts. Then it evaluates them and classifies them in order to produce the best extract. The genetic algorithm starts from a random solution, and then it builds, in each stage, a set of solutions and evaluates them. The genetic algorithm produces, for each iteration, an extract's population while combining, randomly, sentences from the various documents. Then apply crossover and mutation operators. It assigns, for each generated extract, an objective value, which depends on criteria applied to extract as a whole unit. The importance of statistical criteria to determine the candidate sentences to form the extract:

- Position of sentence
- Size of document
- TF*IDF
- Similarity to title
- Similarity to document keywords
- Similarity to question keywords

Feature selection is also an essential part of Information Retrieval (Profile, Summarization, and Extraction 2010) propose clustering method for multi document classification and summarization. The cluster of multi documents are labeled or grouped according to the user requirement. The related documents are grouped in their cluster. Then feature profiling is generated on the cluster by considering the features i.e; word weight, sentence position, sentence length, sentence centrality, proper nouns in the sentences and numerical data in the sentence. Text Summarization is the challenging task to retrieve the required data or information from the bulk of data (Siva kumar, et al. 2011). Summarization allows user to understand the full document by reading the summary. Data compression or reduction plays important role in information retrieval according to the request of the user in the form of query. Query-based test summarization based on

similarity of sentence and word frequency using vector space model. The vector space model will be used to find the similar sentence in the document against the user query and the sum focus on the total word frequency (Achananuparp et al. 2008). The proposed method in this paper works by grouping the similar sentences and word frequency and removes the redundancy which is still a problem for text summarization. Supervised learning method (Shen et al. 2011) for sentence extraction in multi-document summarization. In this method the sentences are labeled for training corpus from the existing human labeling data in form of <query, document set, and human summaries>. The use of ranking SVM learning to rank method, to train the feature weights for query-focused multi-document summarization. To construct the training data for ranking SVM, a rank label of "summary sentence" or "non-summary sentence" needs to be assigned to the training sentences. Information Retrieving is a field in which high level of progress is taking place. It is playing an important role in searching on internet and in query-based processing. Open NLP tool for Natural Language Processing of text for word matching (Jain, et al. 2012) introduced. To extract meaningful and query dependent information from large set of offline documents, data mining document clustering algorithm are adopted. Text classification is used to assign labels to unassigned document into predefined categories. The documents can be converted into such format that documents can be recognized by a classifier. In Vector space model the documents are represented in the form of vectors. The use of tf-idf weightage is to convert the document in such format that improves text classification. The term weighting is utilized for text classification by the author. The proposed methodology of the paper performed consistently well on two benchmark data sets and KNN and SVM classifier (Ko 2012). The pyramid method addresses the problem by using multiple human summaries to create a gold-standard and by exploiting the frequency of information in the human summaries in order to assign importance to different facts. The pyramids annotations are valuable source of information for training automatically text summarization systems using Machine Learning techniques (Damova et al. 2014). The author explores different possibilities for applying them in training SVMs to rank sentences in order of relevance to the query. Structural, cohesion-based and query-dependent features are used for training. Query focused multi document summarization by combining single document summary using sentence clustering. The syntactic and semantic similarity between sentences is used for clustering. Single document summary is generated using document feature, sentence reference index feature, location feature and concept similarity feature. Sentences from single document summaries are clustered and top most sentences from each cluster are used for creating multi-document summary (Gupta et al. 2012). The document and queries are presented in different languages must be translated into some specific language. Cross-lingual information retrieval (CLIR) is a special case of Information Retrieval in which queries and documents are presented in different languages. In CLIR the language barrier is removed by converting the language of the query into the language of the document (Ture et al. 2014). The novel approach to leverage Wikipedia in conjunction with graph based ranking (Sankarasubramaniam, et al. 2014). The first step is to construct a bipartite sentence and then rank the input sentence using iterative updates on that graph. Then, it takes up personalized and query-focused summarization, where the sentence ranks additionally depend on user interests and queries, respectively. Finally, the author presents a Wikipedia-based multi-document summarization algorithm. An important feature of the proposed algorithms to enable real-time incremental summarization. The users can first view an initial summary, and then request additional content if interested. Automatic text summarization is the task of producing a concise and fluent summary while preserving key information content and overall meaning there are three methods in which one sentence is considered to be the part of text summary i.e cue method, title method and location method. The focus of author is extractive summarization method and provides an overview of some of the most dominant approaches in this category (Damova and Kliment 2014) review the different processes for summarization and try to describe the effectiveness and shortcoming (problem or failure) faced by different methods (Yousefi Azar et al. 2015) of the

paper proposed the ENAE Model using inputs with added noise and apply deep neural network to obtain query based extractive summarization. The model is in the paper using deep auto encoder to test their model on emails by considering the "the subject of email" as query. It presents the short summaries of the relevant email. It was tested on both single and multi-threads of mail considering it as a single document. Most of query-based text summarization explores methods that generate summaries based on queries regardless of the user preferences (Valizadeh et al. 2015) present the study how to use machine learning to identify how user summarized their text. Clustering and Support Vector Machine (SVM) used to solve NLP problems. The hybrid approach is used by cascading both techniques for improving the summary. It helps in summarizing the text documents with more efficiency by avoiding the redundancy among the document with highest relevance to the input query. The system provides summary for both single and multiple related documents (Km, et al. 2016). The unsupervised method for query based extractive summarization based on Minimum Description length (MDL) that applies Krimp compression Algorithm. The main idea behind is to select frequent word sets related to a given query that would compress into summary information. MDL principle is defining the best summary. It could lead to the best compression of the text with query related information. In future the authors of the paper improve their work by trying Word Vectors Method. This method assumed to be better in order to have better matching word in question and sentences. Ranking a sentence according to the user query is of the key step in Information Retrieval (Litvak 2017). The Query-relevance through automatically learned statistical rankers. The ranking function not only aims to find sentences that are on the topic of the query but also ones that are "opinionated" through the use of several features that indicate subjectivity and sentiment (Wang, Raghavan, Cardie, et al. 2016) that there is a central topic or query on which a user is seeking diverse opinions. Neural Networks (Hasselqvist et al. 2017) for query based text summarization. In KNN algorithm (Jo 2017) the similarity between the feature vectors were computed by considering the similarity feature and their values. The use of text summarizer is to identify the importance and unimportance of sentence or paragraph using binary classification. In the paper similarity is considered on the basis of both attribute and its values. The goal is to implement the text summarization algorithm which takes and represents data items more compactly and provides more reliability. Text summarization has different types that can be achieved by applying different techniques. Machine learning approaches now a day are also being used to convert large pool of data into concise summary. The focus of this research is to take a survey of Query based text summarization and identify the Machine learning approaches for Query based Text summarization.

3. Discussion

The focus of this survey is to discuss machine learning techniques for query-based text summarization. The different techniques being discussed on the basis of this study. In Text Summarization the summaries are generated as generic summary that highlights relevant information from the original document whereas query-based text summarization systems generate summaries containing related information to the user query. The difference between query and document of length. The document can be comprised of one word while a query is a special kind of document having specific length. The techniques being discussed below:

3.1 Probabilistic Models

These models are also named as statistical models or Language Modeling Methods. These include repetitive process that makes predictions about frequencies of interesting and ranking documents according to the query q . The problem with such models is that they give zero probabilities to the non-existing word in both query and document which leads towards the inaccuracy. But with the passage of time the work in this area is being done to improve these techniques which is known as smoothing techniques. Smoothing techniques use Bayesian Algorithm in such a way that it

gives some probability between 0 and 1 to the unseen words rather than 0 and named models as Query likelihood Models for Query-Based Text Summarization that works on Relevance score by counting exact words between query and document. Query Likelihood is a Relevance Model in which document can be rank against the query where the probability of document is interpreted as the Likelihood which predict the relevancy between the documents and query. This shows the probabilistic score that how much query tokens and sentence of documents is relevant to each other. The selection of Smoothing techniques is very important for Query likelihood Model to achieve accuracy.

3.2 Linguistic Models

They are knowledge based models that having learning capability using Natural Language Processing concepts (Abdi et al. 2017). Lesk model is based on word ambiguity and give back synonym on the base of probabilistic generated result. It is used for semantic matching by using Lexical Dictionary (Basile, Caputo, and Semeraro 2014) where Jaccard Coefficient contains the count of exact word match among query and each individual sentence of the documents. It uses Union of all matching word between the query and sentence divided by intersection always return the score between 0 to 1. if two sentences have same token matching to the query have different length, Higher rank will be given to sentence have shorter length against query but all token must be match to the query (Achananuparp et al. 2008). The Vector Space Model determines the similarity angle between the query and each individual sentence in the document using Vector Space Model. In this mode TF-IDF Algorithm is used in which query and sentence of the document is represented as vector in vector space and return the angle between the sentence and query vector. As Cosine similarity uses the trigonometric function cosine. According to cosine principle the value of cosine will always lies in between -1 and 1. If the angle approaches towards 1 this mean this vector (query token and document or sentence) have higher similarity otherwise if the value approaches towards -1 means the vector (query token and document or sentence) have very low similarity. If cosine angle is exactly "0" mean there is no angle between the vector (query token and document/sentence) mean they have no Document and query have any similarity. This Algorithm of vector space model consist two portions. 1st is TF (Term Frequency) and 2nd IDF (Inverse of Document Frequency). 1st it will calculate the dot product of TF.IDF of query and document and 2nd Divide by dot product of magnitude (TF.IDF) of query and (TF.IDF) of document (Siva kumar, Premchand, and Govardhan 2011).

3.3 Supervised and Unsupervised models

Learning models are termed as supervised learning whereas clustering termed as unsupervised learning models. In supervised learning labels are known where in unsupervised learning labels are unknown on the basis of feature and techniques the labels are decided. Graphs and decision tree models can be supervised as well as unsupervised. These techniques works on the basis of features extracted between query Q and document Features plays an important role for better results. Mostly these days' graphs and linear models are being used such as Support Vector Machine (SVM), Support Vector Regression (SVR). In these models the features being identified from the given query and a document. The relevant information according to the query being retrieved. Sentences or passages within the document must be identified. This is referred to as the sentence selection problem. After the relevant sentences have been identified, the composition Phase begins. When composing an abstract, it is important to take into account how many sentences to include, and how to compress the sentences to fit within a fixed bounding box. The machine learning techniques used to solve the sentence selection problem. There are several benefits to using such techniques. First, they provide an easy means of incorporating a wide range of features. Second, depending on the machine learning technique used, the model can be learned over a rich function space. The features are divided into two categories. Query dependent feature attempt to capture how relevant a given sentence S is to the query Q. These include exact match,

Overlap, Overlap-synonyms. Query Independent feature goal is to encode any a prior knowledge we have about individual sentences.

- Sentence length
- Sentence Location

Identification of proper feature set feature sets available as mark so that other researchers can develop and evaluate. Learning to rank techniques for the sentence selection task which has very different characteristics than the typical ad Hoc and web retrieval tasks (Metzler and Kanungo 2008). Semantic Graph, document graph for query-based summarization in which a combination of semantic relations between words and their syntactic composition is analyzed to extract meaningful sentences from document sets. The method is executed by computing the semantic and syntactic similarity of the sentence-to-sentence and sentence- to-query. To reduce redundancy in summary, this method uses the greedy algorithm to impose diversity penalty on the sentences. In addition, the proposed method expands the words in both the query and the sentences to tackle the problem of information limit. The graph computation is done in two steps first the document graph is created in which in which the document is parsed and split it into text fragments using a delimiter that include new line character. Each text fragments becomes a node in the document graph. A weighted edge is added to the document graph between two nodes if they either correspond to adjacent text fragments in the text or if they are semantically related, and the weight of an edge denotes the degree of the relationship. After this the query is being processed on the graph. Artificial Neural Networks are also a kind of graph that can be processed by applying learning techniques or unsupervised techniques. Cluster-ordering algorithm orders clusters based on the cluster importance, which is computed by the sum of the weights of the content words of a cluster. The importance of a cluster based on the number of important words it contains.

Summing up the discussion the supervised and unsupervised models are used combinely in hybrid way with the linguistic models and statistical models .The linguistic and statistical model only focuses on single attribute that is word count only in different way but supervised and unsupervised models make analysis in different prospective to lead toward accuracy. In such models the feature extraction helps to make strong decision and the linguistic and statistical techniques may act as feature for the SVR KNN ANN and many other algorithms that help to achieve results near to accuracy. For example as one of the query dependent feature relevance score feature so to extract this feature the statistical algorithms being used and so on so the algorithms and techniques may act as feature for the supervised n unsupervised algorithm and these day many researchers are being working to introduced such hybrid techniques.

4. Conclusion

The amount of data and information is increasing exponentially. The domain includes web as well as data of various organizations on their local servers. This forms basis for the data scientists to explore new techniques to fulfill market needs in the field of IR. This survey discusses machine learning techniques used for query-based text summarization. After extensive study of views of different data scientists and authors it is concluded that a combination of supervised and unsupervised machine learning algorithm in order to apply linguistic and statistical techniques gives better results than stand alone single technique. The process improves score of accurate feature extraction, reduces redundancy of calculations and identification of specified data according to query. The future work suggested is to apply the same hybrid techniques for extractive summarization. This will help to make system efficient for linking files in digital archives system.

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AUGMENTED REALITY FOR ONLINE SHOPPING USING ANDROID BASED MOBILE APPLICATION

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Abstract

The main objective of this research is to elaborate the significance of augmented reality and find the way how it could provide the comfort to the people. We have taken an online shopping model as scenario. In many circumstances it happens that people do not get chance to select the best item due to shortage of time. Augmented reality provides a virtual world of shopping. A virtual world that would provide customers all the information related to location of outlets in the mall and the features of the products placed on the outlets. It would also help brands to promote their offers at a very low cost. The research is a complete description of the system it involves analysis of the application from every aspect. Java, PHP, MySQL are the technology used. This research utilizes the mobile based application using android system. The system used would utilize the features of GUI and provide a uniform appearance and texture between all the pages and provide an exact map for finding location.

Keywords: Augmented reality, virtual reality, GPS, SWOT

1. Introduction

The research will describe the need of the application "Augmented Reality" and its functionality too. The research has tried to find the solution in order to make ease for common people who shop. It analyzes the major problems such as finding location, or viewing products of any outlet. The research focused the features of Augmented Reality using android platform. While working on the research there was an idea in mind to provide solution that could be helpful for shoppers as well as shopkeepers to communicate via virtual reality world. A customer can find his location and any outlet's location by offline maps and view the offers by different brands virtually. Following are the problems in current system of manual shopping in Pakistan:

1.1. Crowd:

In several events such as Eid, black Friday etc., it is observed that outlets are overcrowded and it is impossible to view the items of the shop.

1.2. Finding location:

As shopping malls have many outlets in it, so finding an outlet from anywhere in the mall is a big issue.

1.3. Updates/cost:

Marketing is a big issue for the brands. Marketing themselves such as sales, new collection

arrivals and other discounts is costly for brands. Paper media or electronic media are very expensive modes of marketing.

1.4. Online shopping:

In online shopping, it is not compulsory that every time you get product you ordered .the product may vary in size, color, shape.

1.5. Time consumption:

As stated earlier marketing via paper media is costly similarly, finding any desired outlet is a total waste of time. The research tends to fulfill the following objectives:

1. Finding location by tapping camera.
2. Displaying offers in any outlet by hovering camera on logo of outlet.
3. Gathering feedback by customers.
4. Online shopping by outlet's website.

As the application is an android application so, it will be supported by android platform.



Figure 1: How app works

2. Literature Review

2.1. What is augmented reality?

Expanded the truth is innovation that consolidates virtual reality with this present reality. The present universe of increased reality manages live video symbolism which is carefully improved with PC created representation. For instance, a client may wear translucent goggles or view the screen of a camera prepared cell phone where they can see this present reality and in addition deliberately set PC produced pictures. Ronald Azuma's meaning of increased the truth is broadly referenced in the exploration writing. He characterizes an increased reality application as one that:

- Joins this present reality with the virtual world
- It is intuitive and continuous
- It is enrolled in three measurements

2.2. History

Augmented reality has existed since the 1930's however late advances in cell phone innovation have powered the current buildup. For several bucks, a normal individual can point their iPhone at the night sky and view the design of the stars and planets in their correct areas with full definitions. While the cell phone doesn't have the registering power for some increased reality applications, it is acquainting the world with this idea. Numerous analysts have indicated the cell phone industry as sparing their expanded reality inquires about projects by making it more mainstream.

2.3. How are virtual reality and augmented reality similar?

This is fairly unique in relation to virtual reality. Virtual reality entails PC created conditions for customers to interface with and being saturated in. Expanded reality (otherwise called AR), adds to the truth people would commonly observe instead of ousting it.

2.4. Technology

Augmented and virtual substances both use a portion of similar sorts of innovation, and they each exist to serve the client with an improved or enhanced understanding.

2.5. Entertainment

Both advances empower encounters that are winding up plainly more generally expected and looked for after for excitement purposes. While in the past they appeared to be only an invention of a sci-fi creative ability, new fake universes sprung up under the client's control, and more profound layers of cooperation with this present reality are additionally achievable.

2.6. Science and Medicine

Substances have extraordinary potential in changing the scene of the therapeutic field by making things, for example, remote surgeries a genuine probability. These innovations been now been utilized to treat and recuperate mental conditions, for example, Post Traumatic Stress Disorder (PTSD) [3].

2.7. How Do Augmented And Virtual Realities Differ

2.7.1. Purpose

Enlarged reality improves encounters by including virtual parts, for example, computerized pictures, design, or sensations as another layer of collaboration with this present reality. Contrastingly, virtual reality makes its own particular reality that is totally PC created and driven.

2.7.2. Delivery method

Virtual Reality is typically conveyed to the client through a head-mounted or hand-held controller. This hardware interfaces individuals to the virtual reality, and enables them to control and explore their activities in a situation intended to recreate his present reality.

Expanded the truth is being utilized increasingly in cell phones, for example, portable workstations, advanced mobile phones, and tablets to change how this present reality and computerized pictures, representation cross and cooperate.

2.7.3. How do they work together?

It is not generally virtual reality versus increased reality– they don't generally work autonomously of each other , and in certainty are regularly mixed together to produce a considerably additionally submerging background. For instance, haptic input which is the vibration and

sensation added to cooperation with design is viewed as a growth. In any case, it is normally utilized inside a virtual reality setting so as to make the experience more exact however touch.

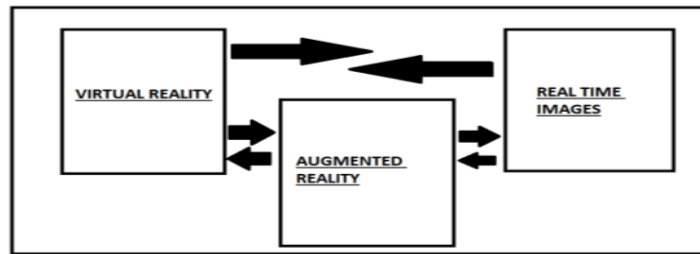


Figure 2: Relation between Virtual and Augmented Reality

2.8. Applications

Applications for increased the truth are expansive. The military uses enlarged reality to help men and ladies making repairs in the field. The gaming business is moving recreations outside like the days of yore... furnished with the wearable head rigging obviously. And after that there is everything in the middle.

2.8.1. Navigation

Route applications are perhaps the most normal spasm of expanded reality with our regular day to day existences. Improved GPS frameworks are utilizing expanded reality to make it less demanding to get from indicate A point B. Wikitude Drive for the Android working framework which is as of now in beta brings the GPS into the 21st century. Utilizing the telephone's camera in mix with the GPS, the clients see the chose course over the live perspective of what is before the auto.

2.8.2. Sightseeing

There are various applications for increased reality in the touring and tourism businesses. The capacity to expand a live perspective of presentations in a gallery with statistical data points is a characteristic utilization of the innovation. Add up to Immersion, a worldwide pioneer in enlarged reality, creates frameworks intended to upgrade the experience of the exhibition hall participant. Their intuitive stand arrangement enables visitors to cooperate with the show in 3D. They pick a model card, for example, a human heart and hold it under the camera. On screen, an immaculate 3D portrayal of the heart shows up on the screen enabling the visitor to interface as though it's a genuine heart.

2.8.3. Medical

There have been truly fascinating advances in the restorative utilization of increased reality. Therapeutic understudies utilize the innovation to practice surgery in a controlled domain. Neurosurgery is at the cutting edge with regards to surgical utilizations of increased reality. The capacity to picture the mind in 3D on top of the patient's genuine life systems is capable for the specialist. Since the mind is to some degree settled contrasted with different parts of the body, the enrollment of correct directions can be accomplished. This can influence the correct situating required for increased reality to work.

2.8.4. Gaming

With late advances in registering force and innovation, gaming applications in enlarged the truth are on the rise. Head-worn frameworks are reasonable and processing force is more compact than

any other time in recent memory. Augmented, an expanded reality amusement designer as of late got \$3.5 million of institutional financing to create gaming applications for the iPhone and Android gadgets. Augment is wagering on preceded with reception of this specialty innovation and acknowledgment by the gaming group.

3. Methodology

3.1. Agile Model

It is incremental software, building methodology which has short iterations of normally 1-3 weeks. The reason for short iteration time is the changing requirements of customer. Each cycle after completion is tested thoroughly to attain the best software quality. Agile method breaks the tasks into smaller chunks as it does not focus on long term planning. Team size is from 5-9 people.

3.2. SWOT Analysis:

Swot is an abbreviation for (strength, weakness, opportunities, threats) .It is a scientific structure that makes the entire picture, dissect the circumstance and locate the best arrangement. The best thing about this apparatus is that it recognizes inside as well as outer impacts. Swot is basically a tool that identifies the outer opportunities and converts them into the strength of organization by using the internal strength of organization. Following are our analysis for augmented reality.

3.3. Story Board:

We have taken a scenario as online shopping for analysis of our research on practical approach. We have characters shown in fig 4.1, that are defined as:

- Augmented reality (an approach we are going to use)
- Customer (a person who shops/user of application)
- Shopkeeper (person who will be managing the carts and shop)

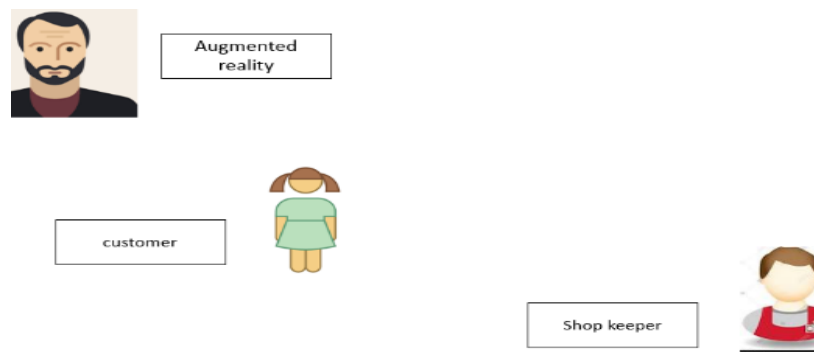


Fig 3. Use case showing actors in application

Customer asks the application to guide location to him as the answer, the application asks the customer to check the wifi connection and hover camera over the shops logo. Customer proceeds and asks to view item placed on outlet, again as the answer application asks the customer to check connection and hover the camera over the specific item, the app will provide the description of the product to customer i-e., price, size, color and availability of the product. After the customer selects the products and add it into his cart, application will provide the notification to collect the

product from outlet. Finally, the customer will collect his product from outlet and pay for it. For our research proposed model is shown in Fig 4.

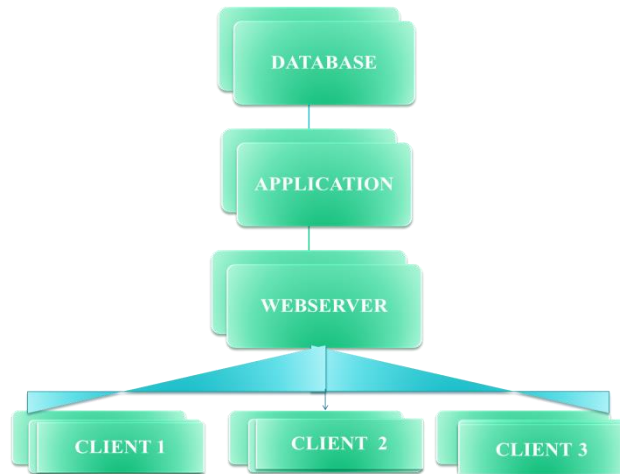


Fig 4. Work flow of proposed model

This section contains subcategory of the requirements for the augmented reality for online shopping. All these functional requirements can be traced using tractability matrix. By implementing augmented Reality, Users can easily find the location of their desired outlets. Also the user can view items presents in shop. On the other hand, online shopping will become easier, as item checking at the receiving counter will increase efficiency for well as shopkeepers. Headache of delivery will be finished too. A customer can pick his order by himself and once it is checked by customers physically. No return or exchange problem will be there.

The system should accurately performs the following functions such as providing exact location, collection feedback from users according to certain products and providing correct formation about products such as price, tag numbers, Size, color.

User interface should be user friendly so that any customer can easily use it. The interface should be continuously update as the camera is moved to another outlet and the user should be able to view the information of outlet instantly as the camera is moved on to a certain store outlet.

Following are the security requirements of the app:

- It automatically log out after order submitted.
- If the customer wants to change and modify the order they can't.
- Order can only be modified by the administrator.

Product needs to be tested again and again as the data of the product needs to be change frequently in shopping malls the offers such as sales discounts are recurrent [2].

4. Conclusion

Our usage of augmented reality in different applications has revolutionize market and very useful for people especially android users. This application has number of advantages for shopkeeper as well as customers it would be very interesting for customers and will attract more people towards mall and towards android applications.

The appropriation of augmented reality while designing software would help people to save their time and effort also it would make shopping more interesting and effortless. For the brand and admin side, it will help reducing their human resource and expenses on marketing.

5. Future Work

The future work in this application will be targeting different malls for the deployment of augmented reality. The application can be made more advanced by adding some other features of this technology such as, kinetic dressing rooms, makeup mirror in cosmetic shops, bar code scanning technique using AR.

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IMAGE PROCESSING BASED ON OFFLINE HANDWRITTEN SIGNATURE RECOGNITION AND VERIFICATION SCHEME

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Abstract

In today's world, numerous techniques are used for human identification. These can be classified into vision-based and non-vision based. Vision-based are an eye, face and fingerprint recognition and iris and retina scanning, whereas the most widely used non-vision based techniques are voice recognition and signature recognition and verification. Signature has remained pivotal bio-metric trait as it can be used for a person's identity as every person has a different signature from that of the other, which distinctive characteristic is either physiological or behavioral.

Handwritten signature serves as "seal of approval" and is widely used mode for authentication purpose in fields like finance, education, legal transaction, and banking etc. Online i.e dynamic and offline i.e static are the two key types of signature recognition and verification techniques.

Image processing technique has been used in this study for offline signature identification. Under this system image of a person's signature is obtained and its recognition is made through several techniques including ANN. For training of the system signature as an image is taken as a sample and checked with already stored samples, which requires authentication. Many kinds of research have been carried out on different aspects of this system yielding distinctive results, which aspects are image feature extraction; modified NN approach; global feature extraction using ANN and training.

In this paper, a brief description of offline handwritten signature recognition and verification scheme are disclosed.

Keywords: Verification, Recognition, Handwritten Signatures, Artificial Neural Networks System, Off-line Signature.

1. Introduction

No doubt arrival of latest technology has to large extent eased the life of a common man, but it also remains an un-denying fact that the same technology has also brought numerous complications in shape of challenges in the life of mankind. Such is the case with development of handwritten signature verification and recognition and advancements made therein.

Signature is an important attribute of a person, which distinguishes a person from another. Signatory or signer is the person making the signature. Signature of each and every person is different from that of the other, which in its own way is unique but signature of a person varies with the passage of time or by using different pen for signing or that may be because of any other reason. Minimizing the intrapersonal discrepancies is the objective of handwritten signature authentication system. Signature verification works both in online and offline systems. It involves five steps including data acquisition, preprocessing, feature extraction, comparison process and decision. [2,3]

The theme of this research is offline system, which involve more challenges as compared to online system. Since offline system works in offline mode, therefore it is referred to as an important feature resulting in higher accuracy as described in [1]. This system i.e. offline system works through static/stationary images.

The signature of a person is a key biometric trait whereby identity of that person either genuine or forged could be determined. Signature shows a person's individual characteristics including physiological as well as behavioral. Physiological characteristics includes scanning of fingerprint, iris, retina, DNA and facial patterns etc, while behavioral characteristics are categorized as handwritten signature, voice keystroke pattern or gait etc.[5] Both of these physiological and behavioral characteristics are used to determine the identity of a person.

a. Identification

Identification of a person can be done using his identity. When we enter biometric images in a database then they compare using matching algorithm for identification.

b. Verification

It involves the process of confirming or denying a person's claimed identity. When the user claim to be already enrolled in the system, the biometric data obtained from the user is compared to the user's data already stored in the database.

Types of Signature Verification System

It is divided into two categories i.e. offline (static) and online (dynamic). [1-7]

i. Offline signature verification system

In offline verification system signature is taken as an image and recognition is performed using some artificial intelligence including neural networks. [1]

Through offline signature verification system analysis of a person's signature images is made. In this method optical scanner serves as a tool to obtain a 2-D image of the handwritten signature made on a paper. This is a more complex method in a way that it does not contain the non-repetitive nature of variations arising out of age, illness, geographic location and emotional state of a person.[3]

ii. Online signature verification system

Under online verification the signature data is obtained from an electronic tablet, which besides capturing the shape of signature also captures the velocity, pressure, speed and number/order of strokes etc. of a signature. [1-6]

The capturing of an image of a person's signature and its analysis in real time is the essence of online signature verification system. Such capturing is done through touch screen monitor and an electronic tablet, whereby verification is made through collection of dynamic information about a signature and extracting various features from it. Where and with what velocity, acceleration and pressure a person makes a signature using stylus (an electronic pen) is recorded by online signature verification system.[2]

The following sections encompass this paper. Section-I covers introduction to offline signature recognition and Verification; Section-II covers various signature verification concepts; Section-III introduces numerous types of forgeries and Error Types; Section-IV introduces different methods of signature verification; Section-V comparison of different offline signature recognition and Verification approaches; Section-VI System Design and Architecture and in Section-VII conclusion of the paper and potential future scope of the work done is given.

2. Signature Verification Concept

The following processes are involved in offline signature recognition and verification.

a) Data Acquisition

Data acquisition is performed in two ways i.e. firstly by collecting a signature's data from the database available on the internet and secondly by scanning the signature image so as to convert it into a digital image.

b) Image Preprocessing

During this process various tasks including conversion of color image into gray image, removal of noise, thresholding, thinning, boundary detection and cropping are performed. Conversion of color image into black and white image wherein the pixel of signature would be "1" and pixel of background would be "0" is a process called binarization, which makes feature extraction easier. The process of background delimitation and noise reduction is applied to images extracted from other documents [7]. A process called skeletonization is performed for obtaining a skeleton of 2-D binary image for easy onward processing.

c) Feature Extraction

During this stage with the help of algorithms certain features of signature image are extracted, which serves as inputs for training and recognition phase. These features are global features which provide wavelet coefficient and Fourier coefficients; mask features which provide information about directions of the lines of the signature, and grid features which provide overall signature appearance information. Selection of a suitable set of features acceptable to the application of signature verification systems is a difficult job to perform.

3. Classification

A signature is classified genuine or forged after matching or non-matching of the features extracted from a signature with the already stored signatures in the database.

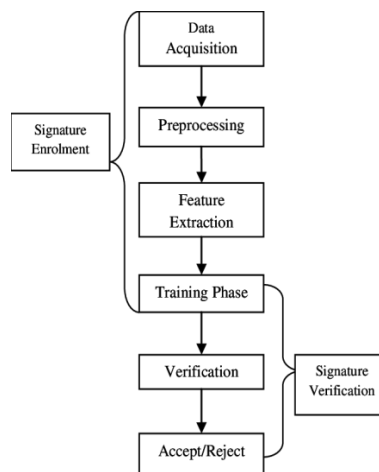


Figure 1: Process of Signature Verification

3. Types of Forgeries and Error Rate

A handwritten signature is a personal attribute mean for identification. The signature verification process of any person have be done by analysis of his or her signature through which a system can differentiate a genuine signature from a forgery signature. Any illegal alteration or reproduction of an original information is referred to as forgery. An item not made by a person claiming it to be made by him/her is termed as forged. Availability of certain powerful image processing and editing software's in the market has made it possible to make alteration in a digital image, manipulate it or to add or remove essential features from it and the result thereof is a forged image.

a) Types of forgeries:

Eight kind of forgeries can be performed.

(i)**Random Forgery:** Random forgery is the one in which a person making the signature is unaware of the shape of original signature. (ii) **Casual Forgery:** The forgery in which the signature making person is unaware of the size of the original signature is casual forgery. (iii) **Skilled Forgery:** This type of forgery is represented by a suitable replication of the genuine signature model. (iv) **Simulation Forgery:** A forgery in which a forger practices making copies of the original signature by having access to the model of genuine signature is called simulation forgery. (v)**Tracing Forgery:** Tracing forgery is one in which the forger trace the line of the signature by having model of the genuine signature and holding the same against a window or use carbon paper or a light box and place another sheet of paper over the top. (vi) **Cut-and-paste Forgery:** The type of forgery in which the forger after cutting the genuine signature from a document, placing it on a bogus document and making necessary lighting and resolution make photocopy of the same to make it look real/genuine is called cut-and-paste forgery. (vii)**Electronic Forgery:** The forgery in which a genuine signature is firstly scanned at a high resolution where-after it is placed on a bogus document and print out of the same is made. (viii)**Freehand signature Forgery:** The type of forgery in which the forger without attempt to copy only write the name of the person on a certain document whose signature/name is intended for the purpose of forgery.

b) Error rate:

(i) **False rejection rate (FRR)** also known as Type-I error shows in percentage form the identification instances in which false rejection occurs. *FRR* showing the percentage of genuine signature tested as forgery.[1-3]

$$\text{FRR} = \frac{\text{No. of Forgery Signatures accepted}}{\text{No. of Forgery Signatures Tested}}$$

(ii)**False acceptance rate (FAR)** also known as Type-II error shows the percentage of the total false acceptances divided by the total identification attempts. *FAR* shows the percentage of forgery signatures accepted from forgery signature tested as genuine.

$$\text{FAR} = \frac{\text{No. of Genuine Signatures Rejected}}{\text{No. of Genuine Signatures Tested}}$$

(iii)**Average Error Rate (AER)** is the average of type 1 and type 2 errors. (iv) **Equal Error Rate (EER)** is the location on a ROC or Detection Error Trade-off curve where the FAR and FRR are equal. System perform badly with increase in value of EER.[1-4]

4. Methods of Offline Handwritten Signature Verification and Recognition

Features extracted from the static signature images only are used in the verification process. Handwriting analysis and pattern matching have been the areas of research over the some years. HSVR (Handwritten Signature Verification and Recognition) especially offline HSVR wherein different technologies have been used is still open to more and more research. This section reviews some of the recent papers on offline HSVR and the approaches used therein by different

researchers are based on extracted features, training method employed and the model used in classification and verification.

4.1. Feed Forward Method

The quality of the image is improved by using image processing followed by features extraction. Certain unique standard statistical features and its features extraction phase this output is given as the input to the above proposed NN model to further improve its decision making capabilities. The performance of proposed model is calculating the fault acceptance and rejection rates for a small set of data [2,7].

4.2. Neural Network Approach

Because of its power and easy to use, neural networks are extensively used in pattern recognition. It is a very simple approach and have two stages only. In the first stage features pertaining to the signature of a signer like height, length etc. with various samples are collected. The second stage is where neural network learn the relationship inter a signature and its class (either genuine or forgery). After learning this relationship test signatures can be presented to this network. For modeling of global features of handwritten signatures Neural Networks are suitable. [6,9,16]

Aqeel-ur-Rehman et al. [1] proposed Artificial Neural Network method/approach also known as Neural Network approach for offline signature verification. Neural network works like nervous system of human being. Through this system signature is verified by using average signature obtained from already stored signatures in a database by way of which the time required for signature verification is minimized. This neural network system works in three layers i.e. input layer, hidden layer and output layer shown in Fig.2. The output layer takes binary decision (choice between two alternatives) on already define level.

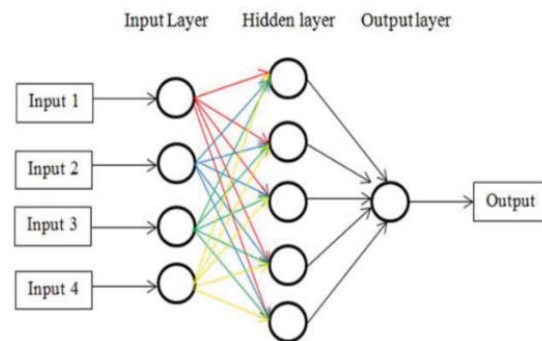


Figure 2: Neural Network

The larger the input size than the predefined level makes the input acceptable otherwise leads to its rejection. During development of this system first preprocessing and image features extraction steps are performed. The *preprocessing steps* include (I) **image resizing**, which makes the image fit to box where equations like $X_{new} = (X_{old} * 100) / H$ and $Y_{new} = (Y_{old} * 100) / W$ (where H denotes height and W denotes width) are used for achieving transformed uniformed 100 * 100 pixels of input image, (ii) **converting to gray scale image**, wherein scanned or captured color images are converted to grey scale using equation i.e. $Gray\ color = 0.299 * Red + 0.5876 * Green + 0.14 * Blue$, (iii) **background elimination**, wherein equation $If\ f(x,y) \geq T\ then\ f(x,y) = Background\ else\ f(x,y) = Object$, (iv) **image thinning**, which is used to cut down the original

image into a more compact representation and for which purpose Steniford algorithm is used, (v) **bounding box the image**, which is used for removal of dimension fluctuation and attain a benchmark for all input signature size. The following equations are used in this process.

$$X_{\text{new}} = [(X_{\text{old}} - X_{\text{min}}) / (X_{\text{max}} - X_{\text{min}}) * M]$$

$$Y_{\text{new}} = [(Y_{\text{old}} - Y_{\text{min}}) / (Y_{\text{max}} - Y_{\text{min}}) * M]$$

Where X_{new} , Y_{new} = Normalized signature pixel coordinates, X_{old} , Y_{old} = Original signature pixel coordinates & M = Normalized signature width/height.



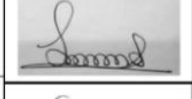



Signature	Image
Original	
Resized	
Gray Scaled	
Background Eliminated	
Thinned	
Boundary Bounded	

Figure 3: Preprocessing of Signature images

During features extraction process information from raw data is extracted. The purpose of this step is to create features to be used as comparison measurements. This step includes (i) **signatures area**, which is normalized area occupied in pixels by a signature and equation used to find out the normalization area is;

$$NA = \frac{\Delta}{D_x D_y}$$

(ii) **Signature Ratio**, wherein width to height ratio of x and y coordinates are calculated by way of equation i.e. Width to height ratio = $(X_{\text{max}} - X_{\text{min}}) / (Y_{\text{max}} - Y_{\text{min}})$, (iii) **Geometric center** given by equation i.e.

$$X = \frac{1}{N} (\sum_{i=1}^n x_i), \quad Y = \frac{1}{N} (\sum_{i=1}^n y_i),$$

(iv) **Edge points** (v) **Aspect ratio**, which denotes the width to height ratio of a signature and is represented by "A". This ratio is calculated through $A = \frac{D_x}{D_y}$. Here MATLAB software has been

used to design the system and proper training is imparted to the system, where-after fruitful results in shape of 95% success rate were obtained.

Teddy Surya Gunawan et al. [3] also proposed the Neural Network approach for offline handwritten signature authentication system. Here around 50 signature images from 05 different persons were used as input. In features extraction process two image filters i.e. **Canny edge detector and averaging filter** were used. Canny edge detector is a form of high pass image filter used for edge detection, while averaging filter is a form of low pass filter used for blurring the image. Here the signature image size was fixed as 206 by 128 pixels. At the end of research the researchers have found Canny edge detector to have produced high recognition rate because of its ability to capture unique characteristics of the signature. During study it was also that when the number of nodes were kept high then the recognition rate remained higher. Thus, Canny edge detector have more satisfying results as compared to averaging filter.

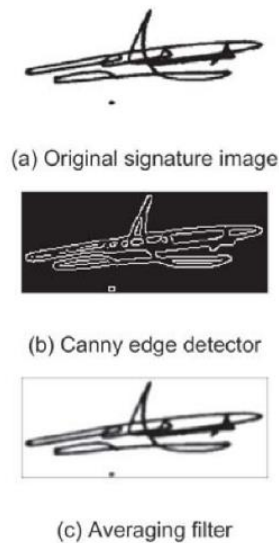


Figure 4: Effect of Canny Edge Detector and Averaging Filter

Navpreet Singh et al. [4] proposed the Modified Artificial Neural Network based offline signature recognition and verification system trained with low resolution scanned signature images. Grey scale image has been used in this research to pave way for feature extraction. This method used features extracted from preprocessed signature images, which are then used to train a neural network to classify all genuine and forged and forged signatures correctly. In this paper MATLAB software was used for implementation of the proposed work. This system is used to obtain better FAR and FRR results.

A.A.M Abushariah et al. [5] proposed automatic person identification system handwritten signatures, wherein tool boxes provided by MATLAB software have been used. A database containing 30 signatures of each of 50 male and 50 female was created as to as to train and test this system. The signatures so collected were passed through numerous preprocessing steps including producing a digitized version of the signatures using a scanner, converting input images type to a standard binary images type, cropping, normalizing images size and reshaping in order to produce a ready-to-use handwritten signatures database for training and testing this system. Global features such as signature height, image area, pure width and pure height have been used in this system. For features training and classification the Multi-layer Perceptron (MLP) architecture of Artificial Neural Network (ANN) was used. A person's gender effecting the overall performance has been investigated in this system. The results obtained showed that the

handwritten signatures of male with 76.20% recognition rate outperformed the handwritten signatures of female with 74.20% recognition rate, while the overall recognition rate stood at 75.20% for both male and female handwritten signatures.

Pansare and Bhatia [6] in their research on handwritten signature verification used and proposed Neural Network approach besides discussing the other methods in this paper. The method proposed uses features extracted to create a feature vector of dimension 24 to uniquely characterize a candidate signature, which features are then used to train a neural network using error propagation training algorithm. The results of testing neural network with trained sample gave Correct Classification Rate (CCR) in recall as 100%, which mean that the network could correctly classify all genuine and forged signatures. When the network was presented with signature samples from database different that the ones used in training phase, out of 300 such signatures (150 genuine and 150 forged) it could recognize 248 signatures correctly, thus giving CCR of the system as 82.66% in generalization.

4.3. Hidden Markov Models (HMM)

One of the most significant model used for offline signature recognition is Hidden Markov Model (HMM). In particular, HMMs with a left-to-right topology have been mostly studied, as they match the dynamic characteristics of American and European Handwriting (with hand movements from left to right). Justino, Oliveira and Batista in their work have divided the signatures in a grid format, where column of each grid is used as an observation of the HMM and features are extracted from the different cells with each column and subsequently quantized in a codebook. In the verification phase, a sequence of feature vectors is extracted from the signature and quantized using the codebook. The HMM is then used to calculate the likelihood of the observations given the model. After calculating the likelihood, a simple threshold (determined level) can be used to discriminate between genuine signatures and forgeries or the likelihood itself can be used for more complex classification mechanisms. [5,17].

Handwritten signature is an arrangement vector of each values related to each point of signature in its trajectory. A well set of feature vector for HMM result in an efficient signature verification system. This model has the capacity to absorb the variability and similarity of signature patterns [1]. Matching of model and signature is done in this model. Probability distribution of features involved in the signature or the probability how the original signature is calculated are the basic steps of matching. A signature is regarded to be of an original person when the matching result has higher probability than the test signature. If the results are otherwise then the signatures are rejected.

4.4. Template Matching Approach

Skilled forgeries are detected through template matching. *Fang et al.* proposed two methods for the detection of skilled forgeries using template matching. One method is based on the optimal matching of the one-dimensional projection profiles of the signature patterns and the other is based on the elastic matching of the strokes in the two-dimensional signature patterns. Given a test signature to be verified, the positional variations are compared with the statistics of the training set and a decision based on a distance measure is made.

Both binary and grey-level signature images are tested. The average verification error rate 18.1% was achieved when the local peaks of the vertical projection profiles of grey-level signature images were used for matching and with the full estimated co-variance matrix incorporated. [1,6,15]

4.5. Statistical Approach

In this approach the concept of Correlation Coefficients is used for finding the relation between some set of data items. By using statistical knowledge deviation, relation etc. between two or

more data items can be found. Correlation has been used to verify test signature with the help of database of signature collected in Data acquisition stage of preprocessing. Divergence in between them can be find out using correlation. Statistical approach was used using global features in offline signature verification. Various global features and statistical features are derived in this approach. Statistical features are extracted from distribution of pixel of signature image.[9,10]

Relationship, deviation etc.in between data can be determined by using statistical knowledge. If the correlation between set of data items is to be revealed, the concept of Correlation Coefficients is usually used. To verify the recently introduced signature, statistical approach pursues the concepts of correlation to determine the amount of dissimilarities among the newly introduced signature and already stored signature. Kolmogorov Smirnov Statistic is a unique method for signature verification in which various features are extracted. This feature includes gradient of image, statistical features (distribution of signature's pixels, geometry and topographical descriptors). The classification consists of collecting different in the signatures of the writer and acquiring distribution in distance space. If signature is to be verified, then procedure secures the distribution that is compared with the recognized one. Kolmogorov-Smirnov test is used to find the probability of resemblance. [1,6]

Using this method with 4 genuine samples yielded 84% accuracy, which accuracy increases upto 89% with increase in genuine signature sample size. No set of forgery signatures in the training/learning was required by this method.

4.6. Support Vector Machine (SVMs)

Support Vector Machines (SVMs) are machine learning algorithms [13]. The system in [10] uses global, grid and directional features of the signature. SVM is used for classification and verification. Support Vector Machines (SVMs) uses a high dimensional feature space and find differences between classes of given data to generalize unseen data.

SVMs are basically an algorithm, these machine learning algorithms requires high dimensional feature space and calculate inequality among the classes of given data to generalize unseen data. Signature features (global, directional & grid) are used by the system and for the verification and classification system uses SVM. [1, 6,10]. A database of 1320 signatures was collected from 70 writers. A total of 320 signatures were collected from 40 writers each signing 8 signatures for training. The method achieved 2% FRR and 11% FAR [14] using 8 original signatures and 8 forgeries.

4.7. Back Propagation Neural Network

Signature verification and recognition can also be done by using Back Propagation of Neural network as proposed by Nilesh Y. Choudhary. In this, for extraction of features, methods like invariant central moment and Zernike moment are used. Easy implementation is the key advantage of Back Propagation method which is based on three-layer architecture. [1]

Hafemann et al [6] proposed Deep Learning methods in offline Handwritten Signature Verification as a result of which error rate have dropped significantly in the last few years mostly due to advancements in deep learning applied to the task. The proposed contributions in the field are (i) obtaining better features (ii) improving classification with limited number of samples (iii) augmenting the datasets and (iv) building model ensembles.

5. Performance Evaluation of Different Approaches with Result

Table 1: Performance Evaluation of Different Approach

S.No.	Approaches	FAR	FRR	Accuracy Rates
1	Signature Feature Correspondence	6.30	8.20	91.80
2	Hidden Markov Method	00.64	11.70	-
3	Based On Neural Network	15.00	3.00	-
4	Global Feature Based	5.40	4.60	-
5	SVM Based Approach	4.83	5.30	91.9
6	Training NN using Error Back propagation training Algorithm	14.66	20	82.66
7	Enhanced Modified Direction Feature	2.88	1.71	91.21
8	Artificial Neural Network	-	-	95% success rate
9	Global Feature Extraction Feature Classification using ANN	-	-	75.20
10	Image Feature Extraction (Canny Edge Detector, Average Filter)using Back propagation Algorithm Modified NN Approach select grey scale image	-	-	84.07 success rate

6. System Design and Architecture

The architecture of the offline verification system using handwritten signatures is divided into two main phases as shown in Figure 6.

During the first phase, all training steps are performed, whereas during the second phase of the system's architecture all testing/matching steps are performed. [4]

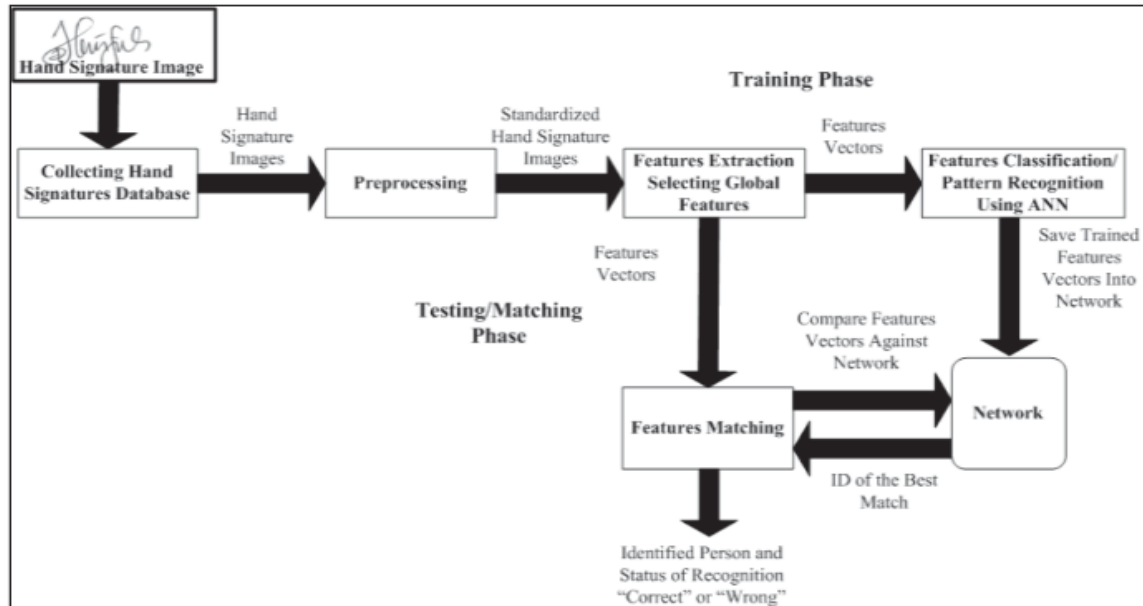


Figure 5: Architecture of the Handwritten Signature-Based System

The design of a system is divided into two stages:

- Training stage,
- Testing stage.

Training Stage:

A training stage consist of four major steps:

- Retrieval of a signature image from a database,
- Image pre-processing
- Feature extraction
- Neural network training

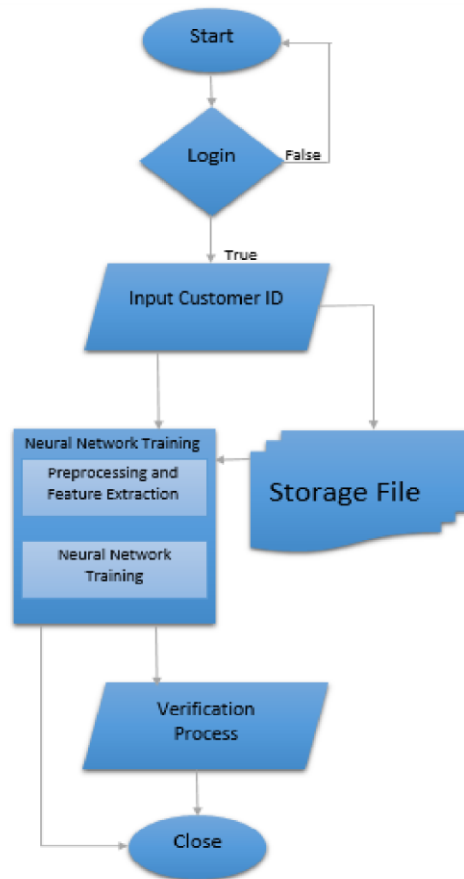


Figure 6: System Training Steps

Testing Stage:

A testing stage consists of five major steps

1) Retrieval of a signature to be tested from a database, 2) Image pre-processing, 3) Feature extraction, 4) Application of extracted features to a trained neural network, 5) Checking output generated from a neural network.

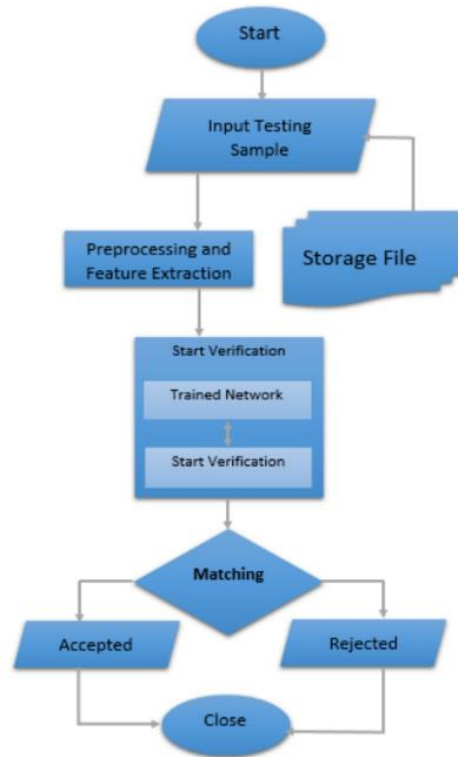


Figure 7: System Testing Steps

7. Conclusion

Signature verification becomes an attractive topic for computer vision community. Many researchers have performed their research in signature verification system by classifying signature as valid or forgery. This paper presents a brief survey of recent work on offline handwritten signature verification and recognition system using artificial neural network. There are two phases to detect the signature identification. First part is to detect the features from signature images and second part is to classify and verify the signature. The results obtained in signature recognition and verification are not very high, thus a need for more research on static signature verification arise.

Future works include the use of different feature and classifier, such as deep learning neural network

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EVALUATING CLOUD TASK SCHEDULING ALGORITHMS USING THREE SYNTHETIC DATASETS

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Abstract

Cloud computing is known for providing dynamic services using very large scalable and virtualized resources over the Internet. The job scheduling plays a crucial role to enhance the performance of the Cloud computing. The scheduling mechanism is required to distribute the dynamic local workload evenly across all the nodes in a manner that optimize the performance of the overall system and minimize the makespan. Various research studies have attempted to build an efficient job-scheduling algorithm that is compatible and applicable in Cloud computing environment. Efficient scheduling plays an important role in the better utilization of resources. In this paper, the performance and analysis of various scheduling algorithms have been presented using performance metrics of throughput and makespan.

Keywords: Cloud Computing, Task Scheduling, Performance Analysis, Cloud Datasets.

1. Introduction:

With the rapid advancement in computation technology both in terms of processing and storage, the availability of these technologies has led to a new computational model called Cloud computing. In Cloud computing, the resources (such as CPU, storage, bandwidth) and services are provided as general utilities that can be leased and released by users in on-demand fashion through Internet [1]. Cloud computing platforms use huge number of heterogeneously distributed resources to provide different services having unique requirements for *Quality of Service (QoS)* [2]. Cloud computing technology is based on virtualization, distributed computing, networking, and web services. Normally, in the industry, these services are referred to as *Infrastructure as a service (IaaS)*, *Platform as a Service (PaaS)* and *software as a service (SaaS)*. A recent report from Berkeley highlighted the importance of these services [3]. IaaS provides infrastructure related services such as storage, Computational power and other IT resources to users [4]. PaaS provides platform that enable users to develop their own applications using the underline platforms [5]. In SaaS services related to software's are provided, where user can use variety of software applications without installing it on their local machines [6].

Conventionally, Clouds are classified in three main categories, such as *private, public and hybrid* [7]. Cloud computing [8] technology aims to power the next generation data centers as enabling platforms for flexible and dynamic resource provisioning. By exposing the data-center capabilities as a network of virtual machines such as hardware, software and user-interface providing the facility to user to deploy and access application form anywhere via the Internet.

This relieves IT companies free from developing and maintaining their own hardware and software infrastructures for their innovative ideas of application services. They can use the Cloud application hosting platforms to focus more on their innovations and creation of business values for their application rather than anchoring heavy costs on setting up hardware and software infrastructures [3].

Typical, Cloud Computing application services include social networking, web hosting, Webmail, and data analytics. Each of these Cloud applications has different requirement for configuration and deployment. To evaluate the performance of the provisioning policies (i.e. Scheduling and allocation) in the real cloud under short-term conditions is a challenging task due to the following reasons. First, the Clouds has fluctuating demands like resources (i.e. hardware, software, bandwidth), system size and supply patterns. Second, the user requirements are heterogeneous and dynamic. Last, the Cloud applications have different performance, workload, and application scaling requirements. The use of real cloud applications such as Microsoft Azure [9] Amazon EC2 [10] and Google App Engine [11] for benchmarking application performance in variable conditions is very limited due to the inflexibility of the infrastructure. The inflexibility of the infrastructure of these applications (i.e. Microsoft Azure, Amazon EC2 and Google App Engine) does not allow users to perform repeatable, controllable and dependable tests on real Cloud Computing environments. Furthermore, in real infrastructure, the reproduction of results that can be relied upon is extremely a challenging task. Moreover, reconfiguration of parameters for benchmarking on such extensive Cloud Computing infrastructure for multiple tests to run is very tedious and time-consuming job [31]. These limitations prevent users to run benchmarking and tests in real Cloud environments.

A more effective alternative solution is to use simulation [12] tools for benchmarking that provide facilities to perform repeatable, controllable and dependable tests. Simulation-based methods offer significant benefits to Cloud Computing service providers to (a) Tune the system bottleneck before deployment (b) Experiments with different workloads and allocation policies and (c) To test their applications and services in repeatable and controllable environments. CloudSim [13] is a simulation tool used to simulate the Cloud Computing applications from different dimensions; it provides features to model Cloud Computing resource provisioning policies (i.e. space shared and time shared). In this paper, we use CloudSim simulation tool to simulate the working of five (05) most prominent scheduling algorithms (i.e., FCFS [19], Round Robin (RR) [30], Max-Min [26], Min-Min [28], and suffrage [29]) under time and space shared resource allocation policies. Several experiments have been performed using 03 datasets to empirically analyze the performance of these scheduling algorithms. The rest of this paper is organized as follows; section 2 presents a brief background of CloudSim and scheduling algorithms, in section 3 we discuss our experimental setup and dataset. Section 4 presents results and in-depth analysis and section 5 concludes the paper.

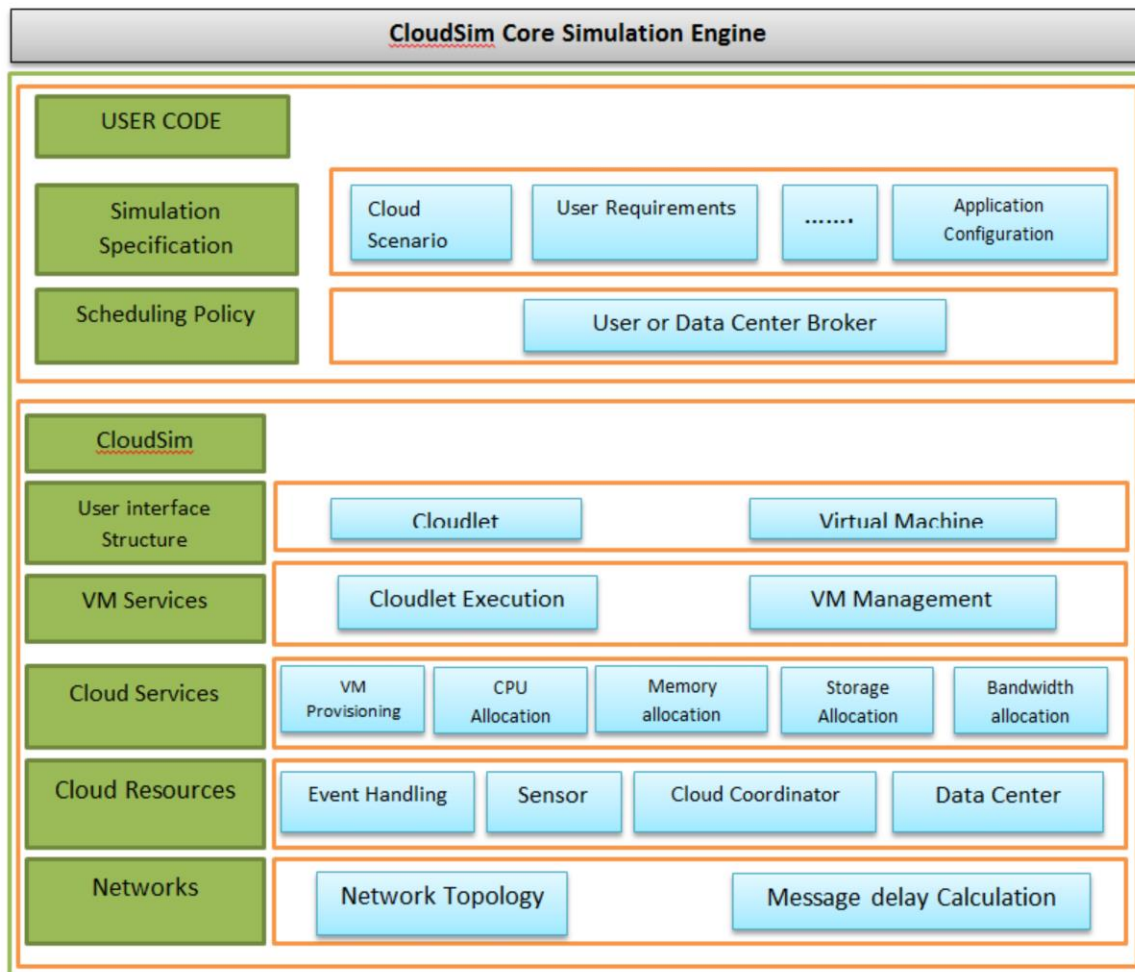
2. Background

This section presents an introduction to CloudSim the simulation tool and scheduling algorithms used in this empirical study.

2.1 CloudSim

CloudSim is a simulation tool [14] that provides the ease of carrying out simulations of different Cloud computing scheduling and resource allocation policies for a Cloud environment. CloudSim is a resource-rich tool having various classes and feature to simulate different Cloud computing components such as VMs, data center, power consumption in data centers, cloudlets and provisioning of scheduling and resource allocation policies. Figure 1 shows the CloudSim architecture.

CloudSim is implemented in a layered architecture, written in Java programming language and is based on *JavaSim* framework [15, 16]. It is implemented in two layers that are (1) user layer and (2) CloudSim and core simulation engine layer. The user layer provides the functionality for users to set simulation specification and scheduling policies and Data Center broker according to user requirements. The CloudSim layer consists of several components such as user interface structure, virtual machine (VM) services, cloud services and network components that include network topology and message delay calculations [17]. The last layer is dedicated to CloudSim core Simulation engine.



2.2 Scheduling Algorithms

In this empirical study, we have employed five different scheduling algorithms for mapping Cloud tasks on virtual machines [18]. We first give a brief introduction and scheduling mechanism of these algorithms used for task scheduling.

Our first algorithm for job or cloudlet scheduling is *First Come First Serve (FCFS)* [19]. This algorithm works in first come first serve manner. With FCFS algorithm the demand of the first arrived task is fulfilled first, and then moves to the next demand that is in the queue that arrived after the earlier task. FCFS is also based on *First in First out (FIFO)* mechanism. Most of the simulation tools such as CloudSim [20], iFOGSim [21], CEPsim [22], ICanCloud [23], Cloud Report [24] and GridSim [25] uses FCFS algorithm by default for scheduling of task and for resource allocations in Cloud and Grid computing environments. The second algorithm we use

for scheduling is *Max-Min* algorithm [26]. This algorithm is an extension of the *Min-Min* algorithm. It first determines the completion time for each task on all the available machines for scheduling. After that, it schedules the task with the maximum required completion time on a virtual machine that has the minimum completion time for that task. This process is repeated iteratively until all the cloudlet or tasks are scheduled [27]. Normally *Max-Min* algorithm performs better in situations where there are fewer longer and many shorter jobs. *Min-Min* [28] is the next scheduling algorithm used for cloudlets scheduling on VMs. This algorithm starts with a search of minimum completion of all the tasks that are to be scheduled on all machines. After that, the task with minimum completion time is scheduled on a machine that has minimum execution time (higher MIPS). The scheduled task is then removed from the task lists. The scheduling process is repeated iteratively until all the un-scheduled tasks in the tasks list are scheduled [28].

The fourth algorithm we employed for task scheduling is *suffrage* algorithm. This algorithm works by calculating values of tasks with first minimum and second minimum completion time. The scheduling of task depends on the difference or suffrage value. The suffrage value is calculated in the second stage of the algorithm. After that, the task with a minimum difference or suffrage value is scheduled on the consistent resource (i.e. a resource that can complete a task in less time) or virtual machine [29]. This process is repeated for the all un-scheduled tasks to be scheduled. The last algorithm we use for job scheduling is *Round Robin (RR)* [30]. This algorithm works in first in first out FIFO fashion, round robin is one of the most widely used algorithms for task scheduling in Cloud and Grid Computing due to its low scheduling overhead. A limited time quantum or time slot is dedicated to each task waiting in queue for the allocation of a resource or *Virtual Machine (VM)*. This means all the jobs or tasks will get the same amount of time on the machine. If a certain task does not complete their execution in its dedicated time slot then another task will acquire the resource and the current task will be sent back to the queue, where it will wait again for its slot. This algorithm treats all the Cloud jobs fairly and removes the monopoly of some tasks over resources.

3. Experiments and Results

Before depicting the in-depth analysis of results, first we briefly discuss the experimental setup used for carrying out experiments and simulations. One of the most obvious reasons to use simulation tool such as *CloudSim* rather than actual Cloud Computing environment is that real Cloud infrastructures are very inflexible due to variable conditions [31,32]. Due to the inflexibility of Cloud infrastructures, the process of carrying out controlled experiments (i.e. different workloads and requirements) and reproduction of results becomes a tedious job. Another reason for using *CloudSim* instead of setting up our own small scale Cloud infrastructure is to avoid the cost of developing the infrastructure.

3.1 Experimental Setup

To perform the experiments we use MacBook Pro machine with 2.8 GHz Intel Core 2 Duo processor and 4 GB 1333 MHz DDR3 RAM with installed operating system (OS X Yosemite 10.10.5) and CloudSim version 3.0.3 a simulation tool integrated with Eclipse IDE for Java (SDK version 7) Developers Version: Oxygen.1a Release (4.7.1a)

3.2 Dataset

For this experimental analysis three different types of Datasets named *Dataset 1*, *Dataset 2*, and *Dataset 3* has been used. Figure 2 depicts the composition of each dataset that has four different categories of cloudlets i.e. *small*, *medium*, *large* and *extra-large*. Small cloudlets range between 1-20 Million Instructions (MI), medium cloudlets range between 20-40 MI, large cloudlets range between 40-60 MI and extra-large cloudlets range between 60-80 MI. Data set 1 has 200

cloudlets in each category as shown in Figure 2(a). Data set 2 has 100 cloudlets of small size (1-20 MI), 150 cloudlets of medium size (20-40 MI), 200 cloudlets of large size (40-60 MI), and 250 cloudlets of extra-large size (60-80 MI) as depicted in Figure 2(b). The Dataset 3 has 250 cloudlets of small size, 200 cloudlets of medium size, 150 cloudlets of large size, and 100 Cloudlets of extra-large size as shown in Figure 2 (c).

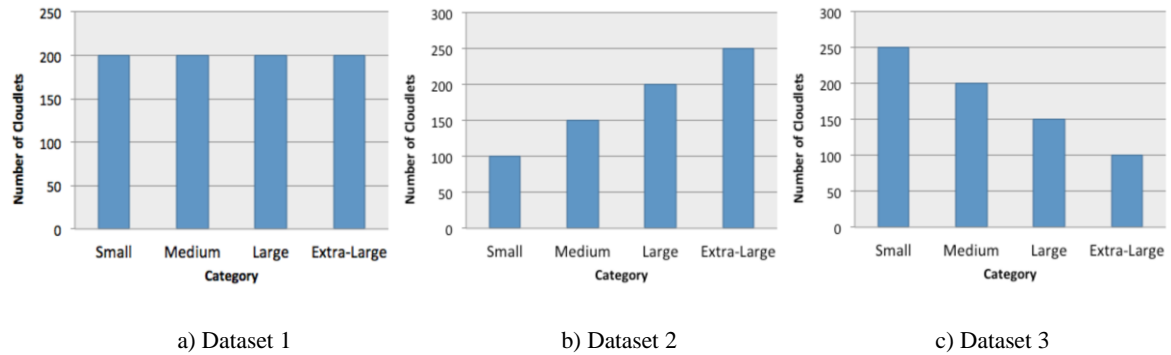


Figure 2: Three datasets used for empirical evaluation of 06 scheduling mechanisms

4. Results and Discussion

Figure 3 depicts the makespan and throughput based results for *Dataset-1*. The Max-Min algorithm performs better in terms of overall makespan (total completion time for the job pool) for *Dataset-1*, which completes all the jobs in less the 2500 milliseconds. FCFS completes all jobs in 2600 milliseconds. The remaining three algorithms (Min-Min, Round Robin, and suffrage) complete the execution of all the Cloudlets or jobs in 2800, 3250, and 3200 milliseconds, respectively. On the other hand, in case of throughput (number of jobs completed per unit time) for Dataset-1, Max-Min completes 300 jobs per unit time while the FCFS based scheduler attains throughput of 300. Min-Min and suffrage algorithm achieve throughput of 270 and 265 number of jobs per unit time, respectively. The Round Robin scheduling achieves the lowest throughput that is 220 numbers of jobs per unit time. In summary, for Dataset 1 the scheduling mechanism of Max-Min and FCFS attain lower makespan and overall higher throughput. These results highlight that the Max-Min and FCFS yields better results if Cloud jobs are in equal ratio with respect to job size (same number of jobs with different sizes as build in our Dataset 1) as based on the same size.

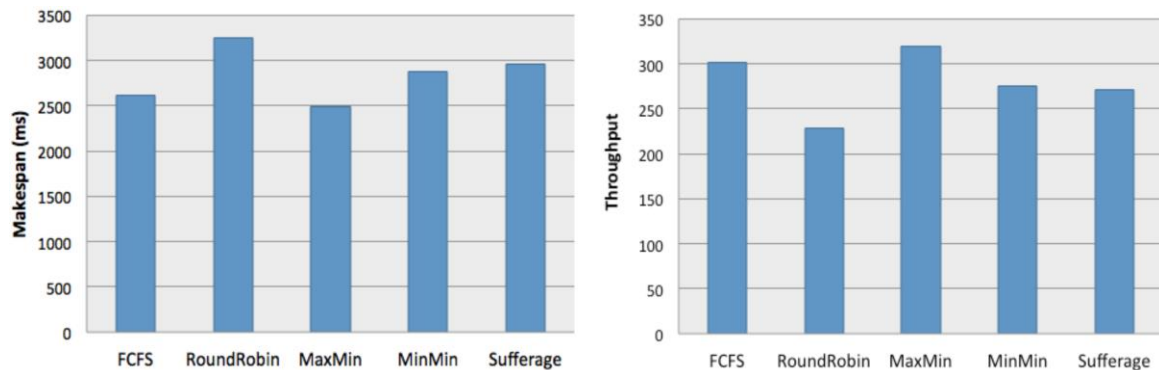


Figure 3: Makespan and throughput of Dataset 1

Figure 4 shows the performance of the scheduling algorithms in terms of throughput and makespan for the Dataset-2 (mentioned in Figure 2). Dataset-2 contains a number of large and extra-large jobs or cloudlets as compared to small and medium-sized jobs. In this experiment, Max-Min and Min-Min attained a makespan of 2500 and 2800 milliseconds, respectively. The other three algorithms (i.e., FCFS, Round Robin, and suffrage) have attained makespan of 3000, 3200 and 3500 milliseconds, respectively. In terms of throughput, Max-Min achieves the highest throughput of above 250 followed by the Min-Min (i.e., 280 throughput) and FCFS (i.e., 210 throughput). Form the experimental results we observed that Max-Min, Min-Min, and FCFS scheduling techniques are more suited to the workload having more number of large size Cloud jobs.

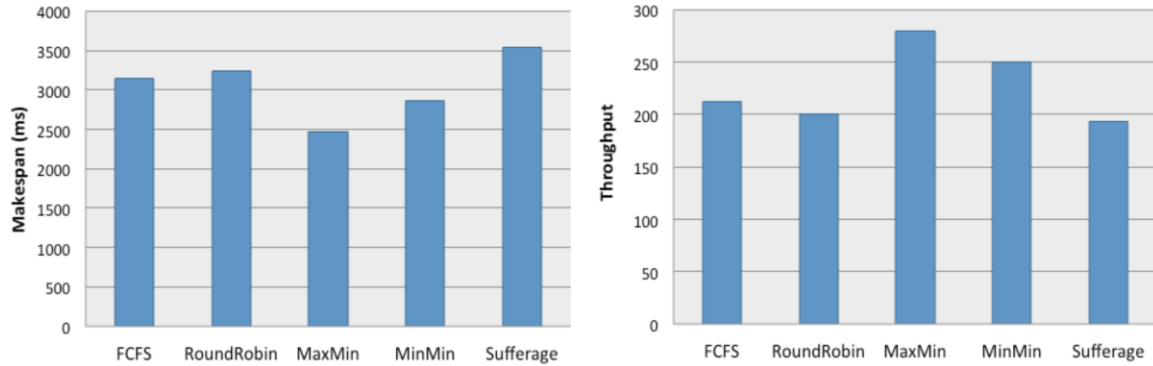


Figure 4: Makespan and throughput of Dataset 2

Dataset 3 in Figure 2 has more number of small and medium-sized jobs as compared to the large and extra-large size jobs. Figure 5 depicts the execution performance and attained throughput using Dataset 3 for 05 Cloud scheduling algorithms we have employed in this emperical study. Here FCFS, Round Robin, and Max-Min achieved better thoroughput and makespan for the execution of Cloud jobs in Dataset 3. The Min-Min has total makespan of 3800 milliseconds and suffrage scheduling heuristic attains 20500 milliseconds of makespan. On the other hand, in terms of throughput Max-Min, FCFS, and Round Robin attain 37, 34 and 36 of throughput. Suffrage and Min-Min have a throughput of less than 25% as compared to MaxMin. These results show that if dataset contains more number of small and medium-sized jobs than Max-Min, FCFS and Round Round yields better results as compared to Min-Min and suffrage.

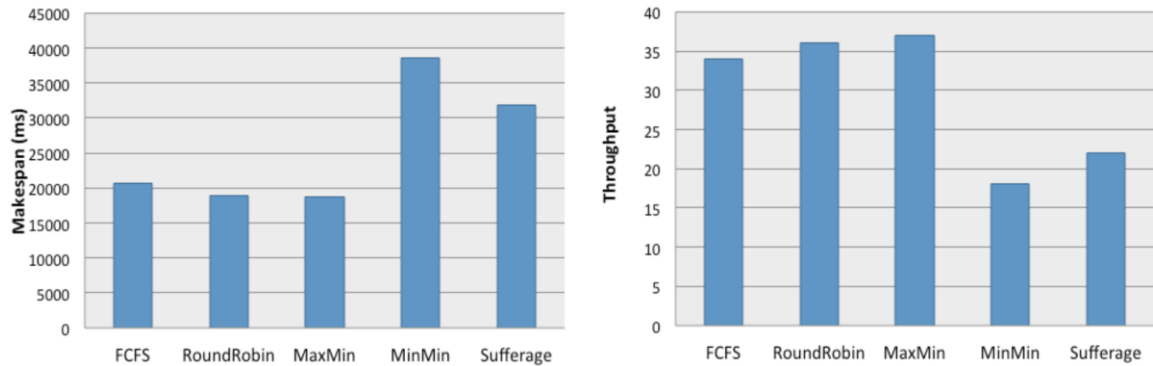


Figure 5: Maskespan and throughput of Dataset 3

The in-depth analysis of the obtained results of 05 algorithms (i.e., Max-Min, Min-Min, FCFS, Round Robin, and suffrage) employed in this experimental study, it is very obvious that Max-Min and FCFS have produced better results against all the 03 datasets as compared to Round Robin and Min-Min. For dataset 2 and dataset 3, Round Robin and Min-Min showed a comparatively better performance as compared to their performance against dataset 1. It was observed that suffrage algorithm has attained the lowest performance (i.e. makespan and throughput) against all the 03 Cloud datasets.

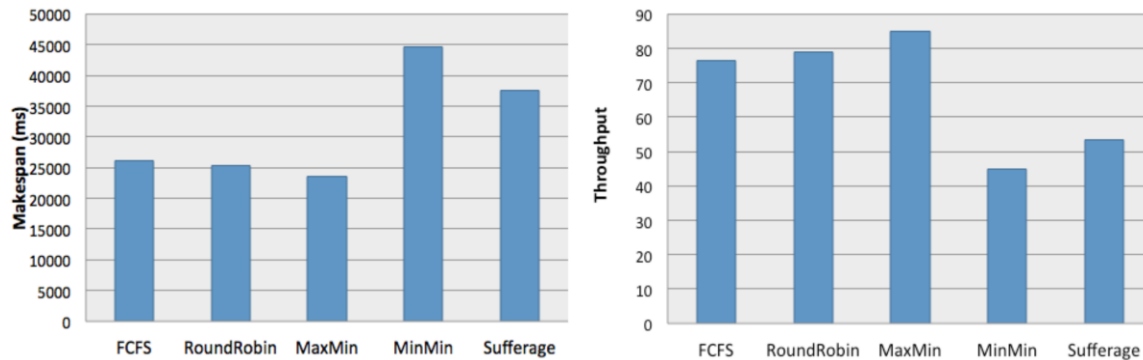


Figure 6: Overall performance of algorithms

Figure 6 depicts the overall performance in terms of makespan and throughput. By considering the overall performance of algorithms, it is very clear that Suffrage algorithm exhibits the lowest performance for the employed datasets. The low performance of the Suffrage scheduling algorithm is due to higher overhead of Suffrage value calculation. In terms of low scheduling latency, our experiments validate that Max-Min, FCFS, and Round Robin could be the preferable candidates for task scheduling in Cloud computing.

5. Conclusion

In this work, we have investigated five prominent Cloud scheduling algorithm using CloudSim simulation tool. Three different types of datasets were created for the experimentation. We analyzed the performance of these algorithms using two performance metrics throughput and makespan. Our experimental results show that the Max-Min yields the best throughput and makespan for all the 03 Cloud datasets. The Min-Min algorithm performs better only for the Dataset-2 (FCFS, Round Robin, and suffrage have attained makespan of 3000, 3200 and 3500 milliseconds, respectively. Max-Min and Min-Min attained a makespan of 2500 and 2800 milliseconds respectively).

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BIG DATA: THREATS, OPPORTUNITIES, TOOLS AND GOOD PRACTICES

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Abstract

Big Data is a collection and combination of huge datasets that are difficult to process using traditional database systems and data processing applications.

The creation and processing of data exceeds 2.6 quintillion bytes on a daily basis. The major source of this data comprised of pictures, videos, posts on different social media networks, daily transaction records, intelligent sensors, mobile phones, and GPS signals. All of these come under the umbrella of Big Data.

Big Data is the driving force for all innovative, informative and creative things to happen. This paper will focus on different challenges, their solutions and technologies which are used nowadays.

Different V's are here to explain the real challenge of big data. These V's includes Volume, Variety, Velocity, Value and Veracity. There are other different challenges which are associated with the term "Big Data" and this research effort will explain all the challenges and its solution for the world in a true sense.

Keywords: Big Data, Big Data Technology, Apache Hadoop, Social Media.

Introduction

Big Data is datasets of large and complex processes [1]. "Big Data is a collection of large and complex datasets that becoming difficult to process using on-hand database system tools or traditional data processing applications".

McKinsey Global Institute (MGI) defines Big Data as datasets whose size is usually beyond the ability of a typical database to analyze, manage, store and capture its details.

According to this definition, the rapid growth of data is handled by Big Data and it also requires technology to deal with it. This definition is not directly concerned with the size of the data as it will further increase in future ranging from few dozen terabytes to several petabytes.

The world is moving towards digitalization and becoming interconnected rather than isolated. As the data is increasing day by day and really requires BI (Business Intelligence). In past we were interested in information and now we are really in need of Knowledge. This BI is really helpful in mining knowledge from data. Today, almost all organizations are facing unprecedented growth in the data. The fact says that almost 2.1 Trillion GB of data that is generated in 2016 and are expected to grow 50 times by 2020 [2]

It has been analyzing that Google receive over 698,445 search queries per minute. Similarly, Facebook status updates are 695,000 per 60 seconds. There are 217 new mobile users connected to internet every minute and that generates a large amount of data [8].

Big Data and Its Application Areas

The question arises where this Big Data will be used? So according to MGI, Big Data generate financial values across different sectors including health care dealing with patient records, global personal location data, public sector administration, manufacturing and retails and nowadays most commonly used social personal and professional data.

What are the Use Cases of Big Data?

The list of Big Data Use cases includes fraud detection, risk modeling and management, log analytics, social media and sentiment analysis and energy sector.

There are certain features of Big Data problems which make them technically challenging. These challenges of Big Data are grouped in three dimensions including data, process and management.

Big Data Advantages and Good Practices

Big Data is beneficial for science, technology and society [13]. Some of the good aspects of Big Data are:

1. **Understanding and Targeting Customers:** Big Data is widely used to understand customers, their buying pattern, their use of plastic money and their purchase behaviors and to deal with it. The common practice nowadays is that companies used to get data of their customers through different tools and logs. Companies then offer products to their customers according to their price range and disposable money they have.
2. **Understanding and Optimizing Business Process:** Businesses optimized their selves through the use of "Big Data". Wholesalers and Retailers are used to update their stocks upon the predictions from search trends, demand and weather forecast. Big data analytics also helps a lot in HR business processes.
3. **Improving Science and Research:** With the advent of big data Science and Research is being transformed to its new versions. Different big data centers and distributed computing tremendously changed the world of science. The power of big data brings new innovations and results. Statisticians, Mathematicians, Physicians, Engineers and medical science are using big data analytics for their upcoming research and innovations.
4. **Improving Healthcare and Public Health:** Big data's power is very much used in improving healthcare. The analytics of "Big data" enables us to decode entire DNA strings within no time (less than a minute) and also helps us in finding new cures and much better understating and predictions of disease patterns.
5. **Optimizing Machine and Device Performance:** The use of big data analytics helps the machines and other devices to become more autonomous and smarter than ever. A good example is driver less cars. Google's self driving car is a real example of machine optimization and device performance.
6. **Financial Trading:** Big data is highly used in HFT (High Frequency Trading). Again, big data prediction algorithms are used here to making decisions related to trading, import and export. Most companies invest in business by keeping in view the results of big data analytics.
7. **Improving Security and Law Enforcement:** Like other fields, big data is extensively used in improving the laws. Criminal's activities and their logs really help the law enforcement agencies in new innovations in laws. Big data techniques are used to detect and prevent cyber-attacks. On the other hand Police department even now in Pakistan uses big data's tools to predict criminal activities and catch criminals. A very recent activity in December, 2017, was that of the predication of the fraudulent transactions. Some of the other advantages includes improving sports performance, improving and optimizing cities and countries, personal quantification and performance optimization.

Big data challenges:

Data Challenges

1. Volume

Volume means the amount of data which is produced every second across different electronic platforms. These platforms include social media (Facebook, Twitter, Instagram etc). The volume of data is increasing day by day and thus we can no longer store and analyze this big data by using the traditional tools and techniques. For example, Facebook can generate more than six fresh profiles every second. Similarly users upload 135,000 new pictures and likewise 510 comments in every minute. Mobile phones are also generating enormous volume of data every minute and these growing rate of mobile phones are really alarming.

- *The challenge is how to deal with the size of Big Data.*

2. Variety

Today more than 80% information is present in unstructured format and too big. It is very difficult to manage it effectively and efficiently. What does it mean? David Gorbet explains [10]:

Organizations come across multiple formats of data which includes structured, semi-structured and un-structure data. Organization needs to run its operations effectively with structured data that was generated within the organization. For example, data generated through customer transactions, data from ERPs and any other Information System's data. Today, companies are handling a lot more data from a different variety of sources both inside and outside the organization. For example word, pdf and excel documents, machine data, social media, emails, sensor data, etc. The list is really endless and such data is termed as semi-structured data. Likewise data in electronic channels will be in form of audios (.mp3, wav etc), videos (mp4 etc) are termed as unstructured data.

- *The challenge is how to handle the different formats of data*

3. Velocity

Shilpa Lawande of Vertica nicely defines Velocity [11]: "as businesses get more value out of analytics, it creates a success problem, they want the data available faster, or in other words, want real-time analytics and they want more people to have access to it, or in other words, high user volumes." One of the key challenges is how to react to the flood of information in the time required by the application.

4. Value

The bigger challenge is how to extract useful data from huge volume of data. Value is referred to the worth of data being extracted. Huge volume of data is worthless unless and until it is converted into valuable information. So converting this huge volume of data to useful information and then extraction worthy knowledge from this information is a real challenge.

5. Veracity, Data Quality, Data Availability

Last but not the least is the veracity of data. Veracity is actually the quality of trustworthiness of the data. Means, how accurate the data is? For example, just think about the posts of Twitter. The Tweets with #tags, typos and abbreviations etc., how much its contents are reliable and accurate?. Who told you that the data you analyzed is good or complete? Paul Miller [12] mentions that "a

good process will, typically, make bad decisions if based upon bad data.

Technical Challenges

1. Fault Tolerance

With the incoming of new technologies like Cloud computing and Big data it is always intended that whenever the failure occurs the damage done should be acceptable. Fault-tolerant computing is extremely hard, involving intricate algorithms. Thus the main task is to reduce the probability of failure to an “acceptable” level. Two methods which seem to increase the fault tolerance in Big data are as: • First is to divide the whole computation being done into tasks and assign these tasks to different nodes for computation. • Second is, one node is assigned the work of observing that these nodes are working properly. If something happens that particular task is restarted. But sometimes it’s quite possible that that the whole computation can’t be divided into such independent tasks. There could be some tasks which might be recursive in nature and the output of the previous computation of task is the input to the next computation. Thus restarting the whole computation becomes cumbersome process. This can be avoided by applying Checkpoints which keeps the state of the system at certain intervals of the time. In case of any failure, the computation can restart from last checkpoint maintained.

2. Scalability

Shilpa Lawande explains [11]: The scalability issue of Big data has lead towards cloud computing, which now aggregates multiple disparate workloads with varying performance goals into very large clusters. This requires a high level of sharing of resources which is expensive and also brings with it various challenges like how to run and execute various jobs so that we can meet the goal of each workload cost effectively. It also requires dealing with the system failures in an efficient manner which occurs more frequently if operating on large clusters. These factors combined put the concern on how to express the programs, even complex machine learning tasks. There has been a huge shift in the technologies being used. Hard Disk Drives (HDD) are being replaced by the solid state Drives and Phase Change technology which are not having the same performance between sequential and random data transfer. Thus, what kinds of storage devices are to be used; is again a big question for data storage.

3. Quality of Data

Big data basically focuses on quality data storage rather than having very large irrelevant data so that better results and conclusions can be drawn. This further leads to various questions like how it can be ensured that which data is relevant, how much data would be enough for decision making and whether the stored data is accurate or not to draw conclusions from it etc.

4. Heterogeneous Data

Unstructured data represents almost every kind of data being produced like social media interactions, to recorded meetings, to handling of PDF documents, fax transfers, to emails and more. Working with unstructured data is a cumbersome problem and of course costly too. Converting all this unstructured data into structured one is also not feasible. Structured data is always organized into highly mechanized and manageable way. It shows well integration with database but unstructured data is completely raw and unorganized.

Management Challenges

“Many data warehouses contain sensitive data such as personal data. There are legal and ethical concerns with accessing such data. So the data must be secured and access controlled as well as logged for audits.”

The main challenges for the management are:

- Privacy of Data
- Data Security
- Governance of Data
- Ethical issues of Data

Solution for Big Data:

Take the Analysis to the Data!

Apache Hadoop is an open source software framework that allows us to store and process large sets of data in a parallel and distributed fashion. It is a well-known Big Data technology. It is designed to process and analyze Big Data and avoid low performance and complexity. Main advantage of Apache Hadoop is its capacity to rapidly process large amount of data sets. [6][7][8].

What Is Hadoop?

Apache Hadoop provides a new open source platform to analyze and process Big Data. It was inspired by Google's Map Reduce and Google File System (GFS) papers. It is really an ecosystem of projects, which includes:

Higher-level declarative languages for writing queries and data analysis pipelines, such as:

1. Pig (By Yahoo!)
2. PigLatin
3. Hive (mainly used by Facebook) and also inspired by SQL
4. Jaql (IBM)
5. Different other modules includes: Load, Transform, Dump and store, Flume Zookeeper Hbase Oozie Lucene Avro, etc.

Who Are the Potential Users of Hadoop?

The users of Hadoop comprises of new users and advanced users.

New Users make use of Hadoop for developing different applications, their deployment and running in production environment. While on the other hand, **Advanced Users** of Hadoop comprised of mostly PhD faculty who have expertise in data mining, databases, and analytics. They look forward to use Hadoop in such a way to support streaming of content in real time. There are certain fields which will be further improved with the real time information; they include patient outcome predictions, sentiment analysis, detection of fraud, product recommendation and ad placements.

Many organizations are now working to expand Hadoop to include secure and business critical applications for integrating file based applications and products. The new Hadoop developments should be plain and simple for operating and getting data easily.

An Example of an Advanced User: Amazon

Amazon make of Hadoop to make its data more secured and protected.

Following is pros and cons of Hadoop.

Hadoop Pros:

Hadoop is an open source, having the ability of scheduling large amount of data, process unstructured data automatic data placement and rebalancing having the ability to schedule large amount of data in chunks,

1. Open source.
2. Supporting recovery of jobs from failed tasks automatically and incrementally.
3. Automatically balance and place data as it grows

4. Non monolithic support for access to file-based external data.
5. Having the ability to maintain and schedule large volume of data in small chunks
6. Hadoop does not require schema first.
7. It has the potential to process and analyze unstructured data with the availability of different algorithms of machine learning and recommendation engines for developing new game changing applications.
8. It supports machine fail over and replication without operation intervention.
9. It supplies a tool for exploratory analysis assisting in Map Reduce programs

Hadoop Cons:

The cons of Hadoop are:

1. It is complex to operate.
2. It is basically a batch oriented paradigm which can support powerful analysis. The missing piece of the Hadoop puzzle is accounting for real time changes.
3. Hadoop make use of check pointing at intermediate stages. There is no transactional guarantee whether during operating, it failed to complete or restart and complete with the passage of time.
4. Name Node is the centralized metadata store of Hadoop file system, which shows failure of a single point without availability.

Conclusion

The research papers mainly focused on Big Data, its challenges, good practices and uses. Later a solution to big data is also presented along with pros and cons of Apache's Hadoop.

In the beginning Big Data required a step forward from traditional data analysis to revolutionary. Characterized by five components as already analyze above. Lastly analyzed and discussed some major problems and their solution related to the problem. The aim of this paper is to provide a researchers and readers a big picture of this era. Hopefully it provides useful suggestions to solve the problem of Big Data for researchers and readers.

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HUMAN COMPUTATION BASED VIOLENCE DETECTION

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Abstract

Surveillance systems have difficulty in tracking suspicious events because it is difficult for the observer to detect a short sequence of suspicious event in large number of video streams. In this regard we need a system that can automatically detect suspicious activities in such video feeds. In this work, we've aimed to detect violence or suspicious activities in large number of CCTV video streams. Based on the training model, the system detects suspicious activities in the incoming streams. The system then extracts short video clips containing possible violence. It then deeply inspects the extracted videos and classify them as suspicious or non-suspicious. For feature extraction, space time interest point was used. K-means was used to cluster those features. Finally, the data was classified using Linear SVM with an accuracy 70%. Further, PCA was used to identify significant features that could help our model in learning fast by ignoring unimportant features. In this work, human computation is also used to assign proper tags to suspicious videos clips.

Keywords: Computer Vision, SIFT, Violence Detection, Bag of Words, Random Forest Tree, SVM Classifier Linear

1. Introduction

Human action recognition has been area of research in many emerging applications. More work has been addressed in focusing simple human motion detection such as clapping, walking and jogging. However, actions like fight or violence detection like human computation-based systems have not been discussed in literature(Vashistha, Bhatnagar et al. 2018).

The implementation of a violence detection system is important to highlight any suspicious activity in thousands of videos streams in security and CCTV control rooms for big city like Karachi. Further, such a surveillance system would also be useful in places like schools, prisons, psychiatric wards, and old home centers.

In this regard, Nam et al. (Nam, Alghoniemy et al. 1998) proposed a violent scenes recognition system for blood detection, flame and the degree of motion. The system also considered some other features like sound of violent scenarios. Cheng et al. (Cheng, Chu et al. 2003) recognized other events such as gun fire, explosions and car braking using a Hidden Markov models and Gaussian mixture model. Giannakopoulos et al. (Giannakopoulos, Makris et al. 2010) also proposed an audio features detection mechanism for violence detection. Chen et al. (Chen, Su et

al. 2011) worked on the motions related algorithms for detecting facial expressions and nearby blood. Bermejo et al. shown results using MoSIFT features and achieved 90 % accuracy on violence detection. However, the proposed action recognition method was computationally expensive in terms of extracting features from frames. Many proposed works regarding the kinematic pattern of movement, for the perception of actions, the degree of correlation of different emotions such as sadness, anger and happiness fits well for detecting violence in short term videos but happen in thousands of video streams are used as input for detecting any suspicious activity at real time.

Since, there are numbers of cameras as compared to the personnel analyzing the footage in a particular area, there is a chance that the personnel would miss a suspicious event within the premises. This work will help the capabilities of the human operators by detecting suspicious activities and possibly classifying them as violent or not. Surveillance cameras are widely used but their quality lacks when dealing with detection. A violence detector will somehow make a difference which could use the capabilities of a mobile device and have the functionality to upload and check possible violence. Along with that to ease the use of security personnel we propose a solution for Human Computation which would allow the users also called volunteers (user that could either use mobile platform to upload videos on server and also add tags to the already existing videos to help classify them as violent or not) to tag or comment on the subset of suspicious clips where the action recognition is difficult in a potential dangerous situation.

The paper presents a smart surveillance system that recognizes activities such as fight or no fight and uses the human cogitation to ensure the accuracy of a particular event occurring. At present, the system detect the presence of violence or non-violence activities having fight and no fight only, but could be trained for other various suspicious activities.

The paper is organized as follow: In Section 2, Litratione Review about the problem has been presented. Section 3 presents the Proposed Methodology about the Feature Detection and Extraction. The Experimental Setup has been discussed in Section 4, followed by the Video Classification and related algorithms in Section 5. Section 6 shows the Experimental Results of violence detection and its accuracy.

2. Litratione Review

In the last few years, the problem of human action recognition from video has become tractable by using computer vision techniques (Deniz, Serrano et al. 2014). In order to detect action recognitions in videos the method of using a combination of feature descriptors and feature detectors is used. Various techniques are built which includes the famous Space Time Interest Points which provides compact and abstract representations of patterns in an image (Laptev 2005). Interest-point based method begins by first detecting space-time key-points (Itcher and ר'א"צ 2013). When the video is detected and then described it produces salient points, these points represent multiple spatial and temporal scales based on the feature descriptor used. The famous Histogram of Oriented Gradients (HOG) is used to find the orientation of pixels in a patch where as there is another feature descriptor which goes by the name of Histogram of Optical Flow (HOF) which finds the flow or movement of detected points in time. A combination of this is often used which is known as HNF, which extracts both feature vectors for a 3D video patch. For the case of Space Time Interest Points feature vectors are extracted in the neighborhood of the salient points which we call feature vectors extracted by STIP in a 3D video patch. Apart from this the approach the method of Acceleration Measure Vectors for violence detection (Deniz, Serrano et al. 2014) considers body tracking can be considered. Also the method proposed by (Hassner et al) of Violent Flows (ViF). Violent Flow detects magnitude changes through times of feature points that change in time also known as Flow-vectors. The information of flow vectors is collected over short sequence of frames.

For most of the time whenever the feature descriptors are used the famous Bag of Words technique which has been borrowed from the Natural Language Processing community is used

over these feature points to create a histogram which bases on a clustering model which produces clusters over a collection of the feature points obtained from the Space Time Interest Points. Given a histogram or vocabulary we find out the count of each feature vector in a cluster for a specific video. The final step of classification is done by using the famous Support Vector Machine algorithm to predict classes of videos. Videos are efficiently labeled using Support Vector Machine (SVM) (Laptev, Marszalek et al. 2008, Wang, Ullah et al. 2009).

3. Proposed Methodology for Feature Detection and Extraction

The main contribution of this work is to classify a video as violent or non-violent. In this regard, different algorithm related to the problem was studied as discussed in the literature review. It was found that the most suitable technique in our domain was to use the space time interest points (Laptev 2005) which is a feature detection and description technique used in Computer Vision to classify videos. The k-means clustering model was then used to create a histogram representation that is the Bag of Feature technique on the Hockey dataset E. Bermejo (Nievas, Suarez et al. 2011). Classification was done using Random Forest Tree and Support Vector Machine similar to the analysis provided by (Bermejo et al.).

For video analysis our choice was to use Space Time Interest Points (STIP) that provides compact and abstract patterns in an image (Laptev 2005). STIP is a very famous feature descriptor which is widely being used in research purposes. To implement STIP the code was provided by Ivan Laptev: <http://www.di.ens.fr/~laptev/>. We set up Ubuntu 16.0.4 on VMware first, then installed OpenCV and attached the STIP code with OpenCV in Ubuntu which was a binary file. In order to take out STIP features from a video sequences we collected the names of all the video sequences then we extracted the STIP features by running a command on the terminal which resulted in a text file containing features.

As part of the implementation, a separate web panel for admin and user was also provided. Each panel contains videos that were uploaded by different users. The videos are then classified by the algorithm (machine) and possibly labelled/tagged by the users. An android app is also developed to support the functionality to record videos and uploads them onto the server. The user can also tag videos as violent and non-violent.

4. Experimental Setup

Ubuntu 16.0.4 image was setup on a virtual machine(VMware). OpenCV was installed on this image. Later on, STIP binaries were used to extract features from videos in textual format, and for the purpose of Video Classification (having textual data) we also setup Python and Libraries like numpy, scikit-learn, moviepy and mysqldb. In order to understand the system implementation we divided our experiments in two parts: (i) feature detection/description and (ii) classification. For this purpose, the Hockey dataset and the UFC fight dataset were used for the training the model. Details about the collected and proposed datasets is given as under:

4.1 Collected Dataset

In order to choose a dataset that exactly match our problem statement, the dataset should contain video sequences of either fight or no fight data. Mostly action recognition datasets are widely available but the dataset where videos are categorized in Violence and Non-Violence are in a small quantity. The Hockey dataset (Dataset 2018) which matched closely to our problem domain was chosen. It is open source and is available from <http://visilab.etsii.uclm.es/personas/oscar/FightDetection/index.html>. The dataset comprises of 1000 videos in total, with 500 fight scenes and 500 non fight scenes occurred during Ice Hockey. Each video is of 2 seconds max, containing 40 frames, few individual frames shown in Figure 1.



Figure 1: Hockey dataset scenes

4.2 Proposed dataset

Our contribution was to create such a dataset that will be specific for the domain of detecting violence or not in a video sequence. In this research we proposed a dataset of 'UFC Fights'. This dataset has been collected from YouTube. Each video sequence downloaded was broken into frames of 4 seconds each video clip contains 25 frames per second. After collecting a large number of small video clips we sorted them into two groups that are Violent as shown in Figure 2 (a) and Non-Violent as shown in Figure 2(b). Only those video clips were kept that we think were significant for learning these two types of classifications.



Figure 2: (a) Violent Videos from our dataset having various quick Movements of fight. (b) Videos that are Labeled Non-Violent in our dataset having comparatively less Movements.

5. Videos Classification

For video classification we took the text file containing video features and applied the well-known Bag of Words(Features) technique and further used random forest tree as a classifier to identify tags. Bag of features in videos represent histogram over features, for this construction we apply k-means clustering on the complete dataset. We use this k-means model for constructing bag of words for each video and record the occurrences of each cluster feature in that video. After obtaining bag of words for all videos we then apply Random Forest Tree Classifier with depth =3 and trees =1000.

5.1 Algorithm Description

STIP, space time interest points are calculated for each video in the dataset. The resultant from the STIP is a text file containing description of features (*Hog+Hof*). Then we calculated 50 Clusters using k-means on the complete dataset. Then we applied Bag of words technique in order to calculate Bag of words for each video. These bag of words represent a histogram for each cluster in a video. Then we trained our model on these bag of words using Random Forest Tree and Linear SVM classifier and achieved 70% accuracy for both the classifiers. The algorithm is illustrated in Figure 4.

5.2 Algorithms:

The following series of algorithms were used in detecting violent activities:

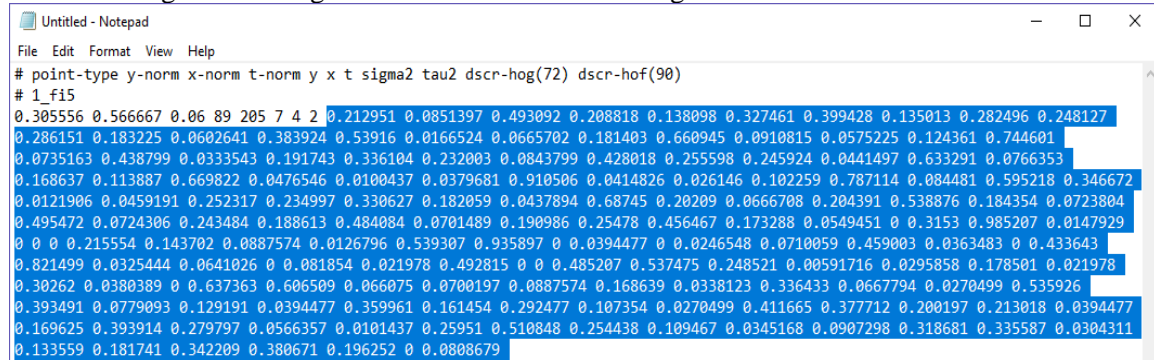


Figure 3 Textual Features extracted from Space Time Interest Points

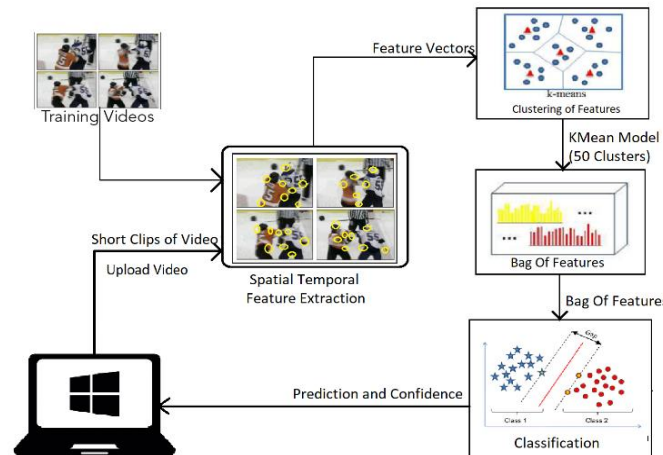


Figure 4. The feature detection and extraction algorithm

5.2.1 STIP

Video features is very successful in scene recognition and human action recognition, Space Time Interest Points(STIP) is a technique which capture motions in a form of textual features with respect to their shifts in space and time(spatio-temporal). Such features also avoid segmentation and tracking methods in video classification. Space time feature detectors and descriptors are numerous. Detectors select spatio-temporal regions with saliency(outstanding property) functions. Descriptors capture motion on these detected points using image measurements, namely histogram of oriented gradients and optical flow. For each detected point, a feature descriptor computes a patch with respect to (x,y,t) its spatial size (sigma) and temporal length(T). For characterizing motion of detected points the method of optic flow in space and time are computed in the neighborhood of the feature points. These features are used to recognize motion with high frequency, velocity variations of the patterns. The resulting features are combined to make one feature vector, the output is in the form of $(x,y,t)+hog+hof$. The Textual Features extracted from Space Time Interest Points is shown in Figure 3.

5.2.2 Bag of Words

It is a famous technique in NLP, it is used for text classification to calculate frequency of occurrences. Computer vision has borrowed this idea from NLP and uses it to classify a video. This approach initially makes clusters which represent features, these clusters are then used for each video frame to create its bag of words. This bag of words approach in our case is known as Bag of Features because each scene is represented in a vector of high-dimensional feature space (Laptev, Marszalek et al. 2008).

5.2.3 Random Forest Tree Classifier

An ensemble learning method for classification and regression works by building large number of decision trees at training time. It then identifying the classes (classification) or mean expectation (regression) of the individual trees.

We used the random forest tree for our classification purpose. By running out at different depth and estimators we found that it was giving the best performance at depth=3 and estimators=100. The reason behind using the random forest was that our data contains 50 attributes (bow) and to select optimal combination of these attributes to classify the video as violent are not is difficult task so random forest was suitable for this task as it builds different decision and tries different combination of these attributes and give the mean prediction based on all these trees

5.2.4 Support Vector Machine Classifier

A support vector machine (SVM) is a supervised learning method with related learning method for classification and regression. The algorithm is based on the concept of hyperplane that separates features of one class from other class with the largest margins. In this work SVM Classifier Linear Kernel was used to trains the model, and later on, the model was used to tests the Hockey dataset and UFC Fight dataset videos. The algorithm predicted classes of videos as violent and non-violent.

Bag of Words

```
k_means=
pickle.load(open('C:/Users/Abid/Desktop/FYIP/CODE/DATA/FinalkMeanModel50.sav'
, 'rb'))
actionCode=1
BagOfWords=np.empty(51)
for fName in filenames:
    f=open(fName,'rt')
    content=f.read()
    examples=content.split('\n\n')

    for ex in examples:
        lines=ex.splitlines()
        pts=[]
        for i in range(len(lines)):
            if(lines[i][0]=='#'):
                print(lines[i])
            else:
                p=[float(x) for x in lines[i].split()]
                pts.append(p)
        arr=np.array(pts)
        hogHof = arr[:,9:]
        Bow=np.zeros(51)
        Bow[50]=actionCode
        for x in range(len(hogHof)):
            pr=k_means.predict(hogHof[x].reshape(1,-1))
            Bow[pr]+=1
        BagOfWords=np.vstack([BagOfWords,Bow])
        actionCode+=1
        BagOfWords_x=BagOfWords[1:,:]
    np.savetxt("Final_Data/BagOfWords.csv",BagOfWords_x, delimiter=",")
```

k-means

```
with open("C:/Users/Abid/Desktop/FYIP/CODE/Final_Data/combine.txt")
as f:
    content = f.readlines()
print(a)
floats=[]
for i in range(len(content)):
    if(content[i][0]!='#' and content[i][0]!='\n'):
        f=[float(x) for x in content[i].split()]
        floats.append(f)
arr = np.array(floats)
arr = arr.astype(np.float16)
dimensions = arr[:,1:9]
#np.savetxt("dimensions.csv",dimensions , delimiter=",")
hogHof = arr[:,9:]
#np.savetxt("Hog_Hof.csv",hogHof , delimiter=",")
k_means = KMeans(n_clusters=50)
k_means.fit(hogHof)
toc = time.time()
print((toc-tic)/60)
a=time.clock()
```

5.3 Algorithm Complexity

Algorithm was run on Intel Core i5 2.2 GHz with 8GB RAM. The following execution complexity was noticed during the experiments:

- a. STIP features were extracted within a minute of time lag considering the video length.

- b. k-means gave 2 hours in Clustering(50 Clusters).
- c. Bag of Words is calculated in relatively runtime.
- d. Random Forest Tree Classifier's Training relatively runtime.
- e. Random Forest Tree Classifier's Testing relatively runtime.
- f. SVM Classifier Linear Kernel Trains in 10 minutes approximate.
- g. SVM Classifier Linear Kernel Tests in relatively run time (Considering runtime to be less than 2 secs).

6. Results and Discussion

The Results on the Hockey dataset and the UFC Fights along with real time feed was analyzed with 5 kfold cross validation. UFC videos and some real time feed from different video streams such as CCTV and mobile phones was also sent to the users/volunteers for any possible violence detection. The user video tags and classification were used as an input to the learning model. Linear SVM was able to find Results with 64 % accuracy by analyzing complete data set. We then plot the graph for variance explained by components and 28 features were able to explain the variance more than 95%, so we apply PCA on it with 28 components and get the accuracy of almost 70%. This decrease in size of Bag of Features helps our model learn fast by ignoring the less important features. The Results of hockey dataset have been shown in Table 1, whereas the UFC Fights and online real time video feed result have been shown in Table 2.

Table 1: Hockey dataset

Algorithm	Accuracy
Random Forest Tree Classifier	90%
Support Vector Machine (Linear)	87%

Table 2: UFC dataset and online feed

Algorithm	Accuracy
Random Forest Tree Classifier	70%
Support Vector Machine (Linear):	64%

7. Conclusion and Future Work

CCTV Control Rooms' surveillance systems have difficulty in tracking suspicious events because it is difficult for the observer to detect a short sequence of suspicious event in large number of video streams. In this regard a system has been developed to automatically detect suspicious activities in such video feeds. In this work, we've aimed to detect violence or suspicious activities in large number of CCTV video streams. The system detects suspicious activities in the incoming streams, extract short videos from the incoming streams and classify them as violent and non violent. In this work the Human aspect has also been used for possible tagging and classifying videos as violent and non-violent and help system learn from the human experience. For feature extraction, space time interest point was used. K-means was used to cluster those features. Finally, datasets: the Hockey dataset and the UFC dataset and real time video feed from different sources was classified using Linear SVM with an accuracy 70%. Further, PCA was used to identify significant features that could help our model in learning fast by ignoring unimportant features. In this work, human computation is also used to assign proper tags to suspicious videos clips.

This work of violence detection is only working to classify video segment as violent or not. However, this could be enhanced up to live feed and detection of particular action in place. In future, the selection of the volunteers can be effectively addressed. As these users can help in efficiently identifying different actions in videos streams. If this system is worked upon

effectively, security agencies and other government officials could use this as a measure of strict security in the vicinity, areas, cities and even be at country level.

```
Random Forest
X=data[:, :50]
Y=data[:, 50]
Clf = RandomForestClassifier(n_estimators=1000,max_depth=3, random_state=0)
clf.fit(X, Y)
train_X, test_X, train_y, test_y = train_test_split(X, Y, train_size=0.9,
random_state=123,stratify=Y)
clf.fit(train_X, train_y)
C = 1.0
pred=clf.predict(test_X)
acc = clf.score(test_X, test_y)
print("Accuracy: ",acc)
toc=time.time()
print("Time: ", (toc-tic)/60)
print(confusion_matrix(test_y, pred))
from sklearn.decomposition import PCA
df = pd.read_csv('C:/Users/Abid/Desktop/FYIP/CODE/Final_Data/BagOfWords.csv')
pca = PCA(n_components=28)
X_train_2, X_test_2, y_train_2, y_test_2 = train_test_split(df.iloc[:, :-1],
df.iloc[:, -1],train_size=0.7, random_state=0)
X_train_2_pca = pca.fit_transform(X_train_2)
X_train_2_pca = pd.DataFrame(X_train_2_pca)
x_test_2_pca = pd.DataFrame(pca.transform(X_test_2))
estimate = svm. SVC(kernel='linear', C=1.0)
estimate.fit (X_train_2_pca, y_train_2)
# predict class labels of the data
pred = estimate. predict (x_test_2_pca)
# Score on the given test data (accuracy in %)
acc = estimate. score(x_test_2_pca, y_test_2)
print ('Gradient Boosting Regression Accuracy with PCA : {}'.format(acc))
```

8. Acknowledgments

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Civil Engineering

EXPERIMENTAL INVESTIGATION OF ENERGY DISSIPATION CAPACITY OF UNREINFORCED BRICK MASONRY

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Abstract

The lateral in-plane response of unreinforced masonry structures plays an important role in their seismic behavior which is further dependent on their energy dissipation capacities. This article presents a study on experimental investigation of the energy dissipation capacity of unreinforced brick masonry by testing three full scale walls with different aspect ratios, under in-plane quasi static loading. A constant level of vertical stress resulting from a two storey unreinforced masonry buildings was applied on the wall. The energy dissipation capacity of the wall specimens with different aspect ratios are compared at the end.

Keywords: Brick masonry, Energy Dissipation, In-plane response, Seismic behavior.

1. Introduction

The brick masonry building construction is mostly used construction throughout the world due to its low-priced constituents and simple construction techniques. The brick masonry construction is very common in the seismically active areas. Masonry construction is feeble against lateral loads, thus it is more vulnerable to the earthquakes. Most of the buildings in Pakistan are made of unreinforced brick masonry, which suffered heavy damages in the October 2005 Kashmir earthquake and November 2015 Pakistan-Afghanistan earthquake. Masonry construction was also badly damaged in 2009 and 2016 earthquakes of Italy. A devastating earthquake of Nepal in 2016 also witnessed heavy damages in masonry construction. These events created awareness to do research work on unreinforced brick masonry (URBM) to understand its behavior and to provide design guidelines to improve it. A lot of research work is already carried out and in progress to interpret the seismic behavior of masonry structures.

The seismic behavior of URBM is greatly influenced by variables that include aspect ratio, vertical stresses, flanges and mechanical properties of the constituents of URBM. This paper investigates the effect of aspect ratio on the energy dissipation capacity of URBM. The aspect ratio affects the seismic capacity of the wall. A lot of research work is done on URBM keeping in view the aforesaid variables that affect seismic properties of URBM. The research work done by Daniel P. Abrams 1992 [2], Magenes and Calvi 1997 [3], Tomazevic 1999 [4], Yi et al. 2004 [5], Javed 2009 [6], Allen et al. 2015[7], Sajid et al. 2016 [8] and Sajid et al. 2018 [1] utilized brick masonry walls to study the effects of aspect ratio and vertical stresses. Quasi-static cyclic test was

adopted in these studies. All the researchers concluded that aspect ratio is one of the important parameters which affects the seismic behavior of URBM.

2. Experimental Program

For the investigation of the energy dissipation capacity of URBM, an experimental program was planned which includes the determination and selection of constituent materials, construction of full scale wall specimens and quasi static cyclic testing on these specimens.

2.1 Material Properties

Before the construction of full wall specimen, the material properties of the constituents of the wall specimen were evaluated according to the ASTM standards. The results are given in Table 1. A backed clay brick of nominal size 229 x 114 x 76 mm was used in the construction of wall specimen, as it is the brick size used in the local construction systems in Pakistan.

Table 1: Material properties

Material	Property	Results (average)	Test Standard
Brick units	Compressive strength (MPa)	12.07	ASTM C67-3a
Brick units	Initial rate of absorption (%)	16	ASTM C67-14
Cement mortar (1:6)	Compressive strength (MPa)	8.16	ASTM C109
Brick masonry	Compressive strength (MPa)	2.25	ASTM C1314

2.2 Construction of walls

This phase includes the construction of three full scale walls named as SPW1, SPW2 and SPW3. The details of all the walls are shown in the Figure 1. The wall specimen was having length of 301 cm, height of 274 cm and thickness of 22.5 cm. The construction of wall was done in English bond pattern which is normal practice in Pakistan. The wall SPW1 and SPW2 were having an opening in the middle having length of 93 cm and height of 120 cm. The average thickness of the mortar joint was 10 mm. A lintel beam of 17 cm thickness was provided above the opening.

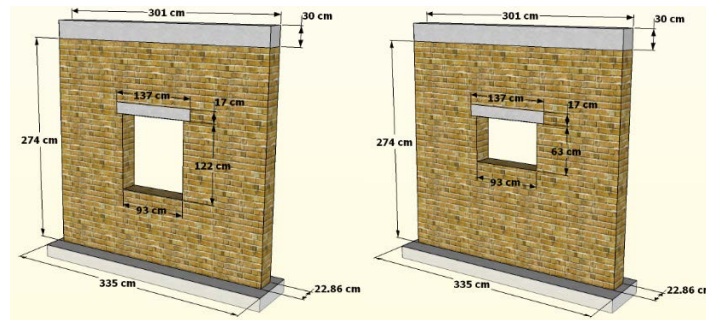


Figure 1: SPW1 and SPW2 (left), and SPW3 (right)

The construction of wall was done in two steps. The first step involves the construction of reinforced footing pad which serves as a platform for the wall specimens. The footing pad was constructed in 1:2:4 concrete mix. To avoid the movement of the footing platform, it was anchored with the floor with the help of bolts and epoxy. The walls were then constructed on this footing. A reinforced concrete beam was constructed on the top of the walls to apply uniform vertical and horizontal loading on the wall.

A constant vertical stress resulting from a residential double storey room was applied on the wall

with the help of dead load of steel beam and vertical load cell. The loading and geometric details are given in Table 2.

Table 2: Geometric and loading details

Specimen Name	Size of opening (l cm x h cm)	Height, h (cm)	Length, l (cm)	Thickness, t (cm)	A.R. (h/l)	Vertical Load (kN)
SPW1	93 x 122	122	104	22.86	1.17	118
SPW2	93 x 122	122	104	22.86	1.17	118
SPW3	93 x 63	63	104	22.86	0.6	118

3. Test setup

The Figure 2 shows an instrumentation plan for all the wall specimens. To record the displacement, linear variable displacement transducers (LVDTs) were installed at six different positions. To record the horizontal displacement of the wall, LVDT-1 also known as control gauge was installed on the front face of the concrete beam, at a horizontal level, at the top of the wall. LVDT-2 was installed on the same level on the opposite side of the concrete beam, at the top of the wall. LVDT-1 and LVDT-2 were installed for the same purpose. LVDT-3 was installed on the midpoint of the lintel beam to record sliding of piers. To record global rocking of the wall, LVDT-4 was installed for this purpose at vertical level. To record the in-plane sliding of the wall, LVDT-5 was installed at horizontal level at the bottom of the wall. LVDT-6 was provided on the concrete beam in the out-of-plane direction, on the top of the wall, to record out-of-plane movement of the wall, so that test can be stopped in excessive out-of-plane rotation. Each LVDT has the capacity to record linear displacement in one direction up to 50 mm. It was kept at 25 mm at the start of the test so that a displacement of 25 mm is recorded in either direction.

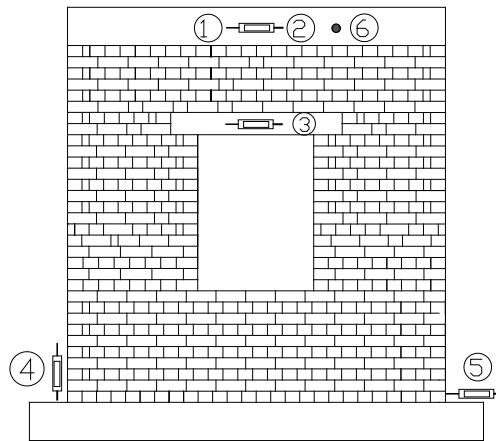


Figure 2: Instrumentation plan for all wall specimens

The wall specimen was constructed in the structural engineering laboratory at civil engineering department, UET, Peshawar-Pakistan. The wall specimen was free at the top to be easily displaced and fixed at the bottom, thus representing a fixed-cantilever setup. Lateral and vertical loading was applied with the help of hydraulic jacks that were controlled by hydraulic pumps. Vertical and lateral loads were applied by load cells having capacity of 500 kN. To ensure the same loading to be applied in pull and push on the walls, loading shoes were attached to both ends of the concrete beam. To apply same vertical load on each pier, two steel plates were placed

on the concrete beam. One steel roller was placed on mid of each steel plate. A steel girder was then placed on these rollers and vertical load was applied through this girder. This mechanism represents the actual loading conditions applied on the URBM.

4. Test procedure

Quasi static cyclic test was performed on the wall specimen to know the aspect ratio on the target parameter. This test type has a lot of advantages over the other type of dynamic testing types. A stepwise linear increasing displacement helps in ease capturing the damage mechanism and identification of cracks. Moreover, this test procedure is adopted by many researchers for analyzing the seismic behavior of URBM.

Displacement controlled regime was followed to apply lateral force. Each displacement cycle was repeated three times. At the duration and completion of each displacement cycle, cracks were identified and drawn with the help of markers on the wall specimen. The test was stopped when a 20 percent degradation of strength was found or the wall is heavily damaged.

5. Test results and discussions

The experimental results of wall specimen are presented here. The data from different gauges was processed to determine the target of interest.

5.1. Hysteresis loops

The force deformation behavior of individual test specimens using force deformation hysteresis loops are shown in Figure 3. These hysteresis plots were developed using cyclic test data obtained through quasi static testing, which was then first filtered using excel sheets by three point moving average method. The energy dissipation capacity and damping curves were developed from these hysteresis loops.

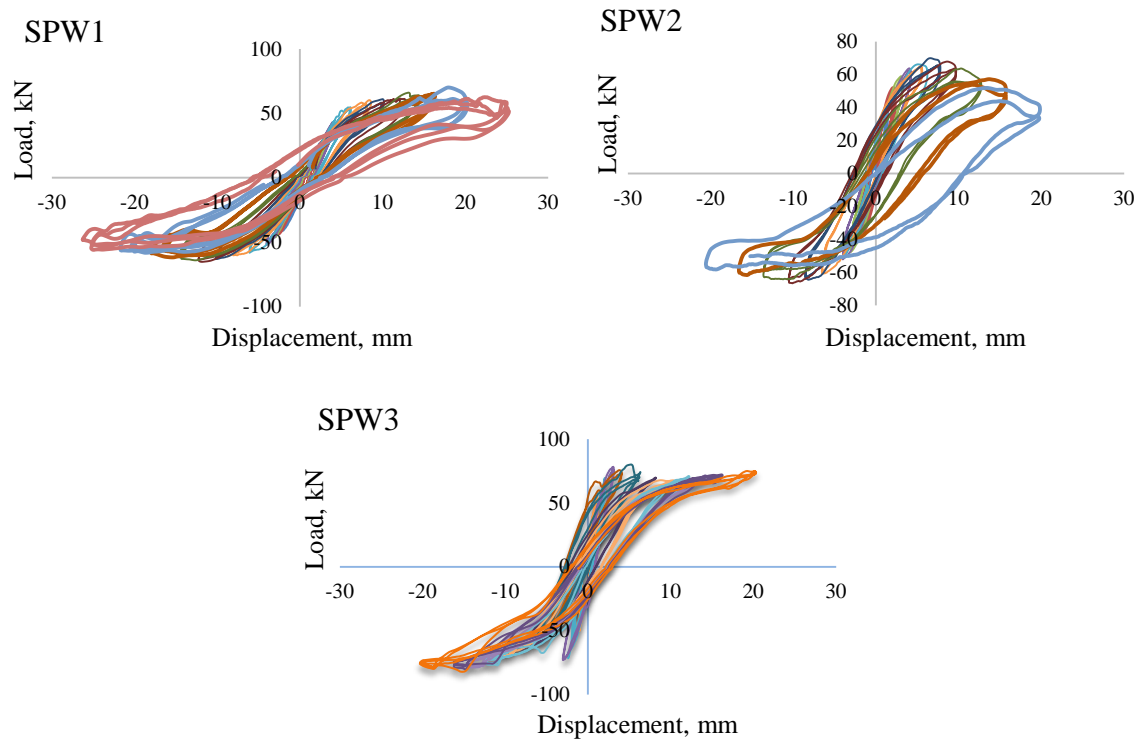


Figure 3: Hysteresis loops for SPW1 (above left), SPW2 (above right), SPW3 (bottom)

5.2. Energy dissipation capacity

The seismic performance of URBM is evaluated in terms of performance index like energy dissipation. It is an important parameter in the evaluation of seismic response of a structure. The dissipated energy is obtained by integrating numerically the force displacement hysteresis loop of each loading cycle. The dissipated energy of each wall are shown in the form of a graph. The ordinate shows dissipated energy (kN-mm) and the abscissa shows the drift demand in percentage (%). An increase in the dissipated energy is found with the increase of drift demand as depicted in Figure 4. The comparison of energy dissipation of all walls is shown in Figure 5.

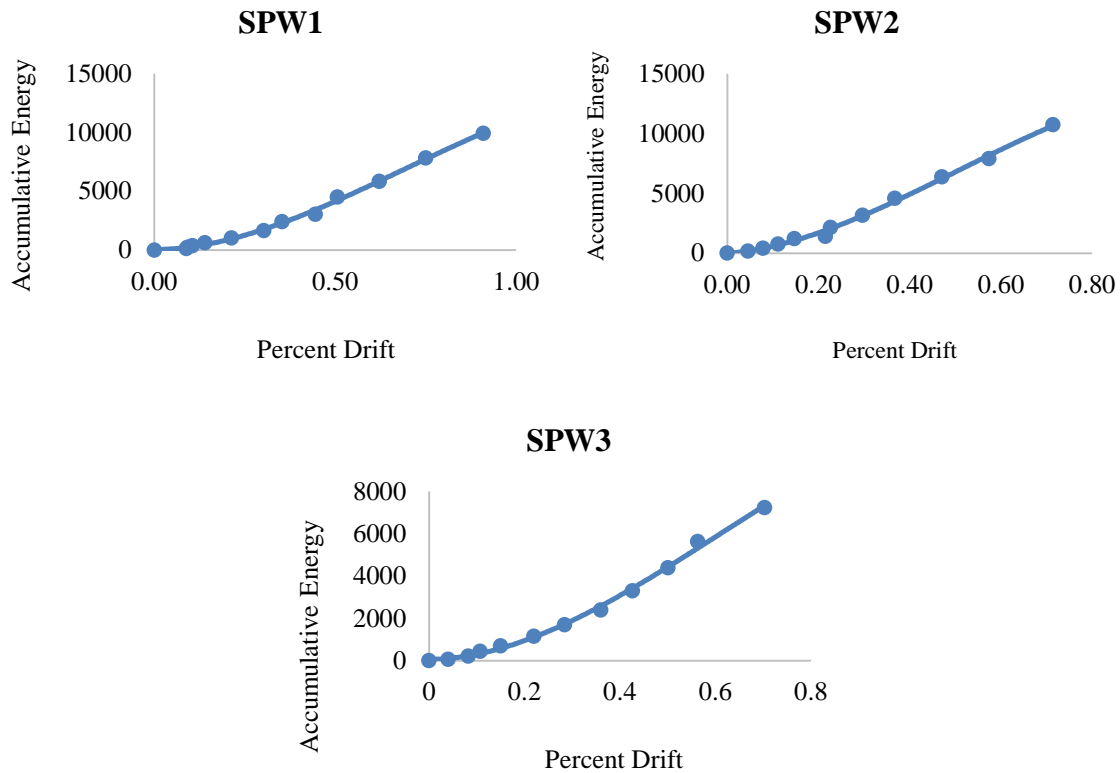


Figure 4: Cumulative energy for SPW1 (above left), SPW2 (above right), SPW3 (bottom)

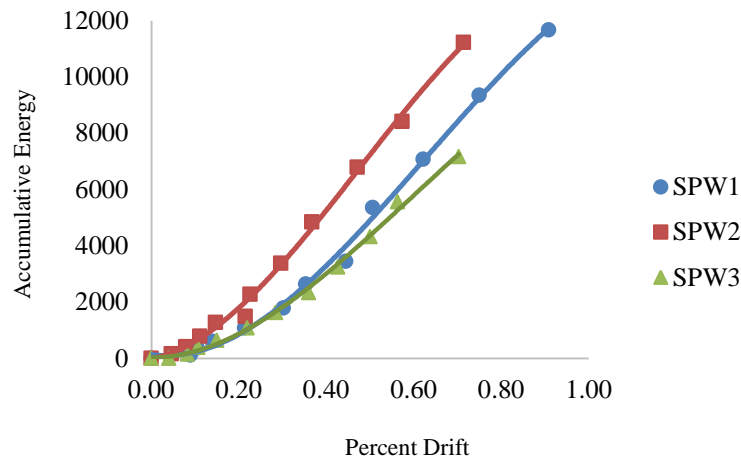


Figure 5: Comparison of Cumulative energy

5.3. Hysteric Damping

The equivalent viscous damping for all the wall specimens are shown in the Figure 6 and is calculated using the following formula.

$$\xi_{eq} = \frac{E_d}{2\pi E_{inp}}$$

Where E_d is dissipated energy and E_{inp} is input energy.

Wall specimen SPW1 started with 8.8 % damping and was almost constant upto 0.51 % drift. After this drift level, damping increased reflecting an increase in wall damages and hence energy dissipation. SPW2 started with a damping value of 19.2 % and was constant upto 0.47 % drift. After 0.47 %, the damping showed an increased trend. Wall SPW3 has a starting damping of 16.5 % and then damping decreased to a value of 9.5 %. After 9.5 %, the damping increased upto 13.8 % and then showed a decreased trend upto 0.36 % drift level. After 0.36 % drift, the damping remained almost constant till the end.

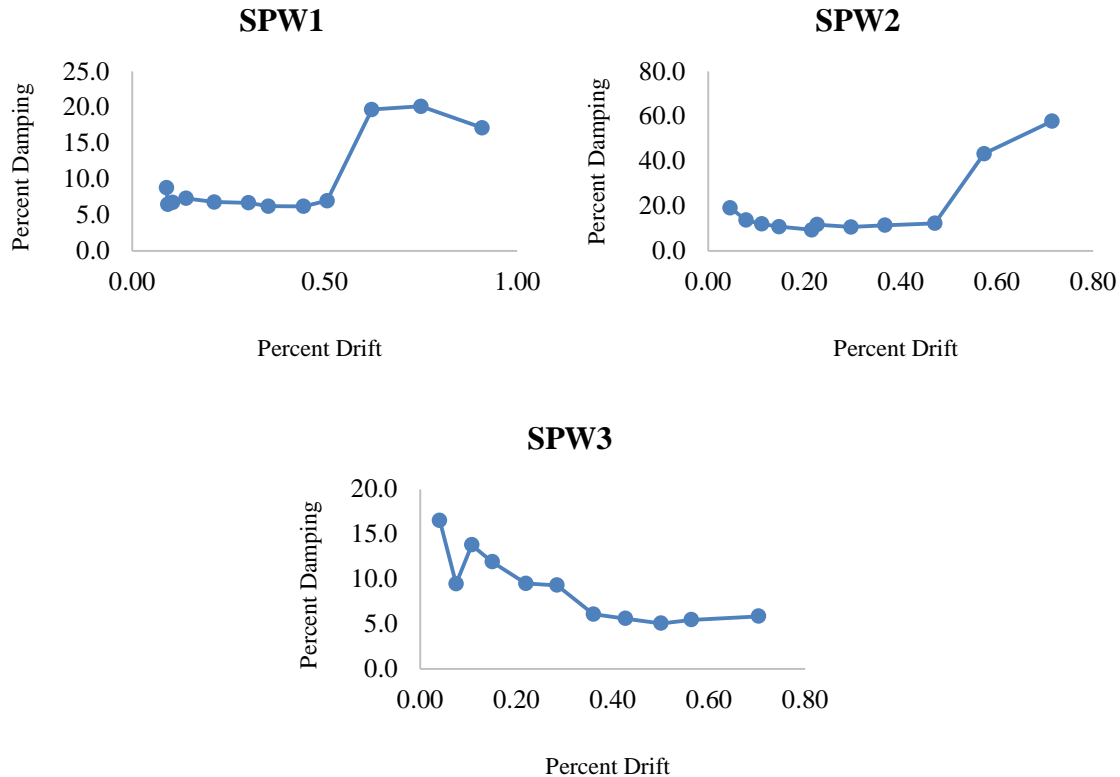


Figure 6: Damping curve for SPW1 (above left), SPW2 (above right), SPW3 (bottom)

5.4. Performance levels

There are three (03) performance levels defined by ASCE/ SEI 41-06. They are named as Immediate occupancy (IO), Life safety (LS) and Collapse prevention (CP). Table 3 shows these performance levels for all wall specimens along with energy dissipation capacity.

Table 4: Building Performance levels (ASCE/ SEI 41-06)

Specimen Name	Performance levels	Storey drift (%)	Dissipated energy (kN-mm)
SPW1	IO	0.18	900
	LS	0.61	7,000
	CP	0.82	11,673
SPW2	IO	0.09	500
	LS	0.47	6,795
	CP	0.63	11,226
SPW3	IO	0.05	150
	LS	0.45	3,500
	CP	0.60	7,166

6. Conclusions

The objective of this research was to study the energy dissipation capacity of URBM walls with different aspect ratios. For this purpose, three full scale walls were constructed. Quasi static testing was performed on these walls and the data was analyzed to study the seismic behavior parameter i.e. energy dissipation.

It is concluded that the energy dissipation capacity showed an increase trend with increasing aspect ratio. After maximum resistance is attained, the energy dissipation increased considerably showing the increase in damage of walls progressively. The total energy dissipated by SPW1, SPW2 and SPW3 were 11673 kN-mm, 11226 kN-mm and 7166 kN-mm respectively.

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MICROSTRUCTURAL AND MECHANICAL PROPERTIES OF USED FOUNDRY SAND (UFS) CONCRETE

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Abstract

Million tons of foundry sand is dumped in waste every year. Foundry sand is used in metal casting industries, which is discarded after use. The discarded foundry sand is termed as Used Foundry Sand (UFS). In this research, an attempt is practiced to use UFS in concrete in order to target environmental and economic consequences. For this purpose, fine aggregates were replaced with a ratio of 10%, 20%, 30% and 40% UFS in concrete. Control mix with no replacement was also made for comparison purposes. Both fresh and hardened properties were checked. The slump of concrete tends to decrease as foundry sand content is increased. Maximum compressive strength noted at 20% replacement compared to control mix. The same trend of increase was noted for the flexural strength test. Scanning Electron Microscopy (SEM) test was conducted to check the microstructural properties of UFS concrete. SEM shows that Calcium-Silicate-Hydrate (C-S-H) gel is broadly developed in concrete mixes having UFS. The slump variations, good compressive and flexural strength, and studying microstructural properties leads to use UFS concrete over conventional concrete.

Keywords: Foundry sand, slump, flexural strength, compressive strength, SEM

1. Introduction

Foundry sand is the byproduct of foundry industries. Both ferrous castings (iron, steel) and non-ferrous castings (aluminum, brass) took place. These industries use specific size sand in the molding process. The sand is reused for several time. It is discarded when it no longer fulfill the

requirements of castings. The discarded foundry sand is named as Used Foundry Sand (UFS) (Singh and Siddique, 2012).

The environmental pollution and consumption of natural resources have led researchers to use an alternative material for tenable development. Therefore, many efforts have been made to utilize industrial wastes in concrete. Foundry sand comprises of medium-sized high-quality silica, bonded to form molds of a different shape for both ferrous and non-ferrous castings. The raw sand, in most cases, is high quality than normal river sand. These sands after many uses are discarded and used for landfilling. (Siddique *et al.*, 2010).

Many researchers have used foundry sand in concrete to study its properties. For instance, (Aggarwal and Siddique, 2014) concluded that using bottom ash and foundry sand up to 30% in concrete greatly enhance compressive strength, flexural strength and split tensile strength. Moreover, microstructural properties show a good spread of C-S-H gel in mixes. (Prabhu *et al.*, 2014) reported that increasing foundry sand content increases water demand where 20% replacement of fine aggregate at all ages, shows close strength properties to conventional concrete. (Torres *et al.*, 2017) suggested that using foundry sand above 20% shows inferior behavior where using foundry sand can solve problems of recycling and save natural reservoirs.

Besides concrete, foundry sand has been used in other construction materials as well, for example (Xiang *et al.*, 2017) preparation of aggregates based on foundry sand, (Arulrajah *et al.*, 2017) studied foundry sand in sub-grade material and pipe bedding, (Yazoghli-Marzouk *et al.*, 2014) studied foundry sand properties as sub-base layer, (Mastella *et al.*, 2014) reported the mechanical and toxicological assessment of concrete artifacts using foundry sand, (Deng and Tikalsky, 2008) studied the geotechnical and leaching properties of flow-able fills using foundry sand.

2. Research Methodology

2.1. Materials

2.1.1 Cement:

Askari cement ASTM Type 1 accordance cement was used in this research. Initial setting time, final setting time, and consistency tests were made on cement.

2.1.2. Foundry Sand:

Foundry sand was collected from Heavy Mechanical Complex (HMC) Taxila, Pakistan as given in figure 1 and figure 2. The physical properties of used foundry sand are given in table 1. To investigate the chemical composition of UFS, Energy-dispersive X-ray spectroscopy (EDX) test was performed at CRL Lab University of Peshawar, Pakistan. The results are given figure 6.



Figure 1: UFS Before Moulding



Figure 2: UFS After Demoulding

Table 1: Physical Properties of UFS

Properties	Bulk Density (Loose), kg/M30	Bulk Density (Compacted)	Specific Gravity	Fineness Modulus	Water absorption (%)	Moisture Content (%)	Material Finer than # 200 (%)
Observed Values	1336	1638	2.18	1.89	0.42	0.11	8

2.1.3. Aggregates:

Fine aggregates were collected from lawrencepur Pakistan. Sieve analysis results are given in figure 5. Coarse aggregates were collected locally from Margalla hills. The physical properties of aggregates are presented in table 2.

Table 2: Physical Properties of Fine aggregates and Coarse Aggregates

Properties	Bulk Specific Gravity (S.S.D)	Bulk Specific Gravity (Oven Dried)	Specific Gravity	Water Absorption (%)	Fineness Modulus
Fine Aggregates values	2.648	2.614	2.648	1.276	2.76
Coarse Aggregate Vales	2.675	2.644	2.728	1.163	-

2.2. Casting Details

The concrete specimens were cast according to ASTM C31 for compressive strength test, using 12 inches long and 6 inches diameter cylinders. Ratio 1:2:4 was used in this research and water-cement ratio 0.53 was kept constant for all mixes. The concrete cylinders were cast for 3, 7 and 28 days curing as shown in figure 3. Fine aggregates were replaced with 10%, 20%, 30% and 40% UFS designated as M10, M20, M30, and M40. Control mix M0 having 0% UFS for comparison purposes were also developed. For flexural strength test, 2 specimens for each mix was developed and tested according to ASTM C293/C293M.



Figure 3: Concrete Cylinders Casted



Figure 4: Measurement of Slump

2.3. Slump Test

Slump test is measured to study the consistency of concrete. ASTM C 143 standards were used. The apparatus ranges 12 inches in height, 8 inches base diameter and 4 inches open at the top. Figure 4 shows the measurement of a slump.

2.4. Scanning Electron Microscopy (SEM)

The test is conducted to study the internal structure of a material. This test was conducted in the University of Peshawar CRL Lab, Pakistan. SEM uses a high energy beam which passes through solid and generates rays of different spectroscopy.

3. Results and Discussion

3.1. Energy-dispersive X-ray Spectroscopy (EDX)

This test was conducted to determine the chemical composition of UFS. This study provides the elemental details of a material. In this case, EDX results show that UFS has a high amount of silica present. The chemical composition is shown in figure 8.

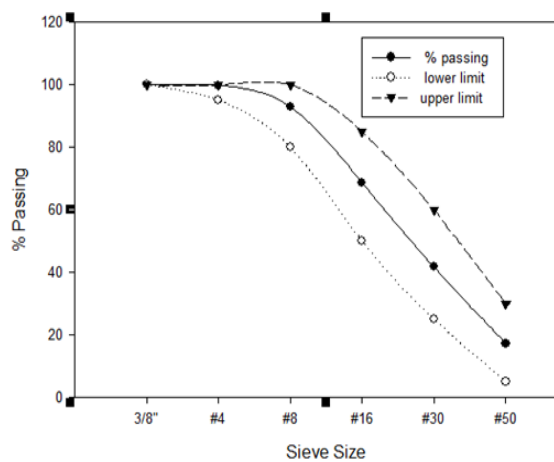


Figure 5: Sieve Analysis of Fine Aggregates

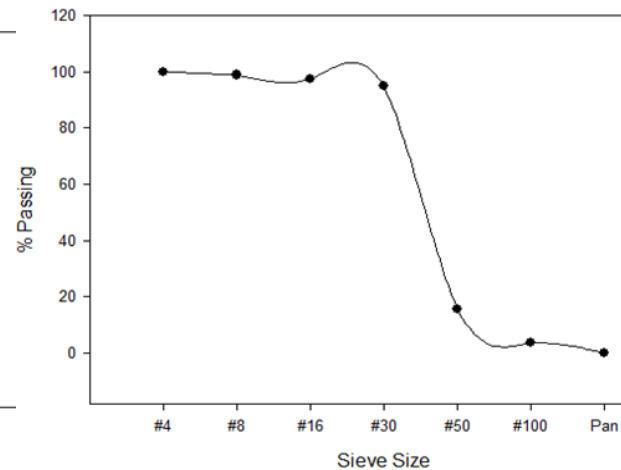


Figure 6: Sieve Analysis of UFS

3.2. Slump Test

It is evident from the results listed in table 4.1 that slump value decreases with increasing content of UFS. It was observed maximum for control mix M0 and minimum for M40 mix ash shown in figure 7. The reason UFS mixes absorbs more water is that UFS has more fine particles compared to normal river sand. These fine particles need more water to wet in the mix.

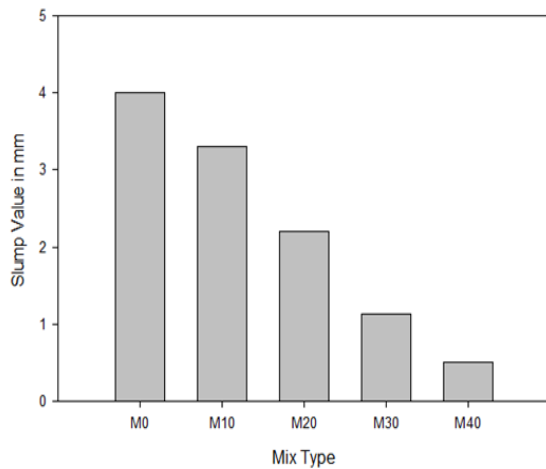


Figure 7: Slump Variations

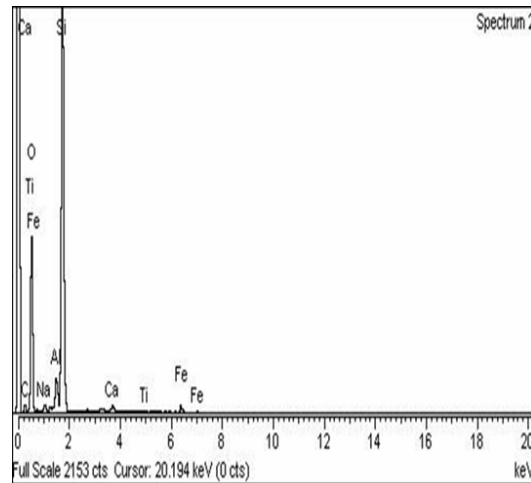


Figure 8: Chemical Composition of UFS

3.3. Compressive strength

The compressive strength results are given table 4.2 which shows that maximum compressive strength at 3 days curing was observed at 20% replacement (M20) where the minimum was observed at 40% replacement (M40) compared to control mix. The same trend was observed for 7 days and 28 days curing. The mixes tend to show inferior property when replacement level reached 20% as given in figure 9. The reason for strength increase is due to fine particles of UFS, which fills the pores of concrete specimens. The fine particles form a compact and dense matrix which is responsible for increment in compressive strength.

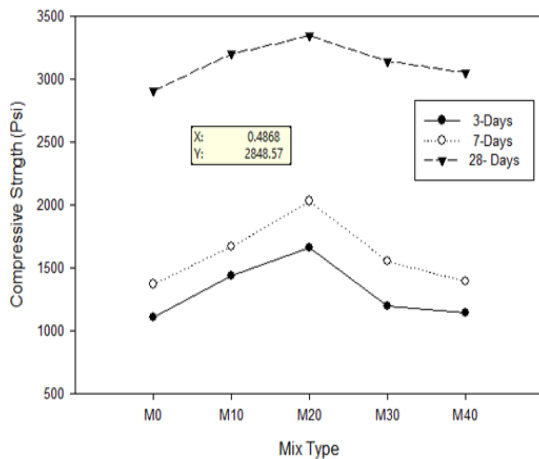


Figure 9: Compressive Strength

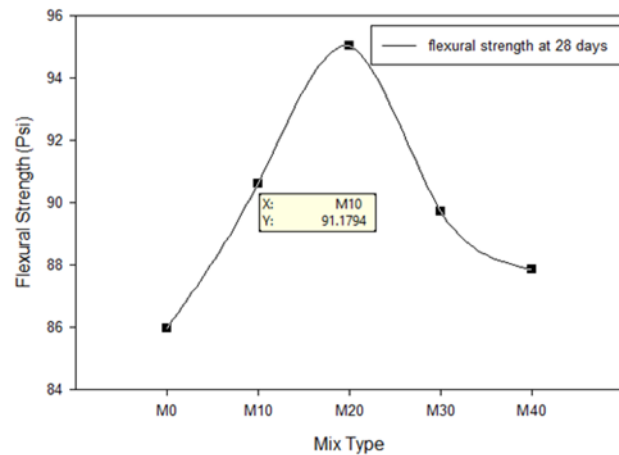


Figure 10: Flexural Strength

3.4. Flexural Strength

The same trend of increase was noted in flexural strength as for compressive strength. The maximum strength was observed at 20% (M20) replacement where flexural strength

tends to decrease when incorporation of UFS is increased from 20% replacement as shown in figure 10.

3.5. Scanning Electron Microscopy (SEM)

SEM test studies the internal structure of a material in forms of images. Considering figure 4.1 (a) and (b), which shows the internal structure of mixes M0 and M20, it shows clearly that Calcium-Silica-Hydrate (C-S-H) gel is widely spread in M20 mix compared to control mix M0. The encircle portion to indicate the C-S-H gel. The strength factor of concrete depends upon C-S-H gel, the wider and spread gel is the more will be the strength of that concrete.

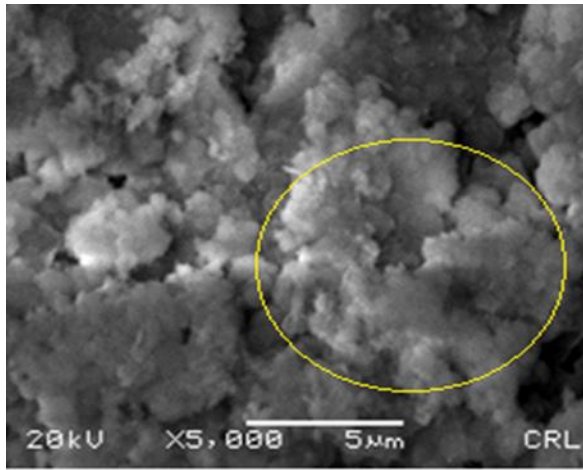


Figure 11: SEM Image Shows Control Mix

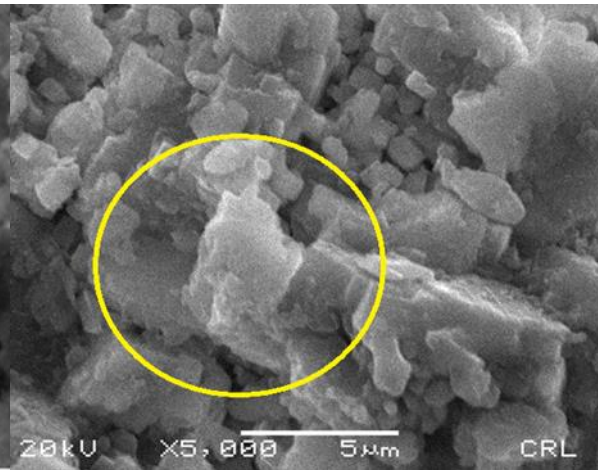


Figure 12: SEM Image Shows 20% UFS Concrete

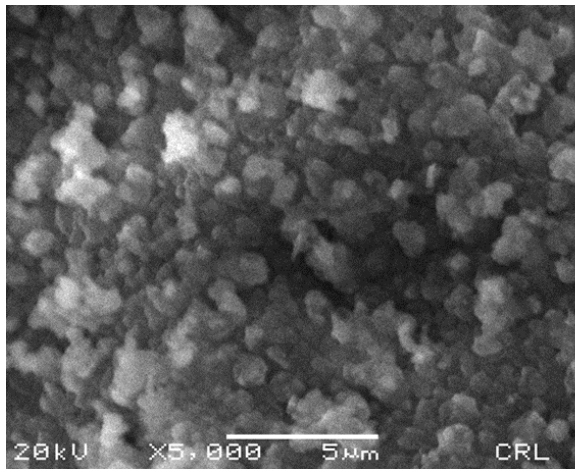


Figure 13: SEM Image of 10% UFS Concrete

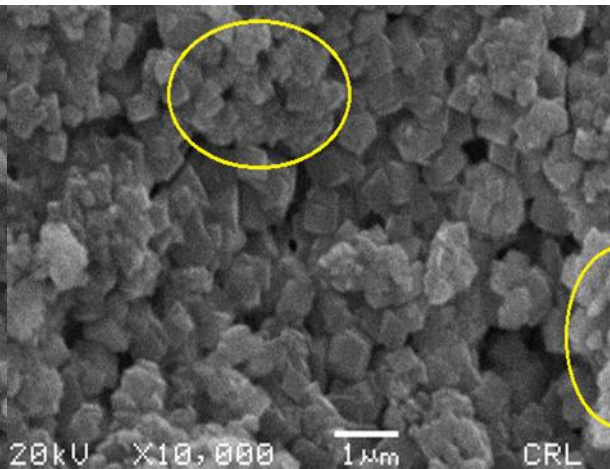


Figure 14: SEM Image of 30% UFS Concrete

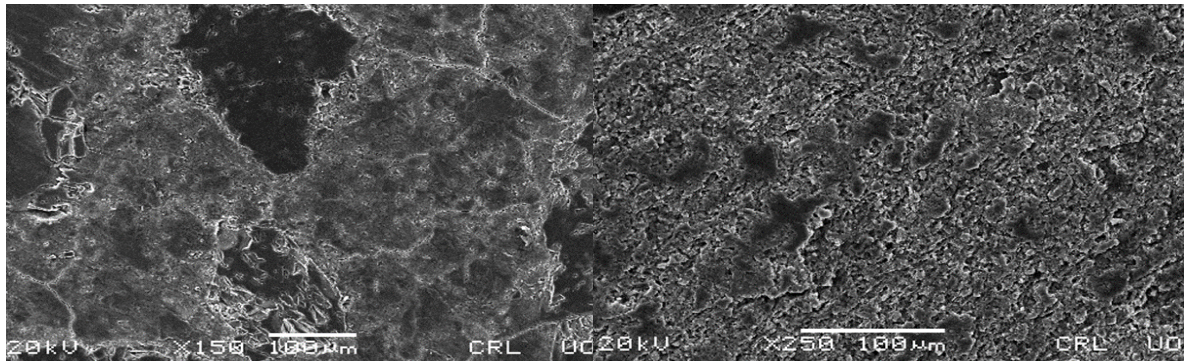


Figure 15: Concrete Surface of Control Mix

Figure 16: Concrete Surface of M20 Mix

The figure shows no or very less porous structure of mixes containing UFS. The fine particles of UFS can be seen from figures. Studying figure 13 and 14 shows less C-S-H gel compared to mix having 20% UFS. The concrete surface in figure 16 of M20 mix is more smooth as compared to the surface of the control mix shown in figure 15. It is evident from figure 14 that foundry sand is present in lumps as shown in encircled parts. The lumps of UFS is responsible for a compact dense structure which gives extra strength to concrete specimens compared to the control mix with no foundry sand.

4. Conclusion

- The slump of concrete tends to decrease by increasing UFS content. The maximum slump was observed for the control mix and the minimum was observed at 40% (M40) replacement.
- Compressive strength tends to increase as UFS content is increased. The maximum compressive strength was observed at 20% (M20) replacement. Beyond this replacement, the compressive strength tends to decrease.
- Flexural strength was noted maximum at 20% replacement. Beyond this replacement flexural strength shows inferior behavior.
- Micro-structural analysis of concrete specimen shows that mix containing 20% UFS has more C-S-H gel spread than any other mixes.
- SEM results show that mixes containing UFS have no or very fewer pores compared to the control mix.

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ASSESSMENT OF LOW STRENGTH CONCRETE WITH DESTRUCTIVE & NON-DESTRUCTIVE TESTING METHOD'S

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Abstract

Abstract Concrete is a world widely used construction material. However, it possesses numerous defects, which provide space for research and development. Compressive strength is an important parameter to assess these defects. In this research article destructive (core cutter and compression test) and non-destructive test (Schmidt hammer and ultrasonic pulse velocity) methods were employed to determine the compressive strength. Main objective was to identify the poor quality of concrete having low compressive strength (1500-1700 Psi). Moreover, factors contributing to poor quality of concrete were also discussed. Test results showed that Schmidt hammer predicted the maximum values whereas core cutter determined most accurate values. Schmidt hammer values were 30% more as compared with standard results. Standard deviation values for Schmidt hammers were maximum, which bring less confidence of interest on this apparatus. Furthermore, careless in sample preparation, labour skills, material characteristics played an important role on quality of concrete.

Keywords: Concrete quality; Destructive test, Non-destructive test, Ultrasonic pulse velocity apparatus (UPV), Core cutter.

1. Introduction

Concrete has been used for construction since ancient times (Shetty 2005). Modern day concrete application includes dams, bridges, swimming pools, homes, streets, patios, basements, balustrades, plain cement tiles, mosaic tiles, pavement blocks, kerbs, lamp-posts, drain covers etc (Bungey and Grantham 2014). Concrete is a composite material which contains cement, fine aggregate, coarse aggregate and water (Libby 2012). Concrete, usually Portland cement concrete is a composite material composed of fine and coarse aggregate bonded together with a fluid cement (cement paste) that hardens over time most frequently a lime-based cement binder, such as Portland cement (Pacheco-Torgal, Abdollahnejad et al. 2012). Its success lies in its versatility as can be designed to withstand harshest environments while taking on the most inspirational forms. The concrete used in our surrounding which is lower than the specified strength recommended by the ACI-318 is known as low strength concrete (Committee, Institute et al. 2008). A method and apparatus are provided for the manufacture of products of concrete or like construction, in which a mixture of calcareous cementitious binder substance, such as cement, an aggregate, a vinyl acetate-dibutyl maleate copolymer, and an amount of water sufficient to make a relatively dry mixture is initially compressed into the desired configuration (Murray 1978).

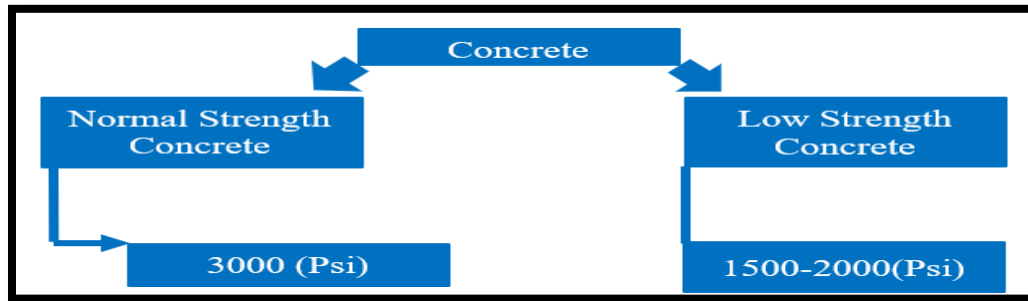


Figure:1 classification of concrete based on compressive strength

It is often necessary to test concrete structures after the concrete has hardened to determine whether the structure is suitable for its designed use (Neville 1995). Ideally, such testing should be done without damaging the concrete. However, a better way is to investigate with NDT (Jones 1949). Non-destructive testing method is Rapid & on-site accumulation of data. Generally, it is less expensive than destructive testing & gives result without structural damage. It's very easy and simple process and a lot many tests can be performed on concrete fewer amounts required for a sampling of concrete. This test also has some drawbacks it only detects defects open to the surface preparation before testing, can be time-consuming and costly. The method takes time and can rarely be completed in less than 30 minutes. The method cannot normally be applied to painted objects It is messy process & Interpretation of results is sometimes difficult the crushing of the specimens is the usual destructive test to assess the strength of concrete. Non-destructive methods like rebound hammer test and ultrasonic test do not damage buildings and allow having an inventory of structures and conditions (Hobbs and Kebir 2007). Destructive tests are widely applied to study mechanical properties and integrity of concrete structures (Boumiz, Vernet et al. 1996).

A lot of work has been done on normal concrete to find out its compressive strength using formulas. However, there is no work done on low strength concrete so we cannot follow the standards of normal concrete. The formula for normal concrete is specified while for local concrete there is no formula. To find compressive strength of concrete by destructive and non-destructive tests at the ages (28 days). The main aim of this project is to minimize the difference between the destructive and non-destructive test and by the help of standards followed to make samples following the standards and then make sample while not following the standards and observe the difference of result (Qasrawi 2000). There is limited research work undertaken on effect of compressive strength and strength development characteristics of low strength concrete.

2. Experimental Methodology and Material

Locally available Ordinary Portland Cement (OPC) 43-grade cement were used for all concrete mixes (Hewlett 2003). The cement used was fresh and without any lumps and free of moisture. Coarse aggregate was fetched from Ring road Peshawar that aggregate was 1 inch down in size. Crushed stone with 9.52mm graded aggregates (nominal size) was used. The sand used for the experimental work was obtained from BRT-Reach 03. The sand was first sieved through 4.75 mm sieve to remove any particles greater than 4.75 mm. The fine aggregates were tested per ASTM C-136 (Bowles, Papadopoulos et al. 2001). Wt. of Dry Sample (grams) = 500 grams was taken and attain 3.07 fineness modulus. Properties of the fine and coarse aggregate used in the experimental work are given in Table 3.1. The material comes up with some results by help of Sieve Analysis of Fine Aggregate (ASTM C-136), Gradation of Coarse Aggregate (ASTM C-136) (Thiers and Donovan 1981), Specific Gravity and Absorption test Fine Aggregate by Pycnometer (ASTM C-128). Specific Gravity and Absorption test of Coarse Aggregate (ASTM C-127).

Table:1 Properties of Coarse & Fine Aggregates

S. No.	Characteristics	Value Coarse	Value Fine
1	Type	Crushed 1inch down	Uncrushed (natural)
2	Specific Gravity (10mm)	2.66	2.68
3	Total Water Absorption (10mm)	1.64%	1.02%
4	Moisture Content (10mm)	0.81%	0.16%
5	Fineness Modulus (10mm)	6.46	3.04

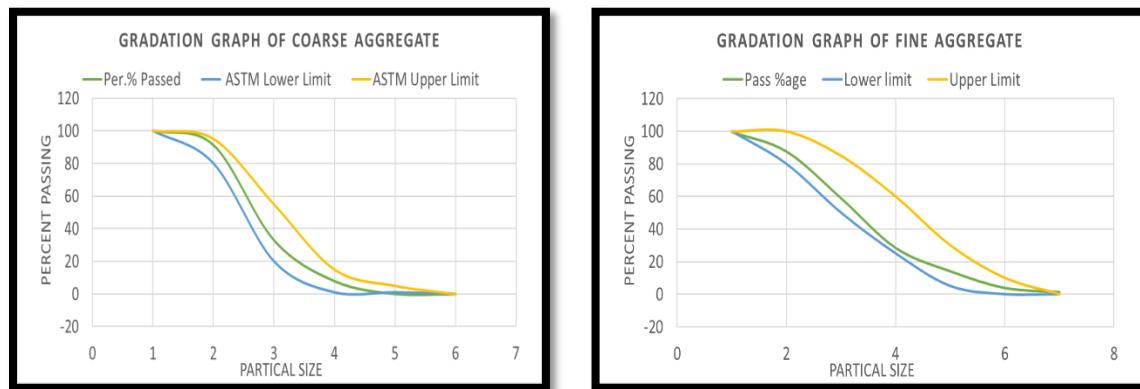


Figure:1 Gradation Curve of Coarse & Fine Aggregate

As shown in the gradation curve diagram both the graphs are in between the range of upper and lower limit shown by the Fine Aggregate (ASTM C-136), Gradation of Coarse Aggregate (ASTM C-136).

3. Methodology:

Table 2: Sample Location

Sample	Location	Ratio	Purpose
S1	Three sample From Shami Road	1:2:4	Foundation
S2	Three sample From Kaka Khel Town	1:3:6	Slab
S3	Three sample From Hayatabad	1:4:8	Street

3.1. Sample Preparation & collection from various sites:

As previous graphs and table clarify the suitability of material for the use in making Concrete. After that we did trial Ratio of Cement, Fine Aggregate, Coarse Aggregate by weight of cement I.e. 1:2:3, 1:1.5:2.5 and 1:1.5:3. Selection of the 1:1.5:3 ratio on bases of Compressive strength at 14 days. Testing was done at BRT-Reach 01 Peshawar. According to research at 07 day it will give 75% of Compressive strength and 1:1.5:3 proportion had achieved that Compressive

strength. After of all, nine sample were collected from three different locations where concreting was in progress. After sample was collected they were kept for curing up to 28 days then all the nine samples were tested for Non-destructive test method with the help of rebound hammer apparatus

3.2. Non-Destructive Methods:

a. Rebound Schmidt Hammer

The rebound hammer test is the most popular method to measure the surface hardness of a concrete mass. The Swiss engineer Ernst Schmidt first developed a practicable rebound test hammer (Aydin and Saribiyik 2010). The hammer is very simple, not heavy (about 2 Kg), and has an impact energy of about 2.2 Nm. It can be operated on vertical, horizontal and inclined surfaces, upwards and downwards, but it has to be at right angles to the measured surface.

Determine the compressive strength of concrete by using Rebound Schmidt Hammer.

Make sure the hammer is calibrated. The surface must be smooth, clean and dry, and should be preferably formed, but if troweled surfaces are unavoidable, use a grinding stone to smoothen the test surface. The plunger is released before use; then it should be pressed strongly and vertically to the concrete surface and locked in its position then taking the scale reading on the side window of the hammer, this reading is known as the rebound number by repeat the test at all points and record the rebound numbers find the mean and check that each reading didn't exceed 6 units difference from the mean reading (Kolaiti and Papadopoulos 1993).

Each rebound number will produce a compressive strength from the relationship between the rebound number and compressive strength on the side of the hammer. Compressive strength can then be found using a calibration graph of Compressive strength v/s Rebound (Rebound Hammer conversion chart) the advantages of rebound hammers that it is less expensive, produce fast results Simple, well established, Direct results, Unlikely to damage the concrete structure Can be affected by many factors (aggregate type, moisture of concrete, surface quality) but the problems that occur from this apparatus is that it's Not suitable for early ages concrete, represent surface strength only, not reliable, Calibration is needed to get a real reading, With the same strength of concrete (15-20%) difference may occur (Shariati, Ramli-Sulong et al. 2011).

b. Pulse Velocity test

An ultrasonic pulse velocity test is a non-destructive test to check the quality of concrete and natural rocks. In this test, the strength and quality of concrete or rock are assessed by measuring the velocity of an ultrasonic pulse passing through a concrete structure or natural rock formation (Shariati, Ramli-Sulong et al. 2011). This test is conducted by passing a pulse of the ultrasonic wave through concrete to be tested and measuring the time taken by pulse to get through the structure. Higher velocities indicate good quality and continuity of the material, while slower velocities may indicate concrete with many cracks or voids. To determine the pulse velocity, crack depth and compressive strength of concrete by using ultrasonic instrument.

it is compulsory to measure the path length between the two transducers and keeping a constant Pressure to the transducers hardly onto the concrete opposite surfaces and hold for a while to allow readings to be taken, wait until a consistent reading appears on the display screen of the instrument.

Record the stable reading, which is the time (T) in microseconds (μ s) for the ultrasonic pulse to travel the path length and pulse velocity (V) in m/s advantages for this apparatus is that Low cost, Fast test, Simple, well established, no damage to the structure, Represent the quality of the concrete (internal compressive strength. But the demerits of UPV are that Accessible surfaces are needed, Maintenances needed, Good contacts needed between concrete, surfaces and transmitters, not reliable, Calibration is needed to get real readings, Indirect results (calculations are needed), accurate measurements needed (Kewalramani and Gupta 2006).

3.3. Destructive Methods

a. Core Cutter Apparatus

Extracting core from a building or sample is a non-destructive testing method (Miyanaga 2009). After extracting core, the sample remains as a non-destructive because the core is extracted and no other damage is done to the construction building or the specimen. After extraction, the empty space is filled with leaving no such harm to the building. Advantages for core cutter are that this method is Speedy for operation, Safe, Accurate, Drill through various material. But cones of this apparatus are that its Dusty, Kick back is too much & Expensive (Blitz and Simpson 1995).



Figure:1 Core Extracted from Sample

b. Compression Test

ASTM C39 determines the compressive strength of cylindrical concrete specimens such as moulded cylinders and drilled cores. It is limited to concrete having a unit weight in excess of 50 lb/ft³ (800 kg/m³). A compressive axial load is applied to moulded cylinders or cores until failure occurs. The compressive strength of the specimen is calculated by dividing the maximum load achieved during the test by the cross-sectional area of the specimen. The results of this test method are used as a basis for quality control of concrete (Chary, Sarma et al. 2006).

A testing machine i-e Universal Testing Machine (UTM), capable of providing the load rates as prescribed in the standard should be equipped with two steel bearing blocks, one of which is a spherically seated block that will bear on the upper surface of the specimen, and the other a solid block on which the specimen will be placed on. Before conducting ASTM C39.



Figure:2 Crushing of Trial Specimen

4. Results & Discussion

a) Schmidt hammer Results

After the casting of the specimen completed & curing was done for 28 days the samples were kept for drying in the open air for 1 day. Testing was performed and the result was concluded as shown in the table.

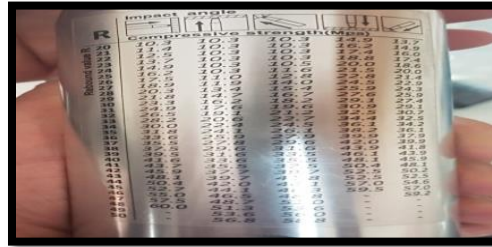


Figure:1 Schmidt Hammer Chart

Table:1 Schmidt hammer.

	S1			S2			S3			Control Sample
NO	S1 (A)	S1 (B)	S1(C)	S2 (A)	S2 (B)	S2 (C)	S3 (A)	S3 (B)	S3 (C)	UT M (MPa)
1	12	20	20	18	14	10	8	15	11	21
2	14	15	23	15	19	13	11	12	12	20
3	12	18	19	22	17	11	9	7	10	20
4	16	19	14	21	18	14	14	9	14	19
5	20	20	12	11	12	12	12	13	13	21
6	16	25	19	17	15	17	10	8	11	21
7	19	16	23	20	19	13	13	13	12	19
8	22	21	14	12	13	15	11	14	8	19
9	16	24	13	11	16	11	8	9	9	21
10	17	20	15	10	21	16	14	16	13	20
11	14	20	20	13	13	17	12	10	8	18
12	18	17	22	22	18	10	16	12	12	18
13	13	21	13	12	12	12	14	11	11	21
14	16	12	17	19	15	14	20	13	9	19
15	12	19	30	25	13	12	15	10	10	20
AVG Mean	15.8	19.1	18.2	16.5	15.6	13.1	12.4	11.4	10.8	19.8
Standard Deviation	3.0	3.2	4.9	4.8	2.8	2.3	3.2	2.6	1.8	1.08

Schmidt hammer table 4.2 showing three different Batch (A, B, C) and each batch contain three samples a test performed on these sample with an equal of fifteen strikes for each sample then average mean and standard deviation was obtained.

Control Sample Results:

Table:2 Control samples

Control Sample	7-day Strength	14-day Strength	28-day Strength
	(MPa)	(MPa)	(MPa)
	16.8	21.1	21.7

Control sample were collected and result was extracted.

Testing of the specimen was performed on UTM after the testing of Schmidt Hammer was done & the following graphs are obtained. The graph shows us that the peak value from the load displacement curve

Table:3 DT & NTD calculation of compressive strength by Schmidt & UTM

Sample No	Control Sample	Destructive testing	NON-Destructive Testing	Difference	Percentage %
	UTM MPa	UTM MPa	Rebound Hammer (MPa)	NDT-DT	(%)
1	21.01	9.86	10.41	0.55	5.42
2	20.66	11.51	13.95	2.44	19
3	20.01	10.41	12.97	2.56	21.89
4	19.58	10.08	11.13	1.05	9.9

4.1. Ultra-Sonic Pulse Velocity Test

UPV is used to determine the quality or strength of the specimen such as concrete. Due to the ability of portability and fewer expenses UPV is used as a Non-Destructive testing apparatus.

4.2. Results

Table:4 UPV Ultrasonic Pulse velocity Quality Table

Pulse Velocity (Km/sec)	Concrete Quality (Grading)	Strength in (Psi)
Above 4.5	Excellent	3500-2500
3.5 to 4.5	Good	2500-2000
3.0 to 3.5	Medium	2000-1500
Below 3.0	Doubtful	<1500

According to the observation & calculation, the samples fall into the values 3.5 to 4.5 which tell us that the condition of the samples is good & can be used for construction purpose.

Table:5 UPV Readings in Km/sec

Sample	Time	Distance	Frequency	Velocity	Quality
	Micro sec	Cm	Hz	Km/s	MPa
1	65	30	1	4.2	13.79
2	66	30	1	4.2	14.01
3	64	30	1	4.7	17.23
4	64	30	1	4.8	17.58

4.3. Core Cutter Test

Extracting core from a building or sample is a non-destructive testing method. After extracting core, the sample remains as a non-destructive because the core is extracted and no other damage is done to the construction building or the specimen. After extraction, the empty space is filled with leaving no such harm to the building.

Table:6 Core Cutter Table Difference between UTM & Core

Sample no	Compressive Strength (UTM)	Compressive strength (core)	Difference B/w (UTM) & (CORE)	Percent Difference
	(MPa)	(MPa)		(%)
1	7.71	7.03	0.68	9%
2	7.33	6.62	0.71	10%
3	6.67	6.57	0.1	1.5%
4	5.74	4.99	0.75	13%

All the above samples were made from the same batch of concrete. After that samples was tested on UTM directly & core was extracted from the other samples and was tested on the UTM. Then find the difference between them and also computing the percentage difference between them (Scherbatskoy 1960).

Table:7 DT & NDT Final Compilation Of Results

S. No	Test by UTM Testing	SCHMIDT hammer	CORE Cutter test	UPV
UNITS	MPa	MPa	MPa	MPa
1	9.86	10.41	7.03	13.79
2	11.51	13.95	6.62	14.01
3	10.41	12.97	6.57	17.23
4	10.08	11.13	4.99	17.58
Standard Deviation	0.7	1.6	0.9	2

As we see in table 4.5 Core cutter is showing less deviation (0.9) as compared to Schmidt hammer and ultra-sonic pulse velocity apparatus and the value is near to UTM testing values (0.7).

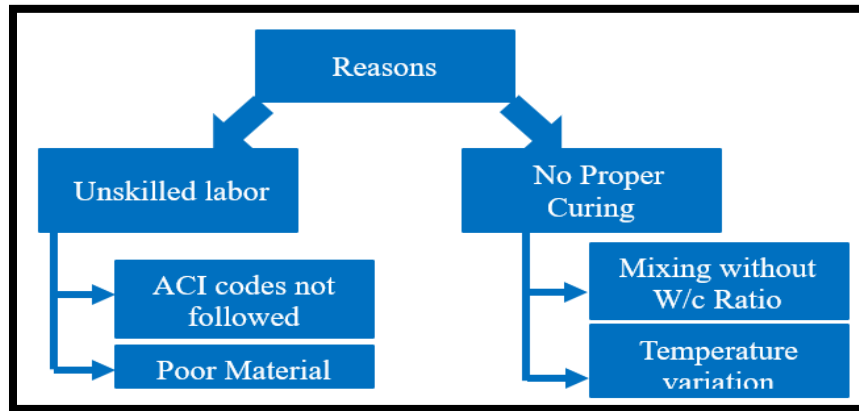


Figure:1 Reason for low strength concrete.

5. Conclusion:

In this study, destructive and non-destructive testing methods were performed to investigate the substandard quality of concrete for low strength concrete no proper standards followed. The finding is summarized as following.

1. Destructive and Non-Destructive testing methods show us intrinsic & extrinsic property of an object. The result shows us that if the standard were followed properly and ratios/mixing was done as per defined standards we could get a better result as we have done it for control samples the reason behind the low strength concrete are shown in figure 1.2 which clearly define that unskilled labour, no proper curing and other factor were involved for the poor quality of concrete. Moreover, the final result after comparison between DT & NDT show us that core cutter is much more reliable approach to follow. If the labour is trained and specific approach is followed the results can be improved. The research can be taken to next level by adding more approaches of NDT methods.

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Conflict of Interest:

The author declares that they have no conflict of interest.

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STRENGTH PROPERTIES OF MORTAR BLENDED WITH WASTE FOUNDRY SAND (WFS)

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Abstract

The increasing waste materials especially industrial by-products have created an environmental consequences throughout the world, thus attract the attention of the world. Concrete being the most usable material in the world also plays a vital role in ozone depletion because the production of 1 Ton of cement produces 1 Ton of carbon dioxide. The utilization of these materials in concrete will not only helps in making economical concrete but also plays an important role in reducing environmental consequences. Waste Foundry Sand (SFS) is also an industrial by-product which is produced in huge quantity throughout the world. In this research WFS has been utilized as a partial replacement of fine aggregates. The experimental investigation is performed to evaluate the strength properties of concrete. Fine aggregate was replaced with various percentages i.e. (0%, 5%, 10%, 15%, 20%) of WFS by weight. Compression test, splitting tensile strength test and flexural tests were performed to evaluate the strength properties of concrete at 3, 7 and 28 days. Test results showed that there is increase in compressive strength, splitting tensile strength and flexural with incorporation of waste foundry sand (WFS) up to 15% replacement. Compressive strength of mortar and concrete mixes were found increased up to 15% of replacement, due to replacement of fine aggregate with foundry sand. The highest compressive strength in cement mortar was found at 15% replacement of fine aggregate with waste foundry sand at all stages of curing. While beyond 15%, the compressive strength started to decrease at all stages of curing. The highest compressive strength of 3081 psi was observed at 28 day of curing. The compressive strength of concrete also increased at all stages of curing with incorporation of waste foundry sand. The highest compressive strength of 3923.51 psi is observed in concrete cylinder at 28 day of curing. Concrete split tensile strength is also observed to increase with incorporation of waste foundry sand with fine aggregate. Splitting tensile strength of all concrete mixes was found to increase with increase in with varying percentage of waste foundry sand. At the age of 28 days, splitting tensile strength of 15% waste foundry sand was found as 672.54 psi while that of reference mortar is 587 psi. Maximum increase in splitting tensile strength was observed at 15% replacement of fine aggregate with waste foundry sand at all age. The modulus of elasticity of reference beam is 3045 psi. The maximum flexural strength of 3245.13 psi is observed at 15% of adding of waste foundry sand. Modulus of elasticity of beam increased at all stages of curing after incorporation of waste foundry sand. Beyond 15% of addition of waste, the flexural strength started to decrease at all stages of curing.

Keywords: Mortar, Waste Foundry Sand, Sustainable Concrete

Introduction:

Concrete is the most widely used man-made construction materials in the world. (Mehta et al., 1993). Slightly more than a ton of concrete is produced each year for every human being on the planet. Fundamentally, concrete is economical, strong, and durable. Although concrete technology across the industry continues to rise to the demands of a changing market place. The construction industry recognizes that considerable improvements are essential in productivity, product performance, energy efficiency and environmental performance. (Hansson, 1995).

It has been estimated that over 12.6 billion tons of concrete is consumed annually (Mehta, 2002). This number increases as the construction process is at peak. Water is an important component of concrete which contributes 14% to 21% of the volume of concrete. The cement paste is produced from mixing aggregates which occupies about 25 to 40% of the concrete by volume. (Kosmatka et al., 2002). Aggregates with size greater than 4.75 mm are classified as coarse and aggregates while size less than 4.75 mm are classified as fine (CSA A23.1-04, 2004).

Concrete being used in construction industry has an importance in terms of durability. The durability is defined as the ability to resist weathering action and abrasion. (ACI 201, 2001).

The industry will need to face and overcome a number of institutional competitive and technical challenges.

A concrete One of the major challenges with the environmental awareness and scarcity of space for land-filling is the wastes/byproducts utilization as an alternative to disposal. Throughout the industrial sector, including the concrete industry, the cost of environmental compliance is high. Use of industrial by-products such as foundry sand, fly ash, bottom ash and slag can result in significant improvements in overall industry energy efficiency and environmental performance (Aggarwal et al., 2007)

Foundry industry produces a large amount of by-product material during casting process. The ferrous metal casts in foundry are cast iron and steel, non-ferrous metal are aluminum, copper, brass and bronze. Over 70% of the total by-product material consists of sand because moulds usually consist of molding sand, which is easily available, inexpensive, resistance to heat damage, easily bonded with binder, and other organic material in mould. Foundry industry use high quality specific size silica sand for their molding and casting process. This is high quality sand than the typical bank run or natural sand. Foundries successfully recycle and reuse the sand many times in foundry. When it can no longer be reused in the foundry, it is removed from the industry, and is termed as waste foundry sand (WFS). It is also known as spent foundry sand (SFS) and used-foundry sand (UFS).

The Waste generated from the industries cause environmental problems. Hence the reuse of this Waste material can be emphasized. Foundry sand is high quality silica sand that is a byproduct from the production of both ferrous and nonferrous metal casting Industries. Foundry sand used for the centuries as a molding casting material because it's high thermal conductivity. The physical and chemical characteristics of foundry sand will depend in great part on the type of casting process and the industry sector from which it originates.

Natural sand has been used widely in construction activities and is diminishing day by day. At present due to the unavailability of natural sand, manufactured sand produced from quarries are widely used for mass production of concrete. Very soon in the near future there will be a scarcity for manufactured sand also. Use of recycled products is the new trend in industry and researchers are keen to find a new material that fit for the right purpose. Here waste foundry sand can be effectively utilized as partial or full replacement of natural sand or manufactured sand. Waste foundry sand (WFS) is a by-product of the metal casting industries generated from the released moulds for casting after several reuses [1]. Foundry sand is basically high quality silica sand.

At present the commercially available blocks are of very inferior quality both in strength and durability. Main objective of this study was that if blocks of higher strength and durability can be obtained by the use of partial or full replacement of waste foundry sand total cost of the cost of

construction of residential buildings can be reduced. Most of the individual residential buildings are made with single storey or twin storey access. Normally these buildings are made using burnt clay bricks or solid concrete blocks utilizing its load bearing characteristics. Adopting lesser width concrete blocks enables more room space for the same plinth area and this will be cost effective according to the availability of high strength solid masonry blocks. Hence the main aim was to find out the feasibility of employing waste foundry sand as an ingredient in the manufacture of high strength concrete masonry blocks



Figure 1: Waste Foundry Sand

The foundry industry faces specific challenges with respect to economic and environmental sustainability. Foundry processes require substantial energy, typically generated using fossil fuels; whether onsite or remotely at an electrical power plant. Melting the material consumes the majority of this energy; however, other energy intensive processes such as heat treatment are also included in many foundry operations. Also, a majority of foundries utilize sand as a molding material. The binders utilized can often include organic compounds, and, when pollutants which are regulated burned out in the casting process, release volatile organic compounds and hazardous air. The casting finishing process can also utilize organic materials which can result in environmental impact.

2. Properties of waste foundry sand

Table 1: Physical Properties

Property	Javed and Lovell (1994)	Naik et al. (2001)	Guney et al. (2010)	Siddique et al. (2011)
Specific gravity	2.39-2.55	2.79	2.45	2.61
Fineness modulus	-	2.32	-	1.78
Unit Weight (kg/m ³)	-	1784	-	1638
Absorption (%)	0.45	5.0	-	1.3
Moisture content (%)	0.1-10.1	-	3.25	-
Clay lumps and friable particles	1- 44	0.4	-	0.9
Materials finer than 75µm (%)	-	1.08	24	18

Table 2: Chemical Properties

Constituent	Value (%)			
	American Foundryman's Society (1991)	Guney et al. (2010)	Etzeberria et al. (2010)	Siddique et al. (2011)
SiO ₂	87.91	98	95.10	78.81
Al ₂ O ₃	4.70	0.8	1.47	6.32
Fe ₂ O ₃	0.94	0.25	0.49	4.83
CaO	0.14	0.035	0.19	1.88
MgO	0.30	0.023	0.19	1.95
SO ₃	0.09	0.01	0.03	0.05
Na ₂ O	0.19	0.04	0.26	0.10
K ₂ O	0.25	0.04	0.68	-
TiO ₂	0.15	-	0.04	-
Mn ₂ O ₃	0.02	-		-
SrO	0.03	-		-
LOI	5.15	-	1.32	2.15

2.2 Compressive Strength:

Concrete cylinders were properly washed and oiled before pouring concrete. Concrete was then placed in three equal layers by compacting each layer up to 25 blows. It was then left at room temperature for 24 hours at room temperature.



Figure 2: Casting of cylinder



Figure 3: Casting of Mortar Moulds

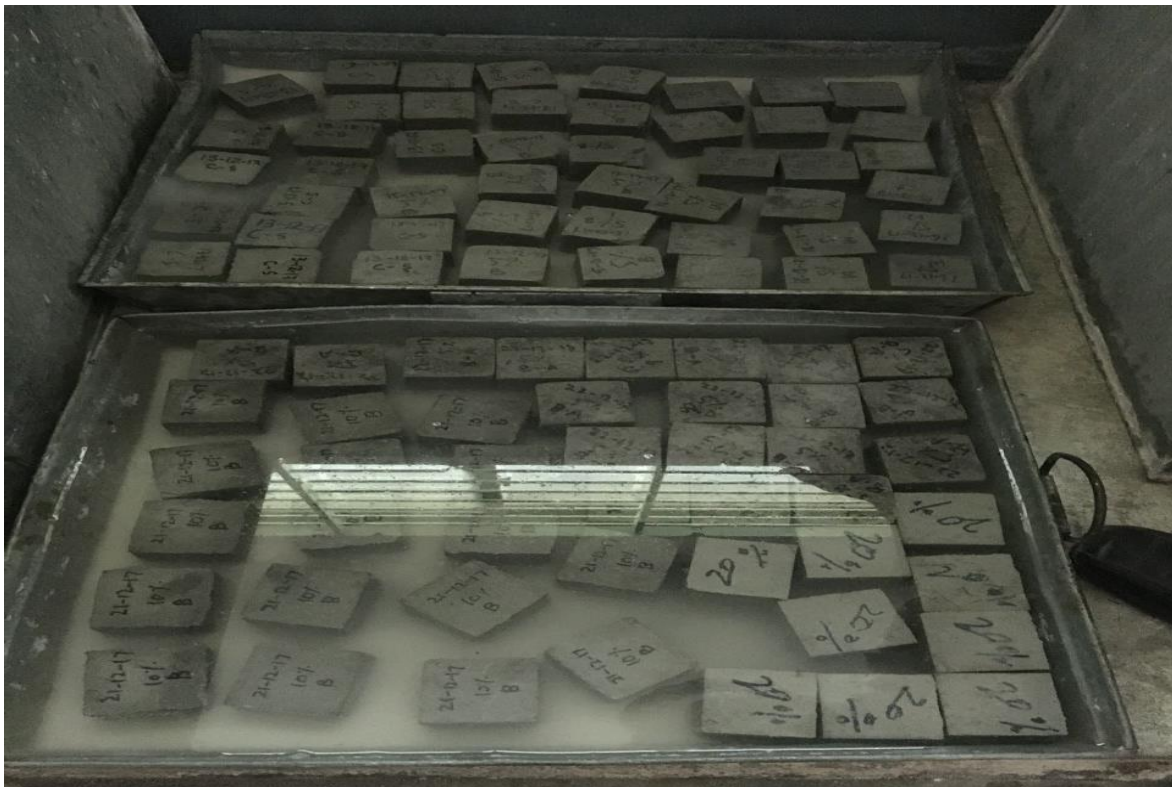


Fig 04: Curing of Mortar Moulds

2.3 Testing of cylinders

To investigate the effect of foundry sand in concrete the mortar moulds and concrete cylinders were tested in UTM in Iqra National University Peshawar for compressive strength at 3, 7 days and 28 days. The split tensile test was done for 28 days.

2.4 Compression test

Concrete cylinders are tested 3, 7 and 28 days of curing to find the compressive strength of the mortar and concrete cylinders as per ASTM C 39 Test Method. Capping was done with sulphur powder. The compressive strength is determined by dividing load at which the cylinder fails by the area of cylinder.



Figure 5: Compression test of cylinder

2.5 Split tensile test (ASTM C 496)

Split tensile strength of the concrete specimen was determined using ASTM C 496 test method. This test is used to find the tensile strength of concrete. Concrete is very weak in tension and it is very difficult to apply load in uniaxial tension to a concrete specimen, the tensile strength of the concrete is determined indirectly from split cylinder test. The tensile strength of the cylinder can be calculated by the following formula.

$$f = \frac{2P}{\pi DL}$$

f = split tensile strength

P = load

D = diameter of cylinder

2.6 Flexural Strength: ASTM-C-78

Flexural strength is the tensile strength of un reinforced concrete beams or slabs by resisting the loads in bending. It is about 10-20 % of the compressive strength of concrete. It is measured by loading 150mm * 150mm un reinforced concrete beams using three point loading. It is also called as modulus of rupture or bend strength.

The flexural test on concrete can be conducted using either three point load test (ASTM C78) or center point load test (ASTM C293). The configuration of each test is shown in Figure-2 and Figure-3, respectively. Test method described in this article is according to ASTM C78.

Table 3: Compressive strength with various percentages of WFS

Type of Mix	Replacement Level (%)	3 days strength psi	7 days strength psi	28 days strength psi
RM	0	2200	2857.243	3271.56
FSC 1	5	2598	3190.83	3460.83
FSC 2	10	2790.78	3335.87	3598.27
FSC 3	15	3478	3625.94	3923.51
FSC 4	20	2897	3480.91	3630.34

It was observed that the compressive strength increased by incorporating waste foundry sand in the concrete mix. The maximum compressive strength was observed at 15% of waste, where the compressive strength of the concrete cylinder is found as 3478 psi for 3 days, 3625.94 psi for 7 days and 3923.51 psi for 28 days. However the compressive is found decreased by further incorporation of waste beyond 15 %.

Tensile strength with various percentages of WFS

The variations in splitting tensile strength are found similar as in case of compressive strength. Splitting tensile strength of concrete mixes increased with the increase in WFS content.

Table 04: Tensile strength

Type of Mix	Replacement Level (%)	3 days strength psi	7 days strength psi	28 days strength psi
RM	0	478.45	565.64	587.56
FSC 1	5	493.76	518.68	591.13
FSC 2	10	512.98	578.90	601.12
FSC 3	15	609.34	632.54	672.54
FSC 4	20	545.89	567.78	639.89

The split tensile strength of waste foundry sand has similar behavior like compressive strength of concrete cylinders. It has been found that the split tensile strength gradually increases with increasing the percentage of waste foundry sand. The highest split tensile strength is observed at 15% of incorporation of waste foundry sand at all stages of curing

Flexural strength with various percentages of WFS

Two beams were casted and were subjected to three point loading at University of Engineering and Technology, Taxila-Pakistan.

The results can be summarized as

Table 05: Flexural strength

Type of Mix	Replacement Level (%)	3 days strength psi	7 days strength psi	28 days strength psi
RM	0	1989	2789	3045.79
FSC 1	5	2077	2794	3110.75
FSC 2	10	2498	2988	3129.89
FSC 3	15	2878	3032	3245.13
FSC 4	20	2519	3011	3045.56

2.4 Conclusions and Recommendations

2.4.1 Compressive Strength

- Compressive strength of mortar and concrete mixes were found increased up to 15% of replacement, due to replacement of fine aggregate with foundry sand.
- The highest compressive strength in cement mortar was found at 15% replacement of fine aggregate with waste foundry sand at all stages of curing. While beyond 15%, the compressive strength started to decrease at all stages of curing.
- The lowest compressive strength of 1885 psi was observed at 28 day of curing.
- The compressive strength of concrete also increased at all stages of curing with incorporation of waste foundry sand. The highest compressive strength of 3923.51 psi is observed in concrete cylinder at 28 day of curing.

2.4.2 Splitting Tensile Strength

- Concrete split tensile strength is also observed to increase with incorporation of waste foundry sand with fine aggregate.
- Splitting tensile strength of all concrete mixes was found to increase with increase in with varying percentage of waste foundry sand.
- At the age of 28 days, splitting tensile strength of 15% waste foundry sand was found as 672 psi while that of reference mortar is 587 psi.
- Maximum increase in splitting tensile strength was observed at 15% replacement of fine aggregate with waste foundry sand at all age.

2.4.3 Flexural Test

- The modulus of elasticity of reference beam is 3045 psi.
- The maximum flexural strength of 3245.79 psi is observed at 15% of adding of waste foundry sand.
- Modulus of elasticity of beam increased at all stages of curing after incorporation of waste foundry sand.
- Beyond 15% of addition of waste, the flexural strength started to decrease at all stages of curing.

2.5 Recommendations:

- The waste foundry sand may be used as a partial replacement of cement to check the strength properties and overall performance of concrete both at early stages of

- concrete and in hardened stage.
- ii. Foundry sand may be used as a substitute for fine aggregate in asphalt paving mixes.
- iii. It can also be used as a fine aggregate substitute in flowable fill applications

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EFFECT OF NANO SILICA ON THE DURABILITY OF CONCRETE

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Abstract

Concrete is a composite, the most abundant and the most important construction material. Concrete is mainly made of aggregates, water and binding material. Its production involves batching, mixing, transporting, proper placing, compacting and finishing. To achieve a good quality concrete the constituents of concrete should satisfy the international or local standards. Many researchers have done on the replacement of waste materials as an aggregate and binding material in concrete.

Cement is used in concrete as a binding material which is not only expensive but the production of cement in a plant also effects the environment very intensively. It is justified that the production of cement evolves 7% CO₂ gas to the atmosphere. The owner of industries and Govt should think about the problem and find out its possible solution as soon as possible. It is important to use locally available material as partial replacement of cement, which is economical as compare to ordinary Portland cement and also environmental friendly without decreasing the concrete strength.

Different additive Cementous materials are used in concrete as a partial replacement of cement. Nano silica is one of the pozzolanic materials which have been used in a recent year as a partial replacement of cement to increase the strength and durability of concrete.

In this research Nano silica was used as a partial replacement of cement in concrete to find the effect of Nano silica on durability and strength of concrete. According to ACI 124 design the ratio of 1:2:4 was selected in all concrete samples with water to cement ratio of 0.55 was kept constant. For comparison a control sample having zero Nano silica was prepared and concrete sample with different percentage of Nano silica as a cement replacement was compared with control sample. The results indicate that the addition of Nano silica as a cement replacement in a concrete increases the durability, compressive and tensile strength of concrete at 28, 56 and 90 days. The maximum strength at 28 days was achieved by 15% replacement of Nano silica in concrete. After that the strength was decreased by increasing Nano silica content beyond 15% as a cement replacement, thus 15% is the optimum amount of Nano silica in concrete.

Keywords: Nano silica, EDX tests, Compression test, SEM tests.

1. Introduction

Concrete is the most commonly using construction material all over the world. Concrete contains binding materials (ordinary Portland cement), fine aggregates, coarse aggregates and water. In concrete cement is used to make bond between fine aggregate and coarse aggregate but cement industries create environmental problem by the emission of CO₂ in the environment. It is estimated that 1 ton of CO₂ is evolve in production of 1 ton cement. It is calculated that about 7%

of CO₂ is produced due to cement industries in the environment, I-e 50% CO₂ of all industrial emission (Metha, 1999).

Cement industries evolves different types of gases like sulphur dioxide, nitrogen dioxide, carbon dioxide (NO, SiO₂, and CO₂) and dust also during production of cement (Castnas and Kampa, 2008; Friedrich and Pregger, 2009).

Cement industries produce environmental pollution because of releasing dust to air. Cement dust create a bad effect on human health, plants and ecosystem. Therefore it is necessary for cement industries to create some solution for solving these problems (Adak et al., 2007; Baby et al., 2008).

Continuous growth in industries decreased the natural resources, increasing pollution and emitting greenhouse gases which results in global warming. Problem related to such depletions and global warming can be overcome by using materials like i-e silica fume fly ash and metakaoline (Mala et al., 2013).

By using cementitious material in concrete as a cement replacement it will reduce the quantity of cement in concrete which in turn will reduce the emission of carbon dioxide gas in the environment which will produce a pleasant effect on environment. (Ecosmart, 2012).

Fundamental properties of concrete especially strength is dependent on concrete quality. Properties such as durability and impermeability are dependent on Compressive strength (Taylor, 2002; Neville and Brooks, 2002).

Compressive strength of concrete is positively improved by utilizing several supplementary cementitious materials. Minerals replaced with cement has the ability to enhance its early strength, thus helping in reducing the amount of cement used (Khokhar et al., 2010).

Supplementary cementitious material if used in optimum quantity can lead to better strength, chemical resistance, permeability, heat of hydration and workability. The enhancement in concrete durability is because of the reaction between hydration of Portland cement and oxides of cementing materials (Perry, 1987).

Nano silica which is a pozzolanic material has been used in recent years as cement replacement material for mounting high strength concrete (HSC).

In general 10% to 15% dosage of Nano silica by weight of total cementitious material has beneficial effects on the strength, durability, workability and cost economy of the concrete.

2. About the Project

2.1 Objectives

The main objective of this project is to evaluate the possibility of using plastic waste materials. The following objectives are also proposed.

- To investigate the effect of Nano silica on the durability of concrete.
- Investigate the mechanical behavior of concrete containing Nano silica.
- To determine the percentage of Nano silica that gives more strength as compared to normal concrete.
- Solve environmental issue indirectly.

2.2 Project Importance

The use of Supplementary cementitious material had its importance in past and will follow the same importance in future. Attempts have been made by many researchers to substitute the ingredients of concrete with locally and cheap available materials.

Due to increasing cost of materials used in conventional concrete such as cement and aggregates and environmental issues of cement production Cementitious material dig up more attention. From prospective of strength and durability cementitious material has verified to be more favorable in concrete.

Due to environmental disquiet and increase in cost of conventional material making concrete (cement, sand and gravels) cement replacing materials dig up more attention. Cement replacing materials in concrete have proved to be more beneficial from prospective of durability and strength of concrete. Many researchers reveal benefits of using admixtures in concrete. Some researcher replaces cement by other binding materials like metakaoline, silica fume and we made attempt to use Nano silica in concrete up to some percentages in place of cement. Because it is justified that about 7% CO_2 is released to the atmosphere due to production of cement. Nano silica is cheaply and locally available material. Nano silica is also friendly to environment. The main aim of this research is that to reduce the use of cement as much as possible by without compromising its strength. Nano silica is replace in place of cement in normal concrete to investigate the durability of concrete as well as its compressive strength.

2.3 Methodology

The flow chart shown in Figure 1 describes the methodology of the project.

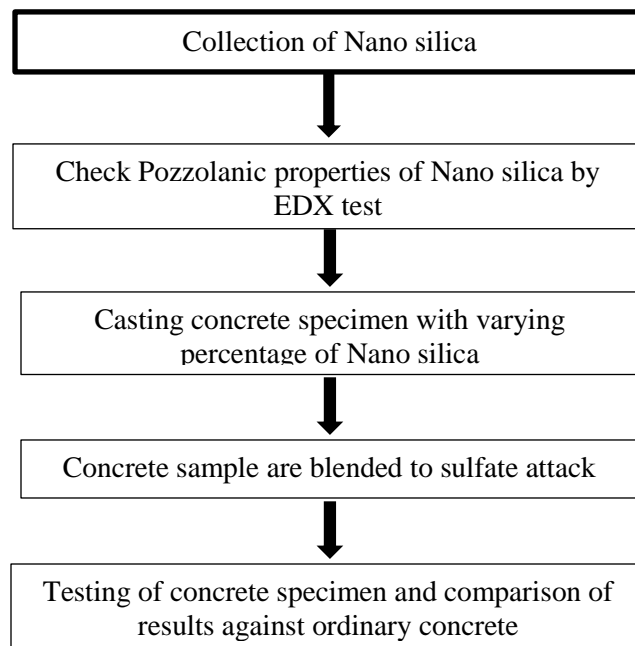


Figure 1: Methodology

2.4 Materials Used

Cement : Ordinary Portland cement.
Fine aggregate : River sand.
Coarse aggregate: 20mm – 60% and 10-13mm – 40%
Replacement material: Nano Silica.

2.5 Experimental Plan

In this project, cement is replaced by 0%, 5%, 10%, 15% and 20% Nano silica for M150 grade concrete with w/c ratio 0.6%. The replacement percent is by volume of total aggregate content derived from the mixture proportioned.

Various concrete mixes are prepared and designated as M_0 , M_1 , M_2 , M_3 and M_4 contains 0%, 3%, 5%, 7% and 9% of PET, which is shown in table 1 and 2

Table 1: Quantities of various materials per cylinder compression strength

S.No	Mix type	Cement (kg)	Fine Aggregates (kg)	Coarse Aggregates	Nano Silica(kg)	W/C ratio(Lit)
1	M ₀	2	4	8	0	1.2
2	M ₁	1.9	4	8	0.1	1.2
3	M ₂	1.8	4	8	0.2	1.2
4	M ₃	1.7	4	8	0.3	1.2
5	M ₄	1.6	4	8	0.4	1.2

The properties of materials used are:

Specific gravity of coarse aggregates = 2.714

Specific gravity of fine aggregates = 2.64

Water absorption:

Coarse aggregate = 1%

Fine aggregate = 0.6%

Fines modulus of coarse aggregate = 2.643

Fines modulus of fine aggregate = 2.45

Bulk density of coarse aggregates = 0.02572kg/in

Bulk density of fine aggregates = 0.02479kg/in

Cylinder specimens of size 6*12 inches were casted for each proportion with Nano silica and compared against ordinary concrete. Slump test was conducted on fresh concrete to determine the workability of concrete. Compression tests are performed on hardened concrete after 28, 56 and 90 days. The collected Nano silica is shown in figure 3



Figure 3: Collected Nano silica

3. Experimental Procedure

3.1 Testing On Specimen

All specimens were de-molded after 24 hours, and placed in curing tank for curing. After curing period, the specimens were taken for testing. The specimens were tested in the universal testing machine.

For each replacement ratio, three samples were tested and its average value is calculated. The results were then compared and analyzed with ordinary concrete with no replacement. The test setup and the failure of samples for compression test are shown.



Figure 3.1 Compression test

3.1.1 Compression Strength Test

The compression strength of the cylinder specimen is calculated by using the following formula: Compression strength (psi), $f_c = \text{Failure load (tons)} \times 2204 / (36 \times \pi \times \text{diameter}^2 / 4)$.

The variation of the compression strength of cylinder specimens with different replacement percentage of fine aggregate by Nano silica of different curing time is shown in graph figure 3.3

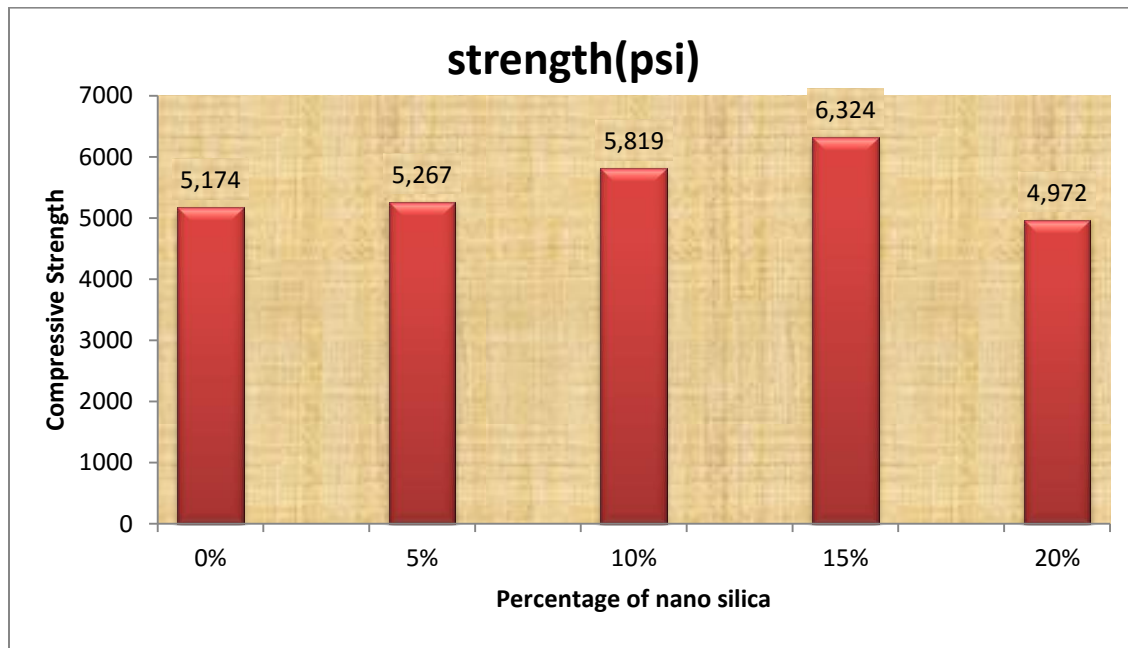


Figure 3.2: Compression strength VS Nano silica (%)

Increase in the compression strength is observed for 28 days strength as compared to 56 and 90 days results. Also 15% replacement of Nano Silica as a cement shows abrupt increase in compressive strength against other replacement ratios.

The compression strength of 56 days cylinder specimens against concentrated and dilute calcium sulphate attack are also investigated which is shown in graph figure 3.4.

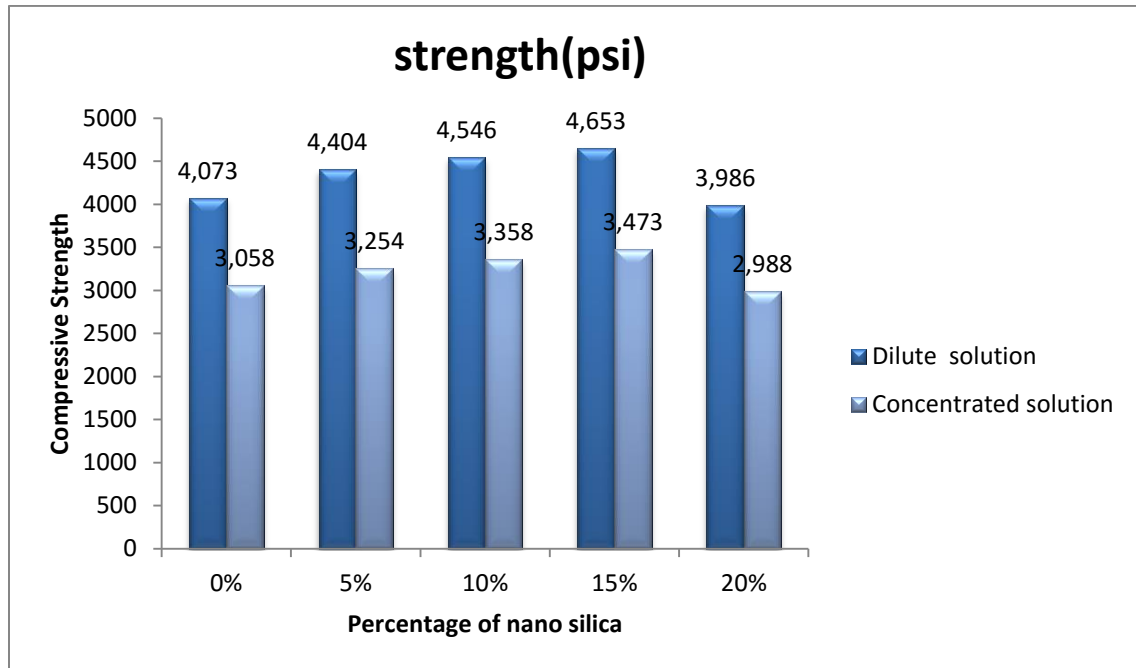


Figure 3.3: Compression strength VS Nano Silica

The compression strength of 90 days cylinder specimens against concentrated and dilute calcium sulphate attack are also investigated which is shown in graph figure 3.4.

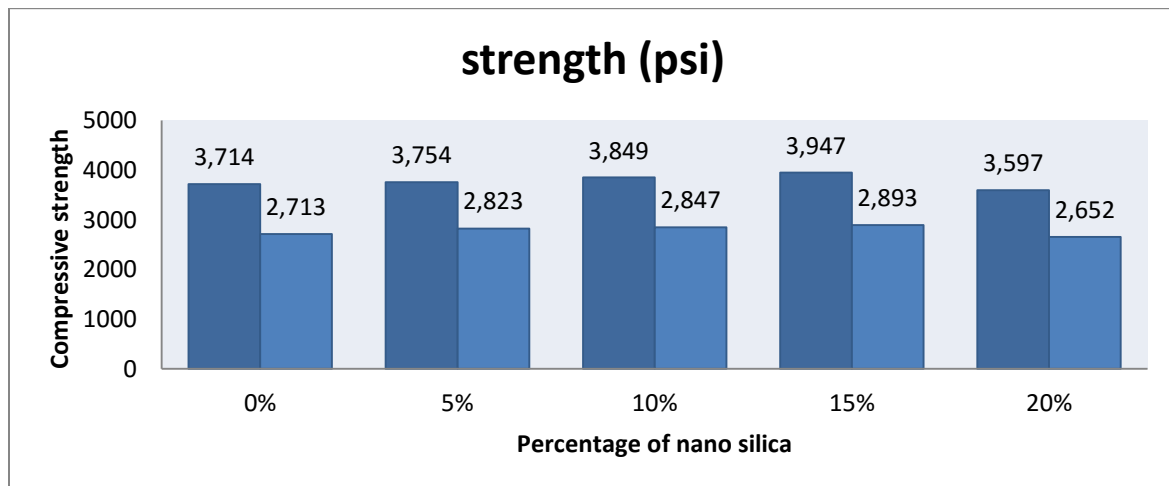


Figure 3.4: Compression strength VS Nano Silica

4. Conclusions

- Workability of concrete decreases with increase in content of Nano silica.
- Compressive strength at all stages increased with increase in Nano silica content up to 15%.
- The effect of sulfate salts were relatively less on mixes containing Nano silica, decrease in strength was less as compared to control mixes.

- The 15% replacement of cement with Nano silica increased the strength of mixes up to 22%.
- Nano silica can be used effectively and efficiently as a partial replacement of cement in concrete.
- Thus 15% Nano silica in concrete as a partial replacement of cement is recommended as optimum content for strength.

5. Scope for Future Research

- Nano can be used as a partial replacement of fine aggregates in concrete for investigation of its mechanical properties.
- The effects of Nano silica in concrete under high temperature can be checked.
- Nano can be checked as additive material in concrete.
- When we increase Quantity of Nano silica beyond 15% decrease in strength occurs.
- The effects of Nano silica fibers in concrete with different admixture can be investigated.
- The combination Nano silica and other waste material in concrete can be analyzed.
- Investigate the effect of Nano silica mix concrete for different water binder ratio on properties of concrete.

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STUDY OF RECYCLED AGGREGATE AS A PARTIAL REPLACEMENT OF VIRGIN AGGREGATE IN CONCRETE

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Abstract

Concrete is a compound, the most abundant of all man made materials and is among the most key construction materials. Concrete is chiefly made of aggregates, water and binding material. Its production comprises batching, mixing, transporting, proper placing, compacting and finishing. To achieve a good quality concrete the components of concrete should satisfy the international or local standards. Many researches have done on the replacement of waste materials as an aggregates and binding material in concrete.

Recycled aggregate can be obtained by crushing concrete that have been already used in construction. Due to increasing construction industry globally, and concrete being a main structural part, researchers are interested in replacement of concrete ingredients by waste materials which have a positive effect on the structural consideration of concrete.

Recycling of aggregates can prevent the wastage of potentially used materials and reduce the consumption of virgin raw materials thereby reducing: energy usage, air pollution and water pollution from land filling.

This work presents the performance of Recycled aggregate as partial replacement of coarse aggregates in concrete in a controlled environment. The purpose of this work is to solve the environment issue, to reduce the use of natural resources, to make the concrete economical and up to the desired strength of normal concrete.

Concrete with 10%, 20%, 30% and 40% replacement of recycled aggregates as a coarse aggregate are produced and compared against normal concrete sample with no replacement. Cylinder specimens are cast, cured and tested for compression at 14 and 28 days. The experiments show that for replacing PET bottles fibers with 10%, 20%, 30% and 40% as a coarse aggregate in concrete increases compression strength against normal concrete and also shows good workability, smooth finish and observation on outer side.

The Recycled aggregate is cheaply available everywhere as compared to natural coarse aggregate. By using waste Recycled aggregates as a coarse aggregate in concrete reduces the quantity of natural aggregates.

Keywords: Recycled aggregate, replacement, compression strength, virgin aggregate, concrete

1. Introduction

The consumption of concrete in construction industry is increasing continuously; its consumption is ten times more than steel. Due to this high rate of consumption, many wastes are added as a replacement or as an additive material in concrete.

There are different waste fractions available in environment, but the recycle aggregate can cover a major portion of coarse aggregate in concrete production, which can be a good economic aspect in construction industry.(Poon, Shui, & Lam, 2004)

Recycled aggregates can be obtained by crushing concrete to reclaim the aggregates, and was first used in 1991 in PCC by Michigan. Recycled aggregate (RA) can be used for many purposes i.e. road base and for low strength areas in structural purposes .The waste concrete can be obtained from demolished site can put in a machine for crushing.

Converting of waste materials into new materials and objects is called recycling. Recycling of aggregates can prevent the wastage of potentially useful materials and reduce the consumption of virgin raw materials thereby reducing: energy usage, air pollution, and water pollution from land filling. (Tošić, Marinković, Dašić, & Stanić, 2015)

Recycled aggregates obtained from materials that have been already used in construction. Recycled aggregates are created by breaking, removing, and crushing existing concrete to a required size. Due to increasing the construction industry globally, the recycling and reuse of waste materials got importance due to its vast application.

As per frontier highway administration FHWA, stated that almost 38 states used recycled aggregate as a partial replacement of virgin aggregate in concrete production depending on the requirements, almost 11 states recycled the demolished concrete it into new Portland cement. Currently, most of the waste generated in construction and demolition sites is composed of materials such as concrete, bricks and blocks which are disposed of in land fill sites due to the absence of markets for their recycled forms. The aim of this model is to develop in this paper is based on the potential decisions facing the waste producer and the aggregate user. Recycled aggregate is mostly used as a base layer for other construction materials because it compacts to form a firm surface.(Duran, Lenihan, & O'Regan, 2006)

Recycled aggregate can be obtained by two methods:

- (i) At the site of source, this method is economically beneficial
- (ii) In a central plant

Aggregates are the major component in concrete mixtures which covers almost 70% to 80% by volume in concrete mixes. Due to this high rate usage of natural resources, the site of new quires is being stopped by environmental regulation or by new land polices due to which cost of natural aggregates NA rise. Using recycled concrete aggregate (RCA) can overcome these crises of economic and environmental problems and waste is recycled in the form of recycled aggregate, which is currently practicing in all over the world. Researcher says that 99% of worlds produce recycled aggregate, and using it for low value applications including the use as a road base material or for pavement bases as filler material. (Wang, Wang, Sun, & Jin, 2013)

The Recycled aggregate has high water absorption property as compared to natural aggregate due to the presence of porosity in demolished concrete due to which workability of concrete can be affected. While in terms of strength it can be used in low-medium required strength i-e <4000psi and the maximum replacement should not be exceeded 50%. (Behera, Bhattacharyya, Minocha, Deoliya, & Maiti, 2014)

According to the U.S. Geological Survey Fact Sheet on Recycled Aggregates more than 100 million of aggregates are recycled out of which 80% is recycled and 20% goes to landfills. For road base about two-third is used as RA while the remaining one-third is used in production of hot mixes. RA aggregates which are mainly used in construction can be also used with blast furnace and steel furnace slag and gives good result.(Knoeri, Sanyé-Mengual, & Althaus, 2013).

Among various types of materials, concrete waste accounts for about 50% of the total waste generation, and for dumping construction materials to landfills generates a significant quantity of waste from construction site.

A comparative study on costs and benefits between the current practice and the concrete recycling method is examined, which shows that it has a negative net benefit for the current practice while a positive net benefit for the concrete recycling method. Therefore, recycling concrete as aggregate for new concrete production can provide a cost-effective method for the construction industry and help saving the environment.(Tam, 2008)

Phosphorous slag (PHS), ground granulated blast-furnace slag (GGBS) and fly ash (FA) were used as replacements of Portland cement to modify the microstructure of recycled aggregate concrete (RAC), to improve the performances of interfacial transition zone (ITZ) between recycled aggregate and mortar, and were investigated by the scanning electron microscope (SEM) shows that the new manufacturing method, adding superfine pozzolanic powders and super plasticizer benefits, makes a much denser ITZ in RAC. (Wang et al., 2013)

Use of fine recycled concrete aggregates to partially or globally replace natural fine aggregates (sand) in the production of structural concrete, results shows that the compressive strength, split tensile strength, modulus of elasticity and abrasion resistance properties of concrete does not jeopardize the mechanical properties of concrete, for replacement ratios up to 30%.(Evangelista & de Brito, 2007)

The use of recycled aggregates in concrete would reduce its compressive strength and render the concrete less durable but incorporating Class F fly ash in the concrete mix design mitigate the lower quality of recycled aggregates in concrete and we can utilize a high percentage of recycled aggregate in concrete is by incorporating 25–35% of fly ash.(Kou & Poon, 2012)

Milled waste glass used as secondary cementations material towards production of recycled aggregate concrete, as partial replacement for cement, showed that waste glass, when milled to micro-scale particle size, is estimated to undergo pozzolanic reactions with cement hydrates, forming secondary calcium silicate hydrate (C–S–H). These reactions bring about favorable changes in the structure of the hydrated cement paste and the interfacial transition zones in recycled aggregate concrete.(Nassar & Soroushian, 2012)

Incorporating recycled aggregates from construction and demolition waste in concrete to assess the carbonation behavior of concrete, results show clear increasing carbonation depths with increasing replacement levels as compared to the natural aggregate concrete. The relationship between the compressive strength and coefficients of accelerated carbonation is similar between the control concrete and the recycled aggregate concrete mixes.(Silva, Neves, de Brito, & Dhir, 2015)

The guidelines and specification for production of recycled aggregate on industrial scale and its use in civil engineering applications have not been established yet, similarly the recycled material may be varying in quality and properties depending on the demolished site properties. The finding of this research is to evaluate the applications and the study of mechanical properties of recycled concrete in concrete industry.

2. About the Project

2.1 Objectives

The main objective of this project is to evaluate the possibility of using recycled aggregate. The following objectives are also proposed.

- As partial substitute of coarse aggregate in concrete.
- Investigate the mechanical behavior of concrete containing recycled aggregate.
- To determine the specific percentage of recycled aggregates that gives more strength.
- Solve environmental issue indirectly.

2.2 Project Importance

The problem of placing and appropriate management of solid waste materials in the world has become one of the key ecofriendly, economic and public issues. The waste management system including land-filling, recycling, reuse and source reduction needs to be applied to control the waste disposal problems. The aim of this research is to use the recycled aggregate as a partial replacement of coarse aggregate in concrete due to its need of alternative material in construction. The demolished concrete are easily and cheaply available at demolished site which is shredded by any method and added into normal concrete to investigate the mechanical properties of concrete.

2.3 Methodology

The flow chart shown in Figure 1 describes the methodology of the project.

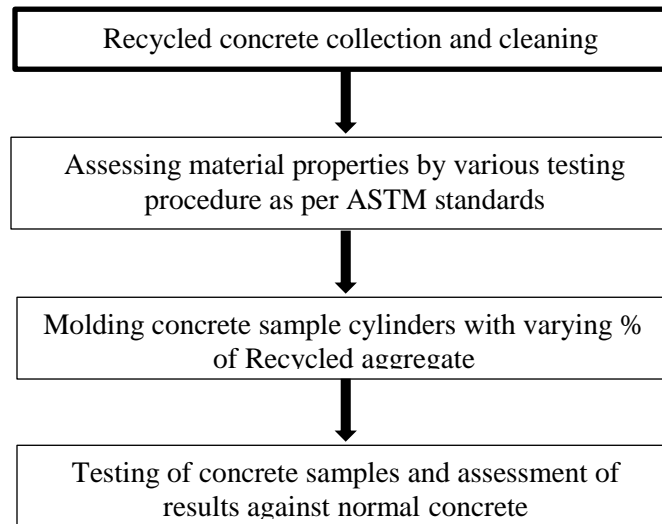


Figure 1 Methodology

2.4 Materials Used

Cement : Ordinary Portland cement.

Fine aggregate : River sand.

Coarse aggregate: 20-25mm – 50% and 10-15mm – 50%

Recycled coarse aggregate: 20-40mm

2.5 Experimental Plan

In this task, Recycled aggregate is replaced by 10%, 20%, 30% and 40% of coarse aggregates for targeted strength of 3000 Psi. After performing mix design through ACI mix design procedure, the ratios derived are 1:2.06:3.4 with a w/c ratio of 0.6%. Cylinders were casted for 14 and 28 days compression strength.

Weight of cylinder = 14 kg

Ratio = 1:2.06:3.4

Cement = $1 \times 14 / 6.46 = 2.16\text{kg}$

Sand = $2.06 \times 14 / 6.46 = 4.46\text{kg}$

Aggregate = $3.4 \times 14 / 6.46 = 7.36\text{kg}$

w/c = $2 \times 0.6 = 1.2\text{ lit}$

The replacement percent is by weight of total aggregate content derived from the mixture proportioned.

Various concrete mixes are prepared and designated as M₀, M₁, M₂, M₃ and M₄ contains 10%, 20%, 30% and 40% of recycled aggregates, which is shown in table 1 and 2

Table 1 Quantities of various materials (Kg) per cylinder compression strength

S.No	Mix type	Cement(kg)	Fine Aggregates	Coarse Aggregates	Recycled Aggregate	W/C ratio(Lit)
1	M ₀	2.16	4.46	7.35	0	1.2
2	M ₁	2.16	4.46	6.5	0.75	1.2
3	M ₂	2.16	4.46	6.0	1.5	1.2
4	M ₃	2.16	4.46	5.2	2.20	1.2
5	M ₄	2.16	4.46	4.35	3	1.2

The properties of materials used are:

ASTM standards are followed for each test:

Specific gravity of coarse aggregates = 1.63

Specific gravity of fine aggregates = 2.64

Water absorption:

Coarse aggregate = 0.02747

Fine aggregate = 0.6%

Fines modulus of coarse aggregate = 6.70

Fines modulus of fine aggregate = 2.6

Bulk density of coarse aggregates = 0.02572kg/in

Bulk density of fine aggregates = 0.02479kg/in

Los Angles Abrasion Test (% Los) = 7.3%

Aggregate Impact Value = 18.31%

Cylinder specimens of size 6*12 inches were casted for each proportion with Recycled aggregate and compared against ordinary concrete. Slump test was conducted on fresh concrete to determine the workability which shows a workable result. Compression tests are performed on hardened concrete after 14 and 28 days, the collected crushed aggregates are shown in figure 2.1 and treated cleaned recycled aggregates are shown in figure 2.2:



Figure 2.1 Demolished aggregates of Margalla Tower Islamabad



Figure 3.1 Cleaned recycled aggregates of Margalla Tower Islamabad

3. Experimental Procedure

3.1 Testing On Specimen

All specimens were de-molded after 24 hours, and placed in curing tank for curing. After curing period, the specimens were taken for testing. The specimens were tested in the universal testing machine.

For each replacement ratio, three samples were tested and its average value is calculated. The results were then compared and analyzed with ordinary concrete with no replacement. The test setup and the failure of samples for compression test are shown below:



Figure 3.1 Compression test



Figure 3.2 Compression test

3.1.1 Compression Strength Test

The compression strength of the cylinder sample is considered by using the following formula:

$$\text{Compression strength (Psi), } f_c' = \text{Catastrophe load (tons)} \times 2204 / (36 \times \pi \times (d/4)^2)$$

The distinction of the compression strength of cylinder samples with different replacement percentage of coarse aggregate by Recycled aggregate at the age of 14 days is shown in graph figure 3.3

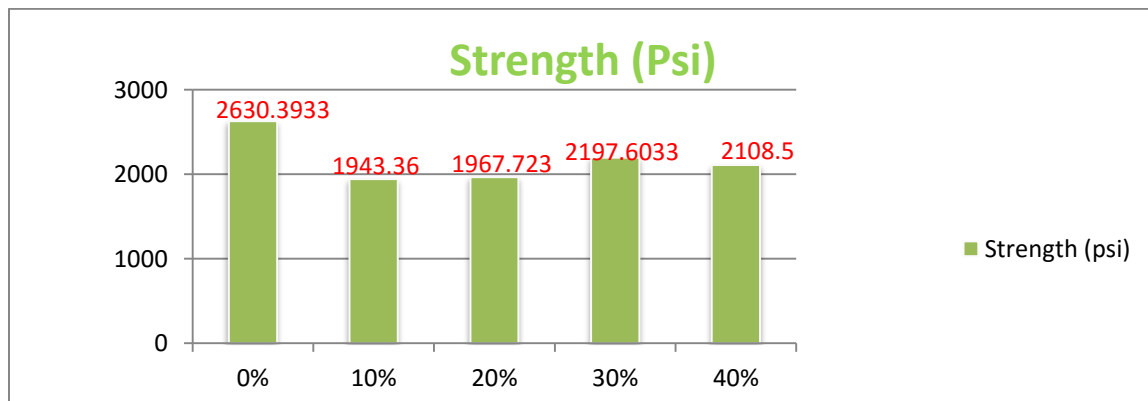


Figure 3.3 Compression strength (14 days) VS Recycled Aggregate (%)

Increase in the compression strength is observed for 20% and 30% replacement of recycled aggregate at 14 days, while a decrease in strength can be seen at 40% replacement. The main reason behind this low strength is the high porosity of recycled aggregate.

The compression strength of 28 days cylinder samples are also examined which is presented in graph figure 3.4.

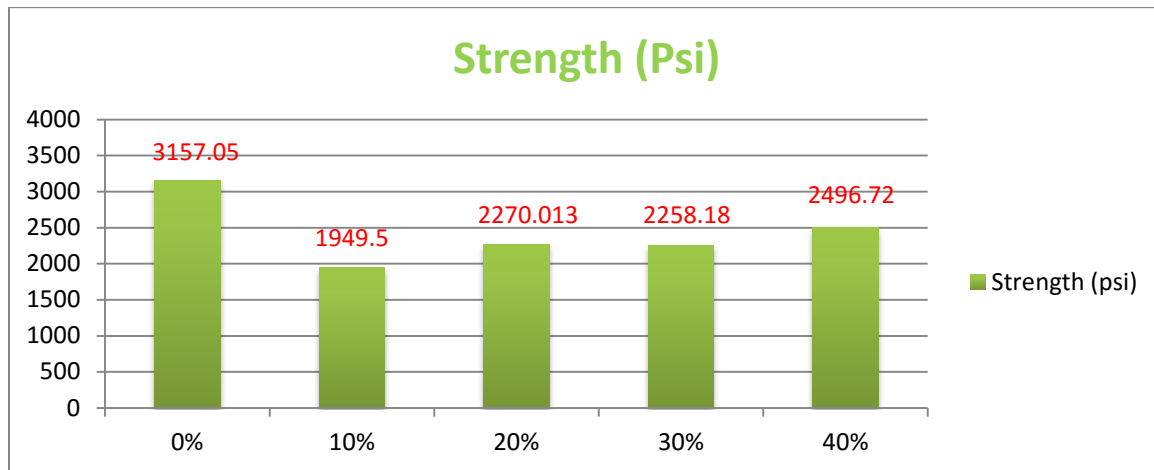


Figure 3.4 Compression strength (28 days) VS Recycled Aggregate (%)

When the Recycled aggregate are added with above ratios as a coarse aggregate in concrete, the compression strength is increased at 20%, 30% and 40% replacement at the age of 28 days.

From the above results we can conclude that by using Recycled aggregate as a partial replacement of coarse aggregate in concrete give max decrease in strength on 10% replacement but then starts increasing on 20 and 30% replacement and shows strength almost to the normal concrete at 40% replacement.

The increase in strength is not such effective but if we use it with supplementary cementitious materials like silica fume, fly ash and steel slag it can show better results due to the pozzolanic reactions and will result a better CSH bond.

4. Conclusions

- Concrete with recycled aggregates shows a good workability, smooth finish and observation on outer side.
- Compression cylinders of 10%, 20%, 30% and 40% Recycled aggregate as a partial replacement of coarse aggregate in concrete tested after 14 days gives a considerable reduction in strength against ordinary concrete, however repeating the same ratios of recycled aggregate in concrete at 28 days testing shows strength up to the normal concrete.
- Compression cylinder tested at 28 days with 40% replacement shows maximum strength and beyond 40% replacement the compression strength decreasing so the max replacement of recycled aggregate should be up to 40%.
- It has been found that use of Recycled aggregate as partial replacement of coarse aggregate in concrete shows strength up to the normal concrete at 30% and 40% replacement.
- It should be used in those areas where low strength are required like in low rise building, in reinforced concrete pavements.

5. Scope for Future Research

- The water absorption capacity of recycled aggregate is more as compared to virgin aggregate which can create shrinkage problem.

- Durability study should be performed for Recycled aggregate in concrete.
- Recycled aggregate can also be investigated at elevated temperatures when used as a replacement of natural aggregate.
- Cooperation between recycling and mining has to be encouraged for environmental benefits and maximize economy.
- The effect of recycled aggregate in concrete with additives and admixtures can be analyzed.
- Recycled aggregate in concrete can be assessed at elevated temperatures.

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STRENGTHENING OF EXISTING STRUCTURE FOR VERTICAL EXTENSION

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Abstract

This paper presents strengthening techniques of an existing single storey structure for vertical extension having pre-stressed double tee unit slab. The structure is utilized as cafeteria at City University of Science & IT, Peshawar. It is a frame structure that carries total load of the building and transfers it to the foundation. In first phase of this project different tests have been conducted for the assessment of existing structure that includes strength capacity of double tee unit beam, soil bearing capacity, non-destructive testing, existing frame analysis. In the second phase, various strengthening techniques have been proposed. For strengthening of structural members, the jacketing method is ideal that is wrapping beams with CFRP sheets in order to increase its strength capacity while for foundation, that the underpinning technique through continuous strip footing is recommended.

1. Introduction

A structure has constructed keeping in view its demand and capacity which meets the requirements at construction time. With the passage of the time and needs, vertical extension became a requirement for which the designing elements needs to be modified. An existing precast structure has been studied for vertical extension. Vertical extension is a storey addition to an existing structure which usually needs strengthening when the existing structure is not supposed to carry any further load. In this paper, basic strengthening techniques have been discussed that helps in early stages of designing an extended storey. The under studied structure is a precast structure, a product that is in reusable form of casting concrete which is prepared in controlled environment and is then transported to the site of construction and here it is tilted to the specified place. Precast components could also be called as ready-made construction components.

According to dependability of members that have been used; there are two types of precast system i-e bearing wall system and moment resisting frame system and dual system (Uang 2006). In-wall system, the whole weight of structure is coming on walls and then these walls transfers the load to the foundation. To transfer the flexural capacity (Thomson Jr et al. 1994; Bramblett et al. 2003), through the height of the wall, it requires that the continuous vertical reinforcement and vertical post-tensioning or coupling of bars could provide this. The second type is Moment resisting frame system and dual systems in which Moment resisting frame system consists of beams, columns and their jointed or monolithically inter-connections while the dual system deals with combination of shear walls and moment resisting frames for lateral loads resistance. Shear cores are responsible to stable the structure.

Basic Strengthening techniques that are an indispensable components to repair solid industry are Structural sustainability (Butler 2001), reestablishing (Winistorfer 1995) and including limit. Expanding load limit of beams, columns, walls, as well as slabs, seismic retrofitting (ElGawady 2004; Manfredi 2010), supporting extra live or dead loads (Wight et al. 1997) could require for structural strengthening.

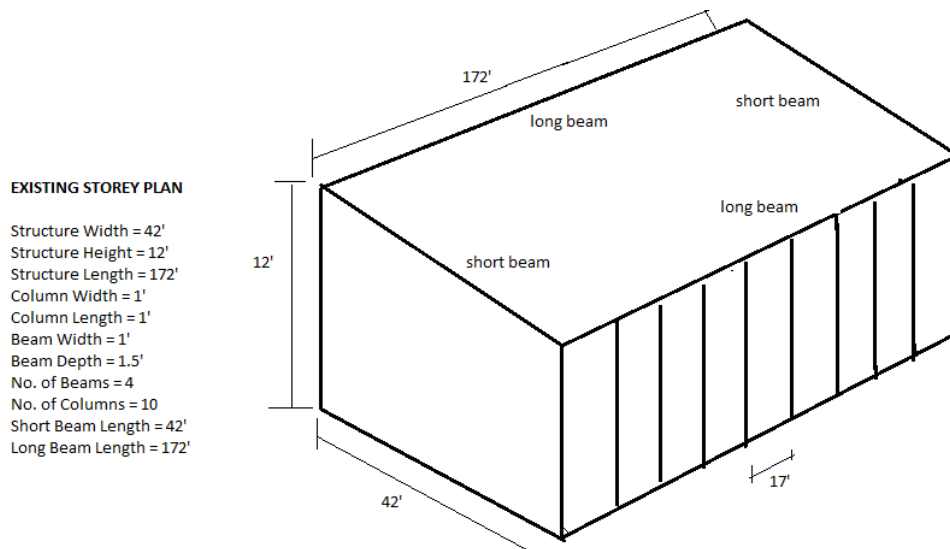
No previous data was available of the structure including drawings, dimensions etc; so complete assessment of the structure has been done to get the complete data. The purpose of this paper is to develop strategies for how could a designer handle storey extension projects. The main focus is on how to identify lack of capacity in the existing structural system and how to perform the

needed strengthening in a good way. The main objectives of this paper are to get knowledge for designing an extended storey, techniques to do strengthening of an existing structure and to deal with different situations and boundaries while designing.

The whole calculation of additional storey is calculated on single column footing because the dowel has been raised only from one column among 10 columns so the whole load is coming to walls and to that single column. Following tests and analysis have been done including Strength Capacity of Tee Unit Beams (Tankut 2005; Sullivan et al. 2010), Soil Bearing Capacity Test for compressive strength of cohesive soil (ASTM 2006), Non-Destructive Testing using Schmidt hammer (Reches et al. 2000; Malhotra 1976), then load calculations for existing and additional floors (Hotta 1999; McLeod 2001), implementation of strengthening techniques on structure (Carneiro et al. 2002; Täljsten 2003; Toutanji, Zhao et al. 2006), foundation (Mahony 1974; Kumpala et al. 2008) and slab (Hassan 2002).

After several strengthening techniques, its has been concluded that structures require strengthening because of natural causes, human error, and change in loading conditions. The technique that is used for strengthening of the structure must ensure the most cost effecting and long-lasting results.

2. Methodology



The methodology includes some testing, analysis and implementation techniques. First of all Strength Capacity of Tee Unit Beam has been calculated because it is necessary for finding unit weight of a beam. Then Soil Bearing Capacity Test has been determined for relative density of cohesion less soil and to find undisturbed compressive strength of cohesive soil. After this, Foundation Testing have been done in which the dimensions, type and specifications of the foundation have been as per ASTM standard . It is strip footing and dimensions have been mentioned in result and discussion part. Non-Destructive Testing is use for inspection and evaluation of materials without any damage to system's serviceability. Schmidt Hammer test have been conducted for it. After that Analysis of existing frame have been done in which the total existing load on existing frame has been calculated for further strengthening and constructing another storey on it. The next step was the calculation of additional loads from results calculated of the above tests and the results shows that calculated load was more than the bearing capacity of the structure. As the additional loads were more than bearing capacity, some strengthening techniques have been planned for structure, foundation and slab to carry additional loads. At last, FEM analysis have been done on SAP2000. FEM stands for Finite Element

Model.. The building material properties of concrete and steel have been used while load combination was considered as per UBC 97 design. Moreover, earthquake loading has not been considered for this study for superimposed dead load and live loads and self weight was taken as zero. The concrete material has been used for 4000psi and load combination have been as 120psf live load and 100psf dead load.

3. Results & Discussions

4.1. Tests for Existing Structure:

Following tests have been carried out for analysis of existing structure.

4.1.1. Strength capacity of double tee unit beam

A site experiment had been conducted in which the web section of the double tee unit was scratched to find out the number of strands been provided. These numbers of strands and their respective diameter was further compared to ACI double tee unit sections to evaluate the strength capacity of the tee unit beam. The precast strength for 28 days is 6,000 PSI according to IBC 2012 & ACI 318-11 standards (Institute et al. 2008) while topping strength for 28 days is 3,000 PSI as per IBC 2012 & ACI 318-11 codes. (IBC 2006)



Figure 1 : (a) and (b) shows scratching of Tee Unit

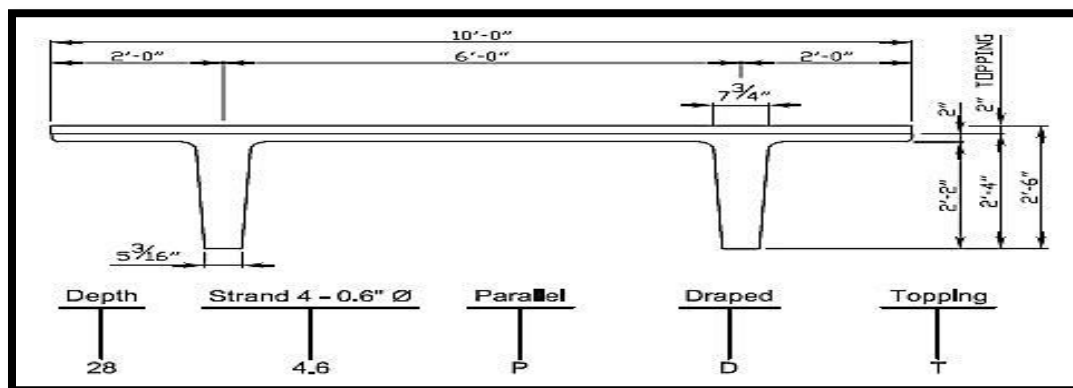


Figure 2 : cross section of Double Tee Unit

4.1.2. Non-destructive testing (Schmidt hammer)

Schmidt Hammer (SH) test is a well-known non destructive in-situ testing technique use for inspection evaluation of materials without any damage to system's serviceability. These R values have been calculated by using SH test table. The compressive strength obtained from the hammer was placed in FPS system. The Compressive Strength of a Single Column calculated is 3160 PSI.

Table 1. Compressive Strength at different intervals

S. No	Rebound R-value	Compressive Strength (PSI)
1	28	2943.5
2	30	3378.5
3	30	3378.5
4	29	3161
5	29	3161
6	28	2943.5

Average = $18966 / 6 = 3160$ PSI

So Compressive Strength of a Single Column is 3160 PSI.

4.1.3. Foundation Measurements:

As the detailed drawing of the structure was not available. Therefore, it was necessary to find out the dimensions of the footing been provided in the foundation. The Foundation measurements have been obtained to find out different characteristics of the subjected foundation which includes the foundation type, depth and width of footing. The major need of foundation measurements is to acquire the bearing capacity of foundation soil.

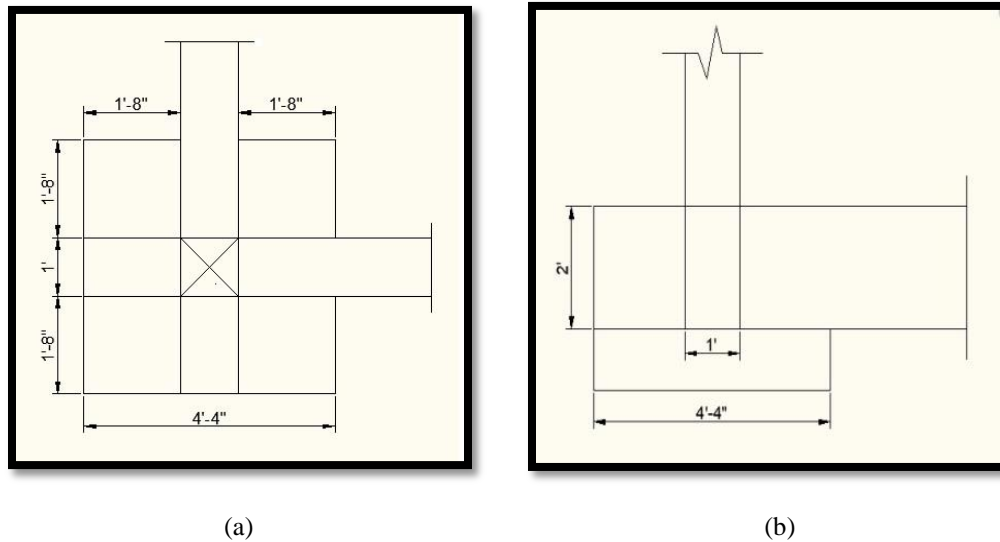


Figure 3: (a) cross section of foundation (b) top view of foundation

4.1.4. Bearing capacity through Standard Penetration Test:

The Standard Penetration test (SPT) is a common in situ test used to determine soil properties related to engineering. The bearing capacity of the foundation had been

evaluated through SPT test in order to find out the allowable pressure. The calculation for obtaining Bearing Capacity is as follows;

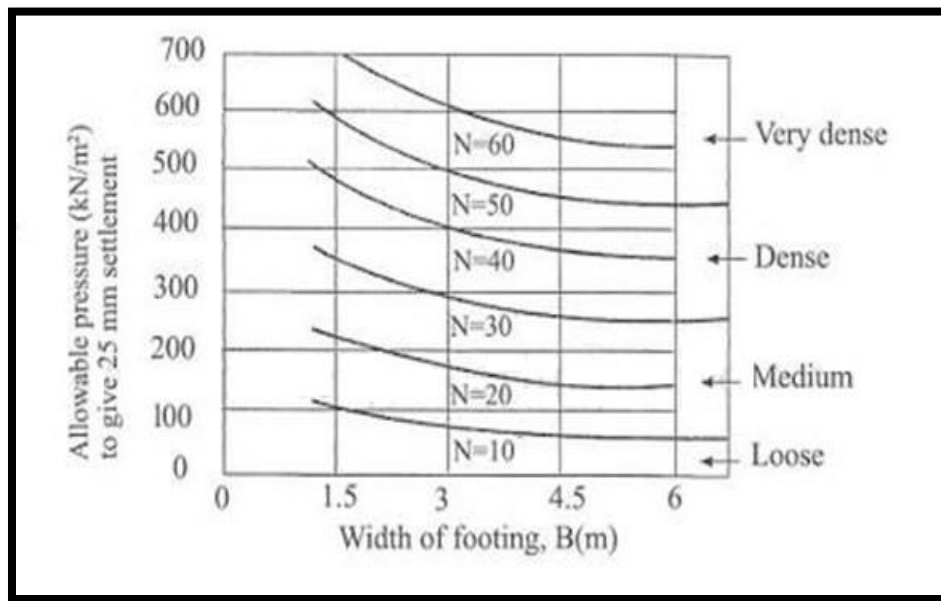
For footing width greater than 4ft

$$\text{Meyerhof's Equation} \Rightarrow Q_a = \frac{\left(\frac{N}{6}\right) \left(\frac{B+1}{B}\right)^2}{K} \dots (1)$$

Table 2. Weight at different no. of blows

S. No	No. of Blows	Bearing Capacity (Tons/ft ²)
01	09	0.77
02	18	1.55

Therefore, Bearing Capacity = 1.55 Tons/Ft²



To calculate the bearing capacity, considering this graph when the width of footing is compared to the experimented values in test and then putting it into the graph we obtained allowable pressure. As Width of footing = 4.3ft Therefore, Allowable Pressure = 225 KN/m² = 2.09 Ton/ft².

4.1.5. Service load of Existing Structure

The complete load of structure is dependent upon beams and columns. Ten columns have been provided through out the structure and this one column has been taken as a reference for calculation.

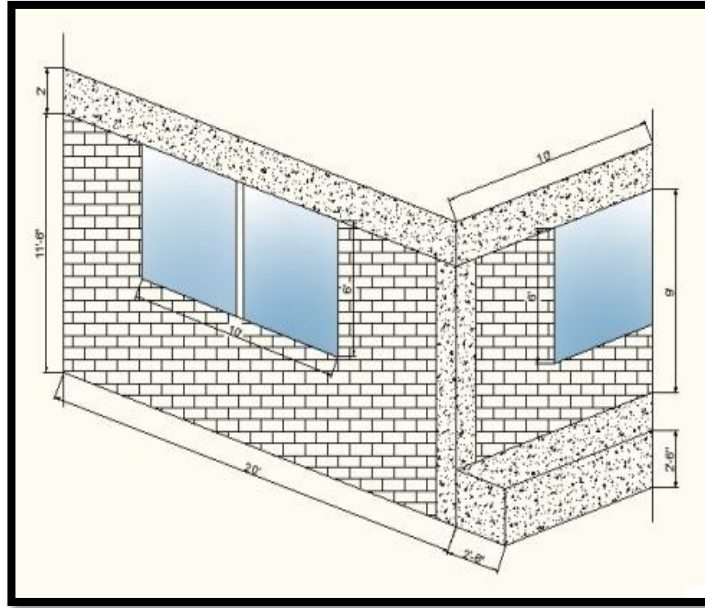


Figure 4. The existing frame structure in which the load has been calculated on single footing

Table 3. Weight of different components on existing structure

S. No	Components	Weight (Tons)
1	Column and beams	8.7
2	Bricks	4.2
3	Mortar	1.6
4	Plaster	1.10
5	Slab	12.03
6	Total Weight	27.6

Further load the foundation can bear:

$$\text{Service Pressure} = \frac{\text{Working Load}}{4.33 \times 4.33} = \frac{27.6}{4.33 \times 4.33} = 1.47 \frac{\text{Tons}}{\text{Ft}^2} \dots (2)$$

$$\text{Extra Load} = \text{Bearing capacity} - \text{Service Load} = 1.55 - 1.47 = 0.08 \frac{\text{Tons}}{\text{Ft}^2}$$

4.2. Tests for Proposed Structure:

The test carried out for proposed structure are as following.

4.2.1. Additional Loads

The proposed storey that have been raised on the existing column will also drop its whole weight to this single column because the dowel has been raised only from this column among other ten columns.

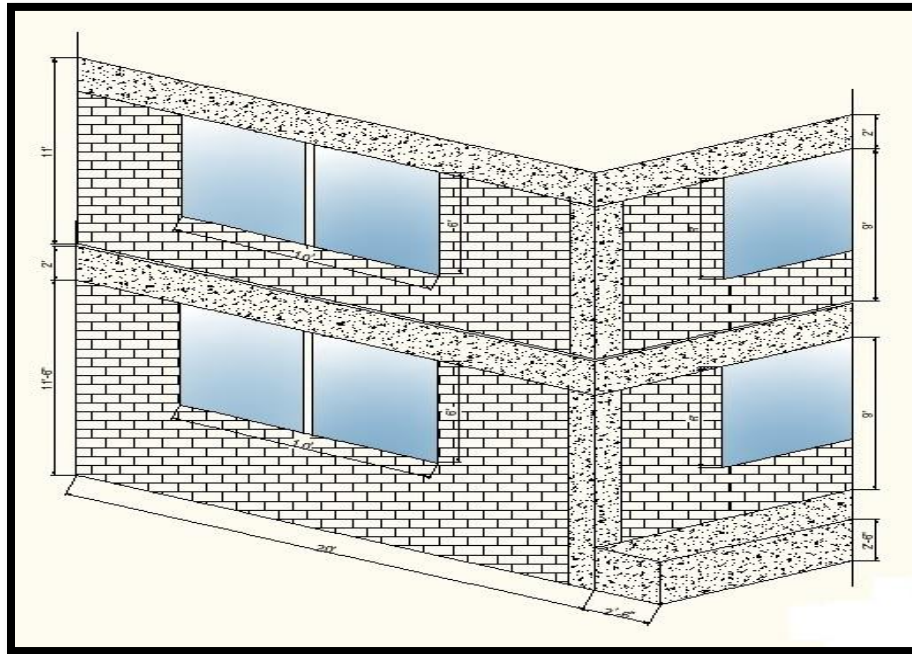


Figure 5. The addition of storey to existing frame structure and the calculated additional loads on single footing has been calculated

Table 4. Total weight on single column footing.

S. No	Components	Weight (Tons)
1	Column and beams	4.55
2	Bricks	2.4
3	Mortar	0.95
4	Plaster	1
5	Slab	7.8
6	Total Weight	16.7

The total weight of ground floor on single column footing is 27.6 tons while the total weight of first floor on single column footing is 16.7 tons that becomes Total 3 Tons The service load calculated from equation 1 formula is $2.36 \frac{\text{Tons}}{\text{ft}^2}$. As bearing service load is less than extra load; the structure needs to strengthen.

The structure requires strengthening of the foundation that can be done by providing underpinning using continuous strip footing. Additional stirrups should be added to the long beams to bear the further load that is upper storey's load. Columns main bars and ties are as suggested for the additional loads. CFRP sheets should be wrap over to different components of the structure that provides approximately 2800 N/mm² tensile strength per single sheet. Another way to overcome the problem is to shift the precast slab to the second storey by replacing it with the site cast reinforced concrete slab. A lightweight steel structure can be constructed as the second storey to reduce the extra load.

4.3. Analysis

The analysis of shear in beams and columns are as follows;

4.3.1 Analysis for shear in beams:

The beam is in rectangular shape with 24" x 18". The total number of beams are 4 in which 2 are long beams while 2 are short beams.

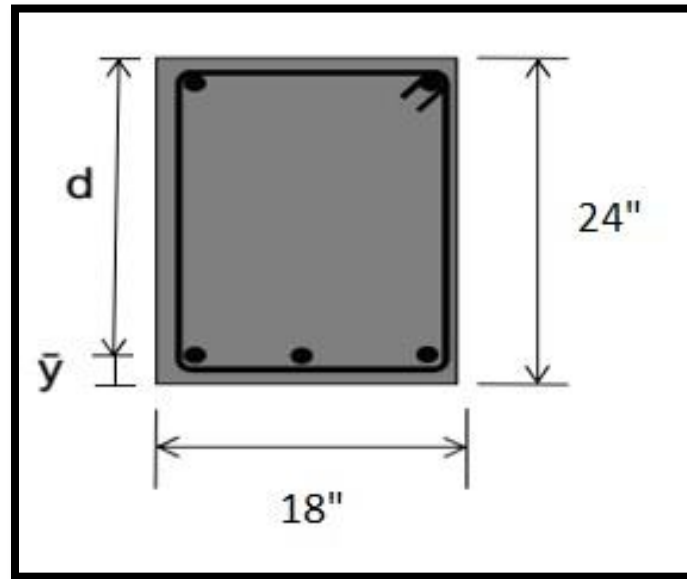


Figure 6. Cross section of beam

4.3.1.1 Existing Structure

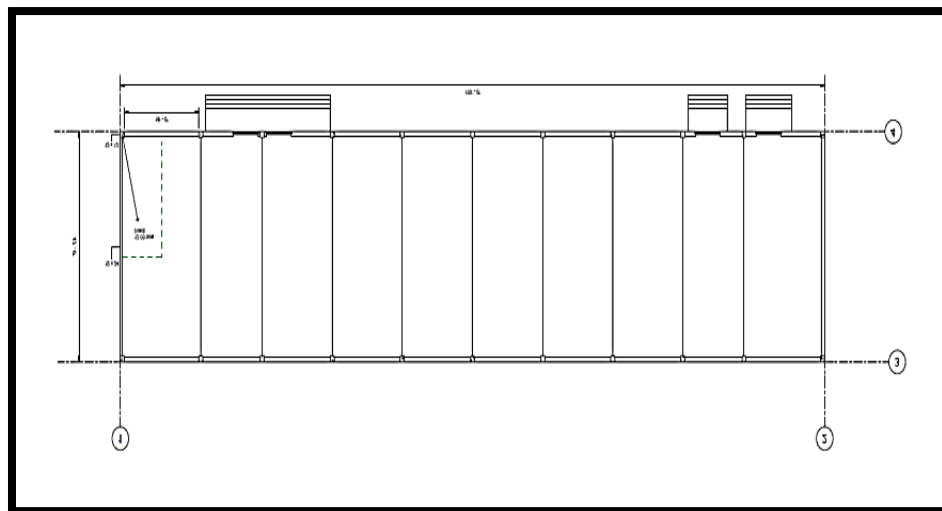
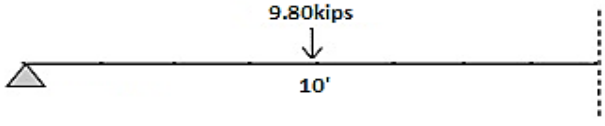
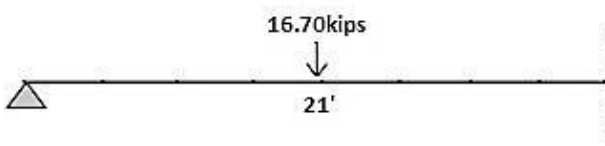


Figure 7. Cross section of existing structure

As the load of existing slab is 12.03 tons; therefore the load is distributed as follow 4.45 tons to a short beam of 10' length while 7.58 tons to the long beam of 21 ft length.

Table 5. The analysis results of beams of existing structure.

Beam Type	Figure	Ultimate Shear V_u (kips)	Shear Capacity ϕV_c (kips)
Short beam		4.9	31.05
Long beam		8.35	31.05

Hence Providing ACI checks its proved that $V_u < \phi V_c$

- The detail of analysis has been given in Annex A.

4.3.2. Column Design:

The columns are designed as per ACI 318-08 having square shape 12" x 12".

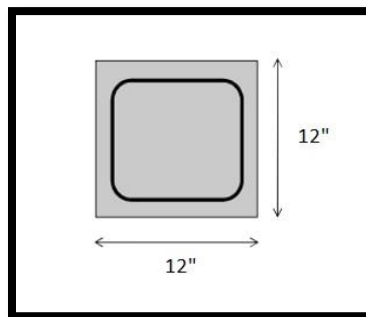


Figure 8. 12in x 12in tied column for a factored axial compression load 97.63 kips.

The material strength used for column design is $f'_c = 3\text{ksi}$ & $f_y = 40\text{ksi}$. All the other components have been calculated as per ACI 318-08

S. No	Components	Calculation
1	Nominal Strength	218.99 kips
2	Gross Area	144 in ²
3	Area of Steel	1.44 in ²
4	Main Bar Area	0.44in ²
5	No. of bars	4 bars
6	Tie Bar Area	0.11 in ²
7	No. of bars	12 bars

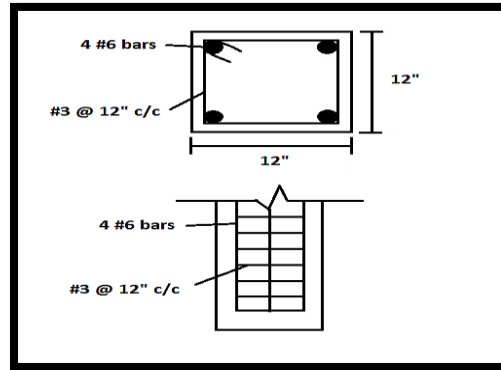


Figure 9. The addition of ties and bars in columns.

4.4. FEM Analysis

The proposed FEM have been analyzed on SAP2000 for maximum deflection, moment and shear.

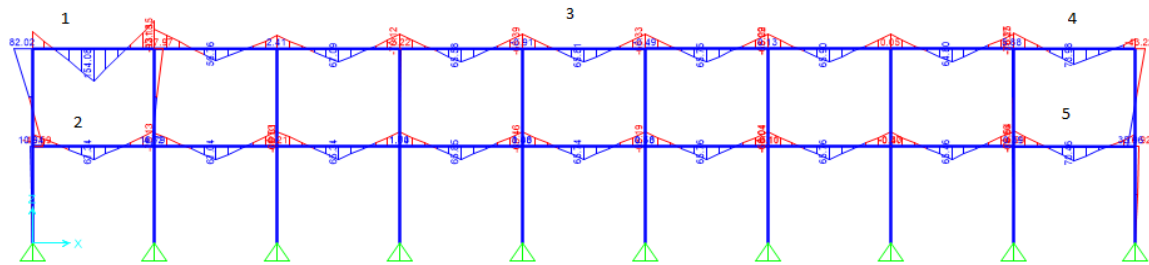


Figure 10. FEM analysis of structure.

4.4.1 Sections:

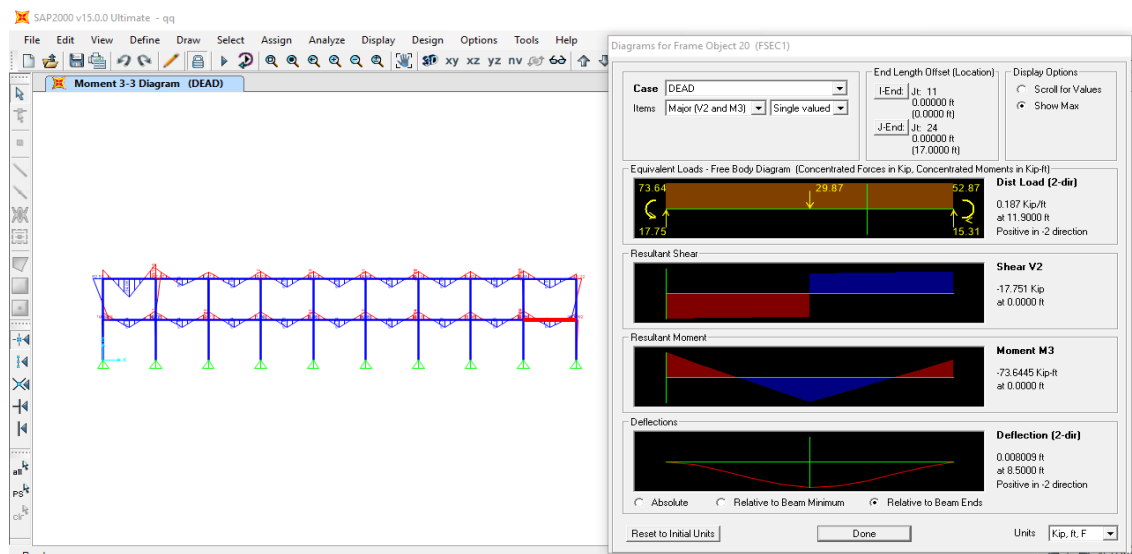


Figure 11. Moment M3-3 for front shape.

Table 6. Presents the Maximum dist load, shear, moment and deflection at different sections.

Section	Max Dist Load (Kip/ft)	Max Shear (Kip)	Max Moment (Kip*ft)	Max Deflection
1	0.187 at 17 ft	34.3 at 17 ft	154.08 at 8.5 ft	0.02 at 8.5 ft
2	0.187 at 11.9 ft	17.5 at 17 ft	-75.6 at 17 ft	0.007 at 8.5 ft
3	0.187 at 11.9 ft	16.5 at 17 ft	-68.3 at 17 ft	0.006 at 8.5 ft
4	0.187 at 11.9 ft	-18.7 at 17 ft	-76 at 0 ft	0.009 at 8.5 ft
5	0.187 at 11.9 ft	-17.7 at 0 ft	-73 at 0.00 ft	0.0090 at 8.5 ft

4.5 Cost Estimation

The cost estimation has been done for both the plans; addition of proposed floor and reconstruction of existing structure along with proposed floor. Materials rates are as per MES schedule book.

4.5.1. Cost Estimation for Proposed Structure

The estimated bill has been made upon regarding standards. In brickwork wall section, the estimation has been done after deducting windows and doors estimates. The amount have been added in multiple of total no. of components. For mortar, value in CFT has been directly putted because of ratio from bricks while in reinforcement, estimates have been done for all the three elements. The estimation is according to following standards that 1 trolley of coarse aggregate and sand is equal to 1000kg in weight while one cement bag is equal to 50kg.

Components	Dimensions (in cft)	Number of elements	Quantity	Unit Price (in Pak Rupees)	Cost (in Pak Thousand Rupees)
Bricks Wall	12 x 214 x 0.375	1	12000	Rs 15/Brick	180
Reinforcement Column	12 x 1 x 1	10	197 kg	Rs 96/kg	19
Beam	42 x 1.5 x 1	4	247 kg		23.7
Slab	42 x 172 x 0.375	1	2470 kg		237
Cement (Overall)	214 x 11 x 0.08	10	1600 kg	Rs 574/Bag	19
Plaster	170		1450 kg		17
Mortar	42 x 172 x 0.375		1000 kg		12
Concrete in Slab	12 x 1 x 1		500 kg		6
Concrete in Column	42 x 1.5 x 1		280 kg		4
Concrete in Beams					
Sand (Overall)	214 x 11 x 0.08	10	4800 kg	Rs 2400/trolley	12
Plaster	170		4350 kg		12
Mortar	42 x 172 x 0.375		2000 kg		5
Concrete in Slab	12 x 1 x 1		1000 kg		2.5
Concrete in Column	42 x 1.5 x 1		560 kg		2.5
Concrete in Beams					

Coarse Aggregate	170		8700 kg		30
Concrete in Slab	42 x 172 x 0.375		4000 kg	Rs	15
Concrete in Column	12 x 1 x 1	10	2000 kg	3700/trolley	7.4
Concrete in Beams	42 x 1.5 x 1	4	1120 kg		4
Grand Total Cost					6,08,500 Rs/- (609.5 K)

4.5.2. Cost Estimation for Proposed Structure with reconstructing the existing one

The estimate is for a condition, if we demolish the existing structure and reconstruct it along with additional floor so it would roughly cost double than the estimate for only proposed structure without estimating the cost of foundation and footings. So it could be better to strengthen the existing structure for vertical extension rather than reconstruction.

Components	Dimensions (in cft)	Numbers of elements	Quantity x no. of stories	Unit Price (in Pak Rupees)	Cost (in Pak Thousand Rupees)
Bricks Wall	12 x 214 x 0.375	1	12000 x 2	Rs 15/Brick	360
Reinforcement Column Beam Slab	12 x 1 x 1 42 x 1.5 x 1 42 x 172 x 0.375	10 4 1	197 x 2 kg 247 x 2 kg 2470 x 2 kg	Rs 96/kg	38 48 480
Cement (Overall) Plaster Mortar Concrete in Slab Concrete in Column Concrete in Beams	214 x 11 x 0.08 170 42 x 172 x 0.375 12 x 1 x 1 42 x 1.5 x 1	 10 4	1600 x 2 kg 1450 x 2 kg 1000 x 2 kg 500 x 2 kg 280 x 2 kg	Rs 574/Bag	38 34 24 12 8
Sand (Overall) Plaster Mortar Concrete in Slab Concrete in Column Concrete in Beams	214 x 11 x 0.08 170 42 x 172 x 0.375 12 x 1 x 1 42 x 1.5 x 1	 10 4	4800 x 2 kg 4350 x 2 kg 2000 x 2 kg 1000 x 2 kg 560 x 2 kg	Rs 2400/trolley	24 24 10 5 5
Coarse Aggregate Concrete in Slab Concrete in Column Concrete in Beams	170 42 x 172 x 0.375 12 x 1 x 1 42 x 1.5 x 1	 10 4	8700 x 2 kg 4000 x 2 kg 2000 x 2 kg 1120 x 2 kg	Rs 3700/trolley	60 30 15 8
Grand Total Cost					12,21,700 Rs/- (1.2 million)

5. Conclusion & Recommendations:

During the assessment of the existing structure, we reviewed that the bearing capacity of the foundation is insufficient to bear upper storey's additional load. It has been observed that FRP has

turned out be an effective technique for strengthening that is now mostly using in concrete structures for strengthening. Long beams require additional stirrups to bear the further load that is upper storey's load.

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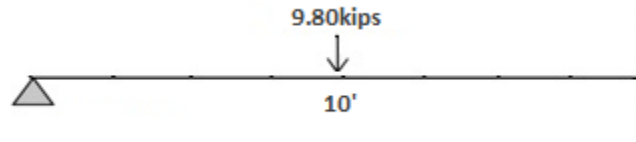
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Annex A

Analysis of beams of existing structure and shear occurred on the single column footing on which the whole load of the structure falls.

4.3.1.1.1 Short beam:



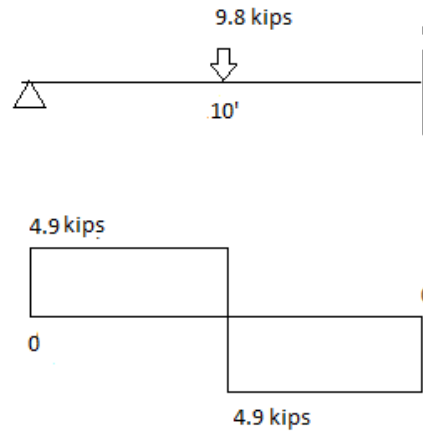
As

$$1 \text{ tons} = 2.204 \text{ kips}$$

$$4.45 \text{ tons} = 9.807 \text{ kips}$$

$$\frac{9.807}{2} = V_u$$

$$V_u = 4.9 \text{ Kips}$$

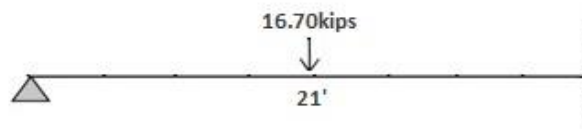


$$\begin{aligned} \phi V_c &= \phi \times 2 \times \sqrt{F_c'} \times (bw)(d) \\ &= 0.75 \times 2 \times \sqrt{3000} \times (18)(21) \\ \phi V_c &= 31.05 \text{ Kips} \end{aligned}$$

$$\phi V_c > V_u$$

Above conditions shows that no shear reinforcement is required.

4.3.1.1.2 Long Beam:

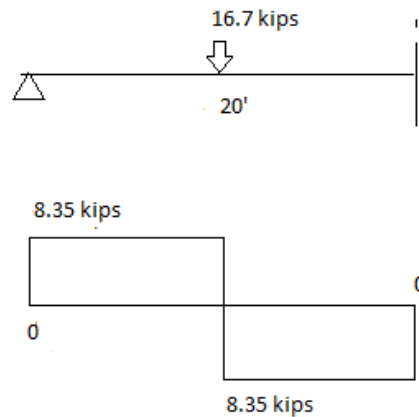


$$1 \text{ tons} = 2.204 \text{ kips}$$

$$7.58 \text{ tons} = 16.70 \text{ kips}$$

$$\frac{16.70}{2} = V_u$$

$$V_u = 8.35 \text{ Kips}$$



$$\begin{aligned}\phi V_c &= \phi \times 2 \times \sqrt{F_c'} \times (bw)(d) \\ &= 0.75 \times 2 \times \sqrt{3000} \times (18)(21) \\ \phi V_c &= 31.05 \text{ Kips}\end{aligned}$$

$$\phi V_c > V_u$$

Above conditions shows that no shear reinforcement is required.

4.3.1.2 Addition of Upper Storey:

As we have existing slab load = 12.03 tons

Upper storey load = 16.7 tons

Total load = 12.03 + 16.7 = 28.73 tons

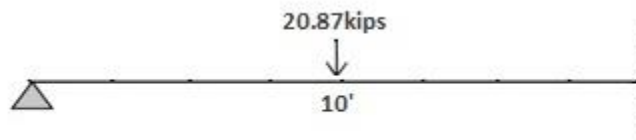
Therefore,

The load is distributed as follow

4.9 tons to short a beam of 10 ft length

8.35 tons to long beam of 21 ft length

4.3.1.2.1 Short Beam:

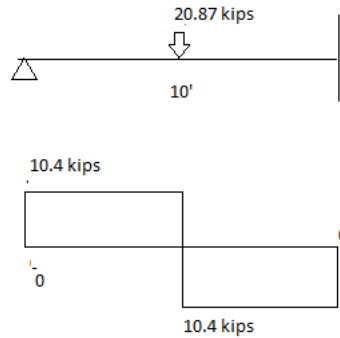


$$1 \text{ tons} = 2.204 \text{ kips}$$

$$9.47 \text{ tons} = 20.87 \text{ kips}$$

$$\frac{20.87}{2} = V_u$$

$$V_u = 10.4 \text{ Kips}$$

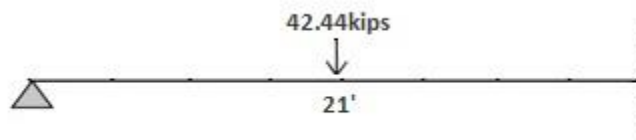


$$\begin{aligned}\phi V_c &= \phi \times 2 \times \sqrt{F_c'} \times (bw)(d) \\ &= 0.75 \times 2 \times \sqrt{3000} \times (18)(21) \\ \phi V_c &= 31.05 \text{ Kips}\end{aligned}$$

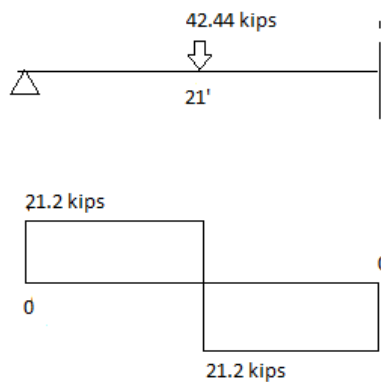
$$\phi V_c > V_u$$

Above conditions shows that no shear reinforcement is required.

4.3.1.2.2 Long Beam:



$$\begin{aligned}1 \text{ tons} &= 2.204 \text{ kips} \\ 19.26 \text{ tons} &= 42.44 \text{ kips} \\ \frac{42.44}{2} &= V_u \\ V_u &= 21.2 \text{ Kips}\end{aligned}$$



$$\begin{aligned}\phi V_c &= \phi \times 2 \times \sqrt{F_c'} \times (bw)(d) \\ &= 0.75 \times 2 \times \sqrt{3000} \times (18)(21) \\ \phi V_c &= 31.05 \text{ Kips}\end{aligned}$$

Therefore,

$$\phi V_c < V_u$$

Shear reinforcement is required.

Assuming #3, 2 legged (0.22 in²), vertical stirrups.

Spacing required

$$S_d = \frac{\phi A_v F_y d}{V_u - \phi V_c}$$

$$= \frac{0.75 \times 0.22 \times 60 \times 21}{40.41 - 31.05}$$

$$S_d = 22.21 \text{ in}$$

Maximum spacing and minimum reinforcement requirement as permitted by ACI is minimum of:

- $S_{max} = \frac{A_v f_y}{50 b w} = \frac{(0.22)(60000)}{50(18)} = 14.66 \text{ in}$
- $S_{max} = \frac{d}{2} = \frac{21}{2} = 10.5 \text{ in}$
- $S_{max} = 24 \text{ in}$
- $S_{max} = \frac{A_v f_y}{(0.75)\sqrt{F_c}(b w)} = \frac{(0.22)(60000)}{(0.75)\sqrt{3000}(18)} = 17.85 \text{ in}$

Therefore $S_{max} = 10.5 \text{ in}$

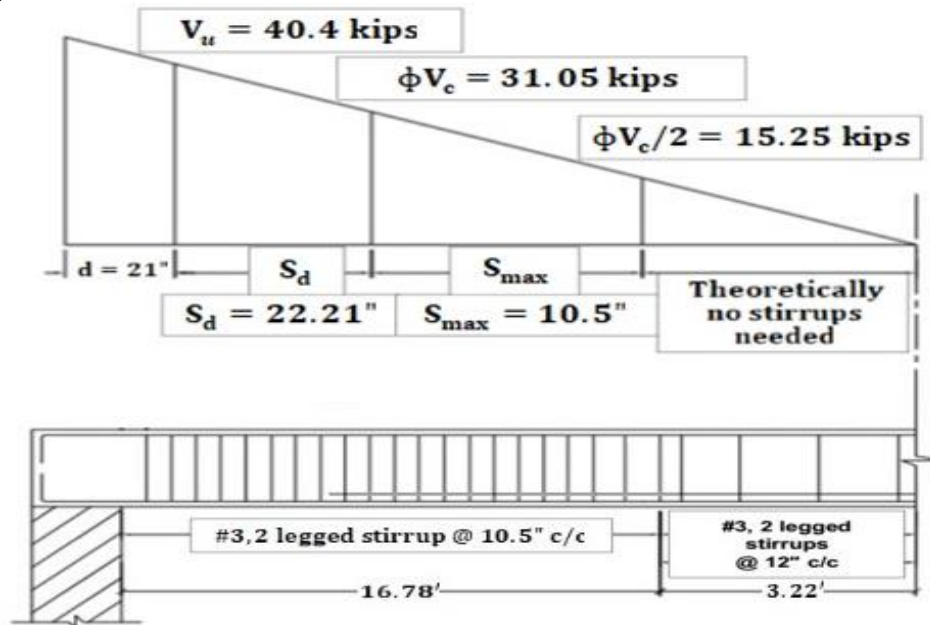
Other Checks:

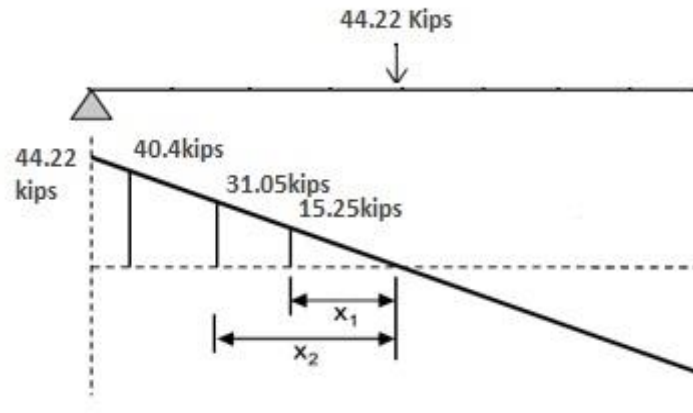
- Check for depth of beam:
 $\phi V_s \leq \phi 8 \sqrt{F_c} b w (d)$
 $\phi 8 \sqrt{F_c} b w (d) = 0.75(8)(\sqrt{3000})(18)(21) = 124.22 \text{ k}$
 $\phi V_s = V_u - \phi V_c = 40.41 - 31.05 = 9.36 \text{ k}$

Therefore, depth is OK.

- Check if " $\phi V_s \leq \phi 4(\sqrt{F_c})(b w)(d)$ "
 $9.36 \leq (0.76)(4)(\sqrt{3000})(18)(21) = 9.36 \leq 62.1$
 The maximum spacing (S_{max}) is OK.

Drafting Shear Reinforcement:





Electrical Engineering

DESIGN AND OPTIMIZATION OF DUAL ROTOR WEDGE SHAPE PERMANENT MAGNET FLUX SWITCHING MACHINE

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Abstract

Permanent magnet flux-switching machine (PMFSMs) is comparatively new category of electrical machines having both windings and magnet positioned in stator, and is a combination of the switched reluctance machine (SRM) and the induction machine. In recent two decades machines with high torque densities are imperative for various applications, including aerospace and automotive industries. Moreover, a high electric loading is mostly applied to maximize the torque density. The maximum electric loading of conventional permanent magnet (PM) brushless machines with PM's on the rotor may be limited by the particular temperature increase of the magnets and they need to prevent by partial irreversible demagnetization. The permanent magnet material having strong magnetic properties like magnetic flux linkage and electromagnetic torque prevail now are based on neodymium iron boron (NdFeB) which is a complex metallic alloy having distinguished magnetic energy of $(BH \max) 512 \text{ kJ/m}^3$, but material suffered to cope at elevated temperature above (300°C) , and the addition of Dysprosium (Dy) - a high critical and costly element is required to maintain stability at high temperature applications. The proposed dual rotor wedge shape PM flux switching machine provides an alternate to presently existing dual rotor rectangular shape PM FSM used in electric and hybrid electric vehicles. The proposed topology retrieves the cost factor for magnet material by substitution of NdFeB material with samarium cobalt (SmCo) permanent magnet material without degrading performance along with improved flux linkage. The results are validated using J-MAG(V.14) designer comprising magnetic flux linkages, average and instantaneous torques, cogging torque and average torque versus various magnet materials.

Keywords: PMFSMs, NdFeB, SmCo, wedge shape magnet, 2D-FEA.

1. Introduction

Electric vehicle (EV) proposed as ideal solution for energy crisis as they have no emission and zero oil consumption on the other hand hybrid electric vehicle (HEV) presented as environment friendly car and considered to be highly rated in future, both EV and HEV need PMFSM for their employment. Even if their exist various PM rotor topologies for elevated torque but still there will be more to be analyzed [1-4]. These machines depend on varied parameters like cogging torque, unbalanced magnetic force, and demagnetization. For wide range speed applications PM generally suffer from constant power operating region and flux weakening capability for this reason variable flux PM machines are reported as existing solution [5- 7]. Further another decisive class of PMFSM is dual rotor type permanent magnet machine. The compact winding in dual rotor permanent magnet flux switching machine (DRPMFSM) allows the machine efficiency and performance to be improved to great extent. The three phase operating principle will be applied to investigate performance of such machines. PMFSM has been under consideration for researchers due to their high average torque characteristic.

Right now PMFSM implemented neodymium iron boron material (NdFeB) as permanent magnet material, the material though have exquisite energy density but confined by cost factor. Likewise

latest machine having yokeless stator has flux leakage issue [8-11]. The proposed research assures the machine cost to be minimum along with flux leakage issue for yokeless topology. The designs are carried out in JMAG Designer version (14.1), a simulation software using 2D-FEA method for examining of complex electromechanically design. The software supports evaluation of complex physical phenomena occurring inside a machine. Material setting for each part of machine like rotor, stator, armature coils and permanent magnet, circuit design, condition setting and mesh are formed in geometry editor and designer windows respectively. For implementation of load and no load studies magnetic transient analysis should be applied. Figure.1 presents block diagram of design implementation using J-MAG designer.

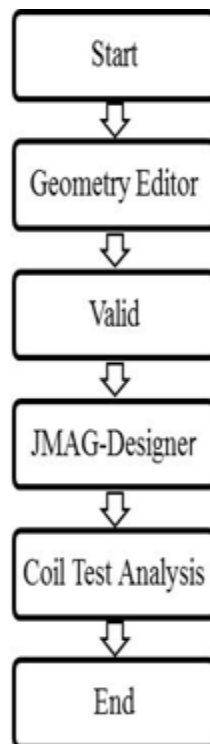


Figure.1 Flow chart of Research Implementation

Figure.1 explains the procedure of complete design procedure. Design part is divided into two portion (i) Geometry editor and (ii) JMAG- Designer. Further figure properly explains the implementation of design through each individual block. First of all design is sketched in geometry editor, the design of rotor, stator, armature coils and PM are sketched in geometry editor. The setting of circuit and coils (number of turns) are set and condition of mesh is assigned, all the parameters will be validated and executed using J-MAG designer application and results can be visualized at the end. J-MAG Geometry editor is a tool used to sketch the machines part individually in project file. Each part of machine is drawn on single layer assembly editor. The design consists of stator, rotor, and armature coils. Hence machine must have three layers assembly editor on the project file that respectively correspond to individual machine part. While sketching of each part no overlapping between each part of machine and no error will be ensured. Figure.2 explains a region pattern of machine sketched in geometry editor. For instance, a complete design of machine is illustrated. The figure explain the complete geometry of PMFSM, the geometry consists of two rotors inner and outer with yokeless stator having permanent magnet and armature coils mounted inside it.

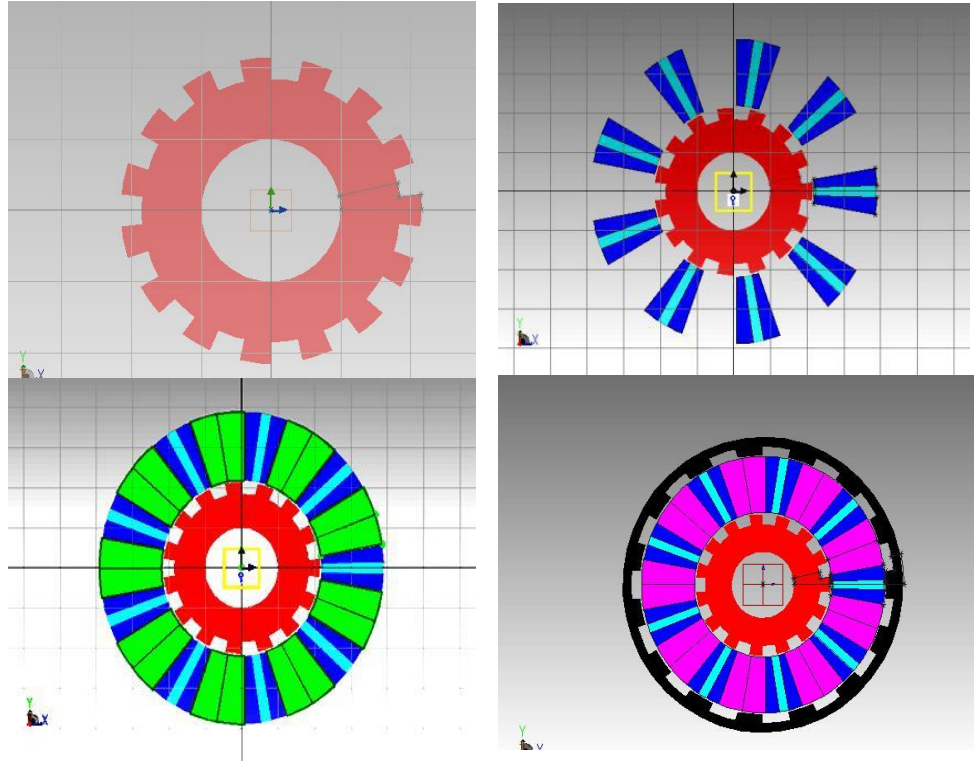


Figure.2 (a) Rotor (b) PM and Stator (c) Armature coil (d) complete PMFSM design sketch in geometry editor

Figure.2 (a), (b), (c) and (d) explain sketching of rotor, stator, armature coils, and complete PMFSM design separately in geometry editor. The dimensions for rotor, stator and armature coils for specific design were selected and sketched as shown in figures. Machine of any type and design can be sketched easily and each single design will be verified by making mesh of it. After completing design the machine will be further import for studying transient analysis in designer file. The designer has easy and simple features for analyzing and observing 2D and 3D transient studies. The designer has an option of multiple studies on single design and multiple results can be analyzed for each study, this feature makes the comparison easy and also saves the time. The designer has multiple options in result part for observing flux linkage, losses (iron, hysteresis), torques (cogging, instantaneous), magnetization force, flux pattern.

2. Design Analysis

Figure.3 exhibits 9S/15P double rotor yokeless PMFSM. Machine has demerit of flux leakage issue having limited applications in electrical drives and wind energy. The tradeoff always comes between cost and machine performance, though machine mechanical structure reduces cost by eliminating yoke but performance degrades in terms of flux leakage and torque speed characteristics, the key to this delinquent is presented proposed in topology.

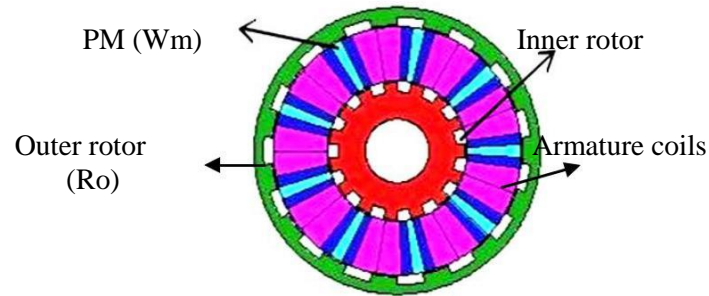


Figure.3 Dual Rotor Yokeless PMFSM (conventional design)

Figure.4 depicts the proposed 9S/15P double rotor wedge shape PMFSM for hybrid and electric vehicle application. Individually inner and outer rotors consist of 15 poles with 9 stator slots. This machine topology excludes the problem of flux leakage raised up for yokeless PMFSM. The flux linkage of anticipated machine is improved with admirable torque speed characteristics and topology is suitable for high temperature applications due to addition of samarium material. The topology also contributes to issue of high speed and high temperature applications.

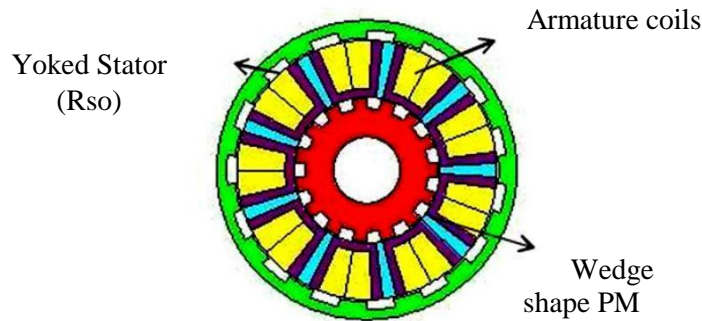


Figure.4 Dual Rotor Wedge Shape PMFSM
(Proposed Topology)

Table .1 exhibits main design parameters for conventional and proposed topologies. Table depicts that for fair comparison all parameters must kept same except PM shapes and PM materials. The proposed machine has wedge shape permanent magnet composed of samarium cobalt material while conventional yokeless PMFSM have rectangular shape magnet with material composed of Neo-Max 35AH.

Table .1 Main Design Parameters of Two Machines.

Machine type	Conventional	Proposed
No. of phases	3	3
Stator slots	9	9
Rotor Poles	15	15
Permanent Magnet	Neo-Max	Neo-Max 35AH
Material	35AH	
Rated Speed(r/min)	120	120
PM shape	Rectangular	Wedge

Table.2 depicts the design specifications for conventional and proposed machines. It contain machine various parameters and their measurement along with symbolic representation of each parameter. The outer radius (Ro) is same 45mm for both topologies, Rso is stator outer radius, Rsi is stator inner radius, Wm is PM width which is 6mm for both machines while L is stack length of both the machines and is 25mm.

Table .2 Design Specifications of Proposed and Conventional FSPMMs.

Parameters	Symbol	Proposed	Conventional
Outer Radius	Ro	45 mm	45 mm
Stator Outer	Rso	39 mm	39 mm
Stator Inner	Rsi	22 mm	22 mm
PM width	Wm	6 deg	6 deg
Air gap	G	0.5 mm	0.5 mm

3. Performance Analysis

The following performance parameters of machine will be discussed in this section.

- Cogging torque for unoptimized and conventional designs
- Instantaneous torque for unoptimized and conventional designs
- Average torque for unoptimized and conventional designs
- Magnetic flux linkage
- Optimized average torque
- Different magnet materials versus average torque

a) Cogging Torque

The cogging torque characteristics of both topologies are discussed in this section; it is an unwanted torque at no load condition that causes noise and vibration in machine. The cogging torque of proposed topology is still better for uoptimized design as seen in fig.5 (a) and (b). The peak cogging torque for conventional and proposed topology are 0.7 Nm and 0.4 Nm respectively, that clearly shows that cogging torque for proposed topology is better. The cogging torque of machine is unwanted torque because it causes vibrations and noise in the machine and that degrades machine efficiency. Various techniques investigated to minimize machines cogging torque that includes skewing, notching, varying rotor pole width. From figure it can be observed that cogging torque for proposed topology is better even for unoptimized model it will be improved by optimization to achieved ideal machine.

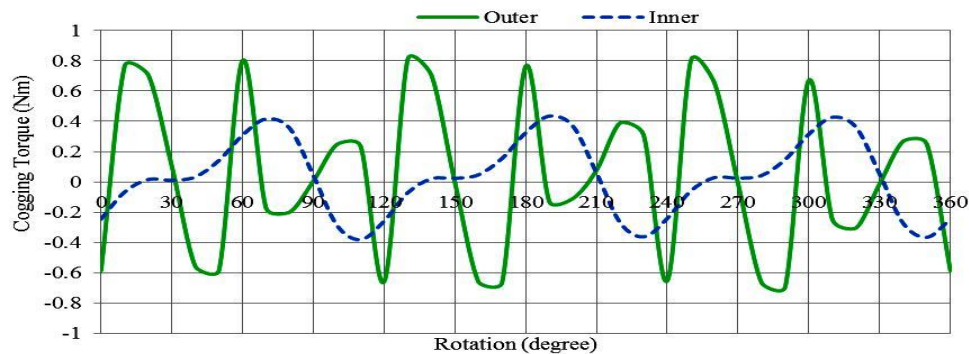


Figure.5 (a) Cogging torque for unoptimized conventional design.

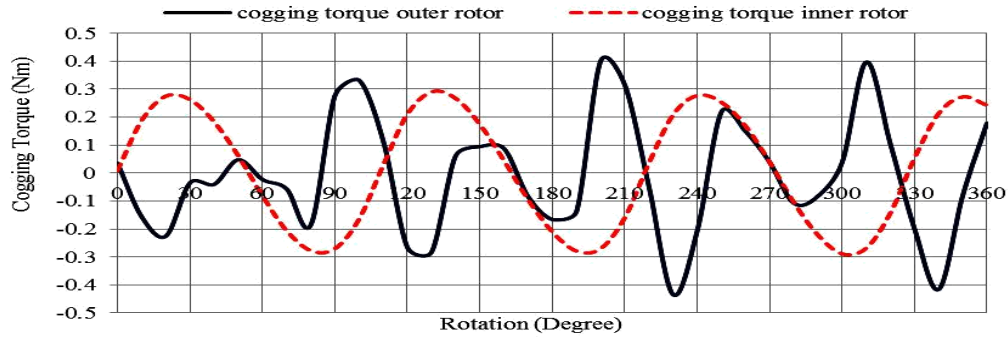


Figure.5 (b) Cogging torque for unoptimized proposed topology.

b) Instantaneous Torque

Figure.6 (a) and (b) presents instantaneous torque characteristics of both conventional and unoptimized proposed topology. The instantaneous torque of conventional design is approximately 4 Nm for outer rotor and 1.5 Nm for inner rotor while for proposed it was 6 Nm and 0.7 Nm approximately. As seen from figure the proposed instantaneous torque for outer rotor has ripples also inner rotor torque for proposed one is minimum compared to conventional, these issues has answered in optimization. Instantaneous torque is the torque of machine at particular instant, for given graphs the armature current of 30 A will be chosen to describe instantaneous torques. The instantaneous torque of inner rotor for proposed design is minimum; this torque will be maximized in optimization.

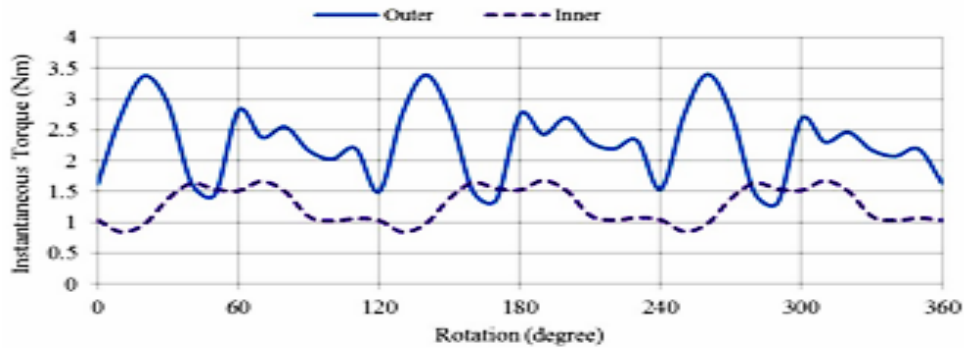


Figure.6 (a) Instantaneous torque for conventional design.

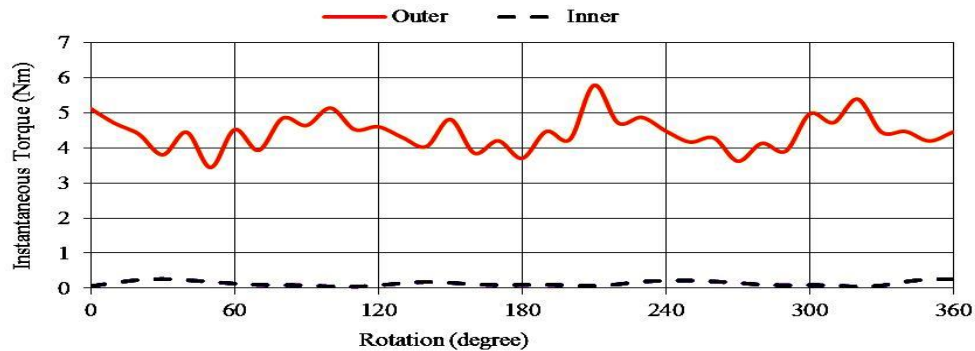


Figure.6 (b) Instantaneous Torque for proposed topology.

c) Average Torque

The average torques for proposed and conventional topologies are discussed in fig7 (a) and (b). The figure depicts that for various armature current values the torque for conventional design is better compared to un optimized design. The average torque for proposed design will be improved in optimization which will be discussed in proceedings sections. The maximum value of average torque for 30 Ampere current for conventional topology is 4.75 Nm while for proposed is 3.77 Nm.

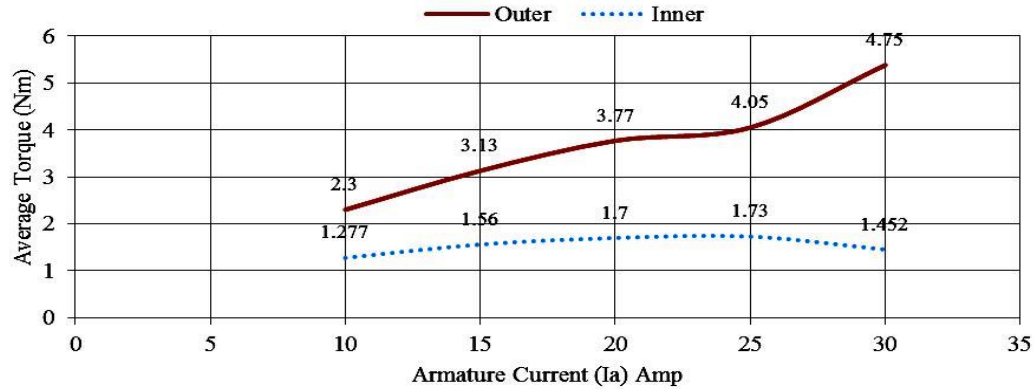


Figure.7 (a) Average torque for conventional design.

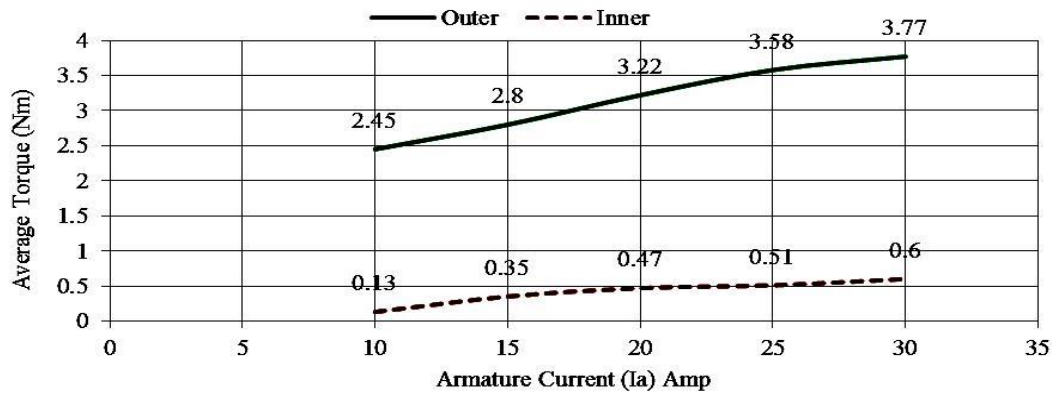


Figure.7 (b) Average torque for proposed topology.

d) Magnetic Flux Linkage

Figure.8 presents magnetic flux linkages of conventional design. As seen from figure the flux linkage of conventional design is 0.04 Wb . The flux linkage will be improved after optimization. The small ripple in flux linkage shows the leakage of flux. It shows that flux did not link properly. The remedy to problem will be answered in optimization of design.

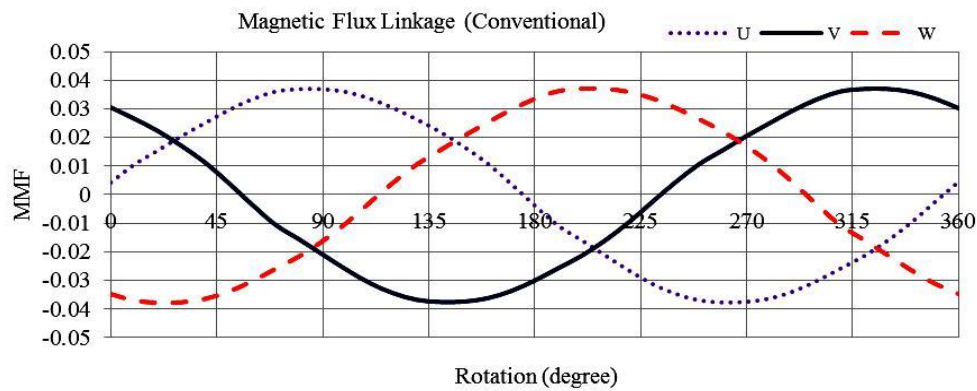


Figure.8 magnetic flux linkage for conventional design.

E. Optimized Average Torques

Figure.9 (a) and (b) presents the average torque for optimized proposed topology and conventional design. The average torque is for different values of armature currents starting from 10 up to 30 A with an interval of 5. Figure depicts that optimized torque for 30 A current of proposed topology is 5.1 Nm maximum and is greater from conventional design. The increased in torque of proposed design is approximately 6.8%.

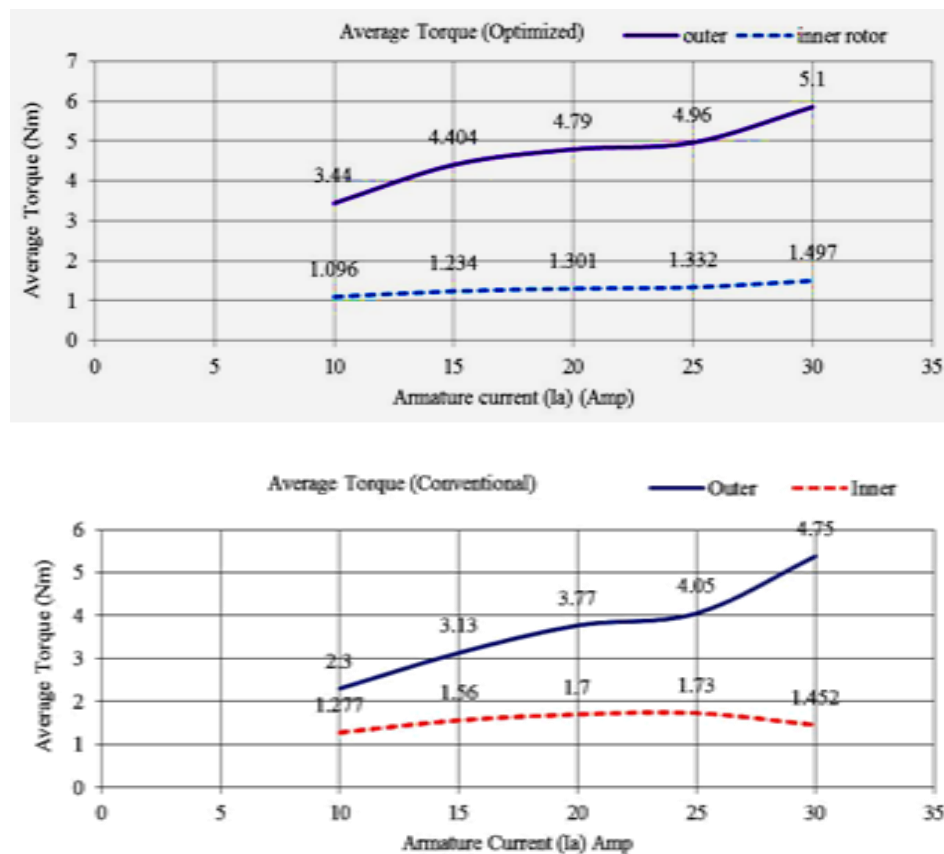


Figure.9 (a), (b) Optimized average torque for conventional and optimized design.

F. Magnet Material versus Torque

Figure.10 explains the effect on the torque by varying magnet materials. It can be cleared from figure that by inserting samarium cobalt material as magnet material the inner and outer rotor torque will be 1.1 and 4.8 Nm. Likewise, when ferrite material is inserted the torque will be decreased as energy density of ferrite material is very low. The value of torque is greater for neodymium iron boron material for both inner and outer rotor. The figure presents that when various magnet materials will be assigned to magnet in PMFSM the average torque of machine varies in special manner. These materials assignment are being carried out for proposed topology, the graph depicts that when samarium cobalt material will be signed to machine the average torque for inner and outer rotor will be 1.1 and 4.8 Nm respectively. Similarly, when neodymium iron boron and ferrite materials will be assigned the torque for inner rotors will be 1.23 and 0.15 Nm respectively and 4.9 and 1.23 Nm for outer rotor respectively. From above discussion the observation can be made that average torque of machine is dependent not only on machine topology, specification and design but also dependent on magnet materials, as from results it can be verified that NdFeB material has maximum flux linkage so its average torque will be more and competitive to SmCo material, while energy density for ferrite material is relatively low and its average torque value will be minimum. As the cost of NdFeB material is high compared to SmCo because of coating of heavy rare earth material dysprosium and SmCo can be used as alternate to it in various applications. The assignment of SmCo material to PM not only reduces the overall machine cost but also improved the stability of PMFSM performance at higher temperature up to 400 degree centigrade. Figure.11 explains the effect on the torque by varying magnet materials. It can be cleared from figure that by inserting samarium cobalt material as magnet material the inner and outer rotor torque will be 1.1 and 4.8 Nm. Likewise if ferrite material is inserted the torque will be decreased as energy density of ferrite material is very low. The value of torque is greater for neodymium iron boron material for both inner and outer rotor.

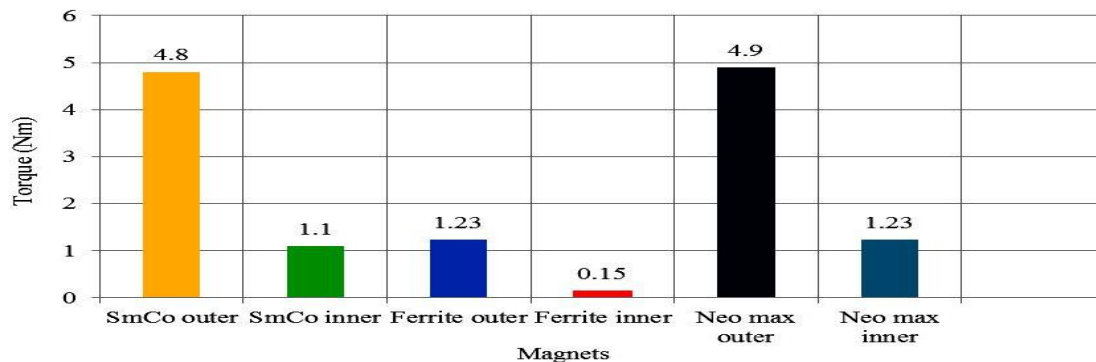


Figure.10 Magnet material versus Torque characteristics

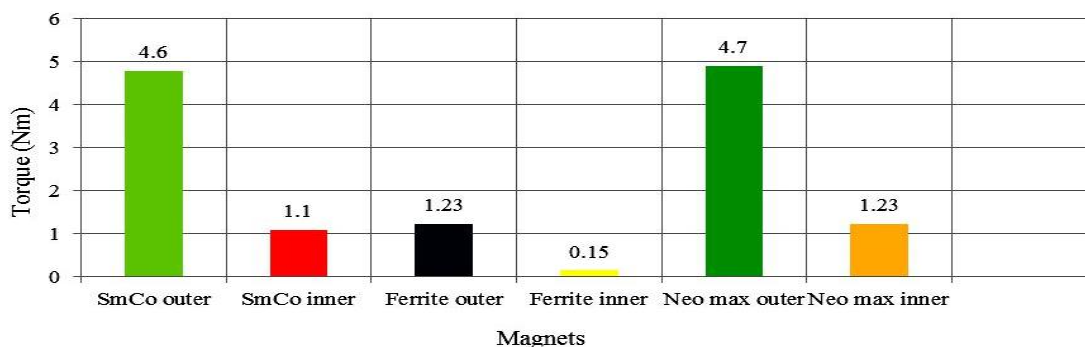


Figure.11 Magnet material versus Torque characteristics (Conventional design).

The figure presents that when various magnet materials will be assigned to magnet in PMFSM the average torque of machine varies. These materials assignment are being carried out for conventional topology, the graph depicts that when samarium cobalt material will be signed to machine the average torque for inner and outer rotor will be 1.2 and 4.6 Nm respectively. Similarly, when neodymium iron boron and ferrite materials will be assigned the torque for inner rotors will be 1.23 and 0.15 Nm respectively and 4.7 and 1.23 Nm for outer rotor respectively. From above discussion the observation can be made that average torque of machine is dependent not only on machine topology, specification and design but also dependent on magnet materials, as from results it can be verified that NdFeB material has maximum flux linkage so its average torque will be more and competitive to SmCo material, while energy density for ferrite material is relatively low so its average torque value will be minimum.

4. Conclusion

This paper presents the novel research on PMFSM and proposed dual rotor wedge shape PM FSM as an alternate to conventional existing costly PMFSM that uses neodymium iron boron material as a permanent magnet material for electric and hybrid electric drives applications, the machine cost can be minimized by replacing magnet material without degrading machine efficiency along with improved flux linkage issue for yokeless stator topology. The proposed machine has merit of usage at high temperature applications because of addition of samarium cobalt material which has high temperature coefficient. The work will be extended by decreasing magnet volume without compromising performance; in that manner machine overall cost can be reduced. Further research will investigate an alternate to costly rare earth materials. The thermal analysis will also be the part of future studies as machine performance degrades and demagnetization occurs at high temperature. Torque ripples reduction had also been a necessary study as it causes noise and vibrations in machine and effects machine efficiency. Various more machine topologies will be investigated to replace yokeless stator topology for EV and HEV applications, as these machines suffered with flux leakage problem.

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FEASIBILITY AND ANALYSIS FOR DEPLOYMENT OF DC MICRO GRID IN SMALL SCALE POWER SYSTEM

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Abstract

Electricity is an essential commodity for the development of any country. Direct Current (DC) micro grid is one of the promising techniques and plays a vital role in distribution power generation. In this work, we explore a DC small scale network for control conveyance while considering City University of Science and Information Technology (CUSIT), Peshawar as a contextual investigation. Alternating Current (AC) conveyance is viewed as a simple route when contrasted with DC appropriation for long separations. Today greatest burdens at the conveyance side are utilizing DC control; in this way DC dispersion is being considered as other option to AC appropriation. DC small scale lattice at the conveyance side has additionally extraordinary focal points of utilizing sustainable power sources straightforwardly, for example, photovoltaic. The proposed DC small scale network is researched as a contextual investigation by contrasting and the current 220V AC framework with the DC dispersion framework for CUSIT, Peshawar. In this work, we analyze AC and DC circulation framework regarding effectiveness and cost investigation. The outcomes demonstrate that DC small scale lattice is more effective in term of cost when contrasted with the AC miniaturized scale matrix.

Keywords: Photovoltaic, Cost Estimation, CUSIT (site for proposed case study), DC micro grid

1. Introduction

The present conventional power framework faces a considerable measure of difficulties to take care of the consistently expanding demand of electric power at the buyer side. There are sure territories which are far from the network and the dispatch of capacity to such zones are excessively troublesome and expensive. A few age plants have been introduced by the power

service organizations to adapt to the shopper request. Additionally, there is likewise a need of furnishing a decent nature of intensity with high unwavering quality to the purchaser. Keeping in mind the end goal to convey solid power, the reliance of the buyer on primary matrix framework should be lessened. In present day period, DC small scale framework is recommended as accessible substitute. Because of the progression in advancements, the small-scale matrix has picked up a considerable measure of significance.

Small scale lattice fundamentally uses the sustainable power source assets alongside the vitality stockpiling gadgets. A programmed framework is utilized to screen the power request of the shopper [1]. Cluster of sun powered board associated in arrangement is utilized to create control at 230V DC. DC miniaturized scale lattice might be associated with brought together or decentralized capacity. It is the least difficult, simple, financially savvy, effective and adaptable answer for give great nature of off-framework control.

A smaller scale lattice has appeared in Figure 1, comprises of a Distributed Generator (DG, for example, sun powered exhibit, wind turbine and diesel generator, vitality stockpiling gadgets, control electronic parts and control framework that oversee control supply from the power source [2]. The fundamental piece of the power age in miniaturized scale matrix is the conveyed generators. Dispersed generators in small scale framework might be either sustainable power sources like sunlight based, wind and so forth or Distributed Energy Resources (DER) like diesel generator and so forth. Vitality stockpiling gadgets are the essential part in the miniaturized scale framework. For the most part batteries are utilized as vitality stockpiling gadgets. Its capacity is to store the electric charge from the sun powered board, keeping in mind the end goal to convey it to the heaps. Power inverters in smaller scale matrix are utilized to change over DC capacity to AC control which is required by AC machines.

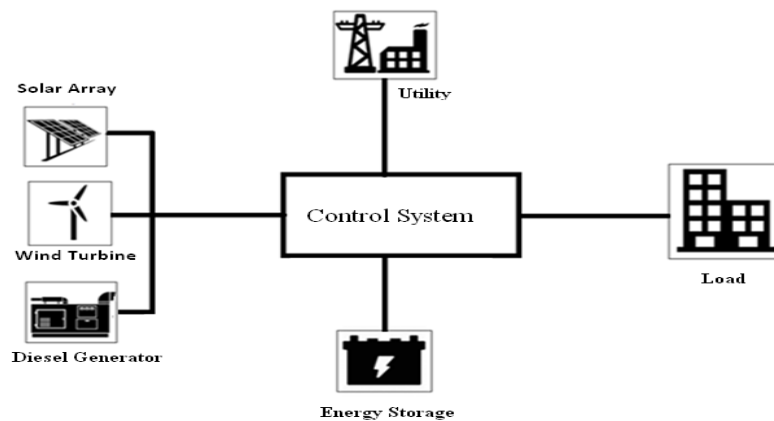


Fig.1: DC Micro Grid

The usage of the sustainable power sources in miniaturized scale framework was finished. In [5], creators thought about DC miniaturized scale matrix in two situations. To start with, the AC control is changed over into DC, for assist use and in second case the DC control produced by sustainable power source and straightforwardly feed to the DC associated with the lattice. Creators found that the second situation has higher proficiency when contrasted with the principal case. The creators recommended depending on the sustainable power sources when contrasted with the AC primary lattice.

In [6], creators built up a recreation model of the smaller scale matrix. In their model, they exhibited distinctive miniaturized scale vitality assets alongside the battery vitality stockpiling

framework and burdens. So also, the created model can be worked in network associated mode and in addition in islanded mode.

DC miniaturized scale matrix can incorporate diverse sorts of sustainable power sources, for example, photovoltaic (PV), wind vitality and so on, and appropriated vitality stockpiling. The creators examined the capacity of DC smaller scale matrix for a family's stack. In [7], different load like lights; fans and ventilation system are furnished with DC supply and remain AC with an AC/DC converter interface between loads. The appraisal between a shrewd DC small scale lattices associated family with customary AC loads with keen advancements. It has been found in [7] that the cost of the keen DC stack encouraging from PV with battery have lesser utility cost in every one of the situations.

In [8], creators investigated the solidness of independent small-scale matrix applying nonspecific Markov Jump Linear System (MJLS). The framework was considered to swing between discrete, limited working modes, and was spoken to as stochastic crossover framework. The usage of AC controls by the buyers are the priority of the structure and association of the present power foundation. After the coming of semi-conductor gadgets and the change in outlook in the sustainable power source ages, had redirected the consideration toward DC control. Be that as it may, usage this DC control for AC loads had brings about inefficacies and power misfortunes.

In [9], creators recommended new structures for practical power age and appropriation. Distinctive DC smaller scale network were evaluated and examined with strong unwavering quality, enhanced productivity and have coordinate incorporation of the sustainable power source. In [10], creators proposed a stochastic method to inexact the family unit stack profiles utilizing Passion process and line hypothesis, for a little network based small scale lattice. The proficiency of the smaller scale matrix relied on the topology of the framework and in addition the heap profiles. The effectiveness of the AC and DC coupled were computed utilizing Queue hypothesis. The proficiency of AC coupled framework additionally diminished and DC coupled expanded by including PV boards. DC coupled framework can likewise be a powerful answer for the small-scale lattice outline.

DC stack are developing in our day by day utilizes fastly, because of the use of the sustainable power source age, for example, PV boards, energy units and so on. The combination of these sustainable power source ages is simple with Low Voltage DC (LVDC) transport as contrasted and the LVAC transport. The proficiency of LVDC conveyance is higher than the LVAC in light of the fact that in LVDC just DC/DC converters are utilized while in LVAC, AC/DC and DC/DC converters for consistent load were utilized. In [11], creators thought about the misfortunes of LVAC and LVDC appropriation regarding the quantity of the converters. The reproduction comes about demonstrated that LVDC conveyance framework is powerful when contrasted with the LVAC dissemination framework.

In [12], creators tended to the miniaturized scale matrix in viewpoints of the sustainable power source advances. Sustainable power source advancements included DER and sustainable power sources. Creators talked about the dependability and monetary issues pertinent to the miniaturized scale matrix. A recreation demonstrates with a target capacity and requirement identified with the task of smaller scale network were figured a scientific model. For dependability situation-based approach was utilized, keeping in mind the end goal to decide diverse unwavering quality lists. The unwavering quality records were vastly improved in the event of the incorporation of DER than without DERs because of its capacity of completing burden in island mode when the fundamental network comes up short.

Smaller scale framework fundamentally a blend of burdens, age sources and vitality stockpiling interfaced through quick power gadgets for little scale control framework. In [13], creators talked about the complexities that could be looked by existing Saudi Arabian appropriation framework. A DC transport licenses to coordinate sustainable power sources when contrasted with the AC transport since DC transport required just voltage as parameter while if there should arise an occurrence of AC transport. The unwavering quality of DC transport is significantly more than

AC transport when AC sources or irregular small-scale sources are associated. The cost of DC miniaturized scale framework is considerably more than AC small scale lattice yet when the complexities, control quality and efficiencies are changed over into taken a toll, DC smaller scale matrix are superior to AC smaller scale network.

In this paper, we compare the DC micro grid with AC micro grid in term of power and cost analysis. The proposed work has been investigated while considering a case study. The detail of the proposed site for the case study is given in Section II below.

2. Case Study

In this study we assume different blocks in the proposed site, which are shown in Figure 2.

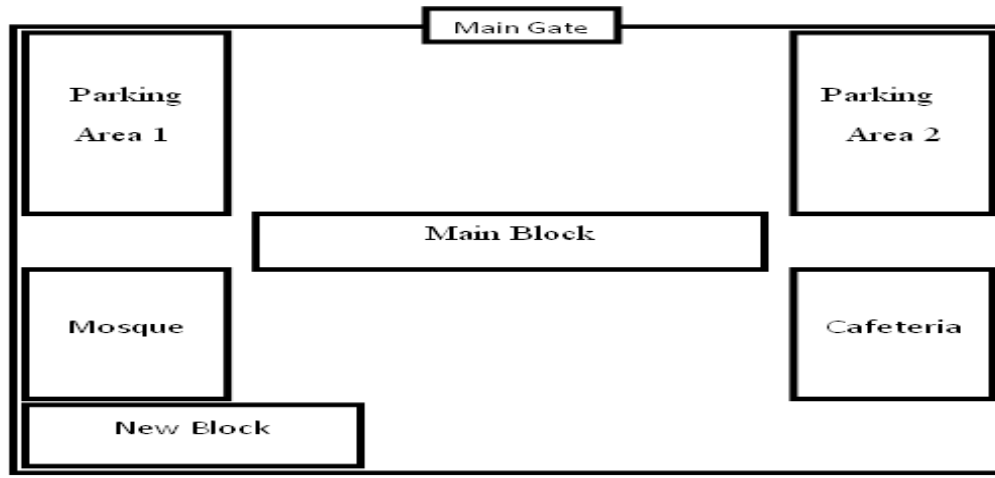


Fig. 2: Layout of CUSIT: A Proposed Site for the Case Study

New Block consists of five stories while Main Block is six story building. Cafeteria, Mosque and Parking areas are considered as Ground and Parking Area in the cost analysis.

In the aforementioned study authors do not consider the pure DC micro grid employment however in this work we only deal with pure DC load of the mentioned case study.

The rest of the paper is organized as follows. In Section II, we discuss the proposed case study. In Section III, load and cost analysis are carried out and Section IV concludes the paper.

3. Load and cost analysis

3.1. Load Analysis of DC Micro Grid

In this section, we calculate the load of the DC micro grid of the proposed site. First step is to calculate the overall load of CUSIT, Peshawar, Pakistan. The details of each section load are given in Table 1.

Table.1: Total Associated Loads of Each Site

Location	Power Demand (W)
New block	25220
Main block	362271
Ground and Parking Area	21965
Total Power	409456

The load distribution in Table 1 is depicted in Figure 3 as follows.

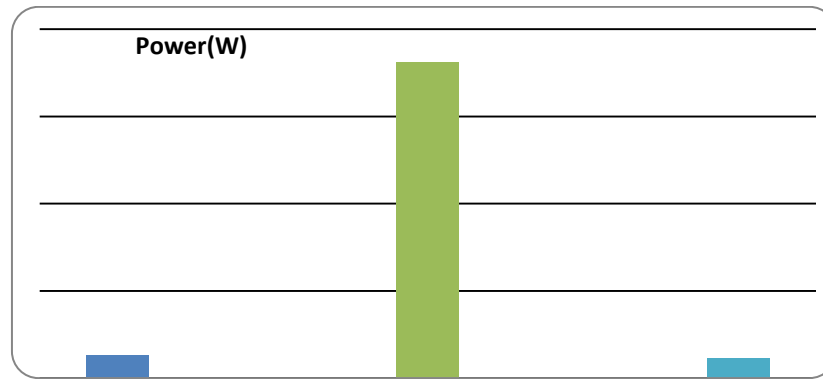


Fig. 3: Power Distribution of Different Sites in the Proposed Study

This result shows that for the proposed site DC micro grid is an efficient scheme in term of cost.

3.2. Cost Analyses of DC Micro Grid

Cost analyses of each component of DC micro grid for CUSIT are shown in table.2.

Table.2: Cost of Components for DC Micro Grid

Component	No. of Components	Cost per Components (\$)	Total Cost of Components (\$)
Solar panel	220	57.5	12584.88
Batteries	32	52.66	1685.25
Converter 12/1.2	24	8.5	203.97
Converter 12/5	1	0.94	0.94
Converter 12/19	8	20.78	166.2
Converter 12/35	17	5.9	100.33
Total cost			14741.58

3.3. Cost Analyses of AC Micro Grid

Table.3: Cost of Components for AC Micro Grid

Component	No. of Components	Cost per Components (\$)	Total Cost of Components (\$)
Solar Panel	1259	63.14	79493.26
Batteries	361	347.27	125364.4
Inverter	63	360.8	22730.4
Controller	122	180.4	230.4
Total cost			115018.46

Table.4: Load Distribution for AC and DC Micro Grid with Estimated Cost

Components	No. of Component	Cost of per Component (\$)	Cost of all Components (\$)
Light	1343	3.62	4865.58
Fan ceiling	356	40.41	14384.54
Fan wall	25	14.16	354.12
LED Monitor	341	47.22	16100.66
Total cost			35704.89

3.4. Total Cost of DC Micro Grid

The cost of converter and component are \$14741.58 and \$35704.89, respectively. Cost of DC micro grid for proposed site at CUSIT and the estimated cost of AC micro grid is shown in Table 3.

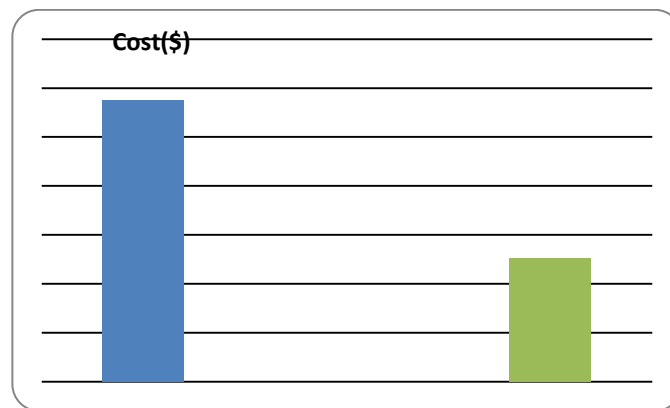


Fig. 4: Cost Comparison of AC and DC Micro Grid of the Proposed Site

Figure 4 depicts that overall cost of DC micro grid is lower, i.e. \$50446.47 as compared to the AC micro grid which is \$115018.46.

4. Conclusion

Small scale lattice is considered as an expansion of primary framework on location age fit for satisfying its nearby request. Smaller scale matrix expands the unwavering quality, enhances control quality, stays away from the utilization of exhausting petroleum products, enhances the specialized execution and decreases the green houses gases discharges. In this paper miniaturized scale framework works self-sufficiently. Moreover, comes about demonstrates that DC framework is more dependable, high proficient and accessible whenever with low vitality utilization. It is likewise researched that the arrangement of PV in the proposed conspire expands the sustainable power source infiltration and lessens the impact of ozone depleting substances when contrasted with AC framework. Additionally, control misfortunes are less in DC when contrasted with AC framework.

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CNC BASED 3D AUTOMATIC PCB DRILLING MACHINE

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Abstract:

Automation has an important role in the economy of world and in daily practice. Main factor of automation is to eliminate the human factor from the process in order to reduce the error rate and also for the better time utilization which primarily increases quality and quantity of the manufacturing process. The idea behind this project is to fulfill the desire for a desktop sized CNC machine. While it would have been nice to purchase an off the shelf unit the issue of price as well as size proved prohibitive. With this in mind we endeavored to design and build a three axis CNC machine by using, simple tools, low cost, easy to source parts, Ability to cut plywood. In this project we use the parallel port to interface the machine with the computer. The PCB pattern of the circuit schematic diagram is drawn on the monitor screen, with the help of software such as Express PCB (software), from this software we extract the DXF file then this file is converted into Excellon file with the help of LinkCAD (software), this Excellon file is then import in the KCAM software and it will send it to the microcontroller and then controller will send the information to driven circuit through parallel port which further control the motors movement.

Keywords: Computerized Numerical Control, Printed Circuit Board

1. Introduction

Holes can be drilled by using CNC drilling machine with numerical control. Many other special types of equipment are widely used in hole processing techniques for the PCB. Main factor is to increase the precision of machine and performance to work on PCB that chooses a distinctive CNC drilling machine. While, the most complex part in designing CNC drilling machine is the motor system which require sufficient time to design and sort out errors. So, it not only consumes resources but also result in the delay in the production. One of the idea is discussed in this paper to overcome this problem.[1] Block diagram of process is shown in fig.1.

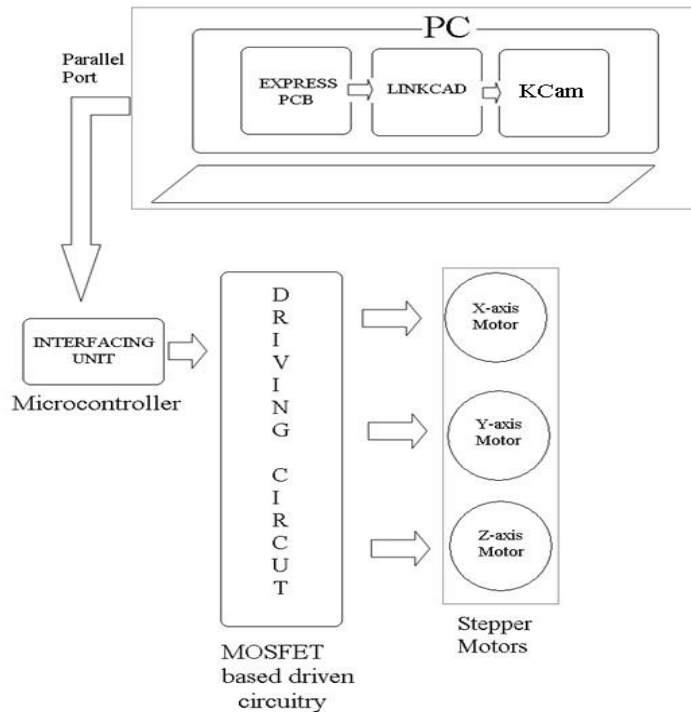


Fig. 1: Frame work of CNC Drilling Machine

2. Machine Design:

In this approach we have designed a machine with 3 movements coordinates, X, Y & Z. where X and Y coordinates consists of the holes position, and Z coordinate will control the movement of drill machine which changes from top to down. Firstly the drill machine is moved horizontally to X & Y coordinates and after reached to desire position moved down in Z direction to make the hole then came back to its starting point. The whole procedure of drilling machine movement is controlled by the software with the help of G-code file. The prototype is shown in fig. 2.

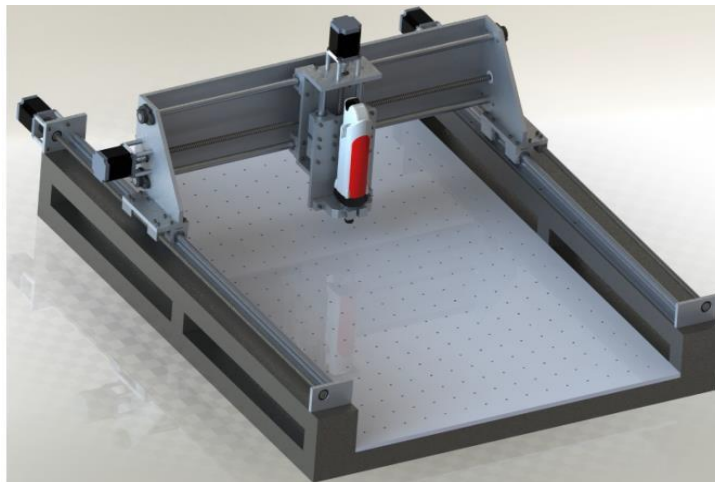


Fig. 2: CNC Drilling Machine Design

3. Implementation:

The implementation of desired machine is shown in fig. 3. There are four major parts needed for building this machine is classified as follows:



Fig. 3: CNC Drilling Machine Prototype

3.1 Software Part:

Software is used to control the CNC through computer via any mode of communication like serial or parallel. The software we are using is KCAM. This software is easily available over internet, and can easily be downloaded. Programming of KCAM in the form of G-Code, programming of 8051 microcontroller in assembly or in C language. The conversion of code is shown in fig. 4.

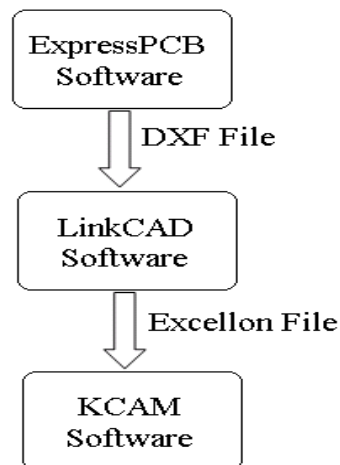


Fig. 4: Process flow diagram of software

3.2 INTERFACING PART

The interfacing circuitry receives the coordinates from the KCAM software through the parallel port connector, the reason for using the parallel port is that we have to send the data of 3 axes from the computer simultaneously. The interfacing circuitry will interpret the coordinates into the actual coordinates in the form of X, Y and Z coordinates and sends it to the driving circuitry.

3.3 CIRCUITRY PART

The circuitry part includes power MOSFETs based and L298 driver circuit which will drive the stepper motors, this circuit receives the signals from the interfacing circuitry in the form of X, Y and Z coordinates and converts it into the appropriate driving signals to operate the motor.

3.4 MOTOR PART

This part includes two types of motors i.e. Stepper motor and DC drill motor. A stepper motor is a brushless, electric motor that can divide a full rotation into a large number of steps. The motor's position can be controlled precisely without any feedback mechanism, as long as the motor is carefully sized to the application.

Stepper motors receives the signals from the diving circuitry and moves the axes of the machine according to it and drill the PCB holes, was made in the Express PCB software.

Some important specifications of motors are as follows:

Table 1: Drill Motor Rating

Drill Motor	
Voltage	12V DC
Ampere	0.7A
Speed (R.P.M)	1400
Drill bit	1.25 mm

Table 2: X Axis Stepper Motor Rating

X-axis Motor	
DC Voltage	5.1v
Ampere	1.42 A
Total Number of Degree/revolution	200 D/R
Single Step	1.8 o

Table 3: Y & Z Axis Stepper Motor Rating

Y & Z axis Motor	
DC Voltage	4V
Ampere	1.2 A
Total Number of Degree/revolution	200 D/R
Single Step	1.8 o

The main idea behind this paper is to get a result in the form of CNC PCB drilling machine with précised size and perform efficiently and effectively. Accuracy and precision are the main factor along with the cost as the cost effectiveness is prime cost. Project has a very sound structure (after completion). Interfacing between machine and computer can be done through parallel port. DXF file from ExpressPCB is extracted and through LinkCAD this file converted into Excellon file. By importing the file to KCAM software it is send to microcontroller and then controller send the information to driving circuit through parallel port which control the motors movement.[5]

4. Conclusion

The work undertaken is very supportive for the progress of industry. The project is implemented using simple tools and easy to source parts which make it very cost effective. Such industrial projects should be appreciated by the university. The university administration should focus on

such industrial projects as such projects create a linkage between the academia and industry.

5. Future Work

Based upon the work done in this project, some new possibilities for future work on drill machine have emerged.

- In future this project can also be implemented by using Matlab.
- For serial operation it can also implemented by using Arduino.
- For more accuracy FPGA can be implemented.
- Furthermore a feedback mechanism for the motors if missing the steps can be implemented and also for the play in the linear motion of the axis (i.e. motor rotates but no linear motion) can be introduce in order to make the project even more precise and accurate.

6. G-Code

G-Code is the common name for a control semantic for CNC machines. It is a way to tell the machine to move with a desired speed to various points and all sorts of other things. The sample of g-code of the machine is shown below:

```
N001 G01 Z00.2500
N002 G00 X00.2000
N002 G00 Y00.2000
N003 G01 Z00.0000
N004 G01 X00.2000 Y01.5000 Z00.0000
N005 G01 X01.5000 Y01.5000 Z00.0000
N006 G01 X01.5000 Y00.2000 Z00.0000
N007 G01 X00.2000 Y00.2000 Z00.0000
N008 G01 Z00.2500
N009 G00 X00.3500
N010 G00 Y01.2500
N011 G01 Z00.0000
N012 G01 X00.3500 Y01.3500 Z00.0000
N013 G01 X01.3500 Y01.3500 Z00.0000
N014 G01 X01.3500 Y01.2500 Z00.0000
N015 G01 X00.4500 Y00.4500 Z00.0000
N016 G01 X01.3500 Y00.4500 Z00.0000
N017 G01 X01.3500 Y00.3500 Z00.0000
N018 G01 X00.3500 Y00.3500 Z00.0000
N019 G01 X00.3500 Y00.4500 Z00.0000
N020 G01 X01.2500 Y01.2500 Z00.0000
N021 G01 X00.3500 Y01.2500 Z00.0000
N022 G01 Z00.2500
N023 G00 X00.0000
N024 G00 Y00.0000
N025 G01 Z00.0000
N026 M30
```

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PERFORMANCE ANALYSIS OF ADAPTIVE FILTER AND FIR WIENER FILTER FOR NOISE CANCELLATION IN AUDIO SIGNALS

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Abstract:

Speech has always been one of the most important carriers of information for people and has become a challenge to maintain its high quality. When the speech signal and noise both change continuously, then arises the need for algorithm that will form best estimation of noise signal. In Adaptive Noise Cancellation and Wiener Noise Cancellation two inputs - primary and reference signals are used. The primary input receives signal from the signal source which has been corrupted with a noise uncorrelated to the signal. The reference input receives noise signal uncorrelated with the signal but correlated in some way to the noise signal in primary input. The reference input is filtered to obtain a close estimate of primary input noise which is then subtracted from the corrupted signal at the primary input to produce an estimate of a clean uncorrupted signal. The audio signal corrupted with noise is used as a primary input and a noise signal is used as reference input. Computer simulations are carried out using MATLAB and illustrated.

Keywords: Adaptive Noise Cancellation, Wiener Noise cancellation, uncorrelated signal, correlated signal.

1. Introduction:

Wiener Noise cancellation is the estimation of a signal $d(n)$ from a noise corrupted observation that is recorded by a primary sensor.

$$X(n)=d(n)+v_1(n)$$

The autocorrelation of noise is obtained from a secondary sensor that is placed within the noise field as illustrated in fig.1. The noise measured by this secondary sensor, $v_2(n)$, will be correlated with noise in the primary sensor, the process will not be same [1] & [4]. It is not possible to estimate $d(n)$ by simply subtracting $v_2(n)$ from

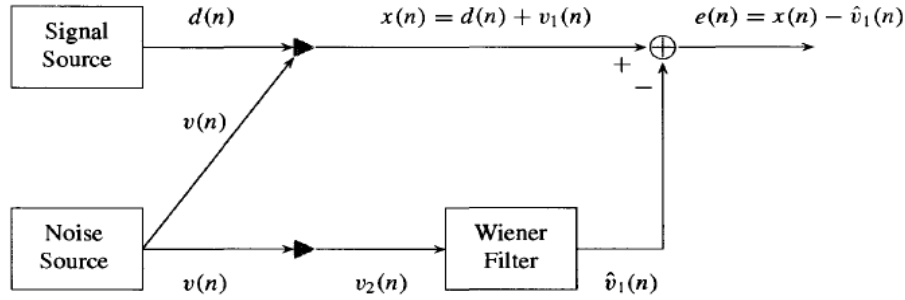


Figure 1: Wiener Noise cancellation

$x(n)$. Noise cancellor consists of wiener filter that is designed to estimate the noise $v_1(n)$ from signal received by secondary sensor. This estimated $v_1(n)$ is then subtracted from primary signal $x(n)$ to from $d(n)$.

$$\hat{d}(n) = x(n) - \hat{v}_1(n)$$

Fig.2 shows a block diagram in which a sample from a digital input signal $x(n)$ is fed into an adaptive filter, that computes a corresponding output signal sample $y(n)$ at time n . The output signal is compared to a second signal $d(n)$, called the desired response signal, by subtracting the two samples at time n . This differences signal, given by

$$e(n) = d(n) - y(n)$$

is known as the error signal [1]. The ANC system as shown in figure 2 is composed of two separate inputs, a primary input or noise source which is shown as $x(n)$ and a reference input that is the noisy input shown as $d(n)$ which is given by

$$d(n) = s(n) + x_1(n)$$

where $s(n)$ is the clean speech signal [4] & [7].

The primary noise signal $x(n)$ is highly correlated with noise present in reference signal $x_1(n)$. This estimated $v_1(n)$ is then subtracted from primary signal $x(n)$ to from $d(n)$ [6] & [5].

$$\hat{s}(n) = d(n) - \hat{x}_1(n)$$

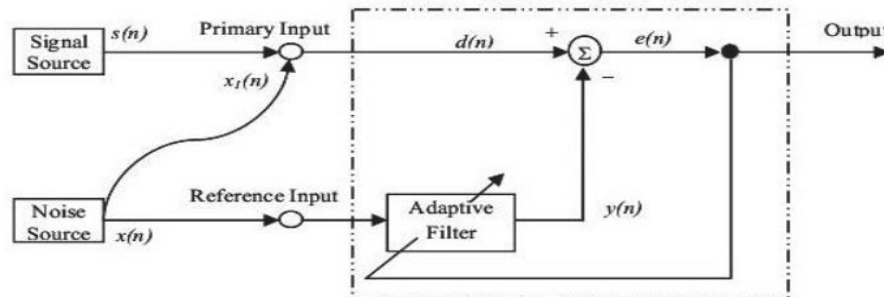


Figure 2: Adaptive Noise Cancellation

1.1 Adaptive Algorithms

This algorithm is very useful in applications where the environment is slowly varying [1]. The RLS algorithm has a high convergence speed which is independent of the Eigen value spread of the input correlation matrix. The price of all these benefits is a considerable increase in the computational complexity of the algorithm. The RLS algorithm is implemented as follows assuming c is a small constant, I is an identity matrix [6].

1.1.1 Initialization:

$$P(0) = R^{-1}(0) = c^{-1} \cdot I$$

$$w(0) = 0 \text{ (All initial tap weights set as 0)}$$

1.1.2 Gain vector update:

$$K(n) = \frac{P(n-1) \hat{x}^*(n)}{\lambda + \hat{x}^T(n) P(n-1) \hat{x}^*(n)}$$

Where lamda λ is the forgetting factor and has a value less than and close to 1.

1.1.3 Estimation error or error signal:

$$e(n) = d(n) - w(n-1)x^T(n)$$

1.1.4 Tap weight adaptation:

$$w(n) = w(n-1) + K(n)e(n)$$

1.1.5 Inverse of the weighted auto correlation matrix update:

$$P(n) = \frac{1}{\lambda} [P(n-1) - K(n)x^T(n)P(n-1)]$$

1.2 Performance parameters used for simulation

1.2.1 Mean square error:

In statistics, the mean squared error MSE of an estimator measures the average of the squares of errors. That is the difference between the estimator and what is estimated [1].

$$\xi(n) = \frac{1}{n} \sum_{i=0}^n |e(i)|^2$$

2. Simulation in Matlab and Results:

These two algorithms are tested in Matlab for real time signal and noise. Input signal and reference noise signals are recorded by microphone and saved in .wav format for processing in Matlab [6] & [7].

2.1 Original Input and noise corrupted input:

Input signal is $d(n)$ and recorded using primary sensor. Noise corrupted signal is $x(n)$ and it is added version of $d(n)$ with $v_1(n)$ [2] & [6]. Illustrated in fig.3.

The whole sampled of input $d(n)$ and $x(n)$ will be look like this. Illustrated in fig. 4.

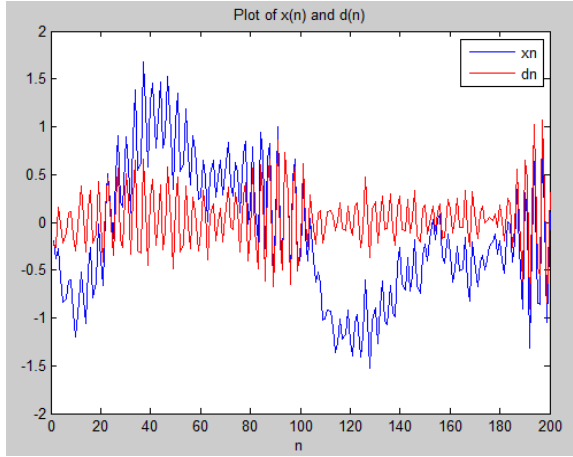


Figure 3: $d(n)$ & $x(n)$, plot of 200 samples.

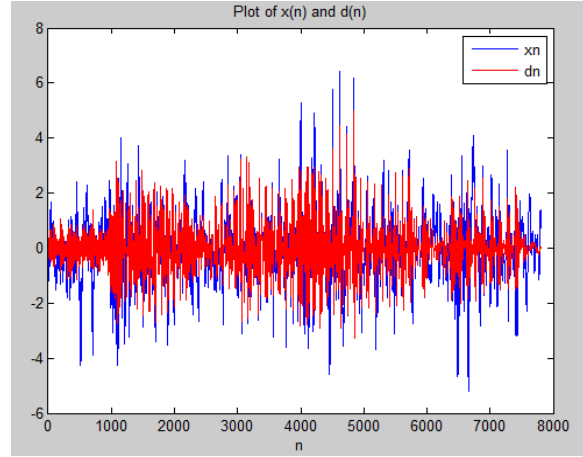


Figure 4: $d(n)$ & $x(n)$, complete sequence.

2.2 Noise signals:

In this paper actual noise of ceiling fan is recorded. And from that generate its correlated noises $v_1(n)$ and $v_2(n)$. Illustrated in fig. 5.

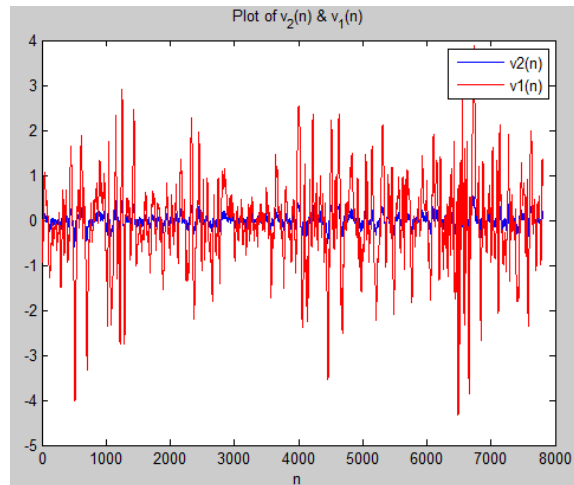


Figure 5: $v_2(n)$ & $v_1(n)$, complete sequence

2.3 Filtered output signal using weiner filter:

The estimated signal $\hat{d}(n)$ is filtered output of weiner filter plotted with actual $d(n)$ in fig.6, order of filter is 1,6,12 & 19.

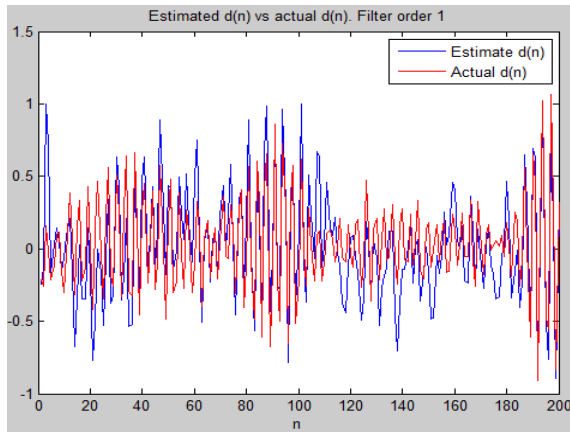


Figure 6: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples

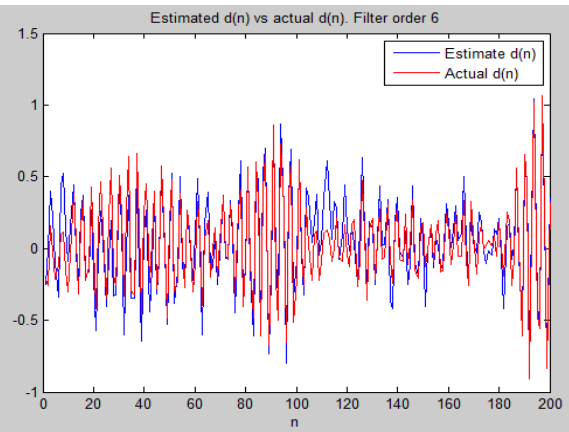


Figure 7: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples

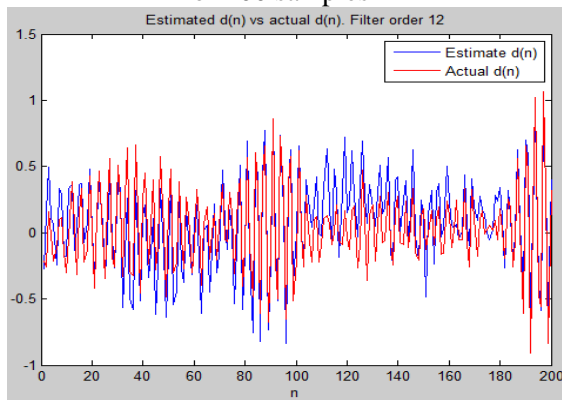


Figure 8: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples

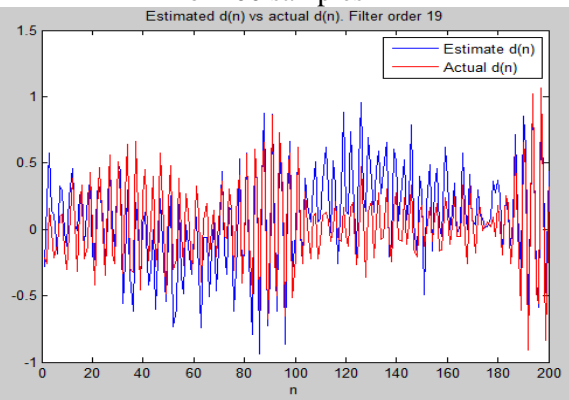


Figure 9: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples

2.4 Filtered output signal using RLS Adaptive filter:

The estimated signal $\hat{d}(n)$ is filtered output of RLS adaptive filter plotted with actual $d(n)$ in fig.10, order of filter is 12, $\lambda=0.95$ & 0.997 . Input signal and noise with its correlated signals are same as used for weiner filter.

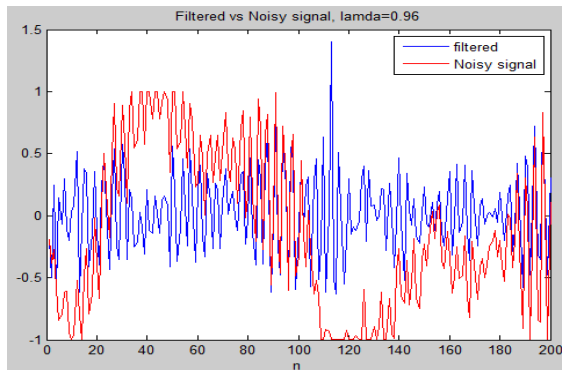


Figure 10: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples, lamda=0.95

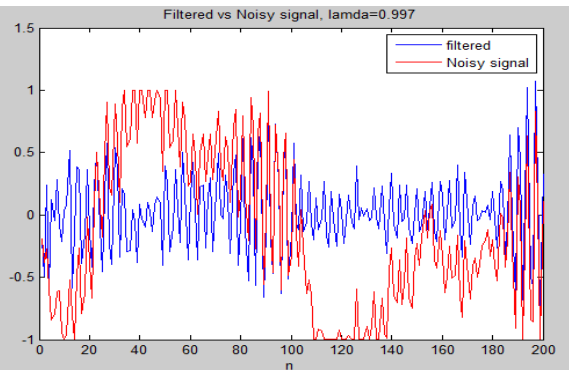


Figure 11: Estimated $\hat{d}(n)$ & Actual $d(n)$, plot of 200 samples, lamda=0.997

3. Mean square error:

Table 1: MSE of weiner filtered signal

Weiner filter	Order 1	Order 6	Order 12	Order 19
MSE	0.981	0.8393	0.8473	0.8860

Table 2: MSE of adaptive filter filtered signal

Adaptive Filter	Lamda=0.96	Lamda=0.997
MSE	19.2	0.315

4. Conclusion:

Adaptive Noise Cancellation removes noise present in a corrupted signal. The primary advantages of the method are its low signal distortion, low output noise and the adaptive capacity. This adaptive capacity allows the signals with unknown or non-stationary properties to be processed or manipulated. Output noise and signal distortion are generally lower than can be achieved with conventional optimal filter configurations. Wiener filter are generally much more difficult to design but their convergence time is small as compared to RLS Adaptive filter. On the bases of SNR.

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Education

THE RELATIONSHIP BETWEEN SELF-EFFICACY AND MOTIVATION OF STUDENTS WITH THEIR ACHIEVEMENT LEVEL IN CHEMISTRY AT SECONDARY LEVEL IN PESHAWAR

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Abstract

The study was undertaken to explore relationship between self-efficacy and motivation of secondary school students on their achievement level in the subject of Chemistry in Peshawar. Self-efficacy of students, their motivational level and their confidence in Content Knowledge were taken as variables. All the secondary schools of Khyber Pakhtunkhwa were the universe of the study. 240 Secondary level students were randomly selected as sample of the study. The data was collected through scales "Motivated Strategies for Learning Questionnaire" (MSLQ) and "Knowledge Confidence Survey" (CKCS) (Xin Wu 2013). The Motivated Strategies for Learning Questionnaire (MSLQ) was used to measure two variables i.e., Self-efficacy (SE) and Motivation (MOT), whereas, Content Knowledge Confidence was used to measure the level of confidence and the same test was used to measure the achievement level of secondary school students (here students' score). Reliability test applied on test items of all three variables confirmed reliability from acceptable to good ranges. The Pearson's correlation results for Self-efficacy and Students' Achievement estimated at $r=.317$ at $p<.001$; while Content Knowledge Confidence with Students' Achievement estimated at $r=0.312$ ($p<0.001$), showing positive relationship. Meanwhile, the results showing a weak positive relationship of motivation with students' achievement i.e., $r=0.24$ ($p=0.000$).

Keywords: Self-Efficacy, Motivation, Content Knowledge Confidence, Students'. Achievement

1. Introduction

Secondary school score is the base of the academic career of an individual. Every student's achievement score is the proof of his/her capability. The motivation and self-efficacy encourage a student to work hard in getting good grades. All subjects' score has their own importance in the cumulative score. Students' self-efficacy and motivation enhances prospects of their achievement level.

The primary aim of studying chemistry is the inducement of critical knowledge in its practical implementation rather than improvement of scientific literacy of students (De Avila Jr and Torress, 2010). Although Chemistry is supposedly a difficult subject (Cousin 2007), even for its likes, yet, it is mandatory to qualify it at SSC level. Chemistry is an integral part of science syllabus at the secondary level and a pre-requisite for entry into medical colleges. The syllabi of chemistry stimulate the intellectual skills, which are important for additional knowledge in other science branches (Taber 2002).

According to Andersson and Wallen (2006), one of the highlighted and most important factors for learning and development of knowledge in science is the motivation of students. As marked in theory of self-determination (Deci and Ryan, 1985), motivation is to affect the level of

accomplishment of learners. Self-efficacy is also one of the factors through which the achievement level of students can be influenced positively (Bandura 1986).

In addition to the variables termed above, there is another variable confidence in content knowledge adopted from Wu Xn (2013), is considered an important factor in students' academic achievement. According to Shoemaker (2011) confidence is a psychological trait, measures one's belief in one's own capabilities, but is different from ability traits and personality. Confidence is interrelated to self-efficacy; one's belief to perform certain task relating to learning, academic motivation and achievement. Whereas these two are interrelated but confidence is more general than self-efficacy.

Sander and Sanders (2005), found that a confident child has a high level of academic achievement while less confident may not come up to the required level of accomplishment. Students with a low level of confidence are found to be less involved in solving transition difficulties.

2. Research Objective

The basic aim of the study was to determine the association of self-efficacy, motivation and content knowledge confidence with students' achievement at secondary level.

3. Hypotheses

The following hypotheses were designed which then proven statistically:

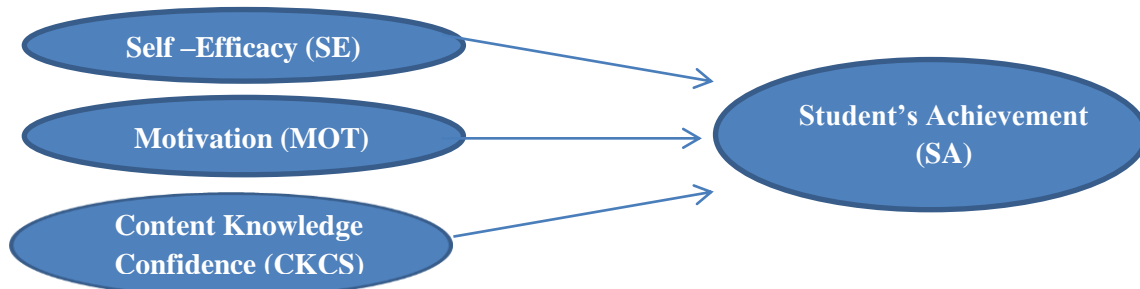
- H₀: There is no positive relationship between self-efficacy and students' achievement.
- H₀: There is no positive relationship of motivation with students' achievement.
- H₀: There is no positive relationship between content knowledge confidence and Students' achievement.

4. Theoretical Framework

The concept of self-efficacy and motivation revolves around social learning theory presented by Bandura (1989). His idea comprises four processes of goal realization: self-efficacy, self-observation, self-evaluation, and self-reaction. These factors are interconnected and each one effects goal attainment and motivation (Redmond, 2010).

There is an interaction between behavioral and environmental factors (Bandura, 1961). Those people regulate and assess their learning process that set goals. So by this, they withstand with self-efficacy and motivation which can moderate their learning behavior whereas motivation boosts them up to work hard to achieve their set goals.

Pintrich and DeGroot (1990) determined that self-efficacy and motivation promote the students' achievement, which can be measured by an instrument, i.e.; Motivated Strategies for Learning Questionnaire (MSLQ). Additionally, self-confidence is an important variable in students' academic achievement. Nuhfer and Knipp (2003) developed a scale known as Knowledge Survey based on self-efficacy concepts, the results of which reveal students' learning and their confidence level.



5. Materials and Methods

The present study being quantitative used two instruments Motivation Strategies for learning questionnaire (MSLQ) and content knowledge confidence survey (CKCS). Both of these measuring instruments have been measured to reach high-reliability requirements, which is a prerequisite for obtaining valid results (Duncan & McKeachie 2005). Study consists of all secondary school students of class 10 in KPK as population. A total of 240 students, selected randomly, constitute the sample of the study, including:

- I. Half male students
- II. Half female students
- III. Half from Public sector and
- IV. Half from Private sector

From each selected school Males and Females, 30 students were randomly selected, this way 240 students were selected from eight randomly selected schools in Peshawar district.

The MSLQ, was used to measure two factors i.e. motivation level and self-efficacy. With the help of CKCS the confidence of students in content knowledge was measured and, same test was used to measure the students' achievement in Chemistry. In MSLQ scale students responded to 10 items for motivation and 10 items for self-efficacy using a 5-point Likert scale ranging from strongly agree to strongly disagree. Whereas CKCS scale was used to ascertain the confidence level of students in the course content taught to them in class 9th, in which 3 items were asked, showed the confidence level from 0 to 100%, a. I have confidence in answering this question b. I could answer 50% of this question or know where to get information quickly. c. I have no confidence in answering the question. marked by learners. And directed them to assign one of the following three levels of confidence. Whereas, students' achievement test was constructed. This test was included 20 items, from the course taught to them in class 9th. The given items were answered by the respondents (students), and marked by researcher with the help of given key. So, the obtained marks were put in the spread sheet by using SPSS version 23.

The preceding variables were then tested and reliability found out in terms of Cronbach's Alpha, which was from acceptable to good ranges as given in table 1. Self-efficacy (SE) and motivation (MT) were then constituted to formulate variable Net Motivation (NMT).

6. Analysis and Discussion

Table 6.1: Results of Reliability test

Variables	Cronbach's Alpha
Self-Efficacy (SE)	0.80
Motivation (MOT)	0.81
Content Knowledge Confidence Scale (CKCS)	0.71

The reliability test given, in table 6.1, indicated Cronbach's Alpha for SE and MOT falling in good range, whereas Cronbach Alpha for CKCS is in acceptable range.

6.2. Pearson's Correlation

Pearson Correlation test, as specified in the preceding section on materials and methods, was applied to determine the relationship between the variables. Results of Pearson's Correlation between Students' achievement and Self-efficacy are given as per table 6.2 below:

Table 6.2. Correlations

		SA	SE
SA	Pearson Correlation	1	.317**
	Sig. (2-tailed)		.000
	N	237	237
SE	Pearson Correlation	.317**	1
	Sig. (2-tailed)	.000	
	N	237	237

** . Correlation is significant at the 0.01 level (2-tailed)

The results of Pearson's Correlation gave the coefficient $r = .317$; $p = .000$, suggested a moderate positive relationship between self-efficacy and students' achievement. The result shows that increased self-efficacy of the students' contributes towards student's performance. So, the results help us to accept the suggested hypothesis i.e. The correlation between Self-efficacy and Student's Achievement is positive.

Table 6.3. Results of Pearson's Correlation between Students' achievement and Motivation

<i>Correlations</i>		SA	MOT
SA	Pearson Correlation	1	.236**
	Sig. (2-tailed)		.000
	N	237	237
MOT	Pearson Correlation	.236**	1
	Sig. (2-tailed)	.000	
	N	237	237

** . Correlation is significant at the 0.01 level (2-tailed).

Pearson's Correlation test applied to determine the relationship between Students' Achievement and Motivation indicated is equal to $r = .236$ at $p < .01$ which is considered as a weak relationship. Therefore, the hypothesis No.2 indicated a nil relationship between motivation and students' achievement which help us to reject the suggested hypothesis.

Table 6.4. Results of Pearson's Correlation between Students' achievements with Content Knowledge Confidence Survey

<i>Correlations</i>		SA	CKCS
SA	Pearson Correlation	1	.312
	Sig. (2-tailed)		.000
	N	237	237
CKCS	Pearson Correlation	.312	1
	Sig. (2-tailed)	.000	
	N	237	237

As seen on table 6.4, indicated the Pearson's correlation between students' achievement and content knowledge confidence (CKCS), was about $r = .312$, different from zero at $p < .01$, suggested a direct relationship between the interested variables. The following results help us to accept the hypothesis i.e. there is a positive relationship of content knowledge confidence with students' achievement.

8. Conclusions

The discussed results help us to draw the following conclusions:

1. Giving Uma Sekaran (2003) that, "reliabilities less than .60 is measured to be poor, those in .70 range, acceptable and those over .80 good". Therefore, the test for SE and motivation falls in good range whereas, for CKCS is, in an acceptable range.
2. Pearson's correlation was used to know about the strength of relationship between students' achievement and self-efficacy, which, was $r = .317$ at $p < .000$ indicated a positive relationship.
3. The correlation between students' achievement and motivation was showed the weak i.e., $r = 0.236$ at $p < .000$
4. The positive relationship existed between students' achievement and content knowledge confidence i.e.: $r = .312$ at $p < .000$.

9. Recommendations

In a nutshell of results a significant relationship was found between self-efficacy and content knowledge, however, the same test has shown weak relationship of students' achievement with motivation. It is also concluded that students were self-efficated in their taught concepts, but they were not properly motivated towards level of achievement, so, it becomes an alarming area of the study to be concerned about.

Therefore, achievement level of students can be enhanced by motivating them applying the following measures, which will also assist to build the confidence level of students.

1. Conducive school climate may be created for the effective teaching learning process.
2. Self-Confidence may be inculcated among the students.
3. The teaching-learning process may provide, students' participation/interaction leading to motivation.
4. Self-efficacy may be inculcated among the students through motivation and generating confidence by effective teaching.
5. Student-Centered approach may be provided for interactive teaching-learning process.

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MEASURING ENVIRONMENTAL ATTITUDE AND PRO-ENVIRONMENTAL BEHAVIORS AT SECONDARY SCHOOL LEVEL

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Abstract

The study was undertaken to explore the relationship between environmental attitude and pro-environmental behavior. All the secondary schools in Khyber Pakhtunkhwa, were the universe of the study. 200 Secondary level students and teachers were randomly selected as sample of the study. The data was collected through an adopted scale by Heyl, Moyano Díaz and Cifuentes's (2013) scale of 'Environmental attitudes' and 'Pro-Environmental Behavior'. The data collected were processed by applying SPSS-23 version. The mean value for all variables indicated agreement of respondents with the questions asked. The results of one sample t-test also give results expressing agreement of a majority of respondents with the questions raised in all three variables. There was a positive relationship between environmental attitude and pro-environmental behavior indicated by the results of Pearson correlation test.

Keywords: Environmental attitudes, Pro-Environmental Behavior

1. Introduction

1.1 Environmental awareness, attitude, and behavior

All the creatures have the right to exist on the earth because environment or biosphere is self-sustained. The Homo sapiens (man), the crown creature of God on the earth extensively use the limited resources without thinking the unpleasant effects of it and come at the point to ponder on the environmental issues concerned to live on the earth. In fact solution of the environmental problems, understanding of the environment and its creatures are implied due to environmental awareness (Bandhu and Ramanathan, 1982).

According to Shukla (2001), world educator and environmentalists strongly recommend that a solution to the environmental crisis is environmental awareness which is based on the education system at all levels of school education. Today, environmental awareness is a very important issue and that's why research and seminars are being held world over. These issues cannot be resolved until and unless we make our students aware of the environmental issues, who would be the mature citizens of tomorrow. Thiengkamol and Thiengkamol (2012) mention that environmental education influences environmental behavior and environmental education sets a positive attitude, takes responsibility and participates in the protection and conservation of the environment.

On the realization of the importance of environmental awareness, environmental education is included in the curriculum at secondary school level in the domain of different subjects. Environmental issues in our part of the world are alarmingly serious and require some out of the box solutions. Students develop permanent environmental attitudes through environmental

education. This leads to active participation in the protection of the environment. Therefore, not only a sense of responsibility is built due to environmental education but it also affects an individual's behavior (Aydın and Kaya, 2011). It is believed that education is more effective when it is based on life experiences started in the early years of life. Hence, a good and effective individual viewpoint on the environment can be shaped in the school-age experiences. (Shobeiri, et al, 2007).

2. Research Objective

1. To assess the level of students- and teachers- environmental attitude and environmental behavior.
2. To explore the association between environmental attitude and pro-environmental behavior.

3. Hypothesis

H: Measures of environmental attitude (MEA) of students and teachers differ from the mid-point on Likert-scale and are statistically significantly on the higher side, suggesting pro-environmental attitude.

H: Measures of environmental behavior (MEB) of students and teachers differ from the mid-point on Likert-scale and are statistically significantly on the higher side, suggesting pro-environmental behavior.

H: There is no association between environmental behavior (MEB) and environmental attitude (MEA).

3. Conceptual Framework

Many questionnaires/scales have been developed to measure environmental attitude and environmental behavior. Heyl, Moyano Díaz, and Cifuentes (2013) based their 'Environmental attitudes scale on the work of following;

- The scale of pro-environmental attitudes by Castanedo, 1995;
- The scale of attitude toward waste by Fernandez, Hueto, Rodriguez & Marcen, 2003;
- The scale of environmental attitudes towards specific problems by Moreno, Corraliza & Ruiz, 2005;
- The scale of environmental attitudes by Berenguer, 1998;
- The scale of environmental attitudes by Vega, 2011;
- The scale of attitude about the consumption of energy by Raviolo, Syracuse & Herbel (2000);
- The scale of pro-environmental behaviors by Martimortugues, Canto, Garcia & Hidalgo, 2002.
- Heyl, Moyano Díaz and Cifuentes's (2013) scale of 'Environmental attitudes' consists of 19 items, including 3 of their own and 16 adapted from others mentioned above. The 19 elements belong to four major environmental areas, namely:
 - i. Responsible Consumption of Resources e.g. Energy and water consumption as to save and use water and energy efficiently.
 - ii. Transportation as the use of public transport, walking or bicycle,
 - iii. Responsible consumption of products as purchasing organic food, use of recycled paper.
 - iv. Information about environmental actions and participation.

Similarly, Heyl, Moyano Díaz and Cifuentes (2013) have developed scale of 'Pro-Environmental Behavior' consisting of 14 items, including 4 of their own and 12 adopted from other researchers as Moyano et al. (2007), Pato, Ros and Tamayo (2005) and Vozmediano and Guillen (2005).

These two scales of Heyl, Moyano Díaz and Cifuentes (2013) for measuring environmental attitude and environmental behavior provided a basis to develop the following conceptual model.

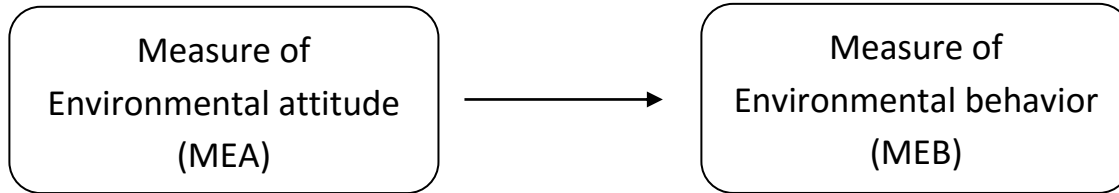


Figure 1 Conceptual model: Dependent variable 'Environmental behavior' association with independent variable 'Environmental attitudes'

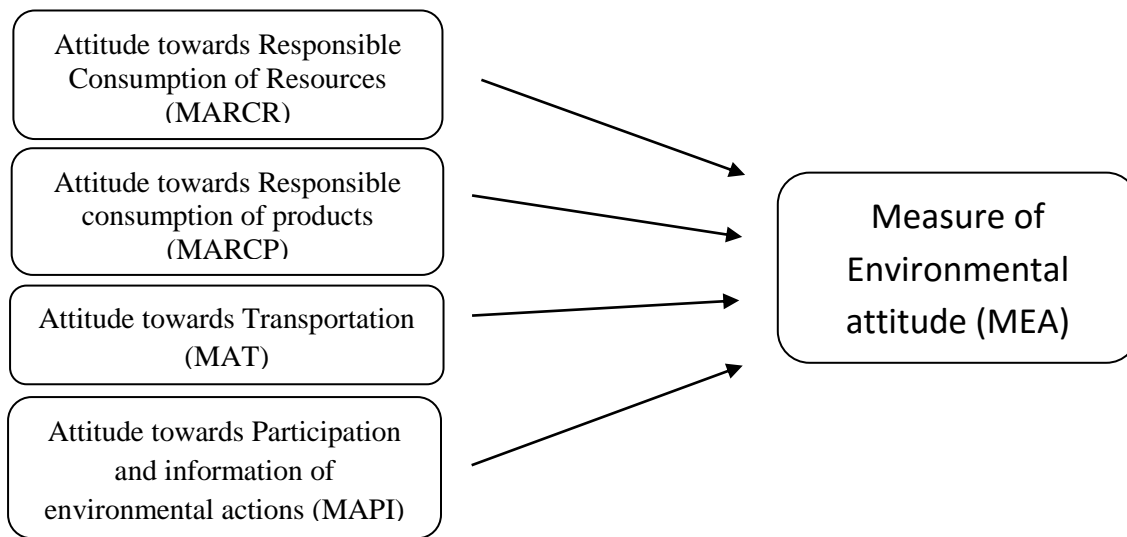


Figure 2 Conceptual model: (a) Measuring 'Environmental attitudes'

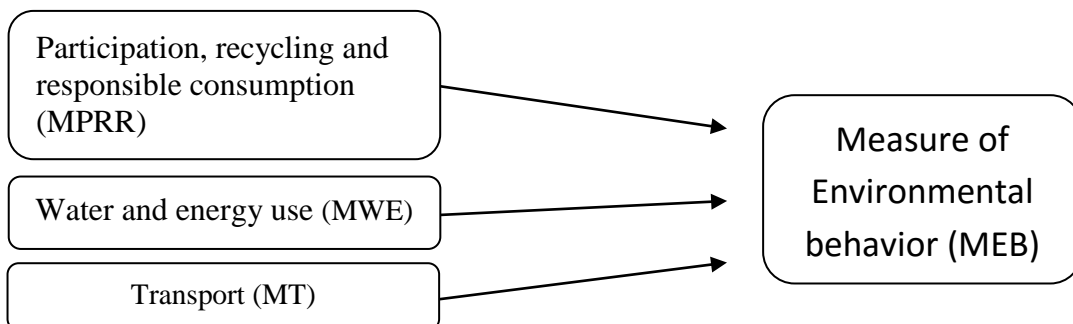


Figure 3 Conceptual model: (b) Measuring 'Environmental behavior'

4. Methods and Materials

Since it is assumed that students' environmental behavior at secondary school education level depends upon their own environmental attitudes and their teachers' attitudes and behavior, the secondary students, and their school teachers constitute the population of this research.

Twenty male and twenty female students were randomly selected from 4 male and 4 female secondary schools of KP's capital city – Peshawar. Hence, there were a total of 160 students, half male and half female, in the sample. Out of 4 male and 4 female schools, 2 schools from each of the two gender groups were from the private sector and 2 schools each from the public sector. Five teachers from each of the 8 selected schools were chosen to include in the sample.

5. Analysis and Discussion

5.1. One sample t-test for environmental attitude (MEA)

One sample t-test is used for the confirmation that means of variables are statistically significant or not.

Table 1(a) One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
MEA	196	3.6771	.59257	.04233

Table 1(b) One-Sample Test

Test Value = 3

	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MEA	15.997	195	.000	.67709	.5936	.7606

The mean value for the environmental attitude (MEA) is 3.6771 differs from mid value (=3) by 0.67709 which is statistically significant at probability $\alpha < 0.01$.

It is concluded that most of the respondents agree with the question raised in measuring environmental attitude although the difference is very less from mid-point which is 3, still it is toward the agreement side.

According to the above table hypothesis, (H: Measures of environmental attitude (MEA) of students (MEAs) as well as that of teachers (MEAt) differ from the mid-point on Likert-scale and are statistically significantly on the higher side, suggesting pro-environmental attitude.) is accepted.

5.2 One sample t-test for environmental behavior (MEB)

To check that environmental behavior (MEB) is statistically significant one sample test is performed.

Table 2(a) One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
MEB	196	3.7702	.73187	.05228

Table 2(b) One-Sample Test

Test Value = 3						
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MEA	14.733	195	.000	.77020	.6671	.8733

The mean value for the environmental behavior (MEB) is 3.7702 differs from mid value (=3) by 0.77020 which is statistically significant at probability $\alpha < 0.01$.

It is concluded that most of the respondents agree with the question raised in measuring environmental behavior so hypothesis (H: Measures of environmental behavior (MEB) of students (MEBs) as well as that of teachers (MEBt) differ from the mid-point on Likert-scale and are statistically significantly on higher side, suggesting pro-environmental behavior.) accepted.

5.4 Pearson's correlation test of association

This test is used for finding a relationship between environmental attitude and environmental behavior.

Table 5 Correlations

		MEA	MEB
MEA	Pearson Correlation	1	.459**
	Sig. (2-tailed)		.000
	N	196	196
MEB	Pearson Correlation	.459**	1
	Sig. (2-tailed)	.000	
	N	196	196

**, Correlation is significant at the 0.01 level (2-tailed).

Pearson's correlation was carried out to look for a relationship between the variables i.e.: environmental attitude and environmental behavior estimated $r = .459^{**}$ at $p < .001$ suggested a positive relationship existed between the variables. Pearson's correlation indicated a significant relationship between environmental attitude and pro-environmental behavior so, hypothesis

(There is no association between environmental attitude (MEA) and environmental behavior (MEB)) was rejected

6. Conclusion

Following conclusions were drawn:

- According to the one sample t-test the mean value for the environmental attitude (MEA) and environmental behavior (MEB) is above the mean value, most of the respondents agree with the question raised in measuring environmental attitude and behavior.
- The results of Pearson's correlation concluded a significant relationship between environmental attitude and pro-environmental behavior suggested a positive association existed between the variables.

7. Recommendations

Environmental behavior has a strong association with environmental attitude and attitude can be developed by conducive teaching regarding environmental topics.

- i. It can be done by changing the topic teaching strategies as by having activities related for the conservation of the environment.
- ii. School should enhance co-curricular activities related to the environment.
- iii. Religious aspect should also be put forward regarding environmental conservation.

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TEACHERS' PERCEPTIONS REGARDING LEARNER CENTERED APPROACH

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ABSTRACT

A critical look at research in education particularly approaches to teaching revealed that generally, the teachers have either opted for learner centered approach (LCA) or teacher centered approach depending on the education system and the country where the research was conducted. In Pakistani context, the dominant mode of teaching is teacher-centered. The people have very little understanding of learner-centered mode. Therefore, the current study aimed to assess the teachers' perceptions regarding learner-centered-approach in City University Peshawar. For this purpose a close ended questionnaire probing teachers' perceptions regarding learner-centered-approach was designed to collect data regarding the perception of the teaching faculty. The data was analyzed by applying various statistical tools. The reliability test determined by Cronbach Alphas indicated the reliability falling in acceptable to good range. The data was processed through SPSS for One-sample t-Test and Descriptive statistics. Deductions were made on the basis of the processed data whereby findings and conclusions were drawn. The Findings showed that overwhelming majority of teachers favored the learner - centered approach of teaching.

Keywords: Learner centered approach, Effectiveness, Activity based learning, Personality development.

1. Introduction

Cannon (2000) asserted that learner-centered approach focuses on student's responsibility and gives much importance to activities. It emphasizes students' responsibility and independence in the class and inculcates distinctiveness of lifelong learning: drives inspiration and motivation, time management, self-evaluation and the appropriate skills to get information. According to Huba and Freed (2000) learning centered assessment plays a pivotal role in the learning process. With this term of learning-centered assessment, she switched over the center of attention of instruction and judgment from teaching to learning. As per Collins & O'Brien (2003) in Learner-centered approach "students influence the content, activities, materials, and pace of learning". Students centered learning focus on students' needs, aims, and long-term goal in the course design which makes it student driven.

In Learner-Centered-Approach (LCA) teachers become co-learners with students thus placing more importance on active learning. This broad shift of learner-centered-approach encompasses active learning, problem-based learning (Allen & Tanner, 2005) and a more considerate understanding of how the effective teachers carry out their work in classrooms (Bain, 2011).

1.1 Teachers' Perceptions regarding LCA

Weimer's (2002) five key changes give a pathway for shifting traditional teaching method or teacher centered method to learner-center teaching practices. It gives students a sense of responsibility in the classroom, engages students in learning, adapts content driven courses, shifts the role of the teacher from master to guide, and provides students with multiple assessment methods to improve the quality of learning.

1.2 Effectiveness of LCA

According to Bloom's (1964) taxonomy of learning outcome, Knowledge and comprehension are lower level learning outcomes in the cognitive domain. King (2002) stated that "Learner-centered educational practices help in implementing higher-level learning objectives, application and analysis."

1.3 Personality Development in LCA

Brockbank (2007) argued that the main aspiration is the development of the learners who have the great capacity to learn. The learner is crucial in relation to area of knowledge. The learner is able not only to get knowledge but to bring his self into the process of learning. The teacher, as facilitator, creates conducive environment to make the learners familiar with the learning process.

1.4 Activity-based Learning

According to Lee (2015) Students familiar with active learning styles in classes are proactive and argumentative and express themselves in a project- and team-based setting throughout the program. They are not afraid of making mistakes and of challenging the authorities. The classroom is more interactive and collaborative as the students are engaged in discussion and activities. Fallows and Ahmet (1999) affirm that 'learning is best when the students' association, investment, and connection is boosted.'

1.5 Theoretical Framework

The conceptual framework of the study evolved as a consequence of review of relevant available literature, previous studies. Teachers' perception, Effectiveness of LCA, Personality development and Activity based learning have been included as the variables of the study.

1.6 Objectives of the Study

- The main objective of this study was to determine teachers' perceptions regarding learner-centered-approach (LCA). The study also aimed at the achievement of following objectives.
- To determine teachers' perceptions regarding effectiveness of LCA
- To explore teachers' perceptions regarding personality development of student in LCA
- To determine the teachers' perceptions regarding the activity based learning in LCA

1.7 Hypotheses

- H01 : Teachers perceive LCA negatively.
- H02 : Teachers do not perceive the effectiveness of LCA.
- H03 : Teachers do not perceive the personality development of students in LCA.
- H04 : Teachers do not perceive that LCA is activity based.

2: Methods and Procedure

The secondary data was obtained through the review of related literature on the subject,

whereas, primary data was collected through a questionnaire specially developed for the purpose. The questionnaire was developed on 5 point Likert scale which was pilot tested indicating Cronbach's Alphas ranging from 0.77 to 0.87. The variables involved in the study included Teachers' Perceptions (TP), Effectiveness of LCA (EFF), Personality Development (PD) and Activity Based Learning (ABL).

2.1 Population and Sample

The entire teaching faculty comprising 70 members from 7 departments of City University of Science and Information Technology, Peshawar (CUSIT) was the population of the study. However, the sample comprised 63 available faculty members.

3: Analysis and Discussion

3.1 Reliability Test

Reliability test was carried out to determine the reliability and consistency of the test items of the variables. Cronbach Alphas yielded as under indicating the reliability range of all the four variables from 0.73 to 0.85.

Table1. Reliability Test

Variable (s)	Cronbach's Alpha
TP	0.85
EFF	0.81
PD	0.78
ABL	0.73

3.2: Descriptive Statistics

Descriptive statistics indicated the mean values of all the variables greater than the mid value meaning by that all respondents were on agreement side. The mean value for TP, EFF, PD, and ABL are 4.0048, 3.8043, 3.4022 and 3.9016, respectively is reflected below.

Table 2: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TP	63	2.20	4.90	4.0048	.60812
EEF	63	2.54	5.00	3.8043	.55580
PD	63	2.29	4.43	3.4022	.69794
ABL	63	2.00	5.00	4.0413	.51073
Valid N (listwise)	63				

Testing of Hypothesis #1

Teachers perceive LCA negatively.

Table 3 (a)

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
TP	63	4.0048	.60812	.07662

Table 3 (b)

One-Sample t –Test						
	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TP	13.114	62	.000	1.00476	.8516	1.1579

The result of the above One sample t-Test shows the mean value of the variable (TP) is 4.0048 which is positive and significant statistically. Therefore, hypothesis #1 stands rejected as the teachers perceive LCA positively.

Testing of Hypothesis #2

Teachers do not perceive the effectiveness of LCA.

Table 4(a)

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
EFF	63	3.8043	.55580	.07002

Table 4 (b)

One-Sample t- Test						
	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
EFF	11.486	62	.000	.80429	.6643	.9443

The results of the above One sample t-Test shows the mean value of the variable (EFF) is 3.8043 which is positive and significant statistically. Therefore, hypothesis #3 is rejected as the teachers perceive the effectiveness of LCA positively.

Testing of Hypothesis # 3

Teachers do not perceive personality development of students in LCA.

Table 5 (a)

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
PD	63	3.4022	.69794	.08793

Table 5 (b)

One-Sample t-Test						
	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
PD	4.574	62	.000	.4022	.2264	.5780

The results of the above One sample t-Test shows the mean value of the variable (PD) is 3.4022 which is positive and significant statistically. The hypothesis is rejected as the teachers perceive the personality development of students in LCA.

Testing of Hypothesis # 4

Teachers do not perceive that LCA is Activity based.

Table 6 (a)

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
ABL	63	3.9016	.55750	.07024

Table 6(b)

One-Sample t-Test						
	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
ABL	12.836	62	.000	.90159	.7612	1.0420

The results of the above One sample t-Test indicates that the mean value of the variable (ABL) is 3.9016 which shows statistical significance.. Hence hypothesis is rejected as the teachers perceive that LCA is activity based approach

4. Findings, Conclusions, and Recommendations

Consequent upon the analysis of the collected data certain findings and conclusions were constructed which are provided as follow. The recommendations are based on the findings and conclusions.

4.1. Findings

Following findings were made as a consequence of data analysis.

1. Overwhelming majority favored the adoption of learner centered approach.
2. Most of the teachers are of the view that learner-centered-approach contributes towards personality development.
3. Teachers perceive that learner-centered-approach generates learner based activities among the students.
4. Teachers perceive that activity based curriculum develops effective learning among the students.

4.2 Conclusion

The study confirmed the acceptability of the learner-centered-curriculum by the teaching faculty. The teaching faculty also endorsed that learner based curriculum generate curricular and co-curricular activities among the students. Majority of the teaching faculty of City University supported Learner-centered –approach because they thought that it develops student's personality. The study confirmed the effectiveness of the LCA.

4.3 Recommendations

Consequent upon the findings and conclusions drawn from the analysis of the data following suggestions are offered.

- 1 The study has confirmed that learner-centered approach is more interactive and productive, therefore, the teachers may be trained in adopting learner-centered approach in their teaching learning process.
- 2 As a paradigm shift the in-service training of the teachers may be arranged emphasizing the need and utility of the learner-centered approach.
- 3 The courses and syllabi of the students may be re-structured accordingly to accommodate learner-centered approach.
- 4 Teacher's guide may be provided to the teachers for interactive, cooperative and collaborative teaching.
- 5 Besides annual exams, appropriate weight age may be assigned to the students' activities and performance as internal evaluation by the teacher.

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THE IMPACT OF WOMEN EMPLOYMENT ON THE SOCIAL DEVELOPMENT OF CHILDREN IN PESHAWAR (KP) PAKISTAN

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Abstract

The research was undertaken with a view to determine the role of the employed women on the social development of their children. It was basically a descriptive research with a blend of both qualitative and quantitative approaches. The target population of the study was all the married school female teachers of private schools in Peshawar. Ten private schools were conveniently/ purposely selected. Five married female teachers, their husbands and their one school group child were selected as a sample out of each selected school. The total sample size was 50 female private school teachers, 50 husband and 50 children. Three questionnaires were developed for teachers, husbands and children respectively. The questionnaire consisted of five variables i.e. Financial support to households activities (FSH), Culturalization/ socialization of children (CSH), Provision of various modern facilities at home (PMF), Budgeting time (BT) and Social development of children (SDC). A pilot study was carried out to determine the reliability level of the variables involved; resultantly the Cronbach Alphas came to be within acceptable to good range i.e. .77 to .90 which is good range. Descriptive statistics and one sample t-test was applied to the generated data which gave the mean value of all the variables on the agreed side that is positive. This result was also reinforced by the frequency test indicating that all the respondents were on agreement side with the points raised. The main conclusion of the study was that the employed female teachers do contribute significantly in the social development of their children besides the employed women have a positive role in the social mobility of the family.

Keywords: Financial support, Social development, Social mobility, Women employment.

1. Introduction

According to Franks (2011), the status of the family has a great effect on a child. Family background shapes the social development of children. Positive interaction between parents and child contributes directly to the development of a balanced personality. Odey (2008) describes the role of women in the social development of children and their education as most significant. According to Sharma and Vaid (2005), Social development refers to the inculcation of social skills and emotional development of the children. For them, social development implies social competence. Epstein (2002) is the view that the role women in children education are highly appreciable wherein they monitor the activities of the children out of school imbining self-discipline. Lines (2005) considers women's role as vital in encouragement of their children, in their education, in their time management and modeling the desired behavior, monitoring home and practically teaching children at home. Cotton and Wicklund (2001) highlight women's role in promoting children's education by participating in school functions and observing school obligations. Swap (2007) considers women's full participation is of great significance for equal and sustainable development.

2. Research Objective

The main objective of the Research was to determine the impact of women employment on the social development of the children.

3. Parent's Employment and child Social Development

Wolfer & Moen (1996) indicated that adolescent girls whose mothers worked during the daughter's early years are more likely to stay in school. The employed mothers who value their parenting role are more likely to adopt authoritative child rearing and regulation allowing their children independence with adequate supervision (Hoffman 2000). Moreover, children of both parents employed households devote more daily hours to doing their homework under parental guidance and participate in household chores. Parental contact is related to higher achievements and intelligence, mature social behavior and gender flexibility (Gottfried, 1991: Radin, 1994), when mother's employment demand heavy schedule it may result in ineffective parenting. Working long hours and spending little time with children are related to less favorable adjustment (Moorehouse 1991). However, part time employment seems to have benefits for children of all ages because of less work load and availability of more time help mothers meet children needs (Hart et al; 1997).

4. Modern Trends of Women Employment

With the advancement of science and technology and with an improved standard of living in developing countries, single unit families replace the joint family system. These families are shifting to urban areas where the new township has emerged. The life in these townships has taken new shape. People expect all essential facilities of life in their household which involve more investment hence urge for more earning and more financial resources has emerged. In these circumstances, a single earning member of the family cannot meet the requirements. Therefore, the modern trend of women employment means more income and financial resources. In Pakistan, constitutionally there is no discrimination in employment opportunities on a gender basis. The government has enacted various provisions safeguarding and protecting women in the workplaces. Women are also coming forward to join man-dominated professions like engineering, banking, and all other commercial enterprises. In Pakistan women have achieved prestigious positions like judges of the high court and Supreme Court of Pakistan, vice chancellor of universities, members of parliament, and ministers at provincial and federal government; even we have women as ambassadors as well. Women are doing well in commercial enterprises and industries having their own chamber of commerce.

5. Conceptual Framework

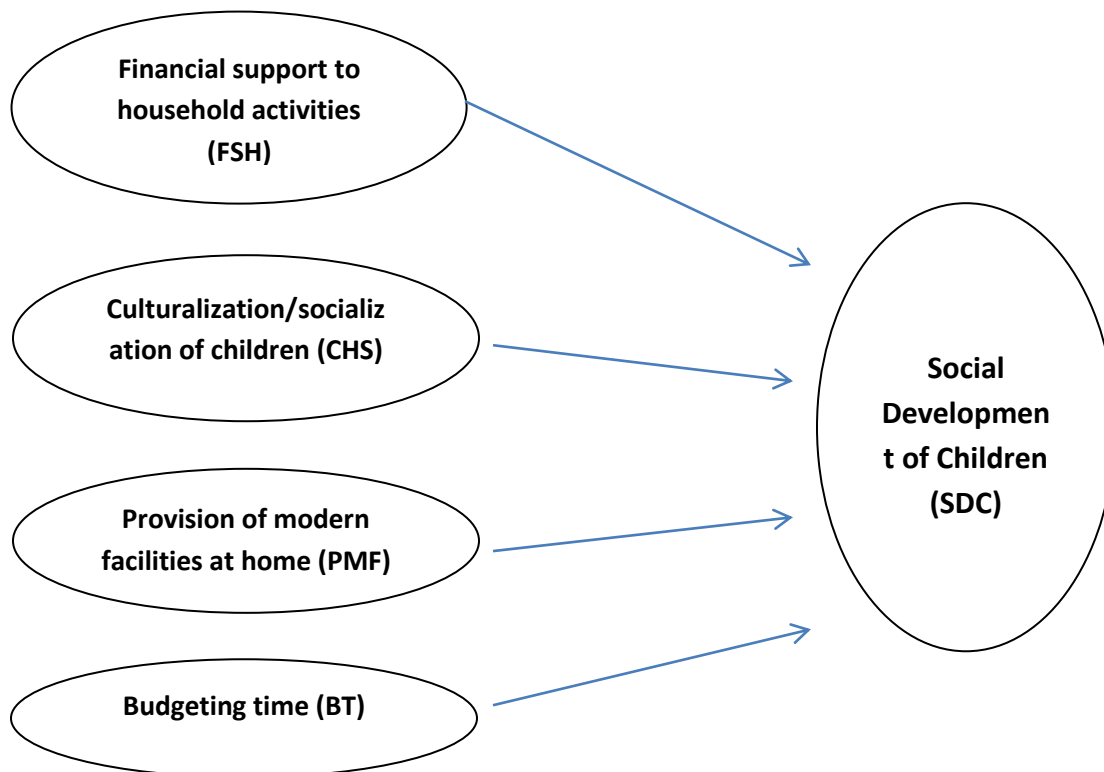
a. Bandura's social learning theory

Bandura's social learning theory suggests that children learn behavior by observing the social environment they live in. Hence parents may provide a conducive, social and cultured environment at home to imbibe desirable behavior among children. The parents must set the example of good behavior; the child will follow the same. A positive reinforcement or reward may be used to encourage children adopting good behavior. A mother may use praise, enlargement and a threat as a reward for good behavior. One important element in shaping the personality of the child is to make him used to dialogue and persuasion. This will help him to develop personality and skills. It is necessary for

the mother to establish children rules they may observe to organize their various routines and activities.

b. Vygotsky's Social Development Theory

Social learning is the foundation for any kind of development in human beings (Lev Vygotsky 1896-1934). His theory of social development is one of the foundations of the constructivism. Every function in the child cultural development occurs twice: firstly on the social level and secondly on the individual level initially interpersonal and later intrapersonal. (Vygotsky, 1978). Vygotsky believed that human beings acquire life skills from a culture, e.g. speaking, writing and understanding social environments. He is of the opinion that children develop these skills as a social function and to communicate their needs, ultimately, these skills are internalized and transformed into higher thinking skills. Vygotsky focused on the interaction between people and the socio-cultural environment in which they live and interact (Crawford, 1996).



6. Methods and Materials

The data was collected from ten randomly selected private secondary schools in Peshawar. The questionnaire was developed on 5 point Likert scale. The questionnaire was pilot tested which indicated Cronbach's Alphas ranging from .75 to .90 that is from acceptable to good range. The variables involved in the study included Financial Support household (FS), Culturalization/Socialization of the children (CSH), and Provision of various modern facilities at

home and Budgeting Time (BT) as independent variables and Social development of children (SDC) as independent variable.

7. Analysis and Discussion

a. Reliability Test

Reliability test was applied to test the reliability of test items used in variables, FSH; CSH; PMF; BT AND SDC. Reliability value below 0.60 is considered to be poor, in the range of 0.70 as acceptable and in the range of more than 0.80 as considered good (Uma Sekaron (2003)). Hence, the reliability of all the variables has been found in acceptable to good ranges as given in Table:

Variables	Cronbach's Alpha
Financial Support to Household (FS)	.85
Culturalization/Socialization of the Children (CSH)	.88
Provision of Various Modern Facilities at Home (PVF)	.90
Budgeting Time :(BT)	.83
Social Development of Children (SDC)	.75

b. Descriptive Statistics

Descriptive statistics indicated of the computed variables indicated the mean values of all the variables greater than the mid value meaning by that all respondents are on are agreement side. The mean value for FSH, CH, PMF, BT and SDC are 3.8744, 3.8692, 3.8120, 3.1705, and 3.8945, respectively.

c. One Sample t-test

- Analyzing variables using One-sample t-test for the variable FSH Indicated the mean value as 3.8744 statistically greater than the neutral value (3). This means that the respondents express their agreement that employed women financially support the household. As per table given below:

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
FS	43	3.8744	.46296	.07060

One-Sample Test

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
FSH	12.385	42	.000	.8744	.7319	1.0169

ii. One sample t-test for variable CSH

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
CH	43	3.8692	.47217	.08210

One-Sample Test

	Test Value = 3					
	t	D f	Sig. (2-tailed)	Mea Difference	95% Confidence Interval of the Difference	
					Lower	Upper
CH	10.842	42	.000	.8692	.7244	1.0558

One sample t-test for variable CSH indicated the mean value as 3.8692 which is statistically significant showing the agreement by the respondent that employed women contribute in culturalization and socialization of their children.

iii. One sample t-test for the variable PMF

Table 4.6(a) One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
PMF	43	3.8120	.47702	.09100

One-Sample Test.

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
PMF	9.477	42	.000	.8120	.6788	1.0461

One sample t-test for the variable PMF indicated the mean value is 3.8120 which is greater than the midpoint indicating the agreement of the majority of the respondents that employed women contribute to the provision of various modern facilities at home given at above table:

iv. One sample t- test for variable BT

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
BT	43	3.1705	.60076	.09161

One-Sample Test.

	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
BT	1.862	42	.070	.1705	-.0143	.3554

One sample t- test for variable BT indicated the mean value is 3.1705 which is statistically significant. This means that employed women manage their time properly for all essential activities at home.

8. Conclusion

- The analysis of the data indicated that female employed teachers do contribute in the social development of their children. They are also instrumental in the improvement of the social mobility of their families. Following conclusions were drawn:
- Employed women have positive impact on the social development of their children.
- The husbands of the employed women do have certain reservations regarding their employment wives but husbands generally support women employment.
- Children though suffer in extra due to the absence of their mother but still they support their mother's employment.
- Employed women do contribute significantly towards the social mobility of her family.

9. Recommendations

Following measures may be adopted:

- Issues in the women education may be addressed to enhance the rate of female literacy.
- Social development sectors may adopt measure to create awareness among the masses regarding the contribution of women employment on children's social development.
- Governments may take initiatives to control the negativity of the women employment.
- All laws and government initiatives regarding women empowerment may be implemented in letter and spirit.

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THE IMPACT OF CLASSROOM MANAGEMENT ON THE ACHIEVEMENT LEVEL OF THE STUDENTS AT SECONDARY LEVEL IN PESHAWAR

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Abstract

Classroom management is an integral part of creating such environment. Generally teachers who do not realized the significance of classroom management. Face problems in the teaching- learning environment. This study was aimed at the assessment of the impact of classroom management on the achievement level of the students at secondary level in Peshawar. The population of the study comprised all the secondary school teachers in Peshawar. 240/secondary school teacher randomly selected, constituted the sample of the study. To determine the reliability and consistency of the questionnaire items reliability test was applied and the Cronbach Alpha yielded results from acceptable to good ranges. Data was analysis through SPSS applying various statistical tools including one sample t-test, Pearson Correlation and Regression. The main finding of the study is that classroom management & students' achievements are positively correlated. The relationship between Teaching Learning Process and students achievements was also found significant. The study also conform that Classroom Rules play positive role in the achievement level of the students. The study indicated that rewards & punishments contribute towards the students achievements. The study suggested that future researcher may take up the issue of classroom management at various others level as well.

Keywords: Classroom Management, questionnaire, secondary school, average score,

Introduction

Sucuogly et al. (2010) stated that classroom management plays a pivotal role in the academic performance and overall development of a student's. A well-managed classroom is directly proportional to the performance and excellence of the teacher. It is a significant component of the teaching-learning process. The primary purpose of the effective classroom management is to keep the learners actively and effectively engaged in the teaching-learning process. Such are engagement means getting a learner to work with and act upon the material presented, progress through seatwork at a steady pace, participating in classroom discussion and being attentive when called upon.

Tsai et al. (2008) stated that classroom is the place where the teacher, student interaction takes place. The classroom environment is created by the method and level to which teacher uses power, shows love, support, encourage teamwork, and tolerance for freedom

of decision and selection. It is the teacher's choice to manage the classroom effectively or ineffectively. The teacher is the manager of the classroom and classroom management. The excellence and performance of the learners are dependent on the teacher's sincere prior planning and preportion, his strategies and methodologies.

Objectives of the Study

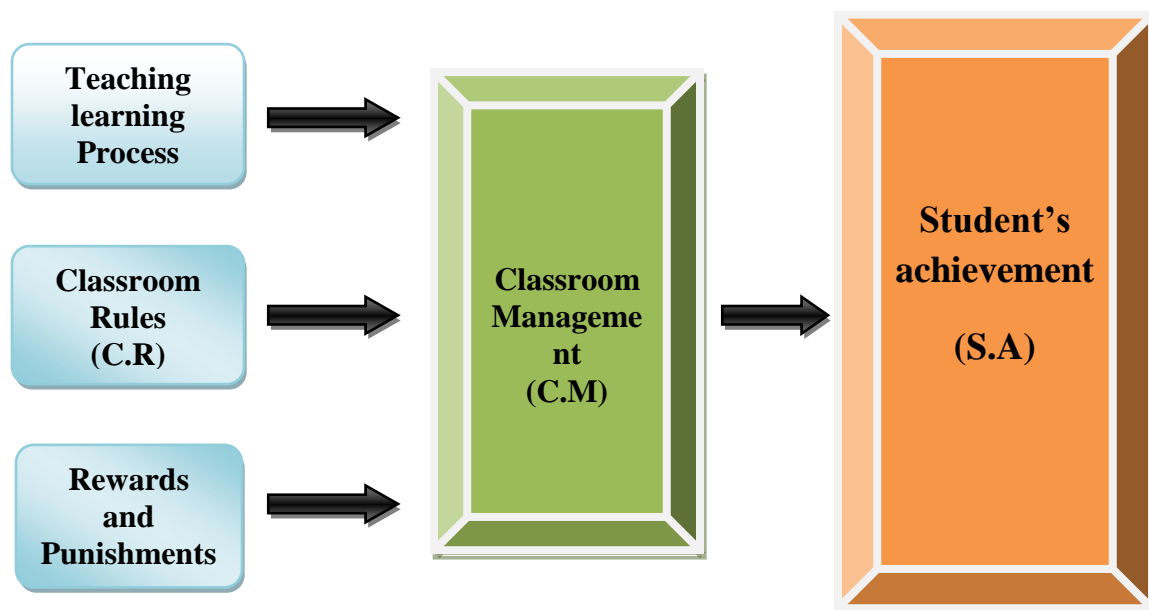
- To explore the relationship between classroom management and achievement level of students.
- To determine the relationship between classroom management and teaching learning process on the achievement level of students.
- To assess the impact of classroom rules on the achievement level of students.
- To evaluate the impact of rewards and punishment on the achievement level of students.

Hypothesis

- **H₀** There is no relationship between classroom management and students achievement level.
- **H₀** There is no relationship between teaching-learning process and student's achievement level.
- **H₀** There is no relationship between classroom rules and student's achievement level.
- **H₀** There is no relationship between reward-punishment and student's achievement level.

Conceptual Framework

Based on this paradigm following conceptual frame has been design for the study. Students achievements is dependent variable where as classroom management is the main independent variable along with three sub variables contributing to classroom management Teaching Learning Process, Classroom Rules and Rewards and Punishment.



Research Methodology

Research Design

Descriptive Research Method was used in this study. Primary data was collected through an adopted questionnaire and secondary data was obtained to the review of related literature including relevant books and researches.

Population, sampling procedure and sample size

The target population comprised of the study comprised all the SST/SET teachers at the secondary level. Forty Government High and Higher Secondary School were randomly selected for the selection of the sample of the study. There are total 658 SST/SET male teachers at the secondary level and total 240 SST/SET teachers were selected from the 40 schools in Peshawar.

Reliability test

The reliability was tested for all respondents responses on the respective items of all measures (CM, TLP, CR, and RP), and the probability values were estimated. The reliability value falling below 0.60s is poor, the 0.70s range is acceptable and 0.80 range and above are good. The reliability of the variables tested is unacceptable to good range.

Table No. 1. The reliability test of variables

Variables	Cronbach's Alpha
Classroom Management (CM),	.712
Teaching Learning Process (TLP)	.719
Classroom Rules (CR)	.734
Reward & Punishments (RP).	.755

One sample t-test for CM (Classroom Management)

One-sample t-test statistics, using SPSS for variable classroom management (CM), we got the following results in Table.

Table No. 2.

One-Sample Test						
	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
CM	18.143	239	.000	.90648	.8081	1.0049

The above tables No. 2 the mean value of CM estimates at 3.90 which is higher from the mid-point (= 3) and therefore it is estimated that majority of respondents are agreed. Mean value of

CM = 3.90 differ from mid-point (= 3) by .90648, and this variance is statistically significant at $p < 0.01$. With the help of this statistical result, the researcher concludes that (CM) Classroom Management has a significant role in the achievements level of the student's.

One sample t-test Statistics for TLP (Teaching Learning Process)

One-sample t-test statistics, for variable Teaching Learning Process (TLP), we got the following results in Table.

Table No. 3

One-Sample Test						
	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
TLP	20.577	239	.000	.76708	.6936	.8405

In case of the above both tables No. 3 the mean value of variable Teaching Learning Process (TLP) = 3.76 is greater than the mid-point (= 3) so therefore the majority of the respondents are agreed. Mean value of TLP = 3.76, and the above mean value is statistically significantly greater than the mid-point (= 3). Mean value of TLP = 3.76 varies from mid-point (= 3) by 0.76708, and this variance is statistically significant at $p < 0.01$.

One sample t-test Statistics for variable CR (Classroom Rules)

One-sample t-test statistics, for variable Classroom Rules (CR), we got the following results in Table.

Table No. 4

One-Sample Test						
	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
CR	6.953	239	.000	.31417	.2252	.4032

In case of the above both tables No. 4 the mean value of variable Classroom Rules (CR) = 3.31 is greater than the mid-point (= 3) it is stated that majority of the respondents are agreed. Mean value of CR = 3.31, and the above mean value is statistically significantly greater than the mid-point (= 3). The mean value of CR = 3.31 varies from mid-point (= 3) by 0.31417, and this variance is statistically significant at $p < 0.01$.

One sample t-test Statistics variable RP (Reward and Punishments)

One-sample t-test statistics, for variable Reward & Punishments (RP), we got the following results in Table.

Table No.5

One-Sample Test						
	Test Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
RP	12.970	239	.000	.61292	.5198	.7060

The above tables No. 5 the mean value of RP estimates at 3.612 which is higher from the mid-point (= 3) and therefore it is estimated that majority of respondents are agreed. Since mean value of RP = 3.612, and this mean value is statistically significantly higher than the mid-point (= 3). Mean value of RP = 3.612 differ from mid-point (= 3) by .61292, and this variance is statistically significant at $p < 0.01$.

Pearson Correlation test

Fitzgerald et al. (2004) stated that Correlation studies assess the strength of relationships as they occur or have occurred without experimental manipulation. Pearson Correlation test was used to evaluate the relationship and nature of strength between the different variables of interest.

Pearson Correlation between Classroom Management and Students Achievements

Table No. 6

Correlations			
		CM	AvMarks
CM	Pearson Correlation	1	.155*
	Sig. (2-tailed)		.016
	N	240	240
AvMarks	Pearson Correlation	.155*	1
	Sig. (2-tailed)	.016	
	N	240	240
*. Correlation is significant at the 0.05 level (2-tailed).			

Testing the Hypothesis No 1:

H₀ There is no relationship between classroom management and students achievement level.

Two hundred and forty Teacher's of high and higher secondary schools were surveyed about the CM (M= 3.9065, SD= .7740) and Students Achievements (M= 58.2583, SD= 10.65197). The coefficient of correlation of 0.155 shows that the two variables CM and SA was significant. On the basis of above correlation result, the null hypothesis was rejected.

Pearson Correlation between Teaching Learning Process & Students Achievements:

Table No. 7

Correlations			
		AvMarks	TLP
AvMarks	Pearson Correlation	1	.200**
	Sig. (2-tailed)		.002
	N	240	240
TLP	Pearson Correlation	.200**	1
	Sig. (2-tailed)	.002	
	N	240	240
**. Correlation is significant at the 0.01 level (2-tailed).			

Testing the Hypothesis No 2:

H₀ There is no relationship between teaching-learning process and student's achievements level. Two hundred and forty Teacher's of high and higher secondary schools were surveyed about the Teaching-learning process (M= 3.7671, SD= .57751) and SA (M= 58.2583, SD= 10.65197). The coefficient of correlation of 0.200 shows that the two variables TLP and SA was significant. On the basis of above correlation result, the null hypothesis was rejected.

Pearson Correlation between Classroom Rules & Students Achievements:

Table No. 8

Correlations			
		AvMarks	CR
AvMarks	Pearson Correlation	1	.150*
	Sig. (2-tailed)		.020
	N	240	240
CR	Pearson Correlation	.150*	1
	Sig. (2-tailed)	.020	
	N	240	240
*. Correlation is significant at the 0.05 level (2-tailed).			

Testing the Hypothesis No 3:

H₀ There is no relationship between & classroom rules and student's achievement level. Two hundred and forty Teacher's of high and higher secondary schools were surveyed about the Classroom Rules (M= 3.3288, SD= .66626) and Student's Achievements (M= 58.2583, SD= 10.65197). The coefficient of correlation of 0.150 shows that the two variables CR and SA was significant. On the basis of above correlation result, the null hypothesis was rejected.

Pearson Correlation between Reward & Punishments and Students Achievements:

Table No. 9

Correlations			
		AvMarks	RP
AvMarks	Pearson Correlation	1	.224**
	Sig. (2-tailed)		.000
	N	240	240
RP	Pearson Correlation	.224**	1
	Sig. (2-tailed)	.000	
	N	240	240
**. Correlation is significant at the 0.01 level (2-tailed).			

Testing the Hypothesis No 4:

H0 There is no relationship between Reward Punishment and Student's Achievement level.

Two hundred and forty Teachers of high and higher secondary schools were surveyed about the Reward & Punishments (M= 3.6129, SD= .73208) and Student's Achievements (M= 58.2583, SD= 10.65197). The coefficient of correlation of 0.224 shows that the two variables RP and SA was significant. On the basis of above correlation result, the null hypothesis was rejected.

Research Findings

1. One-Sample t-test confirmed that the majority of respondents were agreed with the points raised.
2. One-Sample t-test indicated that teaching learning process is contributing towards students achievements.
3. Classroom rules also have positively association with a student's achievements.
4. Correlation of classroom management and students achievement was significant.
5. Correlation of teaching learning process and students' achievement was found significant.
6. Correlation of classroom rules and students' achievement was significant.
7. Regression analysis indicates that the whole research was positively contributing towards students achievements.

Research Conclusion

The study confirmed that classroom management does contribute towards the achievement level of the students. The findings determine that the effective teaching learning process leads to better students' achievements. The study has also confirmed that classroom rules not only help in maintenance of discipline of the class but also positively contribute towards students achievements. It was concluded that rewards and punishments being a very effective instruments for the effective control & discipline of the class but also positively contribute towards students achievements.

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THE EFFECTING JOB SECURITY AND WORK LOAD ON JOB SATISFACTION OF TEACHERS AMONG HEIGHER EDUCATION INSTITUTION IN SOUTHERN PUNJAB

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Abstract

This study is aiming to investigate the relationship between job security and workload factors and teachers job satisfaction. This study has used SMART-PLS-SEM to analyze the data using quantitative research method. The research was conducted among 266 teachers. The teachers' job satisfaction were determined by two separate measures namely the teacher's job security and work load influencing teacher's job satisfaction. This study was triggers as teachers in higher education institutions were facing challenges regarding their job security and workload. The finding revealed that there is a significant association between teachers job security, workload and teachers job satisfaction. The influence of these factors calls for the further research. There is also need to carry out a similar but comparative study in rural settings. In addition it is very important to realize the importance of teachers' job satisfaction where the industry is so uncertain. There is a need to address job satisfaction and work load stress with appropriate assessment such as rating system and teachers' satisfaction index evaluation according to the tasks and work pressure allocated to each and every teacher. This reach adds value to knowledge by making universities, institutes and colleges administration to know the causes of teachers' uncomfortable zone regarding their job security and workload. Conversely, it is also important for the administration in these institutes to better understand the needs and demands of their teachers and what factors will contribute to their satisfaction.

Keywords: Teachers Job Satisfaction, Work load and Job Security

1. Introduction

1.1. Introduction

Human resources are the most precious asset of any institution. They are the corner stone of any working place. The educational sector is the most important sector to be considered in our economy. Teachers have an important role in building the financial structure of our economy so the state is responsible to encourage teachers for their profession through incentive or different enticement (Wiley, 2001). Level of employee satisfaction is one of the ways that make organization successful. The successful of education system depends on the contribution of academics (Lai Chee Yee, 2018). They are the main source of any society for encouraging the nation bringing the children and youth of any nation towards positive as well as prosperous sides. Teachers become the dissatisfied if they are not compensating with appreciation, recognition, security, salary and self-respect (Haq & Hussain, 2014). Teacher's satisfaction is a sort of universal problem (Cheng, 2002). The most dangerous factor for all the professions is dissatisfaction. And it is even more miserable if it is in the profession of teaching (Dogan, 2016).

The most crucial thing is to be satisfied with your job and environment or place where you are working. Worker performance is main thing that do promote their valued as well as attitudes. This study is aiming to investigate all the four (workload, job security,) factors which could influence teachers job satisfaction among private and public institutes in South Punjab-Pakistan. Therefore the research objectives of this paper are:

- 1) To investigate the relationship between job security and teacher's job satisfaction.
- 2) To investigate the relationship between workload and teacher's job satisfaction.

The educational system in Pakistan is undergoing structural transformation in response to change in the technological, economic and culture realms. Public and private institution gives same quality of service to student with reasonable prices for them. Academics staff will lay more effect on working, and it will help organization to produce more and higher quality employee graduates (Lai Chee Yee, 2018). As government is Pakistan is now paying more attention towards education, making new policies, introducing more projects to make it clear that "education for everyone". The root of these project starts from schools. If the children or students get good quality education they become able towards their goals. Good education can be achieved if teachers pay fully attention towards their job. The human resource department among educational institutes in Pakistan has great importance and institutes realize its meaning for their performance is rising with the passage of time. Universities and institutes are looking for competitive candidates and provide them market equivalent compensation to retain them and remain them as their satisfied employees. Improve students academics performance, university should ensure that academic staff is satisfied their job and deliver excellent job performance in the class (Lai, 2018).

2. Literature Review

2.1. Introduction

In 20th century is surrounds of worldwide competition and in this time mostly organization are focus to attain the competitive advantage over others (Yousaf, 2015). Many researchers now a day's give their focus on represent career because technical changes and international trends which produced a stormy natural context. In administration, it's contended that satisfied worker has higher performance. According to Noorshella, (2017) teaching and learning benefits and governess has significant influence on job satisfaction of academician in public universities.

2.2. Job Satisfaction

The organization considers and used many tools for satisfaction of employee like as job security, work place, targets etc. Atkhtar (2015) found that job satisfaction of teacher is a predicted by teacher retention, determine of teacher commitment in turn contribution to school effectively. According to Hall, (1996) study less satisfied employee has more intention and tendency to leave the organization. In addition Ostroff, (1992) proved in his study that satisfied of teacher was linked with the theoretical accomplishment, organization obligation, throughput, teachers quality work and their performance as well. According to Mueller, et, al, (1994); Price, (1997) demographic as well as administrative variable do have an impact on employee's commitment and this close impact is highly related with the job satisfaction of employee. According to Brkieh, Jeffs and Carless, (2002); Singh and Greenhaus, (2004) when employee skills and knowledge matches the performance then they perform well and also feel satisfied with their jobs. Satisfaction of mind is the right of all employees despite the difference in their cast, worksite, race and religion. According to Graham, (1998) job satisfaction is all about measuring an employee assertiveness and session for his job. It is basically the combination of employee's insolvencies about their task. It's about their impression of their tasks and duties.

Job security

Job security is one's expectation about continuity in job situation. It has to do with employee feeling over loss of job or loss of desirable job feature such as lack of promotion chances, current working conditions, as well as long-term career opportunities. Job security is an important factor in employee commitment. Institution teacher job security is ensured after confirmation of appointment. In other words the staff is accorded the tenure status. This means that the teacher cannot be dismissed from the job arbitrarily. Tenure, therefore, give the teacher a sense of job security (Abdullah & Ramay, 2012)

Many researchers have found that job security induce organization commitment of employees (Davy, 1997) investigate that job security significantly relate to employee satisfaction. Iverson (1996) find that job security has significant impact on organization commitment.

Job security significant has expanded and high light in the previous ten years feedback of employees why they change the organization. Yousaf and Waheed (2015) found that academic staff commitment is influenced by various factor but there are two major factors, (i) job security and (ii) job satisfaction. Job security is one's expectation related still in job situation. Job security is important part of job commitment (Akpan, 2013). Therefore, following hypothesis is developed:

***Hypothesis # 1:** There is a significant positive relationship between job security and job satisfaction among teachers in HEI*

2.5. Workload

Work itself plays a key in employee job satisfaction. Employee creativity enhances the company ability for gaining competitive advantage. This study reflects that in order to use the inspiration of employee the company must give them challenging, environment, and variety of tasks. It will also enable the employee to enjoy their and have a sense of pleasure about it (Raza, 2015).

A common problem of teacher is workload due to leave their job. They are not able to pay the attention on their job, when teachers are involved in some other activities. Work over load also consist of school duties perform outside the classroom, they work more 40 hours per week. Many teacher works during the summer vacation. Those teachers may teach in summer classes, take other jobs, journey (Cogalty, 2016). On the basis of above literature review following hypothesis is developed:

***Hypothesis #2:** There is positive relationship between work load and job satisfaction among teacher in HEI.*

3. Research Methodology

3.1. Introduction

Methodology adopted in research study discussed in this chapter. With that of methodology, Focus is also given to certain issues regarding data collection and sampling techniques. More attention is also given to the designing questionnaires and measuring process of variables. Our study is on impact of organization factor affecting the job satisfaction in the Southern Punjab. The study is an exploratory factors study that magnifies mainly on the identification of that is response for their job satisfaction. For the research instrument questionnaires is designed for getting the response of our respondents.

Research Model

To investigate the impact of relationship between organization factors provided by the institution to teacher with that of job satisfaction, proposed model of research is discussed below. Model research is as:

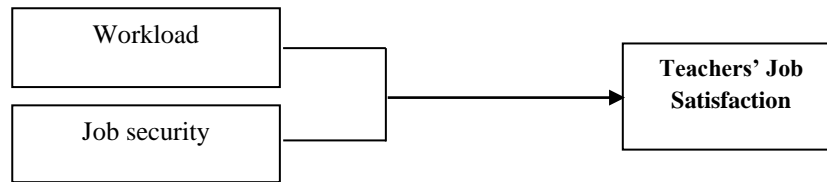


Figure 1: Conceptual Framework

3.3. Unit of Analysis

The unit of analysis is the main entity that is being analyzed in research. It is the 'what' or 'who' that is being studied. In social science research, typical units of analysis include individuals (most common), groups, social organizations and social artifacts. In this study unit of analysis are teachers from private universities, colleges and schools.

3.4. Population Frame

Table 1. Population Table

S. No	Name of Private Institute	Private	Public Institute	Total	Percentage (%)
1	Universities	3	13	16	1.0
2	Colleges	1500	200	1700	77.0
3	Schools	5000	1005	6005	272.0
Total Population				7721	350

Therefore, a total of 266 questionnaires (response rate 81 %) were considered valid and usable to analyze the data Yusr, (2013). On the other hand, it should be noted that 15 to 20 % minimum response rates in acceptable rate for the studies conducted in similar industry; due to the nature of this study. The main problem in such studies is the difficulty to attain the respondents who pertain all the information regarding their institution. Those studies which explore the organizational level, this response rate is quite normal and acceptable.

4. Result and Analysis

4.1. Reliability and Validity

From the Table 2 is demonstrating outer loadings, AVE, composite reliability, R-square, Cronbachs Alpha, communality, and redundancy. As proposed by Hair et al. (2006), that loading underneath 0.5 should to be dropped with an exact end objective to enhance normal change extricated (AVE) esteem. They furthermore explained that dropping qualities below 0.5 is essential to eject errors and mistakes in estimation in this manner enhancing usually speaking SEM display fit. Complying with their recommendation, the researcher dropped the accompanying loading from workload: WL1 (0.073221), WL2 (-0.03922), WL3 (-0.10859), WL4 (-0.066987), WL5 (0.090612) and WL6 (-0.058842).

Table 2. Measurement Model

Variables	Items Codes	Actual Outer Loadings	Outer Loadings After Items Deleted	AV E	Composite Reliability	R Square	Cronbachs Alpha	Communality	Redundancy
Job Security	JS1	0.983057	0.983057	0.96424	0.996639	0.997793	0.99629	0.964235	0.913586
	JS10	0.98371	0.98371						
	JS2	0.98198	0.98198						
	JS3	0.981776	0.981776						
	JS4	0.981523	0.981523						
	JS5	0.979958	0.979958						
	JS6	0.980426	0.980426						
	JS7	0.983256	0.983256			-			
	JS8	0.981101	0.981101						
	JS9	0.982825	0.982825						
Job Satisfaction	JSAT1	0.986926	0.986925	0.96425	0.996306		0.99588	0.964249	
	JSAT10	0.980238	0.980238						
	JSAT11	0.981072	0.981071						
	JSAT2	0.981192	0.981193						
	JSAT3	0.981803	0.981802						
	JSAT4	0.979504	0.979504						
	JSAT5	0.980196	0.980196						
	JSAT6	0.984843	0.984842						
	JSAT7	0.980738	0.980737						
	JSAT8	0.982798	0.982799						
	JSAT9	0.982167	0.982168						
Workload	WL1	0.073221	Item Deleted	0.96817	0.991849		0.989042	0.968173	
	WL10	0.984443	0.98491						
	WL2	-0.03922	Item Deleted						
	WL3	-0.10859	Item Deleted						
	WL4	-0.066987	Item Deleted						
	WL5	0.090612	Item Deleted						
	WL6	-0.058842	Item Deleted						
	WL7	0.981123	0.983206						
	WL8	0.982356	0.983007						
	WL9	0.985015	0.984707						

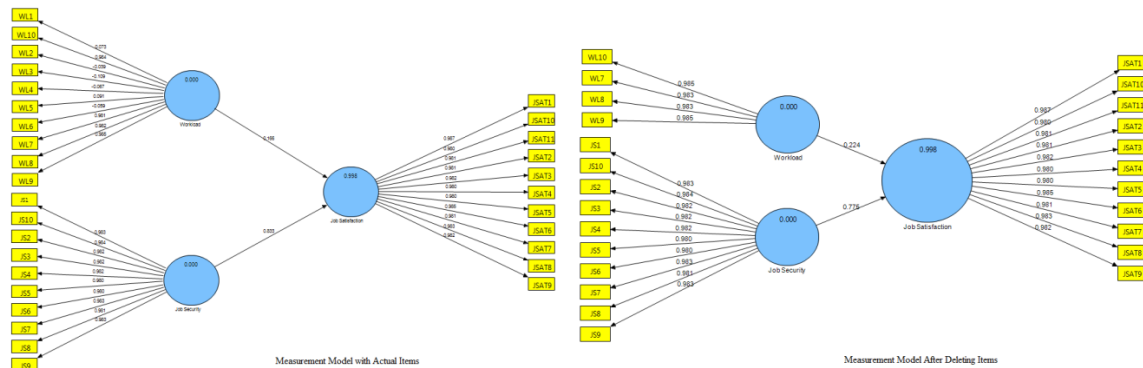


Figure 2. Measurement Model

Hypothesis Testing

In this section, the researcher will look for the answers of the stated research questions proposed above. Which are as follows?

- 3) To investigate the relationship between job security and teacher's job satisfaction.
- 4) To investigate the relationship between workload and teacher's job satisfaction.

H₁: Job Security Has a Significant Effect on Job Satisfaction

There is significant relationship between job security and job satisfaction ($t=5.338868$, $p<0.05$) because t-statistic is greater than 1.96 (refer to table 3). The relationship between the job security and the job satisfaction is the positive. Similarly, Dachapalli and Parumasur (2012) confirmed that opinion of high job security is linked frequency to increase the level of job satisfaction among staffs. When dissatisfaction of job security exists, employees afraid that they may dismiss one day and it will persuade their job satisfaction and less retention to stay at institution (Sverk, Hellgren & Naswall, 2002).

H₂ : Work Load has A Significant Effect on job satisfaction

There is a significant relationship between work load and job satisfaction ($t=2.551566$, $p<0.05$), because t-statistic is more than 1.96 (refer to table 3). Hence, simply conclude that work load significantly influence on job satisfaction. There is a significant relationship between work load and job satisfaction because t-statistic is more than 1.96. Hence, simply conclude that work load significantly influence on job satisfaction. Many researcher find his study that work load teaching and being a teacher, could play a role as a satisfier, daily targets could be classify as a factors that increase job satisfaction.

Table 3. Hypothesis Testing

Hypothesis #	Relationships	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	Standard Error (STERR)	T Statistics (O/STERR)	Acceptance / Rejection
1	Job Security → Job Satisfaction	0.77518	0.635678	0.145196	0.045196	5.338868	Accepted
2	Workload → Job Satisfaction	0.224321	0.244761	0.087915	0.037915	2.551566	Accepted

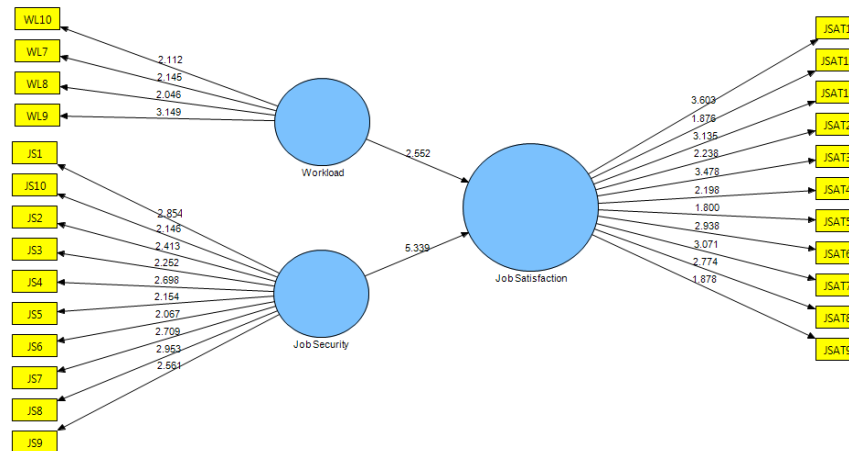


Figure 2. Structural Model

Discussion

This investigation of study that job security and job satisfaction has a positive correlation with each other. Institution can provide stability of job for teacher to constant their satisfaction. In addition, Raza (2015) workload plays a key role in employee job satisfaction. Employee inspiration enhances the company capability for gaining competitive advantage. On the same job employee feel motivated getting the different targets and they appreciate their freedom. There is a significant relationship between work load and job satisfaction because t-statistic is more than 1.96. Hence, simply conclude that work load significantly influence on job satisfaction. Many researcher find his study that work load teaching and being a teacher, could play a role as a satisfier, daily targets could be classify as a factors that increase job satisfaction. Crispen Chipunza (2017), job satisfaction related to what people do their work such as work itself. The consistent of many studies result that employee are satisfied with their nature and quantity of work.

Contribution of Study

Contribution of study to the generation of knowledge about institutions and academics professionals of high learning, forms base for similar study suggest strategies that can be adopt in other district of Punjab, and other provinces of Pakistan

Recommendation

Based on the finding of study, researcher recommended the following:

- A similar study is carried out in a business environment to establish the role of clients in enhancing employee commitment
- Further research is recommended for the contribution of other social stakeholders in education such as parents and institution management boards and committees.

Conclusion

The conclusion drawn from this study is that work load, job security, governance and job satisfaction of teaching staff. Also, there is a significant difference in relative contribution of job security and job satisfaction to educational staff commitment, with job security being the most potent contributor followed by job satisfaction. It would be deduced that university teachers who experience job satisfaction are expected to exhibit high institutional commitment. The same would be applicable with lecturer who perceives their job as being secure. Therefore, job security

and job satisfaction are two related concept that affect job attitudes and organizational commitment of institution of teachers.

There is a significant relationship between work load and job satisfaction because t-statistic is more than 1.96. Hence, simply conclude that work load significantly influence on job satisfaction

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Mathematics

ANALYSIS OF REGRESSION AND CORRELATION OF ENTROPY GENERATION OF NANOFLUID IN THE MHD PERISTALTIC FLOW

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Abstract:

This study presents the mathematical model of entropy generation on MHD peristaltic wave of Nanofluid. The governing equations have been developed by the assumption of low Reynold's number and long wavelength approximation. The analytical solution has been obtained with the help of perturbation method. The expression of temperature profile, pressure distribution and friction forces are presented graphically for some significant parameters. Further, the results of correlation and regression between the entropy generation and some other parameters have been plotted. It is very important to find the sensitivity of each parameter on entropy generation. Findings of regression analysis show that 81% of the variability of entropy generation for magnetic parameter, 99% of the variability of entropy generation for Brownian motion parameter, 40% of the variability of entropy generation for Thermophoresis parameter and 100% of the variability of entropy generation for Brinkmann is accounted for by the variable I_v . Similarly, a decrease of 2.562 in entropy generation for the various values of the independent variable Magnetic parameter, an increase of 2.029 in entropy generation for the values of Brownian motion, an increase of 6.307 in entropy generation for Thermophoresis and 68.492 in entropy generation scores for Brinkmann on every one-unit increase in I_v .

Keyword: Regression; Correlation; Magnetohydrodynamics; Nanofluid; Entropy Generation.

1. Introduction:

The use of heat transfer fluids is one of the technological applications of nanoparticles that hold enormous promise which containing suspensions of nanoparticles to confront cooling problems in the thermal systems. Due to the great demands placed upon the heat transfer fluids in terms of decreasing or increasing energy release to systems. A significance research work has been done by Choi and Eastman [1-2] that a mixture of nanoparticles and base fluid that such fluids were designated as "Nanofluid". He defined a liquid of ultra-fine particle with dia less than 100nm. In the field of thermal engineering and heat transfer nanofluid has always been an engrossing term. Peristalsis in the connection with nanofluid has various application such as in engineering, bio-sciences and industrial. Several theoretical and experimental attempts to this area have been contributed. Specially the works of Latham and Shapiro et al. [3] play very important role in this direction. Similarly, because of its multiple advantages, research findings on peristaltic flows have got wide application in industries, numerous attempts have been made to literature to explore this direction which can be viewed in the available reference [4-6].

Keeping in mind the above-mentioned discussion, in any of these studies correlation and regression has not been investigated. Therefore, the aim of the present study is to investigate the correlation and regression of entropy generation of the MHD peristaltic flow of nanofluid with a porous medium. For this purpose, the study applies the situation of small Reynolds number and long wavelength and an analytical technique named as Homotopy Perturbation Method (HPM) is used to solve the simplified partial differential equations. Expression for temperature, concentration pressure and entropy generation have been obtained graphically. Based on entropy generation results, correlation and regression derived and explained the role of some pertinent parameters on entropy generation. Such kind of investigations can be much beneficial to find the sensitivity of each parameter on objective functions which are we considered as entropy generation in this model.

2. Mathematical Formulation:

We present, modeling of the Peristaltic motion viscous, electrically conducting and incompressible nanofluid properties through a two-dimensional non-uniform channel with sinusoidal wave propagating towards down its walls. As it is mentioned in the Fig. (1) that cartesian coordinate system is taken in such a way that x axis is considered along with the center line in the direction of wave propagation and y is transverse to it. The B_0 , a uniform external magnetic field is imposing along the y axis and the induced magnetic field is assumed to be negligible. The geometry of the wall surface is defined as,

$$H(\tilde{x}, \tilde{t}) = \tilde{a} \sin \frac{2\pi}{\lambda} (\tilde{x} - C\tilde{t}) + b(\tilde{x}) \quad (1)$$

Where

$$b(\tilde{x}) = b_0 + K\tilde{x}$$

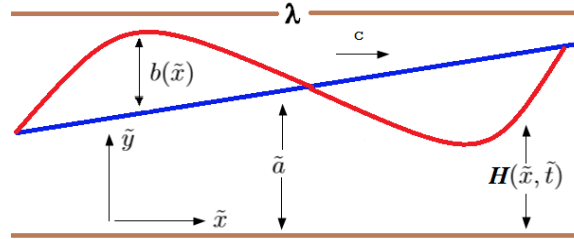


Figure 1. The geometry of the problem

The governing equation of motion, continuity, thermal energy and nano-particle fraction for peristaltic nanofluid can be written as [6].

$$\frac{\partial \tilde{u}}{\partial \tilde{x}} + \frac{\partial \tilde{v}}{\partial \tilde{y}} = 0, \quad (2)$$

$$\rho_f \left(\frac{\partial \tilde{u}}{\partial \tilde{t}} + \tilde{u} \frac{\partial \tilde{u}}{\partial \tilde{x}} + \tilde{v} \frac{\partial \tilde{u}}{\partial \tilde{y}} \right) = -\frac{\partial \tilde{p}}{\partial \tilde{x}} + \frac{\partial}{\partial \tilde{x}} S_{\tilde{x}\tilde{x}} + \frac{\partial}{\partial \tilde{y}} S_{\tilde{x}\tilde{y}} - \sigma B_0 \tilde{u} - \frac{\mu}{k} \tilde{u} + g[(1-F)\rho_{f_0}\zeta(T - T_0) - (\rho_p - \rho_{f_0})(F - F_0)], \quad (3)$$

$$\rho_f \left(\frac{\partial \tilde{v}}{\partial \tilde{t}} + \tilde{v} \frac{\partial \tilde{u}}{\partial \tilde{x}} + \tilde{v} \frac{\partial \tilde{v}}{\partial \tilde{y}} \right) = -\frac{\partial \tilde{p}}{\partial \tilde{y}} + \frac{\partial}{\partial \tilde{x}} S_{\tilde{y}\tilde{x}} + \frac{\partial}{\partial \tilde{x}} S_{\tilde{y}\tilde{y}} - \sigma B_0 \tilde{v} - \frac{\mu}{k} \tilde{v} + g[(1-F)\rho_{f_0}\zeta(T-T_0) - (\rho_p - \rho_{f_0})(F - F_0)], \quad (4)$$

$$(\rho c)_f \left(\frac{\partial T}{\partial \tilde{t}} + \tilde{u} \frac{\partial T}{\partial \tilde{x}} + \tilde{v} \frac{\partial T}{\partial \tilde{y}} \right) = \kappa \left(\frac{\partial^2 T}{\partial \tilde{x}^2} + \frac{\partial^2 T}{\partial \tilde{y}^2} \right) + (\rho c)_p D_B \left(\frac{\partial T}{\partial \tilde{x}} \frac{\partial F}{\partial \tilde{x}} + \frac{\partial F}{\partial \tilde{y}} \frac{\partial T}{\partial \tilde{y}} \right) + \frac{D_T}{T_0} \left(\left(\frac{\partial T}{\partial \tilde{x}} \right)^2 + \left(\frac{\partial T}{\partial \tilde{y}} \right)^2 \right) - \frac{\partial q_r}{\partial \tilde{y}} + Q_0, \quad (5)$$

$$\left(\frac{\partial F}{\partial \tilde{t}} + \tilde{u} \frac{\partial F}{\partial \tilde{x}} + \tilde{v} \frac{\partial F}{\partial \tilde{y}} \right) = D_B \left(\frac{\partial^2 F}{\partial \tilde{x}^2} + \frac{\partial^2 F}{\partial \tilde{y}^2} \right) + \frac{D_T}{T_0} \left(\frac{\partial^2 T}{\partial \tilde{x}^2} + \frac{\partial^2 T}{\partial \tilde{y}^2} \right) - k_1(F - F_0), \quad (6)$$

Now let us consider the assumptions of long wavelength number and low Reynolds approximations in the sense of creeping flow. By using dimensionless quantities in the Eq. (2) to Eq. (6), we get the resulting equations in a simplified form as

$$\frac{\partial^2 u}{\partial y^2} + We \frac{\partial}{\partial y} \left(\frac{\partial u}{\partial y} \right)^2 - \frac{1}{k} u - M^2 u - Gr_F \Phi + Gr_T \theta - \frac{\partial p}{\partial x} = 0, \quad (7)$$

$$\left(\frac{1+R_n}{Pr} \right) \frac{\partial^2 \theta}{\partial y^2} + N_t \left(\frac{\partial \theta}{\partial y} \right)^2 + \beta + N_b \frac{\partial \theta}{\partial y} \frac{\partial \Phi}{\partial y} = 0, \quad (8)$$

$$\frac{\partial^2 \Phi}{\partial y^2} - \gamma \Phi + \frac{N_t}{N_b} \left(\frac{\partial^2 \theta}{\partial y^2} \right) = 0. \quad (9)$$

Subject to the respective boundary conditions

$$, \quad \Phi(0) = 0, \frac{\partial u(0)}{\partial y} = 0, \quad \theta(0) = 0, \quad (10)$$

$$\Phi(h) = 1, \theta(h) = 1, \quad u(h) = 0 \quad (11)$$

In the presence of magnetic field, the entropy generation can be derived from energy and entropy balance for the case of heat and mass transfer as [8]

$$S_{gen} = \frac{\mathcal{K}_{nf}}{T_0^2} (\nabla T)^2 + \frac{\mu_{nf}}{kT_0} \left[2 \left(\frac{\partial \tilde{u}}{\partial \tilde{x}} \right)^2 + 2 \left(\frac{\partial \tilde{v}}{\partial \tilde{y}} \right)^2 + \left(\frac{\partial \tilde{u}}{\partial \tilde{y}} + \frac{\partial \tilde{v}}{\partial \tilde{x}} \right)^2 \right] + \frac{\sigma B_0^2}{T_0} \left(\frac{\partial \tilde{u}}{\partial \tilde{y}} \right)^2 + \frac{RD_B}{F_0} (\nabla F)^2 + \frac{RD_B}{T_0} (\nabla F \cdot \nabla T)$$

The dimensionless form of entropy generation number can be expressed as follows

$$N_s = \frac{S_{gen}}{S_g} = \left(\frac{\mathcal{K}_{nf}}{\mathcal{K}_f} \right) \left(\left(\frac{\partial \theta}{\partial y} \right)^2 \right) + (1 + M^2) B_r \frac{1}{\Omega} \left(\frac{\mu_{nf}}{\mu_f} \right) \left(\frac{\partial u}{\partial y} \right)^2 + \Gamma \left(\frac{\Lambda}{\Omega} \right)^2 \left(\frac{\partial \Phi}{\partial y} \right)^2 + \zeta \left(\frac{\partial \theta}{\partial y} \right) \left(\frac{\partial \Phi}{\partial y} \right), \quad (13)$$

Where $\Omega, B_r, \Lambda, \Gamma, \zeta$ are the dimensionless temperature difference, Brinkman number, concentration difference, diffusive coefficient and constant parameter are represented as

$$\Omega = \frac{(T_1 - T_0)}{T_0}, B_r = \frac{\bar{c}^2 \mu_f}{k \mathcal{K}_f (T_1 - T_0)}, \zeta = \frac{RD_B T_0}{\mathcal{K}_f} \left(\frac{F_1 - F_0}{T_1 - T_0} \right), \Gamma = \frac{RD_B F_0}{\mathcal{K}_f}, \Lambda = \frac{F_1 - F_0}{F_0}. \quad (14)$$

For nanofluid, the viscosity model and thermal conductivity can be defined as [19]

$$\mu_{nf} = \frac{\mu_f}{(1 - \bar{\phi})^{2.5}}, \quad \mathcal{K}_{nf} = \frac{\kappa_p + 2\kappa_f + 2\bar{\phi}(\kappa_p - \kappa_f)}{\kappa_p + 2\kappa_f - \bar{\phi}(\kappa_p - \kappa_f)} \kappa_f \quad (15)$$

here, κ_f and κ_p , are the thermal conductivities of the nanofluid and nano-particle respectively.

3. Solution of Problem:

Considering Eq. (7) to Eq. (9) and with the help of HPM [7] it can be written as:

$$\mathcal{H}(w, \tilde{q}) = (1 - \dot{q})(L_1(w) - L_1(\bar{w}_0)) + \dot{q} \left(L_1(w) + We \frac{\partial}{\partial y} \left(\frac{\partial w}{\partial y} \right)^2 + Gr_T \Theta - Gr_F \vartheta - \frac{\partial p}{\partial x} \right), \quad (16)$$

$$\mathcal{H}(\Theta, \tilde{q}) = (1 - \dot{q})(L_2(\Theta) - L_2(\bar{\Theta}_0)) + \dot{q} \left(L_2(\Theta) + \frac{Pr}{1 + R_n Pr} \left(N_b \frac{\partial \vartheta}{\partial y} \frac{\partial \Theta}{\partial y} + N_t \left(\frac{\partial \vartheta}{\partial y} \right)^2 \right) + \frac{Pr \beta}{1 + R_n Pr} \right), \quad (17)$$

$$\mathcal{H}(\vartheta, \tilde{q}) = (1 - \dot{q})(L_2(\vartheta) - L_2(\bar{\vartheta}_0)) + \dot{q} \left(L_2(\vartheta) + \frac{N_t}{N_b} \left(\frac{\partial^2 \Theta}{\partial y^2} \right) - \gamma \vartheta \right), \quad (18)$$

And the initial guess and linear operators for the Eq. (16) to Eq. (18) are defined as

$$\bar{w}_0 = \frac{\cosh N^2 y - \cosh N^2 h}{\cosh N^2 h}, \quad (19)$$

$$\bar{\vartheta}_0 = \bar{\Theta}_0 = \frac{y}{h}. \quad (20)$$

$$L_1 = \frac{\partial^2}{\partial y^2} - M^2 - \frac{1}{k}, \quad (21)$$

$$L_2 = \frac{\partial^2}{\partial y^2}, \quad (22)$$

Defining the following expansion

$$\vartheta(x, y) = \vartheta_0(x, y) + \dot{q}\vartheta_1(x, y) + \dot{q}^2\vartheta_2(x, y) + \dots, \quad (23)$$

$$\Theta(x, y) = \Psi_0(x, y) + \dot{q}\Psi_1(x, y) + \dot{q}^2\Psi_2(x, y) + \dots, \quad (24)$$

$$w(x, y) = w_0(x, y) + \dot{q}w_1(x, y) + \dot{q}^2w_2(x, y) + \dots, \quad (25)$$

Using the expensing series defined in term of $(\vartheta(x, y), (\Theta(x, y)$ and $(w(x, y))$ as mentioned in Eq. (23) to Eq. (25) into the Eq. (16) to Eq. (18) . We get a system of linear differential equations with their relevant boundary conditions. By comparing the powers of \dot{q} . Apply the scheme of HPM, we obtained the solution as $\dot{q} \rightarrow 1$, we get the required solution of temperature distribution, velocity profile, and concentration profile obtained.

4. Results and Discussion:

In this section the obtained results have been discussed. It depicts from Fig. (2) that for higher values of N_b and N_t Temperature profile increases. Because the Brownian motion creates micro-mixing which rises thermal conductivity. It is observed from Fig. (3) that pressure rise shows completely opposite behavior for the various values of thermal Grashof parameter Gr_T and Basic density Grashof number Gr_F . It can conclude from the Fig. (4a) that pressure rise reducing for the larger values of magnetic parameter M . Which shows the fact that pressure can be control by using the suitable magnetic field. Also, it is concluded from this figure that flow can pass easily without imposing higher pressure inside the channel. After analysis the Fig. (4b) of to Fig. (5), it is observed that there is completely opposite behavior of friction force for the different values of the same physical parameters as compared to pressure rise distribution.

From **Table 1**, the R-square Entropy generation for various values of magnetic parameter M is 0.809, meaning that approximately 81% of the variability of Entropy generation is explained by the parameter M in the model while adjusted R-square 0.799 indicates that about 80% of the variability of Entropy generation is accounted for Magnetic parameter M by the Model. Entropy generation values for Brownian motion parameter N_b is 0.998 which indicates that approximately 99% of the variability of Entropy is due to the parameter N_b in the model while, adjusted R-square 0.999 indicates that about 99% of the variability of Entropy is accounted for N_b by the Model. In the R-square the values of Entropy generation for the parameter Thermophoresis parameter N_t is 0.403 which reveals that approximately 40% of the variability of Entropy is explained by the parameter N_t in the model while adjusted R-square 0.370 indicates that about 37% of the variability of Entropy is accounted for N_t by the Model and the Entropy values for different values of B_r is 1.00 and that 100% of the variability of Entropy is accounted for the parameter B_r in the model while adjusted ,R-square 1.00 indicates that about 100% of the variability of Entropy is accounted for B_r by the Model.

It can be concluded from the **Table 2** that a decrease of -2.562 in Entropy for independent variable M , an increase of 2.029 in Entropy for N_b . Similarly, an increase of 6.307 in Entropy for the parameter N_t and increase of 68.492 in Entropy for B_r scores for every one-unit increase in I_v , assuming all other variables in the model as constant. **Table 3** is plotted to analyze the correlation of entropy generation for some sensitive parameters. It is concluded from these results that a significant perfect positive correlation exists between Brinkman number B_r and its entropy. Strong positive relationship has been observed from the correlation results between the entropy and the parameters N_t and N_b . There is a significant very strong negative correlation exist between M and its entropy.

5. Conclusions:

The Following outcomes demonstrated through this study are as:

- Temperature profile increases for higher values of N_b and N_t .
- Pressure distribution and Friction force has opposite behavior for larger values of the magnetic parameter, Brownian motion parameter and the thermophoresis parameter.
- The variability of entropy generation is 81% for the values of M while 99% variability for the parameter N_b .
- The variability of entropy generation is 40% for the values of N_t while 100% variability for the parameter B_r .

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.900 ^a	.809	.799	.7558884
2	.999 ^a	.998	.998	.0550427
3	.635 ^a	.403	.370	4.6675041
4	1.000 ^a	1.000	1.000	.19437519

Table 2. Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	74.223	.351		211.381	.000
	M	-2.562	.293	-.900	-8.739	.000
2	(Constant)	29.097	.026		1137.975	.000
	M	2.049	.021	.999	95.977	.000
3	(Constant)	65.565	2.168		30.239	.000
	M	6.307	1.810	.635	3.485	.003
	(Constant)	1.359	.090		15.056	.000
4	M	68.492	.075	1.000	908.676	.000

Table 3: Correlation table between entropy generation and parameters.

Entropy and Parameters	N_s Vs B_r	N_s Vs N_t	N_s Vs N_b	M	N_s Vs
Values range	0.1 to 2.0	0.1 to 2.0	0.1 to 2.0		0.1 to 2.0
N	20	20	20		20
Pearson Correlation	1.000 ^{**}	.635 ^{**}	.999 ^{**}		.900 ^{**}
Sig. (2-tailed)	.000	.003	.000		.000
Remarks	Perfect Relation	Strong Positive Relation	Strong Positive Relation		Very Strong Negative Relations

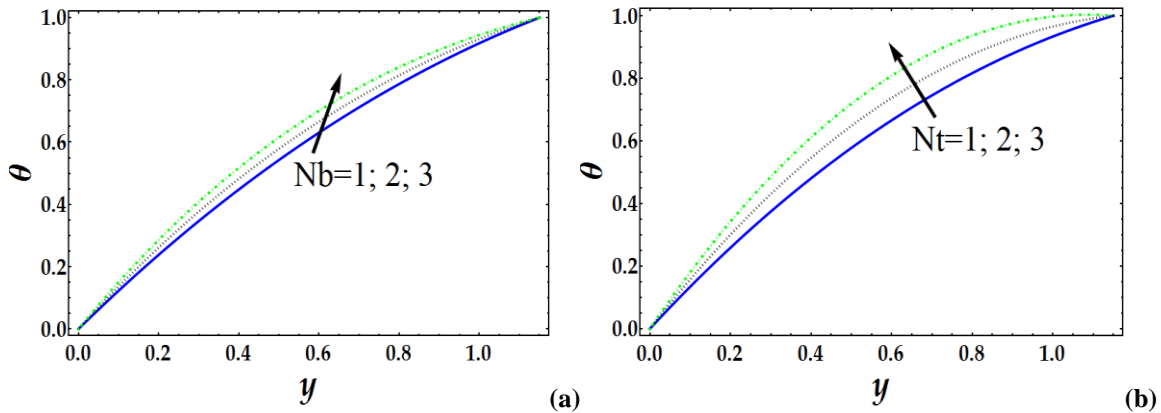


Figure 2: Temperature profile for various values of N_b and N_t when $P_r = 1, \beta = 0.8, We = 0.2, M = 0.1, Gr_T = 0.5, Gr_F = 0.6, \gamma = 0.1, k = 1$.

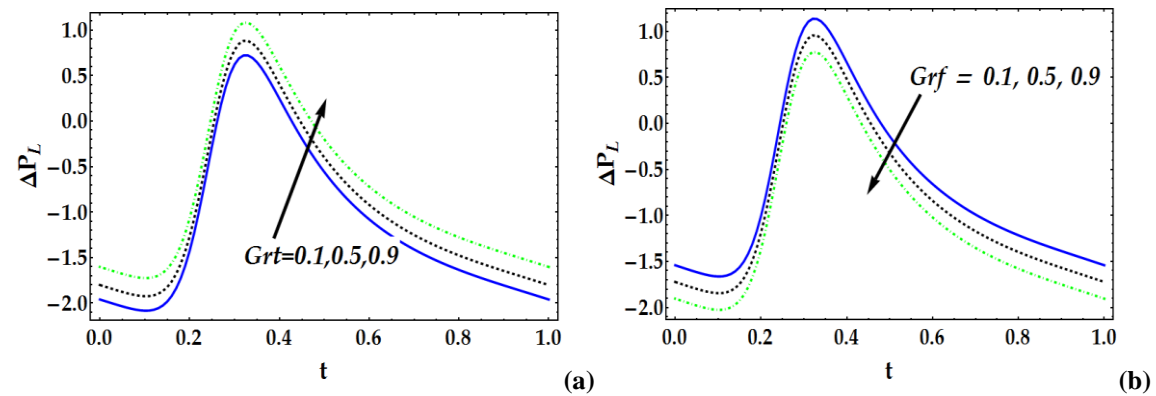


Figure 3: Pressure rise distribution for various values of Gr_t and Gr_f when $N_t = 1, \beta = 0.8, We = 0.2, M = 0.1, Gr_T = 0.5, N_b = 0.6, \gamma = 0.1, k = 1$.

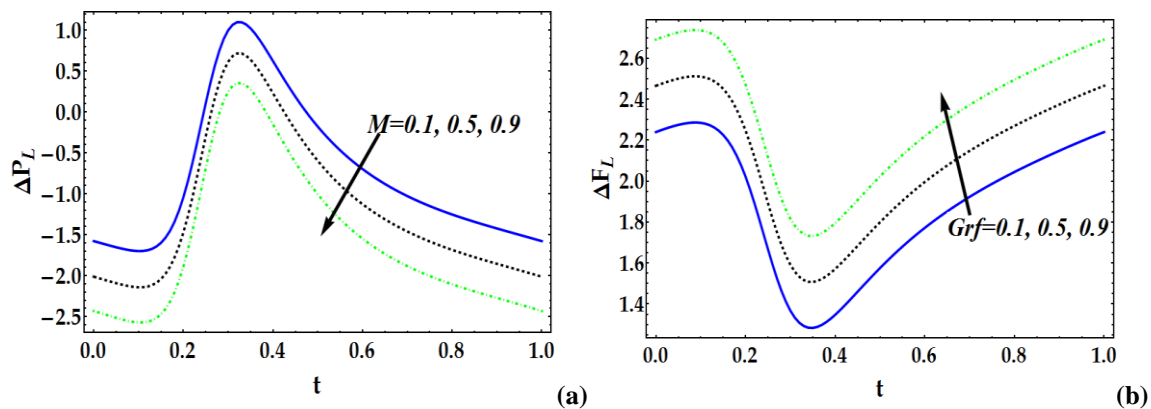


Figure 4: Pressure distribution for various values of M and Friction force profile for various values of Gr_f when $N_t = 1, \beta = 0.8, We = 0.2, M = 0.1, Gr_T = 0.5, \gamma = 0.1, k = 1$.

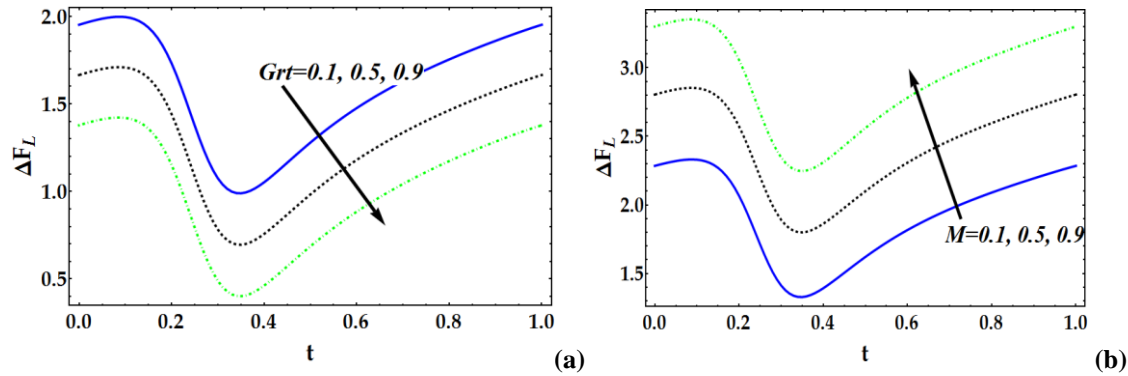


Figure 5: Friction force for various values of Gr_t and M when $N_t = 1, \beta = 0.8, We = 0.2, N_b = 0.1, Gr_F = 0.6, \gamma = 0.1, k = 1$.

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MULTI-STEP QUASI NEWTON'S METHOD WITH NEW ITERATIVE SCHEME FOR THE OPTIMIZATION OF NONLINEAR PROBLEMS

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Abstract

In multi-step Quasi-Newton methods, to update Hessian at each step, interpolatory polynomial is used to derive information from more than one previous steps. To calculate interpolating points Ford and Moghrabi developed techniques like Fixed and Accumulative point method. In this paper, we use three step Accumulative technique with new scheming to update Hessian. The numerical results indicates successive performance with comparison to existing BFGS method.

Keywords: Hessian, quasi-Newton's method, Langrangian polynomial.

Introduction:

In this paper, we are concern to solve nonlinear high dimensional optimization problem. Such as

$$\min f(x) \quad (1)$$

Where $f(x)$ is continuous and twice differentiable. There are numerous iterative methods presents in literature to solve such optimization problems [1]. Among all these methods, the class of quasi Newton's methods considered best in case of large dimensional problems. These methods are variants of Newton's method. In Newton method, we are to compute double derivative at each step, which is become very hard to compute in case of high dimensions [9]. Where in quasi Newton's methods double derivative $\nabla^2 f(x)$ (Hessian) is updated through suitable approximation [2]. BFGS formula is one of the most popular and commonly used technique of this class [3]. Because of its favorable numerical experience and fast theoretical Convergence [6-8]. In this method, the approximated Hessian matrix B_{i+1} is updated by the following formula,

$$B_{i+1} = B_i + \frac{y_i y_i^T}{y_i^T s_i} + \frac{B_i s_i (B_i s_i^T)}{s_i^T B_i s_i}. \quad (2)$$

and the inverse of Hessian is approximated by,

$$H^{-1} = \left(I - \frac{y_i s_i^T}{y_i^T s_i} \right)^T H_i \left(I - \frac{y_i s_i^T}{y_i^T s_i} \right) + \frac{s_i s_i^T}{y_i^T s_i}. \quad (3)$$

Where $s_i = x_{i+1} - x_i$ and $y_i = g_{i+1} - g_i$ are vectors. And $g_i = \nabla f(x_i)$ is the gradient vector of f . The updated matrix B_{i+1} is need to satisfy the secant equation,

$$B_{i+1} s_i = y_i. \quad (4)$$

Furthermore, Ford and Moghrabi [4] introduced multi-step Quasi-Newton methods. Where they showed, how to update Hessian at each iteration by employing interpolating polynomials to derive accurate information from more than one previous steps. The updated Hessian approximation B_{i+1} in multi-step methods is acquire to satisfy the relation,

$$B_{i+1} r_i = w_i. \quad (5)$$

Where r_i and w_i are multi-step vectors, calculated through interpolating polynomial.

Multi-Step Methods

In multi-step methods, the vectors r_i and w_i are calculated from available multi iterative points by defining a path X to be polynomial $x(\tau)$ of degree m . Generalizing these vectors, let us suppose we have two current iterates x_k , x_{k+1} and $m - 1$ most recent iterative points with their corresponding gradient values are available to us, such as, $x_{k-m+1}, x_{k-m+2}, \dots, x_{k-1}$. Thus, in total we have $m + 1$ iterates. The interpolating polynomial $x(\tau)$ can be define as,

$$x(\tau_k) = x_{i-m+k+1} \quad \text{for } k = 0, 1, \dots, m. \quad (6)$$

This polynomial depends on values of $[\tau_k]_{k=0}^m$. Initially, it is taken to be

$$\tau_k = k - m + 1 \quad \text{for } k = 0, 1, \dots, m. \quad (7)$$

The interpolating polynomial and its gradient can be approximated by Langrangian form of polynomial, i-e

$$x(\tau) = \sum_{k=0}^m L_k(\tau) x_{i-m+k+1} \quad (8)$$

$$g(x(\tau)) = \sum_{k=0}^m L_k(\tau) g(x_{i-m+k+1}) \quad (9)$$

Where $L_k(\tau)$ presents Langrangian form of polynomial

By differentiating (7) and (8), the required relation (4) can be satisfied as

$$r_i \triangleq \dot{x}(\tau) = \sum_{k=0}^m L'_k(\tau_m) x_{i-m+k+1} \quad (10)$$

$$w_i \triangleq g'(x(\tau)) \approx \sum_{k=0}^m L'_k(\tau_m) g(x_{i-m+k+1}) \quad (11)$$

Where $L'_k(\tau_m)$ can be explicitly define as

$$L'_k(\tau_m) = (\tau_k - \tau_m)^{-1} \prod_{\substack{j=0 \\ j \neq k}}^{m-1} \frac{(\tau_m - \tau_j)}{(\tau_k - \tau_j)} \quad \text{for } k \neq m.$$

And

$$L'_m(\tau_m) = \sum_{j=0}^{m-1} (\tau_m - \tau_j)$$

Ford and Moghrabi showed [5] that r_i and w_i can be written in terms of most recent step vectors $\{s_{i-j}\}_{j=0}^{m-1}$ and $\{y_{i-j}\}_{j=0}^{m-1}$.

$$\begin{aligned} r_i &= \sum_{j=0}^{m-1} s_{i-j} \sum_{k=m-j}^m L'_k(\tau_m) \\ w_i &= \sum_{j=0}^{m-1} y_{i-j} \sum_{k=m-j}^m L'_k(\tau_m) \end{aligned}$$

They have tested this algorithm for two and three steps. In this paper, we are using three steps technique.

In order to choose suitable values for $[\tau_j]_{j=0}^m$ Ford and Moghrabi [5] defined different approaches. Accumulative and Fixed point technique. In this paper, our focus is upon Accumulative technique. Furthermore, the distance between two iterates is define by θ_M with the any appropriate positive-definite matrix (M say)

$$\theta_M(y_1, y_2) = \{(y_1 - y_2)M(y_1 - y_2)\}^{1/2}$$

They have used different choices of M such as, $M = I$, $M = B_i$ and $M = B_{i+1}$. In our procedure , we used $M = B_i$.

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EFFECT OF ROOTS AND RUNNERS IN STRAWBERRY ALGORITHM FOR OPTIMIZATION PROBLEMS.

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Abstract

It is usually difficult for humans to solve a real world problem. Although for million of years nature has its own ways to look into these problems and solve them. Hence, now a days when man made methods do not work in these situations, they turn to Nature for problem solution. Therefore, the so called Nature inspired algorithms/ Heuristics are developing rapidly. Generally it is difficult to find the optimum solution of the problem by using Heuristic methods. On the other hand these methods are good in approximating the solution in justifiable time. One of such algorithm is known as Strawberry Algorithm (SBA). Here, we propose to investigate the effect of roots and runners in SBA.

Introduction

Nature has played an important role for development of new optimization algorithms for the solution of complex engineering problems. Rechenberg was among first researchers who tried to develop a cybernetic (the science of communications and automatic control systems in both machines and living things) solution to a practical problem. However, Holland developed the genetic algorithm (GA), one of first of its kind, used for the solution of complicated problems. Till date a variety of nature inspired algorithms are available such as the GA, Particle Swarm Optimization (PSO) [1], [2], Ant Colony Optimization (ACO) [3], [4], Artificial Bee Colony (ABC) algorithm [5], [6], Simulated Annealing (SA) [7], [8], Firefly Algorithm (FA) [9], Bacterial Foraging Optimization (BFO) [10], Artificial Immune System (AIS) [11], [12], shuffled frog-leaping algorithm [13], Differential Evolution (DE) [14], [15], and Imperialist Competitive Algorithm (ICA) [16], have attracted more attentions. Enormous best approximation solutions in complicated engineering problems have been found through these techniques [17], [18], [19]. Though, these algorithms are different in nature but they have some similarities, usually in the form of application of random variable, how they deal with uncertain and non differentiable functions, use of more than one computational agent for finding the domain of problem except SA where only one agent is used, use of function values rather than using its derivatives. All these nature inspired algorithms uses the behavior of a certain living thing or its colony or some physical activity by performing some type of optimization. In order to model such algorithm random variables are used for iteration, also in these procedures the algorithm remembers the good solution of previous steps and uses it as finest agent of the colony which will have more chances of survival and reproduction.

All above mentioned algorithms have some advantages and disadvantages, none of the above algorithm can be described as best due to the fact that every algorithm behaves well in certain

conditions. As one of the main reason for an algorithm to be considered as best is the turning parameters, fewer the turning parameters better the algorithm. Keeping in mind the above mentioned fact, the Intelligent water drops (IWD) algorithm is not considered as good algorithm as it uses too many tuning parameters without giving any general procedure. PSO is fast but some time when it is trapped in local minimum its hard for algorithm to escape it. SA has disadvantage of sensitivity to initial guess and have low chances of finding global solution Though GA has advantage over PSO that its solution is always within the region defined by boundaries defined by variables, on the other hand GA has disadvantage of being slow and having restricted accuracy due to coding [20], [21]. Hence it can be concluded from above discussion that any algorithm which uses less tuning parameters in trial and tuning process is more effective, have faster convergence rate and more possibility of escaping from local optimum. On the other hand effectiveness of these algorithms depends on problem considered, as one algorithm may behave good in one type of problem and may behave worse in other problems. Strawberry algorithm (SBA) is also one such type of algorithm, inspired from strawberry plant, used for solution of multi variable problems [22]. The main difference between SBA and other natured inspired algorithms [23] is that here the number of computational agents (an important factor in each algorithm) differ from start till end. In this algorithm half of the weak agents are discarded and good agents are duplicated at each iteration [re for strawberry]. Few other advantages of SBA are that the agents comprise of both large and small movements throughout hence making it possible to find the local and global optima at the same time. Another main difference among SBA and other algorithms is that in SBA the agents does not affect other agents. Therefore, to find the local and global search, at each iteration runners and roots both are developed through this algorithm. Another of this type of algorithm is known as seed based algorithm [24], where queuing process result in seed based search algorithm. Here researchers have used the idea of SBA but instead of using runners and roots they have considered strawberry seeds for propagation.

Strawberry Algorithm

Humans and animals have superiority over plants in many ways, as they have brain and muscles which help them to bear the ecological changes around them and help them to migrate to places with better environmental conditions. The migrants, both humans and animals, during war time and natural disasters, is one of the best example of one of their edge over plants. On the other hand plants (in most cases) can not propagate freely, due to the fact that they are attached to the soil. However, propagation is possible in some types of pastures and plants (like strawberry) through, both, roots and runners. The roots and runners are produced by the parent plant (also known as mother plant), one side of the runner is attached to mother plant whereas the other side is free to move. The free side then produces another plant when landed to fertile land, otherwise, it dies. This new plant, produced by runner of mother plant, is also known as daughter plant. The runner has few unwarranted roots which grows when landed to fertile land. When the daughter plant, produced by the runner, has sufficient roots it can be separated by mother plant and can itself now behave like mother plant. It has been observed that the mother plant usually dies earlier than the daughter plant unless daughter plant lands on the land with bad conditions.

It has been observed by F. Merrikh-Bayat [22] that strawberry plants (or any other plants with runners) are very good examples of optimization, as both global and local search is being performed by these type of plants. Furthermore, it was also pointed out that development of runners and roots is purely random, but it does effect mother plant if runner or root hairs finds a fertile land with lot of water resources which basically helps the daughter plant to grow more roots and runners. F. Merrikh-Bayat had modeled the behavior of these plants to find the optimization algorithm. The algorithm was modeled for global and local search by considering three facts:

- Roots and its hairs are developed by mother strawberry plant randomly (to check the local search for fertile land).
- Runners (generated randomly) propagate each strawberry plant (to find the global search for resources).
- Survival of each strawberry daughter plant depends on its access, if landed to fertile area it will grow faster and will die if lands on poor resources.

Hence, the SBA is developed by first generating few points (each of them considered as mother plant) in the domain of problem, called computational agents. Furthermore, single root and single runner (daughter plant) is generated by mother plant in each iteration, root will be in very near location and runner in farther locality. Hence, the computational agents contains the roots and runners who's movement in domain of the problem is considered as small and large steps. Then the roots and runners in computational agents evaluates the objective function, among the points considered half are selected on basis of higher fitness level produced by the agents (points). In algorithm this procedure is repeated unless it satisfies the termination criteria given in algorithm.

Genetic Algorithm

Many researchers have worked on understanding the link between machine learning and nature's system and finding the way how machine learning can perform better while borrowing from nature [25], [26]. One of such algorithm which inspired the researchers is Genetic Algorithm (GA). Charles Darwin's theory of natural evaluation inspired researchers to develop the search investigation known as GA. In this algorithm nature's process of selection is used to select the individuals (which have best fitness among them self) for reproduction to generate the descendants (off springs) of future generation.

In GA consists of five phases:

1. Early population (or initialization)
2. Fitness Value (or function)
3. Selection
4. Crossover
5. Mutation

In GA, basically iterative process is used in order to find the solution of considered optimization problem [27]. In this process, a set of individuals is considered known as Population set, here it is important to note that each individual is solution to the problem considered. Furthermore, each individual is categorized by number of factors called Genes. These genes are then connected to strings to formulate a Chromosome (known as solution to problem). These randomly chosen individuals are used at each iteration and are known as generation. In this process each individual has to pass through the fitness process (or function), which determines how fit each individual is when compared to other individual. This process provides a fitness point to every individual. Hence, selection of individual for future generation depends on the point values given by these fitness functions. In third phase, selection process, the individuals (parents) with best fitness scores are selected authorizing them to pass on their genes to future generation. The crossover phase is the most important one, in this phase randomly a crossover point is chosen for every pair of parents. The parents exchanges the genes, unless the crossover point is reached, and produces the off springs. These newly produced off springs becomes part of the population. Among these new offspring some are subjected to the next phase, known as mutation, in this process some points or bits can be turned over in bit string. This process is mainly used to avoid the reproduction of same offsprings and avoid the convergence before time. This algorithm stops

when termination criteria is fulfilled, means, the population does not produces next generation, which is different from previous one. The set obtained after termination criteria is satisfied is called the solution set to our problem.

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Engineering & Technology

LIGHTING CONTROL WITH BUILDING AUTOMATION AND MOTION SENSORS FOR ENERGY EFFICIENCY

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Abstract

According to past examination alluded to workplaces applications, funds due toward control frameworks' settling have the capacity to go from 9% to 30% thinking about diminishing light connected controls from 3% to 38% considering inhabitation based ones. An orderly and arrangement report, distributed through Research Center that lighting 10%ly affects add up to vitality costs for lodging structures. The use of mechanized control frameworks can effectively diminish vitality utilization. Past the water and sustenance emergency, it is the season of financial and vitality emergency over the world. The vitality execution of control is influenced by numerous elements, and this is greatly difficult to account that issue amid the strategy of planning. The point and target of this paper is to clarify the elements that spare vitality and control vitality execution, to inspect how the estimation instruments consider lastly proposing a simple technique to modify results get from the PC recreation programming. A few lights on the mockup load up will be reachable that will show the veritable time choices of Actuators by exchanging and diminishing. Lighting Control Systems take a shot at DC framework. This is the reason a Power supply to trade AC to DC and gives yield required to EIB correspondence voltages. An actuator is a mechanical assembly that produces a movement by changing over vitality and signs going into framework. The movement it produces can be either rotational or direct. We have too Z41 Full Color Capacitive touch board which is a capacitive touch board which speak to a progress in Digital Home control. Sensors permit you to sense motion, approximately always used to sense whether a human being have moved inside or out of the sensors range. Combination of Building Management Systems over single universal system. Lighting blinds, heating and ventilation can be automatically controlled via E.I.B cable. This radically reduces the wiring necessary in a modern building. Plain copper conductors 0.8mm, Polyethylene insulation, cores twisted into pairs, pairs laid up, aluminum/polyester foil screen, stranded tinned copper drain wire, least 1 pair cable to run down volts for communication between networked field controllers and interfaces. Following are the focuses that finish up the possibility of this Research structure, Greater vitality administration at the building

level, the road light framework, in which lights open when required and light-off when not required is for all intents and purposes characterized in explore work since this is loss of vitality and this real subject in Pakistan.

Keywords: Daylight, lighting control systems, energy savings

1. Introduction

Energy expenses of lighting systems be able to characterize a huge piece of buildings whole energy expenses furthermore they vary depending on a building's function. A new systematic and policy report, published through Research Centre that lighting has a 10% impact on total energy expenses for housing buildings. The utilize of automated control systems can efficiently decrease energy consumption. Past the water and food crisis, it is the time of economic and energy crisis across the world.

These systems are normally separated in three kinds: timers, occupancy-based and sunlight-linked controls. Timers without human intervention turn on and off lights depending on timetable. Occupancy-based controls regulate lights thanks to the use of occupancy sensors. lastly sunlight controls switch on and off or dim light as a per sun light comes which are detected by sensors called as photo sensors .

As per previous study referred to offices applications, savings due toward control systems' fixing be able to range from 9% to 30% taking into consideration dimming daylight-linked controls from 3% to 38% considering occupancy based ones .

The majestic variation inside the reported data are due to lots of factors: daylight availability, lighting systems' characteristics, controls' settings. A quantity of of these affecting factors can influence the performance of all control systems' types This is lighting classification uniqueness), although others are severely depend lying on the preferred control technology like. photo sensors and daylight-linked organism). Throughout the design procedure it is very hard to account for all these parameters and to predict the achievable energy savings. Consequently it is tough to calculate the subsequent payback period and the financial advantages of a specific design explanation.

Though earlier studies demonstrated that the use of different software may determine discordant energy savings outcome . Given these premises, the aim of this paper is on one hand to analyze the disturbing factors that influence the energy performances of different control systems and on the further hand to analyze which of them are considered by simulation software and which not. Lastly, considering that tools' approximations influence the evaluation of calculated energy savings, the paper proposes to adjust software results via the use of correcting factors defined on the basis of the mentioned affecting parameters.

1.1 Energy efficiency

a) Reference/residential/how to reduce energy usage

Energy preservation put into practice of dropping the use of energy. Individual customers be able to perform various things toward conserve energy and decrease home energy expenses. Assume presently a a small number of strategies be able to create a calculable differentiation within overall energy usage, as well as the energy load of the world.

Troubles of energy conservation can be solved only with efforts at domestic, the same as well as on industrial level. Therefore, each person must think it to be his/her personal task in favor of judicious use of electrical energy, therefore to save it for the upcoming generations.

That's why we implementing multiple intelligent controls to reduce consumption of electrical energy. Techniques like infrared motion sensors, Time switches. The thought of controlling lightings through different means proves the elasticity of system to be used within any occupancy

similar to housing and commercial apartments, industries and hospitals. Prefer energy-efficient residence appliances, which have been designed with energy conservation in mind. In the United States, Energy Star is a government agenda to encourage energy-efficient customer products. The EU energy label is a like European Union program. Fix motion-detection switches or timers for outside lighting relatively than leaving lights on all nighttime. Set up dimmer switches for glowing light equipment so you can use a lesser amount of light when less is required.

1.1.1 Building management system

A building automation system is fully Programming-based control system that fix in any home system used for controlling and check the whole building's equipments like HVAC, lighting system, fire alarm systems, furthermore controlling of security systems. A BMS consists of software as well as hardware; the software program

1.1.2 Experimental data and results:

a) *Led lights:*

several lights on the mockup board will be obtainable that will demonstrate the genuine time decisions of Actuators by switching and dimming.



Figure 1: DC light

b) *Power supply:*

Lighting Control Systems work on DC system.

- KNX Power Supply 160mA Plus 29VDC



Figure 2: DC Power Supply

c) *Actuators:*

An actuator is a apparatus that manufacture a motion by converting energy and signals going into system. The motion it produces can be either rotary or linear. There are going to be two types of actuators:

- Switching (ON/OFF)
- Dimming (Phase or 0-10V)
- Inside this Project we make use of Multi function KNX Multifunction Actuators
- KNX standardized designed for building automation European Home Systems Protocol (EHS) and European Installation Bus (EIB).



Figure 3: An actuator

d) Z41 pro. full capacitive touch panel:

We have as well Z41 Full Color Capacitive touch panel which is a capacitive touch panel which represent an advance in Digital Home control



Figure 4: Full Capacitive Touch Panel

e) Motion sensor:

The Sensor allow you toward sense movement, approximately for all time used to sense whether a human being have moved surrounded by or elsewhere in 2M of distance sensors range.



Figure 5: Motion Sensor

f) EIB communication cable:

Combination of Building Management Systems over single universal system. Lighting, blinds, heating and ventilation can be automatically controlled via E.I.B cable. This radically reduces the

wiring necessary in a modern building. Plain copper conductors 0.8mm, Polyethylene insulation, cores twisted into pairs, pairs laid up, aluminum/polyester foil screen, stranded tinned copper drain wire. least 1 pair cable to run down volts for communication between networked field controllers and interfaces.



Figure 5: An EIB Communication Cable

2. Results:

Power in wattage units will be calculated to examine estimated decrease in percentage of electrical energy after using intelligent lighting control system in small scale.

There are a lot of profits of lighting control a few are

- Reduce the cost of bill.
- Conservation of electrical energy.
- Dimming saves energy and the environment while enriching your life.
- Switching off *lights* when not in use.
- Turn on the lights when it required.



Figure 6: Prototype model designed on Adobe Photoshop

3. Conclusion

Look ahead to attain middle level proficiency in advanced automation Systems & promote smart usage of lighting to decrease energy consumption and encourage idea of Smart Cities. Following are the points that conclude the idea of this project:

- Greater energy management at the building level
- The street light system, in which lights open when required and light-off when not required is practically defined in project since this is loss of energy and this major topic in Pakistan.

- Its human being tendency of take no notice of little consumption in their homes and offices and eventually end up being victimized of countable high electrical bills. We want to approach up with newest tendency of smart lighting system.

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SYNCHRONIZATION OF CHAOTIC SYSTEM VIA SLIDING MODE CONTROL

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Abstract

In this paper, synchronization is proposed for a general chaotic system while a new control strategy based on Sliding Mode Control with known parameters to be tracking of desired trajectory achieved with a systematic way. In this model a complete synchronization are achieved through sliding mode control, the nonlinear control approach that interlaces the appropriate choice of Lyapunov function. The numerical simulation show that the new proposed control input to enforce system dynamics to stability and the synchronization error is zero on the other hand, system will be asymptotically stable. The simulation results show the applicability to the control system of this synchronization.

Keywords: Nonlinear, Lyapunov, Synchronization, chaos.

1. Introduction

All bodily structures are non linear through nature. In order to achieve the higher expertise about the dynamical behavioris one-of-a-kind of non linear system. An interesting and essential concept is to inspect closely the synchronization among the dynamical structures, has vast effect in different regions of engineering, Medical, all categories of sciences, technology or even within the social life. Synchronization of nonlinear (SON) structures is an attractive area among the scientists and mathematicians. Also have some of the researchers of diverse disciplines owing to its several applications and advantages in the fields of engineering and technology. Many struggles by scientists and researchers have been dedicated to make an analysis the problem of SON.

Figure: (1), show the fundamental version for SON device through the ideal controller. An error convergence is vanished through a suitable manipulate input signal $u(t)$ to response system and then the some part of output signals $y(t)$ is fed back to controller.

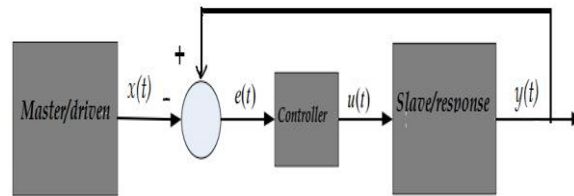


Figure 1: Block diagram of synchronization using controller.

From the last decade chaos synchronization has been focused, for controlling chaos synchronization there are so many techniques such as adaptive feedback control, state feedback control and observer based control have been developed. Furthermore, a few appealing consequences of chaos synchronization for a class of various chaotic structures have been mentioned [1-17].

Based totally on above consequences, a massive range of chaos synchronization schemes are aimed toward asymptotical stability of errors synchronization dynamics.

Chaos concept describes the qualitative take a look at of risky and unstable nonperiodic behavior in deterministic nonlinear dynamical systems. Each dynamical system can call a chaotic system if it satisfies the three properties: boundeness, countless recurrence and sensitive dependence on initial conditions that popularly referred to as butterfly effect [1].

Chaos is characterized by the approach of dynamical system which does no longer repeat itself, even though the system is ruled out by deterministic equations. Within the equal manner that point and the frequency are used to perceive chaotic signals, phase-plane and correlation are used to discover the attractor and randomness of the chaotic system. The attractor is a region of the state space from which there are no exit paths. That is, factors that get near sufficient to an attractor remain near even though they may be barely disturbed. Attractor's contain of single state called an equilibrium state, or a cycle of states called a limit cycle. For chaotic systems, the attractor does not settle to one of these, but explores all of the state space around the attractor for all time without ever repeating [2].

Chaotic systems have been invoked as details for, or as casual appreciably to clarification of, real-global behaviors. Several examples are epileptic seizure, heart traumatic inflammation, neural technique, chemical reactions, weather, business manipulate processes. Apart from irregular overall performance of real-world systems, chaos is as well invoked to make clear form such as the real trajectories exhibited in a specified state space or the sojourn times of trajectories in exacting areas of state space [3, 4]. The nature of scientific details in the literature on chaos is carefully under-discussed to put it gently.

In 1963 Lorenz proposed a mathematical model of chaos [5]. Rikitake also introduced different kinds of chaotic systems [3, 6, 7], Rössler [8], Shimizu-Morioka [9], Chua [10], Rucklidge [11], Sprott [12], Chen [13]. So, in literature [14] many chaotic and hyper-chaotic systems have appeared. Lately, there has been great involvement in chaotic studies on chaotic systems and their applications in secure communications, data encryption, etc.

The purpose of this paper is to build a suitable synchronization scheme for two nonlinear systems working according to master and slave principle.

- That addresses complete synchronization (CS) of nonlinear master and slave chaotic system using Sliding Mode Control (SMC) technique.

Synchronization of chaotic system is the basic determination of this research. The techniques are used sliding mode control. Appropriate Hurwitz sliding surface and a Lyapunov function are selected for the stabilizing controller. The Lorenz system is used in this paper are verified through simulation studies using MATLAB.

2. Complete Synchronization

The trajectories of the driven and the response systems converge to be accurately the same, so that is the primary and the simplest form of synchronization [8].

Chaos systems are very sensitive to initial value [9]. Due to sensitivity two CS starting from a similar starting focuses in stage space create onto directions which end up uncorrelated in the way of the time. It is plausible to synchronize those assortments of frameworks, to make them advancing at the same confused trajectory [8, 15].

When one manages coupled indistinguishable frameworks, synchronization shows up as the balance of the state factors while advancing in time. We credit to this sort of synchronization as total synchronization.

Two continuous-time chaotic systems:

$$\dot{x}(t) = (F(x(t))) \quad (1)$$

And

$$\dot{y}(t) = (H(y(t))) \quad (2)$$

Are supposed to be CS if:

$$\lim_{t \rightarrow \infty} \|y(t) - x(t)\| = 0 \quad (3)$$

3. Sliding Mode Control

An invention of sliding mode control was developed by Prof. V.I Utkin and Prof. S. V Emelyanov in 1950s. SMC widely is implemented in practical applications due to its simplicity and robustness against parameter variations and disturbances[18]. SMC has formed into a general outline strategy being inspected for a wide range of frameworks including nonlinear frameworks, indeterminate frameworks, stochastic frameworks, and vast scale and limitless dimensional frameworks. [19]. SMC may be linear or nonlinear control system design technique with inherent robustness properties beside parametric or variable changes, turbulence and perturbation and so forth, in contrast to the classical, current and wholesome control systems design method. Actually this method is based on the on-off sort of control technique, where the controller switches the control path, it relying on the estimation of predefined polynomial, which is a motivation behind the framework position and is term as sliding surface. Because of the idea of the controller it is viewed as a rotating kind of control procedure and the controller development is genuinely easy to plan and execute. As will being a control frameworks strategy, it is likewise utilized for the aggravation estimation and dismissal. SMC [8] is a variable shape manages systems layout method. The very basic notion of sliding mode control is given in [16].

4. Numerical Simulation

The following system is taken from [17], are considered to verify the proposed control strategy where synchronization for this system is obtained by using controller, while we used sliding mode control for known parameter to achieve synchronization of chaotic system. We compare our result with given results in [17], and our error result approaching to zero faster as compare to result presented in [17].

The following Lorenz system is considered as a master system:

$$\dot{x}_1 = a(x_2 - x_1).$$

$$\dot{x}_2 = -cx_1 - x_2 - x_1x_3 \quad (4)$$

$$\dot{x}_3 = x_1x_2 - bx_3$$

and the slave or response system are:

$$\begin{aligned} \dot{y}_1 &= a(y_2 - y_1) + u_1 \\ \dot{y}_2 &= cy_1 - y_2 - y_1y_3 + u_2 \\ \dot{y}_3 &= y_1y_2 - by_3 + u_3 \end{aligned} \quad (5)$$

The system parameters are taken from [17] When system parameters are chosen as: $a = 10$, $b = 8/3$, $c = 28$, Then this system shows chaotic behavior with initial conditions:

$x(0) = [1, 2, 0]^T$, $y(0) = [0, 1, 2]^T$ and $e(0) = [-1, -1, 2]^T$ as given in [17]. Figure (2) show the phase portrait of three states Lorenz system.

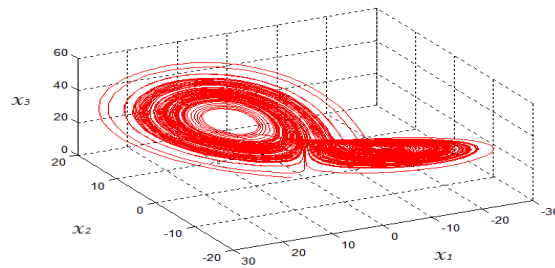


Figure 2: Three states phase portrait of x, y, z .

Synchronization with known parameters:

The error signals are defined as:

$e_1 = y_1 - qx_1, e_2 = y_2 - qx_2, e_3 = y_3 - qx_3$ (6) Where $q = 1$, for synchronization, then the error dynamics becomes:

$$\begin{aligned} \dot{e}_1 &= \dot{y}_1 - q \dot{x}_1 = a(y_2 - y_1) - q a(x_2 - x_1) + u_1 \\ \dot{e}_2 &= \dot{y}_2 - q \dot{x}_2 = cy_1 - y_2 - y_1y_3 - q(cx_1 - x_2 - x_1x_3) + u_2 \\ \dot{e}_3 &= \dot{y}_3 - q \dot{x}_3 = y_1y_2 - by_3 - q(x_1x_2 - bx_3) + u_3 \end{aligned}$$

By choosing

$$\begin{aligned} u_1 &= -a(y_2 - y_1) + q a(x_2 - x_1) + e_2 \\ u_2 &= -(cy_1 - y_2 - y_1y_3) + q cx_1 - x_2 - x_1x_3 + e_3 \\ u_3 &= -(y_1y_2 - by_3) + q x_1x_2 - bx_3 + v \end{aligned}$$

Where v is the new input, which can be written as:

$$\begin{aligned} \dot{e}_1 &= e_2 \\ \dot{e}_2 &= e_3 \\ \dot{e}_3 &= v \end{aligned}$$

Define the Hurwitz sliding surface for nominal system as:

$$\sigma_0 = \left(1 + \frac{d}{dt}\right)^2 e_1 = e_1 + 2e_2 + e_3$$

Then,

$$\dot{\sigma}_0 = \dot{e}_1 + 2\dot{e}_2 + \dot{e}_3 = e_2 + 2e_3 + v$$

By choosing $v = -e_2 - 2e_3 - k\sigma_0$, $k > 0$, we have $\dot{\sigma}_0 = -k\sigma_0$. Therefore the error of system is asymptotically stable.

Consider a Lyapunov function: $V = 0.5(\sigma_0^2)$

Then,

$$\dot{V} = \sigma_0 \dot{\sigma}_0 = \sigma_0(-k\sigma_0) = -k\sigma_0^2$$

From Lyapunov function we concluded that $\sigma_0 \rightarrow 0$, since σ_0 are Hurwitz therefore $e_i \rightarrow 0, i = 1, \dots, 3$, therefore error dynamics the systems are asymptotically stable.

Simulation results:

This simulation results is for known parameters.

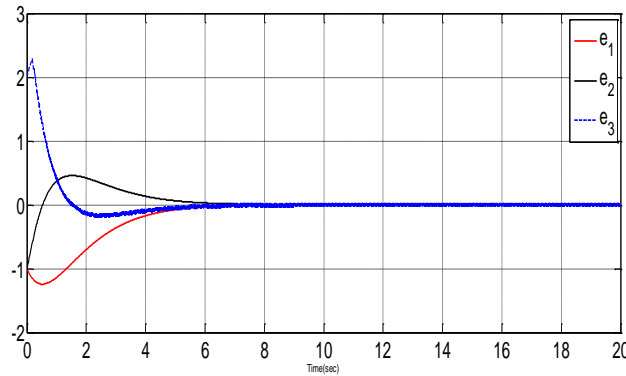


Figure 3: Time history of error dynamic variables for known parameters

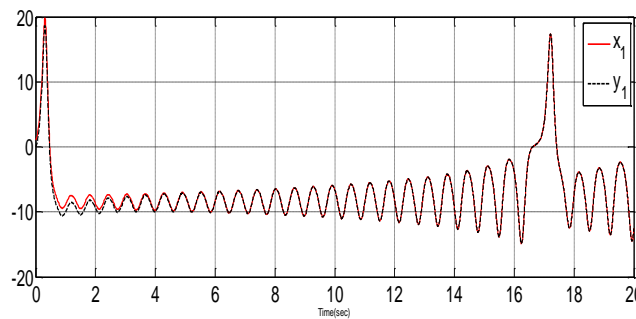


Figure 4: Synchronization between x_1 and y_1 for known parameters.

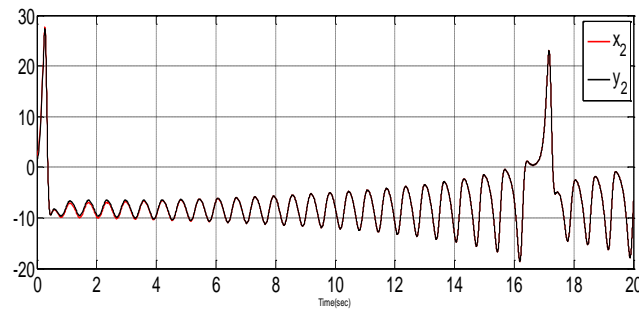


Figure 5: Synchronization between x_2 and y_2 for known parameters

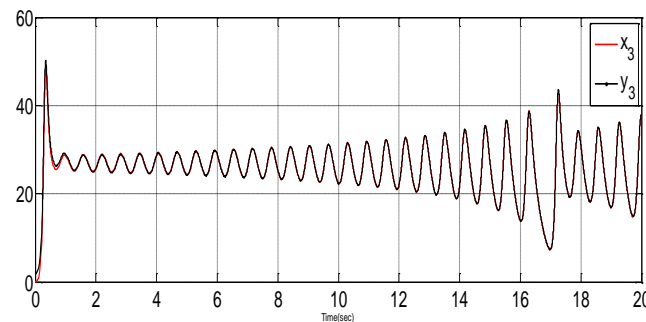


Figure 6: Synchronization between x_3 and y_3 for known parameters.

5. CONCLUSION

In this paper, the sliding mode control technique is used for known parameters, for achieving complete synchronization of a chaotic system. The stability criteria are presents for error dynamics based on lyapunov method. Results compared with others, proposed control is simpler. The numerical simulation results for Lorenz system the control scheme and its applicability to control system, like communication system to provide a safe way to carry signals.

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COMPLEX COMPLETE SYNCHRONIZATION OF CHAOTIC SYSTEM VIA INTEGRAL SLIDING MODE CONTROL

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Abstract

In this paper we present a new control design methodology to achieve Complex Complete Synchronization (CCS) in complex chaotic systems with unknown parameters. The proposed design methodology is based on Adaptive Integral Sliding Mode Control. First, the design methodology is presented for the general case of complex chaotic systems. Then, to illustrate the design procedure, to verify its validity, and to show its effectiveness, the proposed design approach is applied on two identical complex Lorenz systems [1] with unknown parameters.

Keywords: Nonlinear, Lyapunov, CCS, chaos.

1. Introduction

All physical systems are nonlinear by nature. In order to attain better understanding about the dynamical behavior of different nonlinear systems, an interesting and important phenomenon is to investigate synchronization between these dynamical systems. Synchronization, observed as naturally occurring process, has significant impact in diverse areas of engineering, sciences and even in the social life.

The complex chaotic synchronization has been a topic of interest for the researchers over the last two decades. It is hardly possible to avoid contact with complex chaotic systems. Such problems arise in our daily life. Some of these problems are simple to solve but there are control problems with more complications. Synchronization of nonlinear systems contains diverse area of application in almost every field of life.

Chaos is the irregular motion of a dynamical system; it is deterministic, sensitive to initial conditions, and impossible to predict in the long term. It is neither harmonic nor random. Chaos is characterized by the way a dynamical system does not repeat itself even though the system is governed by deterministic equations [2]. Phase plane and correlation is used to identify the attractor and randomness of the chaotic system. The attractor is a region of the state space from which there are no exit paths. For chaotic systems, the attractor does not settle to one of these but span the state space around the attractor for all time without ever repeating. It does not come back to previously points in the state space, this describes the stretching and folding properties [3],

which can be seen when plotting the states of the system against each other. Figure 1 plots the trajectory of the Lorenz attractor in the phase space, depicting the stretching and folding properties [4], which can be seen when plotting the states of the system against each other.

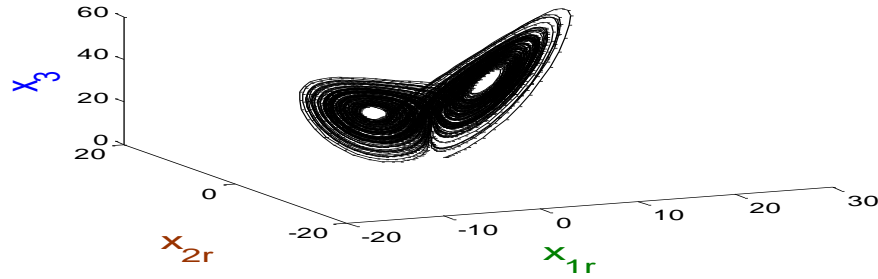


Figure 1: The phase portrait of Lorenz system

The purpose of this study is to develop appropriate synchronization schemes for different nonlinear complex chaotic systems working according to master-slave principal that addresses Complex Complete Synchronization of two identical nonlinear complex chaotic systems. Synchronization of chaotic system is the basic determination of this research. The techniques are used integral sliding mode control. Appropriate Hurwitz sliding surface and a Lyapunov function are selected for the stabilizing controller. The Lorenz system is used in this paper are verified through simulation studies using MATLAB.

2. Complex Complete Synchronization (CCS)

One of important part of Chaos synchronization is nonlinear science. It has been researched in many branches of science e.g. chemistry and physics etc. [5-7]. The underlying condition of chaotic system dependency shows long term periodic behavior and is deterministic, the system having single positive Lyapunov exponent, is called chaotic system. For more details, have a look at synchronization of chaotic systems [8-10]. In the literature reference few outcomes are derived on chaos synchronization by utilizing already known parameters of slave and master systems. The synchronization may be ruined due to the impact of these ambiguities. On other side the chaotic system may have some parameters that are uncertain and these can vary with time in real systems and experimental situation. In the way it is essential problem of uncertain chaotic systems by using chaos synchronization. The issue of controlling and synchronizing non-linear systems with some uncertain variables can be best resolved by using adaptive control [11]. The first research in adaptive control was done in 1950s on high performance aircrafts autopilot design that can operate with range of speeds and altitudes [12]. The study of chaotic non-linear systems has been performed by researchers with complex variables in last few years [13-15]. Disk dynamos and rotating fluids etc. has been described by these chaotic systems having complex variables.

Consider the two complex chaotic systems:

$$\dot{x} = f(x) + F(x)\theta \quad (1)$$

$$\dot{y} = g(y) + G(y)\theta + u \quad (2)$$

Are said to be CCS if:

$$\lim_{t \rightarrow \infty} \|y(t) - x(t)\| = 0 \quad (3)$$

3. Integral Sliding Mode Control

The starting concept of ISMC was primarily presented to use the sliding mode control in the system to monitor the system response from the start. This means a controller which is based on ISMC concepts may produce the compensation to certain ambiguities in the complete response. The asymptotic stability and some pre-defined performance parameters has been ensured by the ISMC concept in which feed-back controller has been designed. The addition of integral term to the feedback controller in order to the nominal performance stability and the system insensitivity to outside disturbances

4. Numerical Simulation

The following example is taken from [1] where CCS problem was solved by adaptive control scheme. We have achieved CCS using adaptive integral sliding mode control.

Consider the Master system given in [1] as:

$$\begin{aligned}\dot{x}_1 &= a(x_2 - x_1) \\ \dot{x}_2 &= bx_1 - x_2 - x_1x_3 \\ \dot{x}_3 &= 0.5(\bar{x}_1 x_2 + x_1 \bar{x}_2) - cx_3\end{aligned}\quad (4)$$

Where, $x_1 = x_{1r} + jx_{1i}$, $x_2 = x_{2r} + jx_{2i}$ are complex and $x_3 = x_{3r}$, are real. \bar{x}_1, \bar{x}_2 denote the complex conjugate variables of x_1, x_2 . a, b and c are unknown real parameters. When $a = 14$, $b = 35$, $c = 3.7$ and $x(0) = [2 + 1j, 5 + 3j, 4]^T$, the chaotic attractor is plotted in figure 2.

The slave system consider as [30]:

$$\begin{aligned}\dot{y}_1 &= a(y_2 - y_1) + u_1 \\ \dot{y}_2 &= by_1 - y_2 - y_1y_3 + u_2 \\ \dot{y}_3 &= 0.5(\bar{y}_1 y_2 + y_1 \bar{y}_2) - cy_3 + u_3\end{aligned}\quad (5)$$

Where, $y_1 = y_{1r} + jy_{1i}$, $y_2 = y_{2r} + jy_{2i}$ are complex and $y_3 = y_{3r}$, are real. \bar{y}_1, \bar{y}_2 denote the complex conjugate variables of y_1, y_2 and u_1, u_2, u_3 controllers.

Let $\hat{a}, \hat{b}, \hat{c}$ be estimates of a, b, c and $\tilde{a} = a - \hat{a}, \tilde{b} = b - \hat{b}, \tilde{c} = c - \hat{c}$, be the errors in estimations of a, b, c , respectively. Then systems (4) and (5) can be written as:

$$\begin{aligned}\dot{x}_1 &= \hat{a}(x_2 - x_1) + \tilde{a}(x_2 - x_1) \\ \dot{x}_2 &= \hat{b}x_1 + \tilde{b}x_1 - x_2 - x_1x_3 \\ \dot{x}_3 &= 0.5(\bar{x}_1 x_2 + x_1 \bar{x}_2) - \hat{c}x_3 - \tilde{c}x_3\end{aligned}\quad (6)$$

$$\begin{aligned}\dot{y}_1 &= \hat{a}(y_2 - y_1) + \tilde{a}(y_2 - y_1) + u_1 \\ \dot{y}_2 &= \hat{b}y_1 + \tilde{b}y_1 - y_2 - y_1y_3 + u_2 \\ \dot{y}_3 &= 0.5(\bar{y}_1 y_2 + y_1 \bar{y}_2) - \hat{c}y_3 - \tilde{c}y_3 + u_3\end{aligned}\quad (7)$$

The 3-dimensional complex systems (6) and (7) can be written into 5-dimensional real systems:

$$\begin{aligned}\dot{x}_{1r} &= \hat{a}(x_{2r} - x_{1r}) + \tilde{a}(x_{2r} - x_{1r}) \\ \dot{x}_{1i} &= \hat{a}(x_{2i} - x_{1i}) + \tilde{a}(x_{2i} - x_{1i}) \\ \dot{x}_{2r} &= \hat{b}x_{1r} + \tilde{b}x_{1r} - x_{2r} - x_{1r}x_3 \\ \dot{x}_{2i} &= \hat{b}x_{1i} + \tilde{b}x_{1i} - x_{2i} - x_{1i}x_3 \\ \dot{x}_3 &= (x_{1r}x_{2r} + x_{1i}x_{2i}) - \hat{c}x_3 - \tilde{c}x_3\end{aligned}\quad (8)$$

$$\begin{aligned}\dot{y}_{1r} &= \hat{a}(y_{2r} - y_{1r}) + \tilde{a}(y_{2r} - y_{1r}) + u_{1r} \\ \dot{y}_{1i} &= \hat{a}(y_{2i} - y_{1i}) + \tilde{a}(y_{2i} - y_{1i}) + u_{1i} \\ \dot{y}_{2r} &= \hat{b}y_{1r} + \tilde{b}y_{1r} - y_{2r} - y_{1r}y_3 + u_{2r} \\ \dot{y}_{2i} &= \hat{b}y_{1i} + \tilde{b}y_{1i} - y_{2i} - y_{1i}y_3 + u_{2i} \\ \dot{y}_3 &= y_{1r}y_{2r} + y_{1i}y_{2i} - \hat{c}y_3 - \tilde{c}y_3 + u_3\end{aligned}\quad (9)$$

Where $u_{1r}, u_{1i}, u_{2r}, u_{2i}$ and u_3 in Equation (9) are the control functions to be determined.

$$\begin{aligned}e_{1r} &= y_{1r} - x_{1r}, e_{1i} = y_{1i} - x_{1i} \\ e_{2r} &= y_{2r} - x_{2r}, \\ e_{2i} &= y_{2i} - x_{2i}, e_3 = y_3 - x_3\end{aligned}\quad (10)$$

$$\begin{aligned}\dot{e}_{1r} &= \dot{y}_{1r} - \dot{x}_{1r}, \dot{e}_{1i} = \dot{y}_{1i} - \dot{x}_{1i}, \\ \dot{e}_{2r} &= \dot{y}_{2r} - \dot{x}_{2r}, \\ \dot{e}_{2i} &= \dot{y}_{2i} - \dot{x}_{2i}, \dot{e}_3 = \dot{y}_3 - \dot{x}_3\end{aligned}\quad (11)$$

$$\begin{aligned}\dot{e}_{1r} &= \dot{y}_{1r} - \dot{x}_{1r} = \hat{a}(y_{2r} - y_{1r}) \\ &+ \tilde{a}(y_{2r} - y_{1r}) + u_{1r} - (\hat{a}(x_{2r} - x_{1r}) \\ &+ \tilde{a}(x_{2r} - x_{1r})) \\ \dot{e}_{1i} &= \dot{y}_{1i} - \dot{x}_{1i} = \hat{a}(y_{2i} - y_{1i}) \\ &+ \tilde{a}(y_{2i} - y_{1i}) + u_{1i} - (\hat{a}(x_{2i} - x_{1i}) \\ &+ \tilde{a}(x_{2i} - x_{1i})) \\ \dot{e}_{2r} &= \dot{y}_{2r} - \dot{x}_{2r} = \hat{b}y_{1r} + \tilde{b}y_{1r} \\ &- y_{2r} - y_{1r}y_3 + u_{2r} \\ &- (\hat{b}x_{1r} + \tilde{b}x_{1r} - x_{2r} - x_{1r}x_3) \\ \dot{e}_{2i} &= \dot{y}_{2i} - \dot{x}_{2i} = \hat{b}y_{1i} + \tilde{b}y_{1i} \\ &- y_{2i} - y_{1i}y_3 + u_{2i} \\ &- (\hat{b}x_{1i} + \tilde{b}x_{1i} - x_{2i} - x_{1i}x_3)\end{aligned}\quad (12)$$

$$\begin{aligned}\dot{e}_3 &= \dot{y}_3 - \dot{x}_3 = y_{1r} y_{2r} + y_{1i} y_{2i} \\ &- \hat{c}y_3 - \tilde{c}y_3 + u_3 \\ &- ((x_{1r} x_{2r} + x_{1i} x_{2i}) - \hat{c}x_3 - \tilde{c}x_3)\end{aligned}$$

By choosing

$$\begin{aligned}u_{1r} &= -\hat{a}(y_{2r} - y_{1r}) + \hat{a}(x_{2r} - x_{1r}) + e_{1i} \\ u_{1i} &= -\hat{a}(y_{2i} - y_{1i}) + \hat{a}(x_{2i} - x_{1i}) + e_{2r} \\ u_{2r} &= -(\hat{b}y_{1r} - y_{2r} - y_{1r}y_3) + (\hat{b}x_{1r} - x_{2r} - x_{1r}x_3) + e_{2i} \\ u_{2i} &= -(\hat{b}y_{1i} - y_{2i} - y_{1i}y_3) + (\hat{b}x_{1i} - x_{2i} - x_{1i}x_3) + e_3 \\ u_3 &= -(y_{1r} y_{2r} + y_{1i} y_{2i} - \hat{c}y_3) + ((x_{1r} x_{2r} + x_{1i} x_{2i}) - \hat{c}x_3) + v\end{aligned}$$

Where v is the new input, the system (12) can be written as:

$$\begin{aligned}\dot{e}_{1r} &= \tilde{a}(y_{2r} - y_{1r}) - \tilde{a}(x_{2r} - x_{1r}) + e_{1i} \\ \dot{e}_{1i} &= \tilde{a}(y_{2i} - y_{1i}) - \tilde{a}(x_{2i} - x_{1i}) + e_{2r} \\ \dot{e}_{2r} &= \tilde{b}y_{1r} - \tilde{b}x_{1r} + e_{2i} \\ \dot{e}_{2i} &= \tilde{b}y_{1i} - \tilde{b}x_{1i} + e_3 \\ \dot{e}_3 &= -\tilde{c}y_3 + \tilde{c}x_3 + v\end{aligned} \quad (13)$$

Choose the nominal system for (13) as:

$$\begin{aligned}\dot{e}_{1r} &= e_{1i} \\ \dot{e}_{1i} &= e_{2r} \\ \dot{e}_{2r} &= e_{2i} \\ \dot{e}_{2i} &= e_3 \\ \dot{e}_3 &= v_0\end{aligned} \quad (14)$$

Define the sliding surface for nominal system (14) as:

$$\begin{aligned}\sigma_0 &= (1 + \frac{d}{dt})^4 e_{1r} = e_{1r} + 4e_{1i} + 6e_{2r} + 4e_{2i} + e_3 \text{ Then} \\ \dot{\sigma}_0 &= \dot{e}_{1r} + 4\dot{e}_{1i} + 6\dot{e}_{2r} + 4\dot{e}_{2i} + \dot{e}_3 = e_{1i} + 4e_{2r} + 6e_{2i} + 4e_3 + v_0 \text{ By Choosing} \\ v_0 &= -e_{1i} - 4e_{2r} - 6e_{2i} - 4e_3 - k\sigma_0 - k \text{sign}(\sigma_0), k > 0\end{aligned}$$

We have

$$\dot{\sigma}_0 = -k\sigma_0$$

So the system is asymptotically stable.

Define the sliding surface for system (13) as:

$$\sigma = \sigma_0 + z = e_{1r} + 4e_{1i} + 6e_{2r} + 4e_{2i} + e_3 + z$$

Where, z is some integral term computed later. To avoid the reaching phase, choose $z(0)$ such that $\sigma(0) = 0$. Choose $v = v_0 + v_s$ where, v_0 is the nominal input and v_s is compensator term computed later. Then

$$\begin{aligned} \dot{\sigma} &= \dot{e}_{1r} + 4\dot{e}_{1i} + 6\dot{e}_{2r} + 4\dot{e}_{2i} + \dot{e}_3 + \dot{z} \\ &= \tilde{a}(y_{2r} - y_{1r}) - \tilde{a}(x_{2r} - x_{1r}) + e_{1i} + 4\tilde{a}(y_{2i} - y_{1i}) \\ &\quad - 4\tilde{a}(x_{2i} - x_{1i}) + 4e_{2r} + 6\tilde{b}y_{1r} - 6\tilde{b}x_{1r} + 6e_{2i} + 4\tilde{b}y_{1i} \\ &\quad - 4\tilde{b}x_{1i} + 4e_3 - \tilde{c}y_3 + \tilde{c}x_3 + v_0 + v_s + \dot{z} \end{aligned}$$

By choosing a Lyapunov function: $V = \frac{1}{2}\sigma^2 + \frac{1}{2}(\tilde{a}^2 + \tilde{b}^2 + \tilde{c}^2)$, design the adaptive laws for $\tilde{a}, \hat{a}, \tilde{b}, \hat{b}, \tilde{c}, \hat{c}$ and compute v_s such that $\dot{V} < 0$.

$$\begin{aligned} \dot{z} &= -e_{1i} - 4e_{2r} - 6e_{2i} - 4e_3 - v_0, \\ v_s &= -k\sigma - k \operatorname{sign}(\sigma) \\ \dot{\tilde{a}} &= -\sigma(y_{2r} - y_{1r}) - 4\sigma(y_{2i} - y_{1i}) + \sigma(x_{2r} - x_{1r}) \\ &\quad + 4\sigma(x_{2i} - x_{1i}) - k_1\tilde{a}, \\ \dot{\hat{a}} &= -\tilde{a} \\ \dot{\tilde{b}} &= -6\sigma y_{1r} + 6\sigma x_{1r} - 4\sigma y_{1i} + 4\sigma x_{1i} - k_2\tilde{b}, \\ \dot{\hat{b}} &= -\tilde{b} \\ \dot{\tilde{c}} &= \sigma y_3 - \sigma x_3 - k_3\tilde{c}, \\ \dot{\hat{c}} &= -\tilde{c} \\ k_i, k_i &> 0, i = 1, \dots, 3 \end{aligned}$$

Proof:

Since

$$\begin{aligned}
 \dot{V} &= \sigma \dot{\sigma} + \tilde{a} \dot{\tilde{a}} + \tilde{b} \dot{\tilde{b}} + \tilde{c} \dot{\tilde{c}} \\
 &= \sigma \{ \tilde{a} (y_{2r} - y_{1r}) - \tilde{a} (x_{2r} - x_{1r}) + e_{1i} \\
 &\quad + 4\tilde{a} (y_{2i} - y_{1i}) - 4\tilde{a} (x_{2i} - x_{1i}) + 4e_{2r} \\
 &\quad + 6\tilde{b} y_{1r} - 6\tilde{b} x_{1r} + 6e_{2i} + 4\tilde{b} y_{1i} - 4\tilde{b} x_{1i} \\
 &\quad + 4e_3 - \tilde{c} y_3 + \tilde{c} x_3 + v_0 + v_s + \dot{z} \} \\
 &\quad + \tilde{a} \dot{\tilde{a}} + \tilde{b} \dot{\tilde{b}} + \tilde{c} \dot{\tilde{c}} \\
 &= \sigma \{ e_{1i} + 4e_{2r} + 6e_{2i} + 4e_3 + v_0 + v_s + \dot{z} \} \\
 &\quad + \tilde{a} \{ \dot{\tilde{a}} + \sigma (y_{2r} - y_{1r}) + 4\sigma (y_{2i} - y_{1i}) \\
 &\quad - \sigma (x_{2r} - x_{1r}) - 4\sigma (x_{2i} - x_{1i}) \} \\
 &\quad + \tilde{b} \{ \dot{\tilde{b}} + 6\sigma y_{1r} - 6\sigma x_{1r} + 4\sigma y_{1i} \\
 &\quad - 4\sigma x_{1i} \} + \tilde{c} \{ \dot{\tilde{c}} - \sigma y_3 + \sigma x_3 \}
 \end{aligned}$$

By using

$$\begin{aligned}
 \dot{z} &= -e_{1i} - 4e_{2r} - 6e_{2i} - 4e_3 - v_0, \\
 v_s &= -k\sigma - k \operatorname{sign}(\sigma) \\
 \dot{\tilde{a}} &= -\sigma (y_{2r} - y_{1r}) - 4\sigma (y_{2i} - y_{1i}) + \sigma (x_{2r} - x_{1r}) \\
 &\quad + 4\sigma (x_{2i} - x_{1i}) - k_1 \tilde{a} \\
 \dot{\tilde{a}} &= -\dot{\tilde{a}} \\
 \dot{\tilde{b}} &= -6\sigma y_{1r} + 6\sigma x_{1r} - 4\sigma y_{1i} + 4\sigma x_{1i} - k_2 \tilde{b} \\
 \dot{\tilde{b}} &= \dot{\tilde{b}} \\
 \dot{\tilde{c}} &= \sigma y_3 - \sigma x_3 - k_3 \tilde{c}, \quad \dot{\tilde{c}} = \dot{\tilde{c}} \\
 k_i, k_i &> 0, i = 1, \dots, 3
 \end{aligned}$$

We have

$$\dot{V} = -k\sigma^2 - k|\sigma| - k_1 \tilde{a}^2 - k_2 \tilde{b}^2 - k_3 \tilde{c}^2.$$

From this we conclude that $\sigma, \tilde{a}, \tilde{b}, \tilde{c} \rightarrow 0$

Since $\sigma \rightarrow 0$, therefore $e = (e_{1r}, e_{1i}, e_{2r}, e_{2i}, e_3) \rightarrow 0$.

In simulations, the initial conditions are chosen as: $x(0) = (2 + 1j, 5 + 3j, 4)$ and $y(0) = (2.001 + 1j, 5 + 3j, 4.01)$. The true value of the unknown parameters are chosen as: $a = 14$, $b = 35$, $c = 3.7$.

Simulation results:

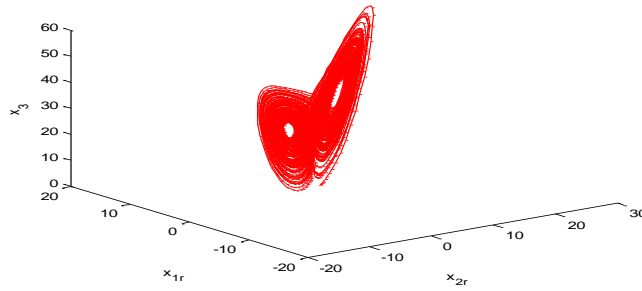


Figure 2: 3D Phase portrait of complex Lorenz system

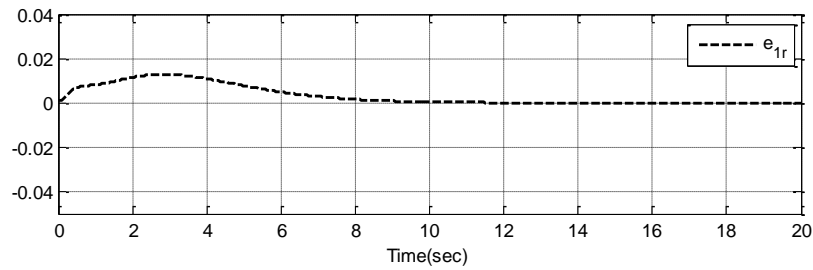


Figure 3: Time Response of e_{1r}

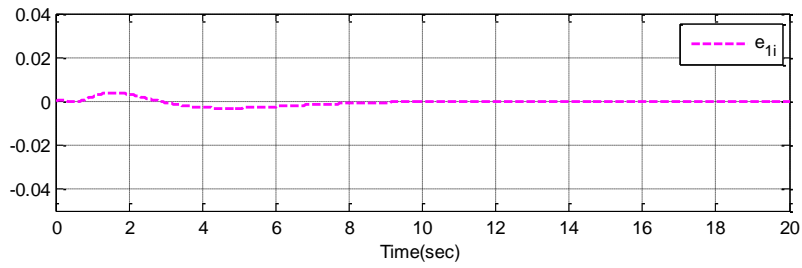


Figure 4: Time Response of e_{1i}

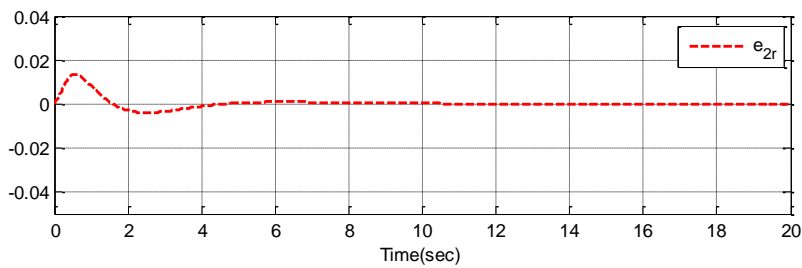


Figure 5: Time Response of e_{2r}

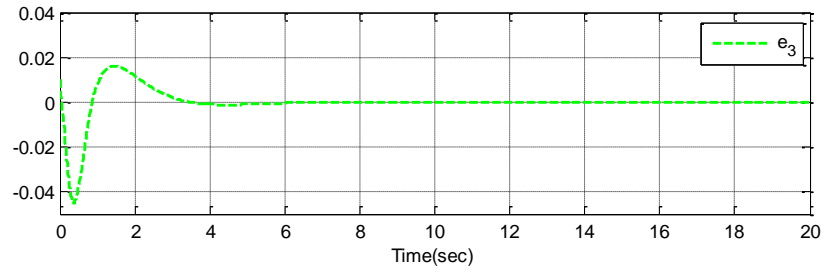


Figure 6: Time Response of e_{2i}

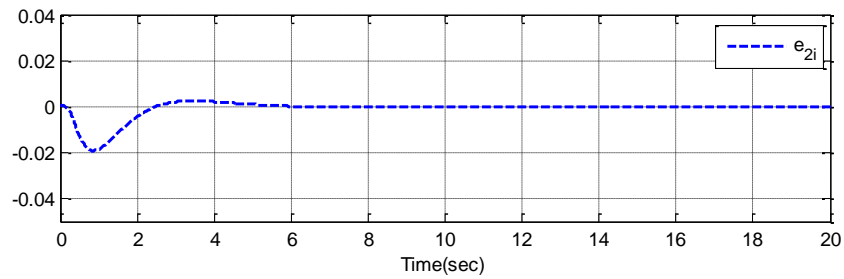


Figure 7: Time Response of e_3

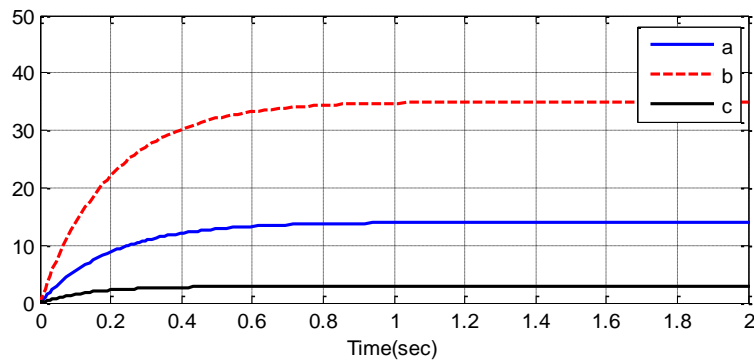


Figure 8: Estimation parameter of \hat{a}, \hat{b} & \hat{c}

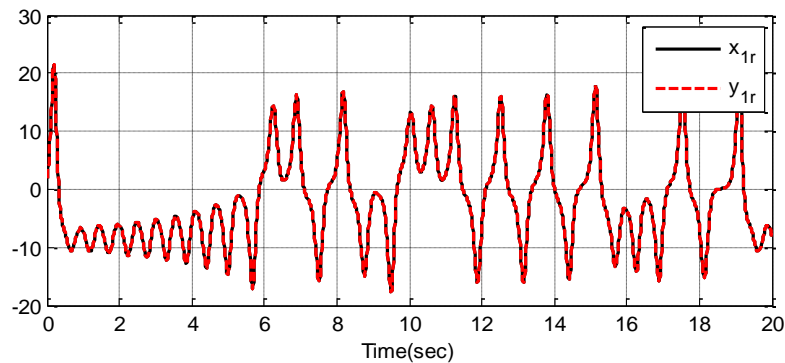


Figure 9: Time Response of x_{1r} & y_{1r} with IC (-2, 2.001)

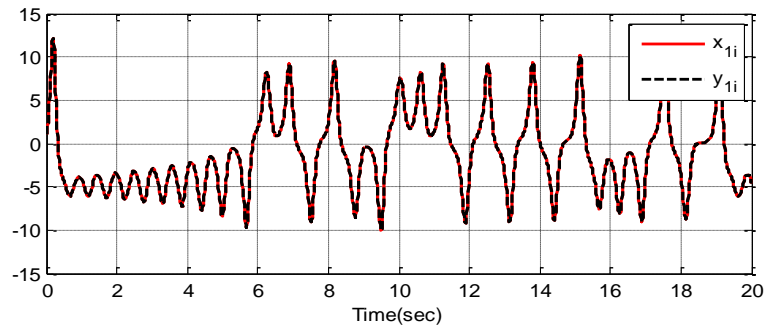


Figure 10: Time Response of x_{1i} & y_{1i} with IC (1, 1)

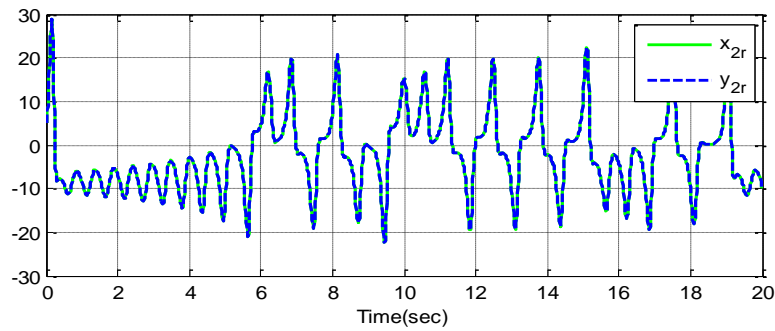


Figure 11: Time Response of x_{2r} & y_{2r} with IC (5,5)

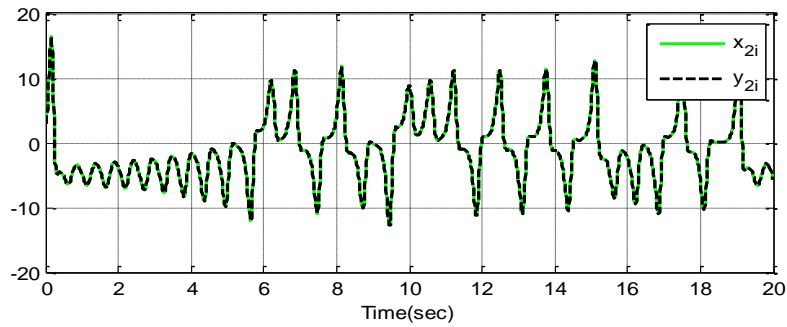


Figure 12: Time Response of x_{2i} & y_{2i} with IC (3,3)

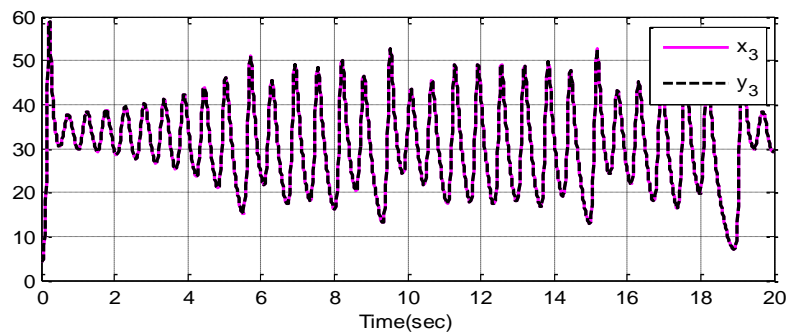


Figure 13: Time Response of x_3 & y_3 with IC (4,4.001)

5. Conclusion

In this paper, the integral sliding mode control technique is used for unknown parameters, for achieving complex complete synchronization of a chaotic system. The stability criteria are presents for error dynamics based on lyapunov method. Results compared with others, proposed control is simpler. The numerical simulation results for Lorenz system the control scheme and its applicability to control system, like communication system to provide a safe way to carry signals.

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EVALUATING THE EFFECT OF SUGARCANE BAGASSE ASH AS A PARTIAL REPLACEMENT OF CEMENT IN CONCRETE

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Abstract

Bagasse ash is an industrial by-product which can be used as a replacement of cement. Sugarcane Bagasse ash (SCBA) is one of the industrial waste which is produced from sugarcane and consist mainly of SiO₂. SCBA can be used in concrete to improve its properties and can provide economical concrete as well. This research work is focused on the use of SCBA in concrete as a partial replacement of cement at 5%, 10%, 15% and 20% to determine its effect on properties of fresh and hardened concrete and also to check the pozzolanic potential of SCBA. Initially material testing was carried out which also includes the chemical composition of bagasse ash followed by fresh and hardened concrete tests. The experimental results gave highest compressive strength and tensile strength at 5% replacement of SCBA. Similarly the experimental result shows that replacement of all percentages of SCBA, the highest compressive strength and tensile strength is obtained at 28 days of curing compare to reference concrete at 7 and 14 days of curing. Beyond 5% replacement of SCBA the decrease in compressive and tensile strength is noted at all stages of curing. Incorporation of SCBA in concrete reduces the environmental consequences and also minimizes the landfill area required for disposal of SCB. Similarly SCBA can also be incorporated as an admixture in concrete due to its high content of silica and workability of concrete is also enhanced.

Keywords: Bagasse ash, Pozzolanic, Compressive Strength.

1. Introduction

Agro wastes are most commonly used construction material. These industrial wastes such as wheat straw ash, rice husk ash and sugarcane bagasse ash are incorporated in concrete as partial replacement of cement with their pozzolanic potential (Dhengare et al., 2015). Ordinary Portland cement is the major construction material used throughout the world. Cement is considered as responsible for 5-8% CO₂ emission globally. The increase in demand of cement proportionally increases this environmental problem. Most of the researchers from different parts of the world are focusing on the agricultural wastes as partially replaced with ordinary Portland cement (OPC), which not only provides economical concrete but also the agro wastes are disposed off. Several

researchers currently working on utilization of Sugarcane bagasse ash, the waste from sugar industry (S et al. 2017).

Bagasse is produced as sugar waste after juice extraction in sugar industry. It is fibrous agro-agricultural waste, which is utilized as boiler in alcoholic factories and sugar mills and produces huge amount of ash as shown in figure 1. In past sugarcane bagasse (SCB) as a solid waste was used for burning purpose only due to increase in electricity and natural gas cost (Aher and Natraj, 2016). Sugarcane Bagasse Ash (SCBA) is one of the byproduct that can be utilized as a cement replacement in concrete due to its high silica content, which shows that SCBA is a pozzolanic material. Due to this utilization of waste not only give green environment effect but also gives economical concrete which subsequently reduces the construction cost without compromises the quality of concrete (Mutua, Nyomboi, and Mutuku 2016).



Figure 1: Sugarcane Bagasse

2. Literature Review:

(Mahmud et al. 2018) investigated the effect of Sugarcane bagasse ash as partial replacement of cement on concrete. He concluded that the replacement of 5% SCBA, gives high strength. He further concluded that beyond 5% ,the compressive strength decreases.(Sampaio, Souza, and Gouveia 2014), incorporated SCBA in concrete to check the effect on mechanical properties of concrete. The research shows that compressive strength increases with the addition of SCBA however the plasticity is found decrease due to presence of fine particles which results in high water consumption. Berenguer et al., carried out research on the influence of SCBA as a partial replacement of cement. They concluded that SCBA has pozzolanic potential which can be used in as a binding material. They further stated that the strength of concrete blended with SCBA.(Gorky 2015) utilize SCBA in concrete as partially replacement with cement as well as sand. He concluded that up to 20% and 10% increase in strength is noted as a result of partial replacement of SCBA with cement and sand respectively. The chemical investigation also shows that SCBA is a pozzolonic material. (Petronas and Iskandar 2014) carried their research on Sugarcane Bagasse Ash concrete. They concluded that higher compressive strength of 48% is achieved with 5% replacement at 28 days of curing compare to reference concrete. (Cordeiro et

al. 2008), carried out research on the pozzolonic potential of SCBA. According to their conclusions the SCBA is finer material due to which it provides high packing density which is responsible for high compressive strength and pozzolanic potential of SCBA.

3. Material and Methods:

The material used in this research is the locally available ingredients of concrete which are listed below. The experimental program is carried out at Swedish college of Engineering and Technology Wahcantt-Pakistan.

3.1 Cement:

Most commonly ordinary Portland cement (Askari Cement) available in market locally is used. The specification of cement is listed in table 1.

Table 1: Ordinary Portland Cement Chemical Composition

Name of Chemical	Molecular Formula	Weight
Tricalcium Silicate	$\text{Ca}_3\text{O}_5\text{Si}$	50%
Dicalcium Silicate	Ca_2SiO_4	25%
Tricalcium Aluminate	$\text{Ca}_3\text{Al}_2\text{O}_6$	10%
Tetracalcium Aluminoferrite	$\text{Ca}_4\text{Al}_2\text{Fe}_2\text{O}_{10}$	10%
Gypsum	$\text{CaSO}_4\cdot 2\text{H}_2\text{O}$	5%

3.2 Aggregate:

Fine aggregates used in this research is collected from Nizampur, District Nowshera-Khyber Pakhtunkhwa, Pakistan while the coarse aggregates are collected from Margalla hill. Material properties are listed in table 2.

Table 2: Aggregate Properties

	Fine Aggregate	Coarse Aggregate
Fineness Modulus	2.52	2.68
Specific Gravity	2.62	2.71
Water Absortion %	1.5	0.35
Density (Kg/m ³)	1603.2	1552
Moisture Content%	1	3

3.3 Sugarcane Baggase Ash:

Sugarcane Bagasse Ash SCBA is collected from Khazana Sugar mill, Khyber Pakhtunkhwa-Pakistan. Chemical composition is investigated in Geosciences Laboratory, Islamabad, Geological Survey department of Pakistan. The chemical composition of SCBA is shown in table 3.

Table 3: Chemical Composition of SCBA

Sample No.	Ash-CEM
SiO ₂	53.076
Al ₂ O ₃	12.384
Fe ₂ O ₃	9.103
CaO	12.918
K ₂ O	2.463
Na ₂ O	0
MgO	2.636
P ₂ O ₅	0.167
TiO ₂	1.002
MnO	0.131
LOI	6.093

3.4 Mix Ratio:

In this research M20 grade concrete was selected for experimental work. The water cement ratio was kept 0.50. SCBA was replaced with cement in percentage of 5%, 10%, 15% and 20% by weight of cement. Concrete cylinders were casted, cured and tested at 7, 14 and 28 days of curing.

4. Finding and Discussion:

The objective of the study is to investigate the pozzolanic potential of SCBA and hardened properties of concrete containing 0-20% SCBA by weight of cement. Cylinders were casted and cured in water for 7, 14 and 28 days. All the cylinders were tested for compressive strength as well as split tensile strength.

4.1 Compressive Strength:

Table 4 and figure 2 (Graph) shows the average compressive strength of concrete specimen having 0-20% SCBA for 7, 14 and 28 days. The results obtained shows that up to 5% replacement of cement with SCBA give higher compressive strength than control mix at all curing ages. The addition of SCBA beyond 5% reduces the compressive strength gradually.

Table 4: Compressive Strength of SCBA Concrete

Percentage of (SCBA)	After 7 days strength (psi)	After 14 days strength (psi)	After 28 days strength (psi)
0%	1821.0	2136.4	3056.3
5%	1912.0	2268.9	3222.6
10%	1485.3	1880.4	2055.8
15%	1103.4	1380.9	1970.7
20%	541.5	657.9	1031.1

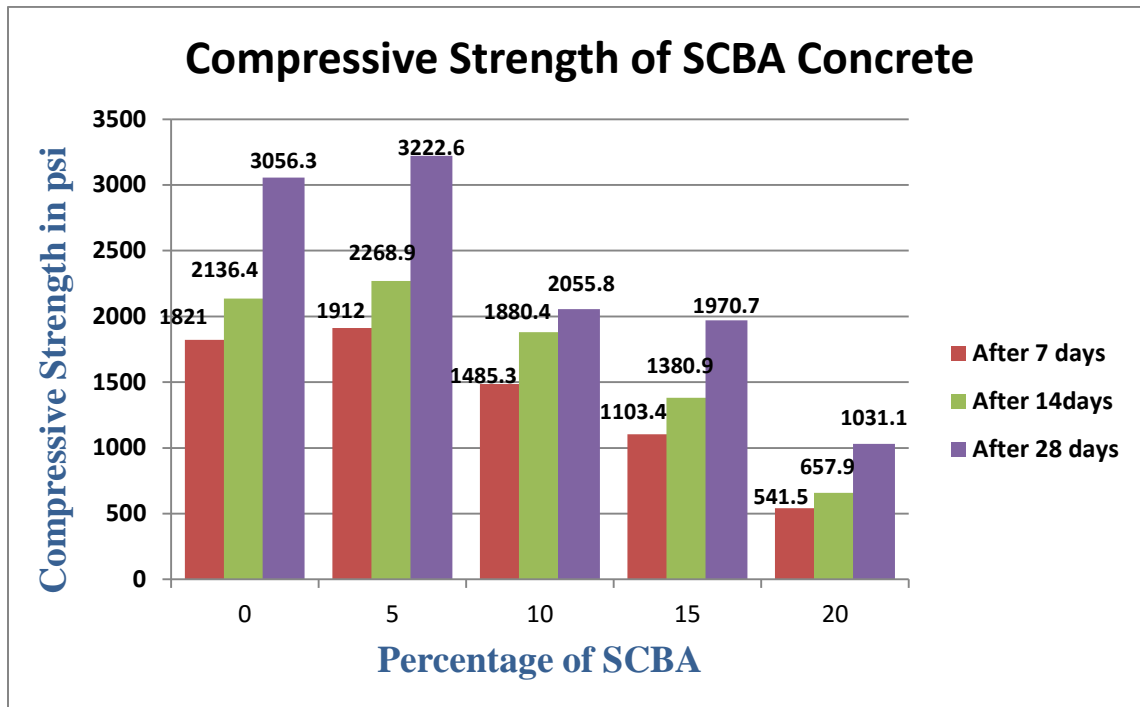


Figure 2: Cylinder Compressive Strength after 7, 14 and 28 days

4.2 Splitting Tensile Strength:

Table 5 and figure 3 (Graph) shows the results obtained after testing of concrete cylinders for splitting tensile strength at curing age of 7, 14 and 28 days. According to the results, the concrete specimens having 5% SCBA give higher splitting tensile strength as compared to controlled concrete specimen. Addition of SCBA beyond 5% shows a gradual decrease in splitting tensile strength.

Table 5: Splitting Tensile Strength of SCBA Concrete

Percentage	7 days(psi)	14 days(psi)	28 days(psi)
0%	209.5	287.3	318.6
5%	262.7	298.3	333.6
10%	201.5	239.0	319.7
15%	139.2	175.0	202.6
20%	99.4	141.5	156.4

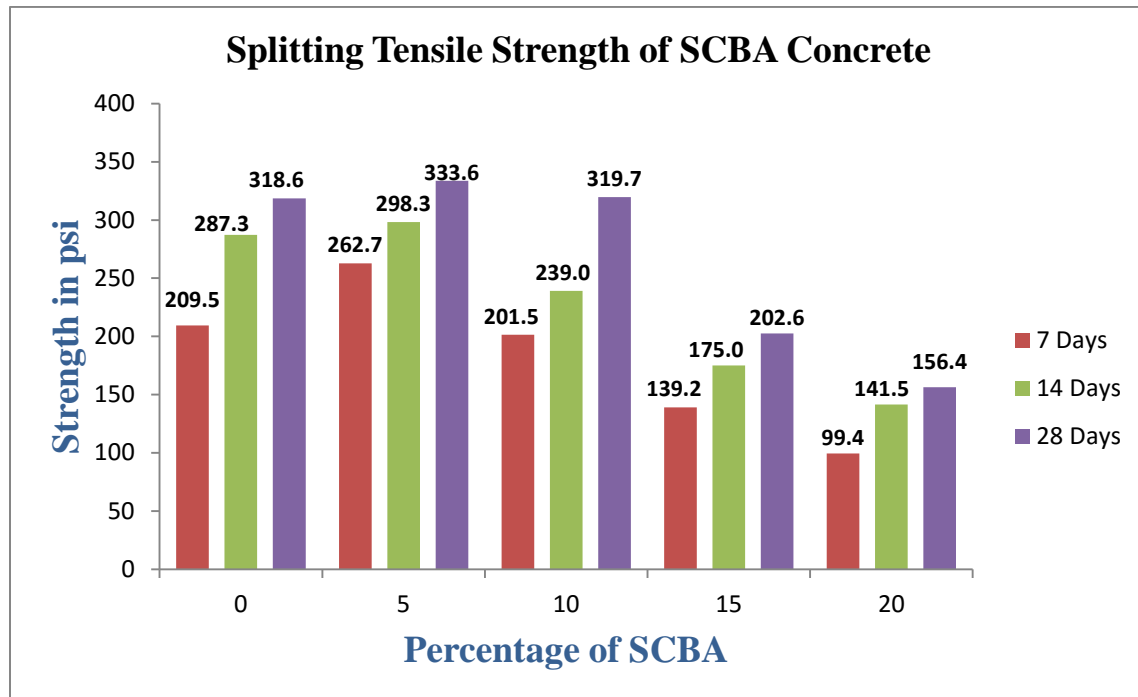


Figure 3: Splitting Tensile Strength of SCBA Concrete at 7, 14 and 28 days

5. Conclusion:

The following conclusions can be drawn from this research

1. The SCBA being pozzolonic in nature can be utilized in concrete as a binding material.
2. The compressive and split tensile strength is enhanced with replacement of SCBA at all the stages of curing.
3. The maximum compressive strength of 3222.6 psi while maximum split tensile strength of 333.6 psi is achieved with replacement of 5% SCBA with cement at 28 days of curing.
4. Beyond 5%, the compressive as well split tensile strength reduced at all stages of curing
5. The lowest compressive strength of 1031.1 psi while split tensile strength of 156.4 psi is obtained at 20% replacement of SCBA at 28 days of curing.

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APPLICATION OF 3M ANALYSIS FOR DECREASING WASTED SPACES IN HEALTHCARE SETTING IN KPK

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Abstract

The built environment of hospital buildings may have both positive and negative impacts on patients. In the design of healthcare facility, it is quite important that its design, spatial arrangement and areal distribution must respond to curative needs of people so as the outcome emerge in the form of healing environment in the physical spaces. Total two case study analyses of hospital projects are spatially analyzed i.e. Peshawar Institute of Cardiology, FC Hospital Peshawar for simulation of Spatial analysis based on 3M analysis which is a Japanese model referred as Muda (waste), Muri (over burden), MURA (unevenness) obtained from Kaizen theory for eliminating wasted spaces from Hospital buildings. Total eight design determinants were investigated based on the opinion of the interview on House of Quality template which is a objective aspect of this research i.e. the user which includes: entry, parking, waiting area, connectivity, visibility, walkability, accessibility, and way finding. With regard to spatial organization, the characteristics of individual space, site allocation plan and typology of circulation was especially examined. The two cases from Peshawar Institute of Cardiology Peshawar and FCP (Frontier Corp Hospital Peshawar), are analyzed from the lenses consisting aspects of, circulation pattern in the hospital, accessibility, connectivity and barrier free movement within buildings, walkability status of over stressed staff within the Hospital building. Here functionality of the schematic designs and the problem of the users concerning repetitiveness in their circulation pattern and the way to increase the efficiency of spaces, their spread and flow in the hospital building.

Keywords: 3M Analysis Muda (Waste) Muri (Over Burden), Mura (Unevenness) Kaizen Theory, Visibility Graph, Space Syntax, Axial Line Application, Total Quality Management, House of Quality.

1. Introduction

In Pakistan, the total number of healthcare services, i.e. community health centers, polyclinics, primary, secondary and tertiary hospitals are only 8306 [1]. From among them 1356 are primary scale hospitals, 1255 are secondary scale hospitals, 394 are tertiary scale hospitals and the remaining are community health centers and polyclinics. Pakistan has four main provinces, i.e. Punjab, Sindh, Balochistan and Khyber Pakhtunkhwa [2]. This country lacks documented record of hospital plans and design, thus the first issue is to collect data about the hospital buildings and selection of samples. In this regard a small scale reconnaissance survey of 02 hospital buildings was conducted by the author during the year 2017. The hospital buildings that were selected from Khyber Pakhtunkhwa (KPK) province were 02 in number which were of secondary and tertiary

scale which were studied with the lens of healing environments. The survey found out that the hospitals of Pakistan have a very small percentage of healing places, that is to say, only 11% of the places were healing spaces.

2. Literature Review

Muda (Japanese for waste) that includes seven forms of waste: transportation, waiting, overproduction, inventory, movement, extra processing, and defects. Muda also means the basic waste at the workplace. There are various attributes of the concept of waste such as those factors that do not contribute to the processes going on in any hospital building Verderber, S. (2010). Various kinds of wastes generated in a hospital building in terms of wasted spaces as well as wasted efforts of staff and other employees.

Muda is any activity or process that does not add value; a physical waste of your time, resources and ultimately your money. These wastes were categorized by Taiichi Ohno within the Toyota production system. Many "lean" initiatives fail to see past the elimination of Muda and believe that the point of Lean is to just eliminate waste Ulrich, R.S., (1991). This leads to implementations that initially appear to save money but quickly fall apart and revert as problems such as customer demand fluctuations and supplier problems occur [20]. Nettleton *et al.* (2018):

3. Research Methods

Total eight design determinants were investigated i.e. entry, parking, waiting area, connectivity, visibility, walkability, accessibility, and way finding Haq et al. (2012). With regard to spatial organization, the characteristics of individual space, site allocation plan and typology of circulation was especially examined. Concerning areal distribution, the total spatial sizes, standards and areas allocated to individual rooms and spaces were studied of selected hospital buildings. These three key factors therefore design determinants, spatial organization and the areal distribution were analysed and examined through the data obtained from interviews and 3M analyses tool which further eradicated the waste spaces in Space Syntax application.

4.1 Case Study

The analysis of spatial organization of ICP Institute of Cardiology Peshawar is Muda with the application of Space Syntax software to identify space utilization. Fig. 2 depicts the typical floor plans of the ICP hospital building with division of spaces. These plans were drawn to identify the most used spaces, semi used spaces and less used spaces within the Hospital building. Three different colours were used in the space syntax diagram. Here red colour identifies the most used spaces, orange shows the semi used spaces and blue colour depicts the less used spaces in the building.

The analysis of spatial organization of ICP is Muri with the application of Axial Lines on the floor plans of the hospital to identify the circulation pattern and accessibility or barrier free movement within buildings. Fig. 1 depicts the typical floor plans of the ICP hospital building with axial lines depicting the circulation pattern and association between different spaces and their functions. The axial lines on floor plan are marked in red colour. These axial lines are basically the connectivity lines which were also drawn to identify the walkability status of overstressed staff within the Hospital building

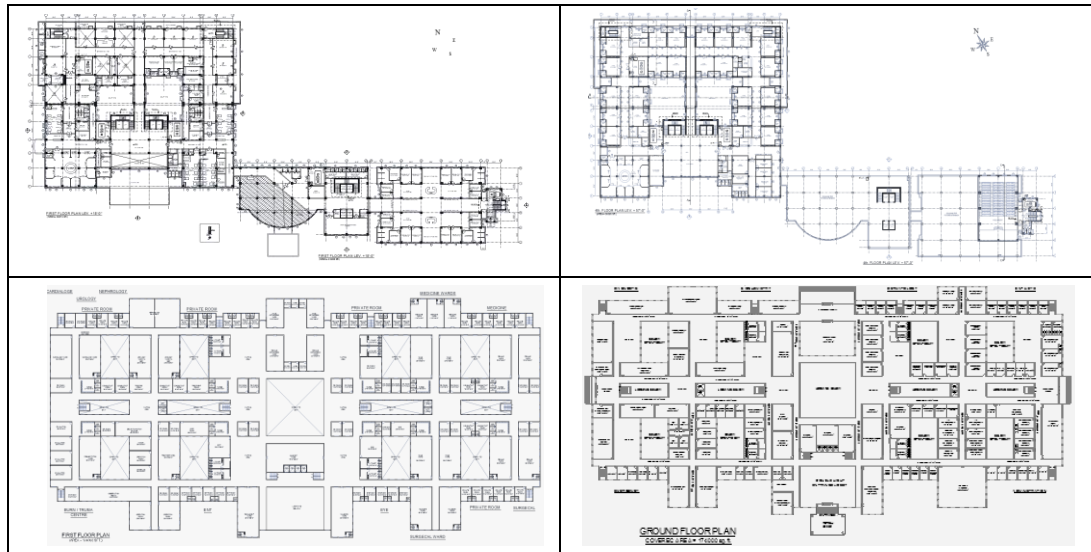


Fig. 1. Plans of hospital developed with the Application of Muri

Fig. 1 depicts the application of statistical analysis of spatial organization of ICP in which visibility analysis depicted through axial line. The axial line shows the efficiency of ICP hospital by linking the Muda-Mura-Muri, as of 5, 4, and 3 from which it can be inferred that, a positive relationship is quite evident in the spatial organization of ICP hospital. It is because the axial line is inclined downwards from Muda to Mura and to Muri.

It may also be interpreted that since Muda is directly proportionate to Visibility and Mura is inversely proportionate to Axial line which means maximum visibility minimizes stress. Similarly, Muri is directly proportionate to Space syntax. In this case standardization adds to appropriate circulation and variation confuses the staff and visitors. With this analysis appropriate recommendations can be proposed for the improvements in spatial organization of Hospital Building.

4.1.1 Case-2: Frontier Corp Peshawar Hospital (FCP)

Health is a state of physical, mental and social well-being and not merely the absence of disease or infirmity. KPK is a province in Pakistan where mortality rate is high compared to the other provinces. FCP Hospital is working for the benefit of patients suffering from disease. The hospital building is divided into two specific portion i.e. in-patients and out- patients. The wards are placed separately in the master plan and located far from the main building which provides a quiet environment. The surgical beds are located near to the surgery in order to provide an easy access to surgery. The private wing has four floors, each connected to the main hospital with a corridor on each level. The second floor of hospital accommodates the Administration. The Inpatient department for FCP consists of 800 beds. Additionally, there are OPD's such as Peads, Speech therapy, Neurosurgery, Antenatal care and Gynecology. Also, there is a medicine store along with laboratories of Hematology, Histopathology, and Microbiology lab.

Table 1. Statistical analysis of spatial organization of fcp

FCP Hospital	Spatial Organization		
	Muda	Mura	Muri
Visibility graph	4	4	5
Space Syntax	5	5	3
Axial line	3	4	4

Total 20 people were consulted and the earlier analysis on Muda, Mura and Muri was shared with them and their viewpoint was taken. The selection of respondents was fairly precise and categorized with the guidance of International Red Cross. These respondents contain nurses, doctors and architects of the hospital. A grading on the scale of 1 as best and 5 as worst was taken from them on all three variables therefore, Muda, Mura, Muri as given in Table 1.

5. Conclusion

The Algorithm for Eliminating Wastage is as shown in the figure 1, vicinity and direct are directly proportionate. It can also be denoted as $Vicinity \propto Orientation$ since maximum visibility shows minimum stress. Also, Mura is inversely proportionate to Axial Line, i.e. $Mura \propto Axial\ Line-1$. This is represented by orientation and corridor which shows (++) relationship that is highly positive.

Whereas $Muri \propto 1/Space\ Syntax$, which infers standardize aids circulation and variation confused staff and visitors. FC hospital is open to sky and is using space to maximum efficiency while it is planned on grid. Label and orientation are positively related as studied at both the hospital in Peshawar.

The spacings must be as follows:

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DESIGN OF LOGISTIC AIR VEHICLE (LAV) TO AVOID REAL- TIME OBSTACLES IN LOGISTICS AND BIOMEDICS

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Abstract

This paper represents autonomous Logistic Air Vehicle (LAV) which is capable of transferring products from one place to another. By following Google maps, the first step in this case is to find obstacles in real world. This is done by locating the coordinates the specific obstacle in order that the specific path as well as direction can be sustained. In this manner, real objects have been tested as obstacles.

The LAV is not only capable of locating and to navigate toward destination but also to avoid obstacles during flight as well as image processing for recipient recognition. This strategy helps in determining the location, confirming its coordinates and finally helps in determining the path that has to be traversed afterwards. This work demonstrates the LAV capabilities to deliver products and coming back to its origin where it starts flight or adjusted starting place. The auspicious result of this method of transferring products will allow the future research on using Air vehicle for logistic as well as biomedical purposes, negotiations of which have been undergoing with some technical vendors with significant expertise in the said areas of specializations. Another plan in this connection is to use this machine at home where toddlers and their maneuvering can be monitored on continual grounds, based on the principles of computer vision.

The project primary aim was to develop autonomous quad-copter which is capable of transferring products autonomously. This project implemented mathematical modeling and control of a quad-copter. The mathematical model of quad-copter dynamics was presented and the differential equations were derived for further simulation using control system theory. The model was verified by simulating the flight of a quad-copter and also by the simulation of motors with MATLAB. Stabilization of altitude of the quad-copter was done by utilizing a PID controller. A divide & conquer method was developed to control the trajectory of the quad-copter. The PID controller was integrated into the flight controller for better response to disturbances in the flight. The various elements that concern the quad-rotor Unmanned Air Vehicle (UAV) including

different sensors, applications and their advantages are simulated and tested. It starts at the basic control structure and describes advanced applications that a quad-rotor can be put to as well. The field of UAVs and specifically quad-rotors has more areas to develop and improve. These areas have lead to major developments in automation and robotics. The improvement in other technologies has given further leads in improving the design and computing power that can be associated with a quad-rotor. Technologies like IC fabrication, chemical materials and programming are not the only fields that affect UAVs, various other fields add up to the improvement and hence the research in this field is never ending. The future work of this project is that we can enhance quad-copter trajectory method and we can also implement Artificial Intelligence to remember the path of trajectory of flight. The image processing part can also be include as a future work to recognize the recipient identity.

Keywords: Logistic Air Vehicle (LAV), Electronic Speed Controller (ESC)

1. Introduction

An autonomous air vehicle is a quad-rotor without the presence of human pilot abroad. Its navigation or movement is controlled through control system onboard or it can also navigate manually by remote control from the ground. A quadrotor has three translational and rotational movement through which it can achieve six degrees of freedom. For this purpose, the rotational and translational motion have to couple with the help of rotors. The quad-copter have four arms and each arm contain independent rotor. In generally quad-rotors use two pairs of propellers with identical parameters i.e. (two clockwise and two anti-clockwise). The variation in speed of each rotor makes it possible to achieve the maneuvering of quad-rotor. The resulting dynamics of model are highly nonlinear, especially after accounting for the complicated aerodynamics effects and unlike ground vehicles which have much friction during their motion, the quad-rotors may have little friction to gain their movement but system model or design must provide their own damping effects to eliminate all these nonlinear factors and for this purpose, these vehicles use an electronic control system to maintain stability of quadrotors using electronic board and sensors i.e. Accelerometer. The quad-rotors were among the first vehicles which can take off and land vertically. The agile and revolutionary design of quad-rotors not only make capable to explore unknown locus but also can move with precise and much faster than any other vehicle in the dense environment. This paper is a demonstration of one of the versatile application of quad-rotor to transfer product autonomously to the required destination.

2. Literature Review

In the last few years, the need of unmanned air vehicle has been increased in the different field of life. The cheap and potential use of these vehicles gives opportunities to perform such tasks which is very difficult and impossible. These vehicles not only flight in complex and rush places but also can reach in much less time than the human. Many companies start delivering products through multi-rotors after recognizing the capabilities of these flying vehicles [1]. Due to these reasons, the researcher & engineer's focuses on the design and modelling of quad-rotors to make it cheap and stable. Frame design and modelling are the first steps toward the journey of building any air vehicle. Overall flight dynamics and parameters are based on frame[2]. The design of quadcopters dynamics is classified with respect to two reference system i.e. body frame and inertial frame [3]. Propulsion means to push forward or to drive an object. In any air vehicle, Propulsion is the force through which propellers push the air down and gain thrust [3]. The brush-less motors are mostly used to achieve propulsion in quad-copter. These motors not only have very high power to weight ratio but also can spin with thousands of RPM [4]. The motors speed is controlled through an electronic device called electronic speed controller (ESC). The ESC by switching motors in on and off state control the speed and thrust of quad-copter. Controlling the

air-vehicle flight dynamics is a complex and interesting problem. The core unit of an air vehicle is control system which works as a brain in human. The researcher and engineers did a lot of research to make this core unit more stable and efficient from the past few years. The different approaches were applied to implement and design control systems. Some model the control system directly by calculating their required parameters from the system and some uses different theories to achieve these tasks i.e. classical control theory.

3. Design Model

The Unmanned air vehicle design is quite different from aircraft because it has no wings. So its flight or movement depends on only thrust forces produced by motors. Mainly there are two forces act on the quad-copter during flight: thrust and weight. As weight is constant so thrust is approx. directly proportional to the rotational movement of rotors and controlling the speed of one or more rotors is the way to establish flight of quad-rotors. [6]. A different variety of configuration of quad-copter frames exist depend upon their application and criteria shown below.

The LAV design consist of four arms with rotor assembled on each arm at an equal distance from the center point of frame. The orientation of rotors is designed in such a way that the thrust generated by the rotors is perpendicular to the frame of LAV.

The construction of each rotor is the same so each rotor produces same thrust with approximate same efficiency. This will cause the LAV to fly against the gravity in a balance way. The assembled figure of LAV is shown in figure 1.

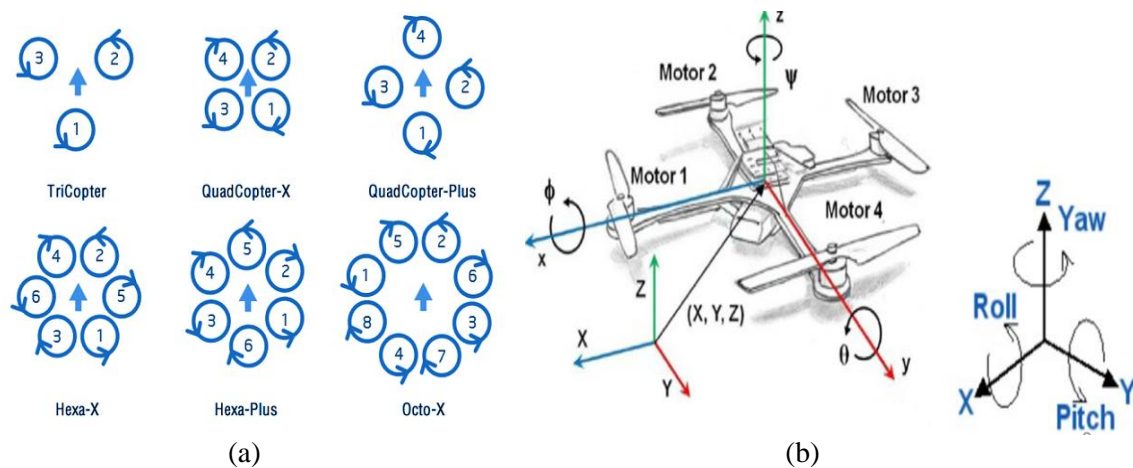


Figure 1: Reference System of Quad-copter

The LAV frame orientation is X-type so in this orientation the adjacent rotors spin in opposite direction while opposite arm rotors spin in same direction to gain the movement in desire direction.

The flight controller is the brain of the LAV which control each electronic operation include movement of rotors, GPS, and other sensors functioning. For this use purpose, we use APM flight controller to control the operation of LAV. The flight controller generates control signals and these signals are fed to Electronic Speed Controller (ESC) which act as inverter and convert the Dc voltage of battery into pulsating 3-phase wave to energize the brush-less motor. The ESC rotate the rotor into a specific angle according to the control signal receive from flight controller.



Figure 2: Quad-copter

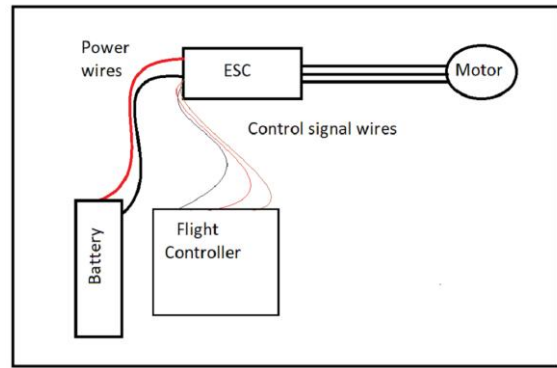


Figure 3: Controller mechanism of the system

The Ultrasonic sensors are used to detect the obstacle along the path of LAV. The Ultrasonic sensor required following parameters to detect any obstacle along the path of LAV.

- Freq: 20 KHz
- Amplitude: 2.5 Vpp
- Waveform: pulse
- Duty Cycle: 50
- Trigger: After a certain time

By implementing these settings, we produced a triggering pulse for the ultrasonic sensor. The results of these simulations are given in Figure 4 and Figure 5. The green line indicates the triggering pulse of the ultrasonic sensor, while the yellow line represents the output from the ultrasonic sensor echo pin. The Figure 4 below shows the output results when the object is at a far distance of about 5 feet. In this case, the echo takes more time to travel corresponding to applying trigger pulse as shown in figure 4.

The Figure 5 represents the output when the object is at a distance of about 3 inches away (near case). In this case, the echo travel less time to corresponding triggering pulse.

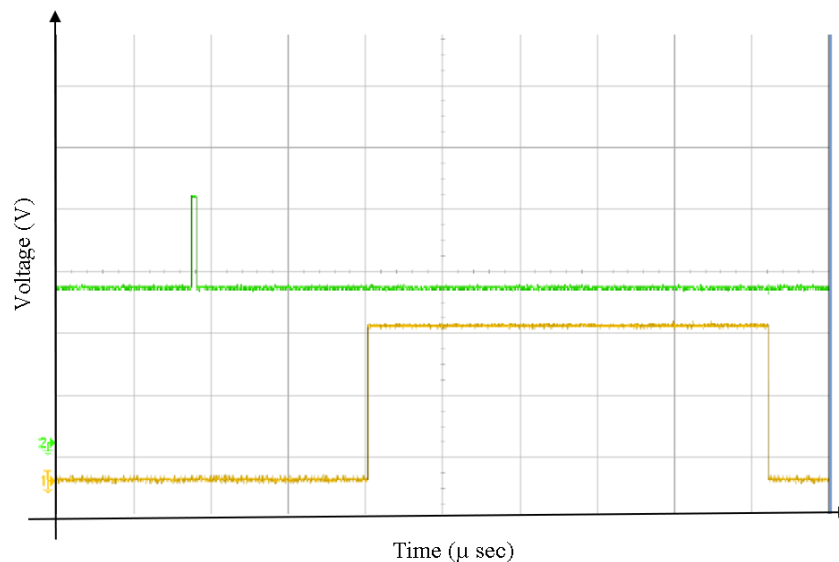


Figure 4: Ultrasonic sensor response when object is at far distance

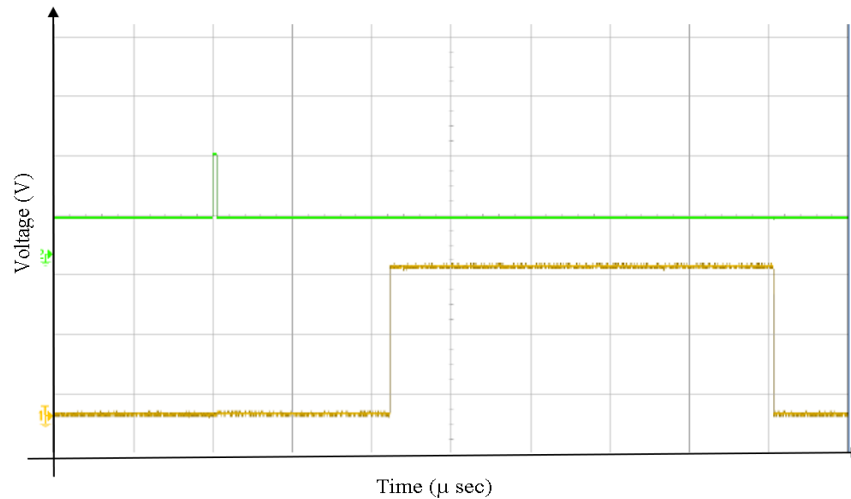


Fig. 5. Ultrasonic sensor response when object is near

So, in this way the object along the path of flight of LAV can be detect and change its trajectory according to the current scenario on a real time.

The GPS module used to find the desired and current location of the LAV. The purpose of GPS is to find the latitude and longitude of the earth. These two parameters are used to track the location of the LAV during its flight. The specification of GPS used for LAV are as follows:

Specifications:

- Satellites: 22 tracking, 66 searching
- Patch Antenna Size: 15mm x 15mm x 4mm
- Update rate: 1 to 10 Hz
- Position Accuracy: 1.8 meters
- Velocity Accuracy: 0.1 meters/s
- Warm/cold start: 34 seconds
- Acquisition sensitivity: -145 dBm
- Tracking sensitivity: -165 dBm
- Maximum Velocity: 515m/s
- Vin range: 3.0-5.5VDC
- Multi-path detection and compensation

The output results of the GPS module are shown in Figure

Latitue:	20.6754
Longitude:	-220.85987
Altitude:	40.900M
PDOP:	2.2(2.2)
HDOP:	0.8
VDOP:	2.0
Satellites Tracked:	15
Satellites in View:	17

Fig. 6. GPS Module output Results

After getting these parameters, the algorithm used to manipulate these parameters are as follows:

- Sort points along the x-coordinate.
- Split the set of points into two equal-sized subsets by a vertical line $X = X_{mid}$
- Solve the problem recursively in the left and right subsets. This will give the left-side and right-side minimal distances dL_{min} and dR_{min} respectively.
- Find the minimal distance dLR_{min} among the pair of points in which one point lies on the left of the dividing vertical and the second point lies to the right.
- The final answer is the minimum among dL_{min} , dR_{min} , and dLR_{min} .

After getting the shortest distance among the destination and current location, the LAV continues its flight toward the destination coordinates.

4. Lav Flight Operation

At the beginning, the LAV is armed using GUI and apply the power through switch button. The parcel is attached with it which have to deliver. After that the coordinates of desired and current location form GPS module is feed into flight controller. The desire location altitude and longitude is selected using GUI from ground station and send to flight controller using telemetry wireless. The flight controller after getting these coordinates manipulate the distance using algorithm divide & conquer to reach the desire location. The complete operation of picking the product and to deliver is represent in the below flow chart.

The track of flight is also defined on the GUI which can be monitor while parcel delivery. The LAV will reach its destination coordinates and deliver the parcel. After that, it will return to its base station coordinates which is already saved in flight controller memory. After returning to the base station, the LAV will disarmed using ground station or GUI.

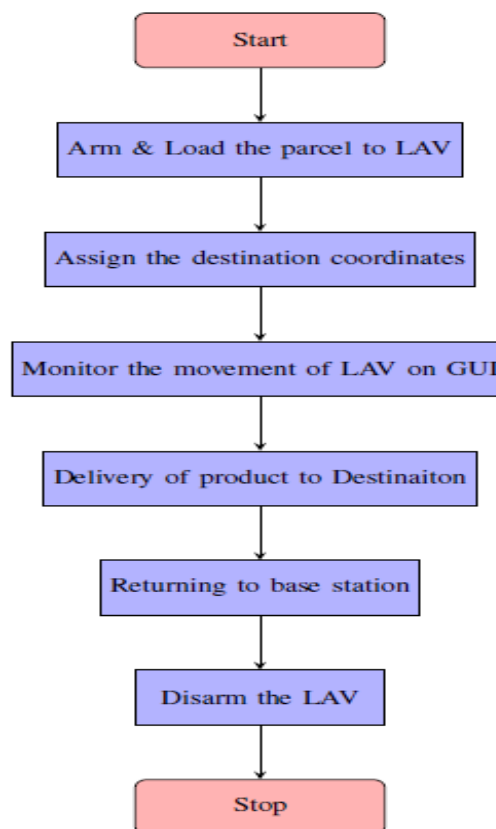


Fig. 7. Flow chart of Delivery of Product

5. Conclusion

The paper primary aim was to develop autonomous LAV which is capable of transferring products autonomously. A divide & conquer method was developed to control the trajectory of the quad-copter. The PID controller was integrated into the flight controller for better response to disturbances in the flight. The various elements that concern the LAV including different sensors, applications and their advantages are simulated and tested. It starts at the basic control structure and describes advanced applications that a LAV can be put to as well. The field of LAV has more areas to develop and improve. These areas have led to major developments in automation and robotics. The improvement in other technologies has given further leads in improving the design and computing power that can be associated with a LAV. Technologies like IC fabrication, chemical materials and programming are not the only fields that affect LAV, various other fields add up to the improvement and hence the research in this field is never ending. The future work of this project is that we can enhance LAV trajectory method and we can also implement Artificial Intelligence to remember the path of trajectory of flight. The image processing part can also be including as a future work to recognize the recipient identity.

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PROPOSED IMPROVEMENTS IN TRAFFIC CONTROL DEVICES FOR RURAL HIGHWAYS OF PAKISTAN

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Abstract

Traffic signs, signals and road markings installed on the roads and highways need a lot of improvements in Pakistan. They do not fulfil the fundamental conditions as per international standards i.e. peculiar shapes, sizes and colors. Among all the reasons the most important being the lack of a proper Manual, outlining the warrants and other details essential for putting up proper signs. Moreover, the manual formed by the planning commission of Pakistan back in 1989 is not reviewed since its development. The problem is further being made worse by the lack of qualified traffic engineers, not fully familiar with the art and science of traffic signs. As a result, the field engineers and contractors were left to their own wishes with regard to design and installing of the road signs. Where as in developed countries there are many signs manufacturing firms who are specialized in this particular field. Many international organizations making efforts for the uniformity of markings and road signs in order to increase the road safety and to enhance international road traffic, but in Pakistan not much significant work has been done and is still very much lagging in this industry. This study is aimed to investigate about the improvements that need to be done in traffic signs and markings, there installation and their maintenance. This helps to make the traffic flow more safe and efficient and also make us familiar with the ongoing practice around the world. The up short of all this study is to enhance the best possible safety of the road users by awaking and changing the aptitude and attitude of users towards the traffic control devices.

Key words: Traffic Control Devices (TCD), Traffic signs, Road marking.

1. Introduction

Traffic control devices (TCD) are all type of markings, signs, and signals placed on or adjoining to a highway by local authorities and the officials having authority to guide, regulate or warn the traffic. The need of uniform standard for traffic control devices has been felt for long time by all countries of the world. Various international agencies are making effort for the uniformity of markings and the road signs in order to increase the road safety and to enable international road traffic (FHWA, U. 2010).

Markings and traffic signs are provided for legal compulsions and give information and guidance, there by manipulating the behaviour of road users. Moreover, they are used to guide and control traffic and to endorse road safety keeping in view the legal requirements of marking and signs. In considering traffic signs and markings it is critical that they should be provided such that they support through movement and surrounding movements safely.

In Pakistan, signs, signals and road markings installed on the roads and highways need a lot of amendments. They did not fulfil the fundamental conditions i.e. shapes, sizes and colors are not up to standard. The persons installing these signs are also not that much skilled in terms of message to be conveyed by those signs. There are a number of reasons for this, the most important being the non-implementation of a proper Manual, outlining the warrants and other details essential for putting up proper signs. The problem was further being made worse by the lack of qualified traffic engineers, fully familiar with the art and science of traffic signs. As a result, the field engineers and contractors were left to their own wish with regard to design and installing of the road signs (Manual of Sign, Signals and markings, 1989).

More over in developed countries, there are many sign manufacturing firms who are specialized in this particular field. In comparison Pakistan is still very much lacking in this industry. Secondly even the local language in most developed countries use English alphabets for the purposes of road signs, letters capital as well as small have been standardize in terms of their shapes, size, width, height and spacing. Templates are provided for each letter which makes the job of sign composition very easy. On the other hand, the same cannot be done for Urdu language due to distinct styles of calligraphy. The only helpful hint which can be given in this regard is that person composing the sign must do so in such a way that the Urdu version is in harmony with the English message.

The highway code further provide a detail info about the rules for pedestrians, rules for users of powered wheel chairs and mobility scooters, rules about animals, rules for cyclists, rules for, rules for drivers and motorcyclists and also techniques and advice for all drivers and riders.

Therefor it's the need of the day to proposed improvements in standards of pavement marking and road signs keeping in view the internationally practicing standards (Highway Code).

For the general discussion of traffic control devices, a literature review has been analysed to collect information concerning the use of TCD practicing in Pakistan. Traffic control devices in Pakistan are erected in very haphazard way, without regard to the need. The erection/installation of these devices is governed by the individual whims. As a result, they often create problems. So we have studied Manual of signs signals and markings by National Transport Research Centre Planning motorcyclists Commission of Pakistan and proposed further improvements that need to be exercises. We will propose a design according to the international standards but that proposed design does not imply that it is the best or most efficient design.

Improvement of the standards and applications of traffic signs and road markings is an on-going process. We commenced a comprehensive study on manual of signs signals and marking by National Transport Research Centre Planning Commission Pakistan, on bases of that studies and our daily life observations we identify improvement measures. Based on the analysis of the identified common problem areas and a study on practices adopted by major overseas countries, we have developed an improvement strategy that include three main areas i.e. design standards, installation and monitoring/maintenance.

1.1 Proposed Improvements to Design Standards

We have identified a number of existing regulatory traffic signs and markings that could be improved by redesigning their size colour and shape for better readability and aesthetic appearance. Following are some of the design standards that need improvement.

Warning signs, such as Curve sign, Pedestrian crossing sign, Animal crossing sign, Pavement narrows sign, Two-way traffic sign and U turn sign appeal consideration to unforeseen situations on or neighbouring to a street, highway or private roads used by public for travel and to circumstances that might not be voluntarily obvious to road users. Warning signs aware facility users to circumstances that might identify for reducing of speed or an accomplishment in the curiosity of efficient traffic operations and safety. An engineering judgment or engineering study should be carried out while using warning signs. The use of warning signs should be optimum as the needless use of warning signs tends to raise disrepute for all signs. In circumstances where the

activity or situation is temporary or seasonal, the warning sign should be detached when the condition or activity does not exist.

Regulatory signs, such as stop sign, slow sign, speed limit sign and mandatory speed limit are used to notify facility users of certain regulations or traffic laws and specify the applicability of the legal necessities and shall be mounted at or near where the regulations apply. The signs shall evidently specify the necessities forced by the regulations and shall be planned and mounted to deliver satisfactory legibility and visibility in order to attain compliance. Regulatory signs shall be retro reflective to illustrate similar colour and same shape and by both day and night, unless specifically indicated else in the text discussion in this Manual for a group of signs or particular sign (Highway Code).

Information signs, such as Hospital sign, Advance direction sign and Petrol pump sign are used to inform the road users of the purpose of an object or to give some instruction on the use of something.

1.2 Installation

In addition to design standards, we have also carried out an assessment of the existing practices and procedures relating to the installation of traffic signs and road markings in Pakistan and suggested some improvements in installation. In order to improve the putting in place of signs and markings, we should include drawings in the Works Request Forms that shows the elevation view of the proposed signs and the minimum visibility requirement. This helps to reduce obstruction to pedestrians and to deal with sign clustering or visibility problems. Moreover, completed work on site should be checked and photographs should be taken of completed work for further assessment and modification. We would put multiple signs (up to a maximum of three) on a single post to reduce the number of street furniture. Landscape works along roads would be so designed to minimize the sign visibility problem. Sign poles, sign mountings and their bases shall be built to grip signs in stable position and appropriate orientation, to stand firm fluctuation in the wind and dislocation by wreckage. Following are the improvements in installations of signs.

A warning sign is usually positioned in advance of the situation to which it calls consideration. Warning signs explain consideration to unforeseen circumstances on or neighbouring to a highway that might describe for a reduction of speed. The use of such signs shall be also based on an engineering study. The use of these signs should be preserved to a lowest. In environments where the condition is short-term, these signs should be detached when the situation does not exist. Perception-Response Time should be kept in mind for determining warning sign location. On rural highways where feasible, these signs should be located at least 3.6 m and a maximum of 9 m from the verge of travelled way section. In rural zones, these signs should generally be positioned about 150 m in advance of the situations. Typical positions and situations that may justify the use of these signs include:

- Changing horizontal alignment
- Congregating traffic lanes
- Intersections
- Tapered roadways
- Changes in highway design
- Facility situations
- Change in Grades
- Entrances and crossings
- Railroad intersections

Regulatory signs inform road users of selected traffic rules and shall be mounted at or nearby where the regulations apply. The regulatory signs shall plainly specify the regulations and shall

be fixed to provide satisfactory visibility to obtain obedience. These signs shall be retro reflective to show similar colour and same shape by both day and night. Excluding parking limitations, two of these signs for dissimilar purposes fronting the same traffic stream should not be attached on the same pole. All regulatory signs shall be illuminated or retro reflected to show the same shape and colour both by day and by night, unless accepted in the Traffic Sign Specifications. These signs should be placed at least 3.6 m and a maximum of 9 m from the verge of travelled way section same like the warning signs.

Guide or information signs are sited where desirable to inform motorists up to date of the direction to their station. Signs which are demanded chiefly for publicity or recognition commitments shall not be mounted. Neither sign nor its pole shall endure any profitable advertising material. Never place a diverting legend on these signs. The letter height for the standard legend shall be at least 100 mm. These signs should be positioned in advance of a point where a driver decision is obligatory so that they can be read helpfully. If approaching speeds are high, a supplementary advance guide sign should be deliberated that need to be installed. A positioning of at least 60 m between these signs should be preserved on rural highways. These signs should be positioned as far from the travelled way as possible, up to a maximum of 9 m when it is preferred to deliver a clear roadside recovery area

1.3 Maintenance

Maintenance activities should be carried out on regular bases to reflect suitable legibility, location, concentration and daytime and night time reflectiveness. Scratched signs should be substituted. To guarantee satisfactory conservation, a plan for cleaning, examining and substituting object markers and signs should be reputed. Staffs of highway, law execution and other public agencies should be encouraged to report any worsened and scratched post or signs at the first break. A systematic plan of replacement of lighting features for illuminated signs should be conserved (Transit New Zealand, Planning for a Safe and Efficient Highway Network under the Resource Management Act, June 1992)

1.4 Proposed Improvement in Markings

Vital purposes of markings along with the signs on highways are to provide information and guidance for the facility users. Foremost marking types comprise of delineators, curb and pavement markings, islands and collared pavements. However reflectivity of the markings can be flawed by debris, snow and water on or adjacent to the markings.

1.5 Materials

The prominence of edge and centreline markings at night can be enhanced by using retro reflection paint because in case of fog and rain especially the visibility of centreline becomes very low. Curb and pavement and markings are usually positioned by using thermoplastics or paints though collared pavements, elevated pavement markers, channelizing devices and delineators can also be used as pavement marking .It is significant that particular colour should be provided by the materials used for marking throughout their useful life. Attention should be given while selecting pavement marking materials that decrease the loss of grip for facility users, including bicyclists, pedestrians, and motorcyclists.

1.6 Brink Marker Posts

To delineate the alignment of the roadway a head brink marker posts or post mounted delineators are used, particularly at vertical and horizontal curves (National Roads Board, 1985. Guide to Geometric Standards for Rural Roads)

They are mainly of use for night time regulation and have the following benefits:

- They can be noticed far ahead, mostly in reduced visibility situations.

- They can be noticed even when the pavement has become invisible because of horizontal or vertical curves.
- They remain safe from traffic wear
- Unlikely pavement markings, they do not become covered by water, sand or snow.
- They are positioned on the neighbouring side of the road, thus away from the headlights glare of opposing vehicle .
- The fixing of brink marker posts on the facility is not generally essential for roads carrying less than 500 vehicles per day; however, situations may happen where the fixing of either isolated or continuous unit of brink marker posts is required.
- Where there are frequent vertical or horizontal curves.
- Over segments where there is a greater number of crashes.
- Through regions normally subjected to fog and heavy rain.
- Where there are substantial night traffic movements.
- Where there are hefty non commuter traffic movements.

1.7 Raised Reflective Pavement Markers

Raised Reflective Pavement Markers offer both 'near' and 'far' demarcation at night. When crossed by vehicle wheels RRPMS can also deliver a perceptible and noticeable signal (National Roads Board, 1985. Guide to Geometric Standards for Rural Roads).

The colours coding of RRPMS are as follow:

- No passing line: yellow
- Centreline: white
- Left brink (special circumstances): red
- The desirable spacing between the RRPMS is from 15 to 20 m.

2. Conclusions

- Manual formed by the Planning Commission of Pakistan back in 1989 is not reviewed since it is developed.
- Due to the deficiency of Qualified Traffic Engineers irregularities have been found and proper standards are not been followed.
- Field engineers and contractors were left to their own will with regard to design and installing of the road signs due to lack of proper supervision.
- Maintenance of sign and marking is not carried out regularly after initial installation.
- The work done in field of traffic engineering in Pakistan is not satisfactory.
- Very less work done specially in case of rural highways.
- The highway department work in this field in not matching with international standards.
- Authorities are not implementing internationally recognized methods, techniques and principles.
- MUTCD illustrate how to implement internationally recognised methods and the ways which are to be followed.

Therefore, the manual developed in 1989 should be reviewed and should be updated according to the new standard practice in world. The implementation of manual should be made sure. The maintenance of the sign and markings should be done on regular interval. The contractor and field engineer should not be left at their own to post a sign or marking where ever they want but a proper engineering study should be carried out by traffic engineer that should be followed in the field.

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EFFECT OF AGGREGATE GRADATION ON RUTTING

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Abstract

In 1993, a new mix design procedure was developed by Strategic Highway Research Program with the title SUPERPAVE mix design procedure, which is an acronym of Superior Performing Asphalt Pavement. Specifications for aggregate gradation under Strategic Highway Research Program consist of maximum density line, restricted zone and control points. Control points serve as a controlling range through which gradation must have to pass, whereas the gradation should not pass through restricted zone, because the gradation compliance with restricted zone fails prematurely before completing its service life. In this research three gradations were considered and evaluated for volumetric requirements and rutting potential. Among the three gradations one was passing through the restricted zone and other two gradations were passing outside the restricted zone. The outcomes shows that the gradation passing through the restricted zone not only satisfy Superpave volumetric requirements but also performs better against rutting as compare to the gradations passing outside the restricted zone.

Keywords: SHRP, SUPERPAVE, Aggregate Gradation, Restricted Zone, Rutting.

1. Introduction

Asphalt concrete is composed of binder and aggregates. In asphalt pavement 94 to 95% is aggregate whereas remaining portion is binder that acts as gluing agent. In hot mix asphalt the aggregates provide strong aggregate skeleton to resist each application of load. When load is applied the rough and angular aggregates tightly lock together and serve as a single large elastic

mass thus increasing the shear strength of asphalt mixtures. Therefore, gradation is an influential characteristic of aggregate that affects the performance of hot mix asphalt mixtures like fatigue cracking and permanent deformation. Mixes having different gradation have different stability and rutting potential. To encounter permanent deformation issues SHRP introduced new mix design method named as SUPERPAVE and specifications for aggregate gradation chart. The gradation chart has maximum density line, control points and restricted zone. Maximum density line splits coarse gradation with finer, control point serve as master range through which gradation must have to pass, whereas, the restricted zone restricts the gradation to pass through restricted zone.

Superpave gradation performance was carried out for two NMA 9.5mm and 19.0mm, five blends passing above, below, through, and crossover and humped through the RZ including 10 FAA. The mixed gradation met the Superpave volumetric and FAA requirements. The shows that the gradation that was passing through the restricted zone performs better as compare to gradation that were passing outside the restricted zone (Khandal, 2001).

Fatigue properties of bituminous mixtures designed by using Superpave mix design method. Nine aggregate gradations with 100-percent crushed aggregates were evaluated. 25-mm, 19-mm, and 12.5-mm NMA has been considered in research. Among the nine gradations, three gradations passing TRZ, four gradation passing ARZ and remaining two passing BRZ. The results obtained from four point bending beams shows that the gradation passing TRZ has better fatigue performance (Sousa et al. 1998).

Another literature review of thirteen published paper to study the impact of SUPERPAVE restricted zone on aggregate gradation performance was carried out. The literature review included extensive range of aggregates, gradations, NMA, and performance testing. The results obtained by reviewing the papers is that the gradations passing TRZ performance better as compare to gradation passing outside the restricted zone (Hand and Epps, 2001).

In another study the effect of resilient modulus on specimen thickness, diameter and aggregate NMA and three loading factor including load, waveform and strain level is computed. It was believed that resilient modulus decreases as load duration increases because plastic strain becomes higher. This effect is also related with viscoelastic nature of bituminous mixes and causes the mixes to be rate dependent. This effect can be described as slower the traffic more will be damaging effect on pavement structure (Jahromi and Ali, 2009).

2. Aggregate Gradation

SHRP specification for aggregate gradation use a unique graphing technique where abscissa shows the percentage passing while the ordinate shows the sieve size raised to power 0.45. The chart has maximum density line, control points and restricted zone. The gradation passing closer to maximum density line provides lower VMA, control points control the maximum size of aggregate, control proportion of dust and relative proportion of fine and coarse aggregate and restricted zone restricts the gradation that passed through the restricted zone, because it has more fine sand in relation to total sand and the gradation passed TRZ will produce the weak mix. This study is based on three gradations ARZ, BRZ and TRZ of one NMA as shown in below Figure1.

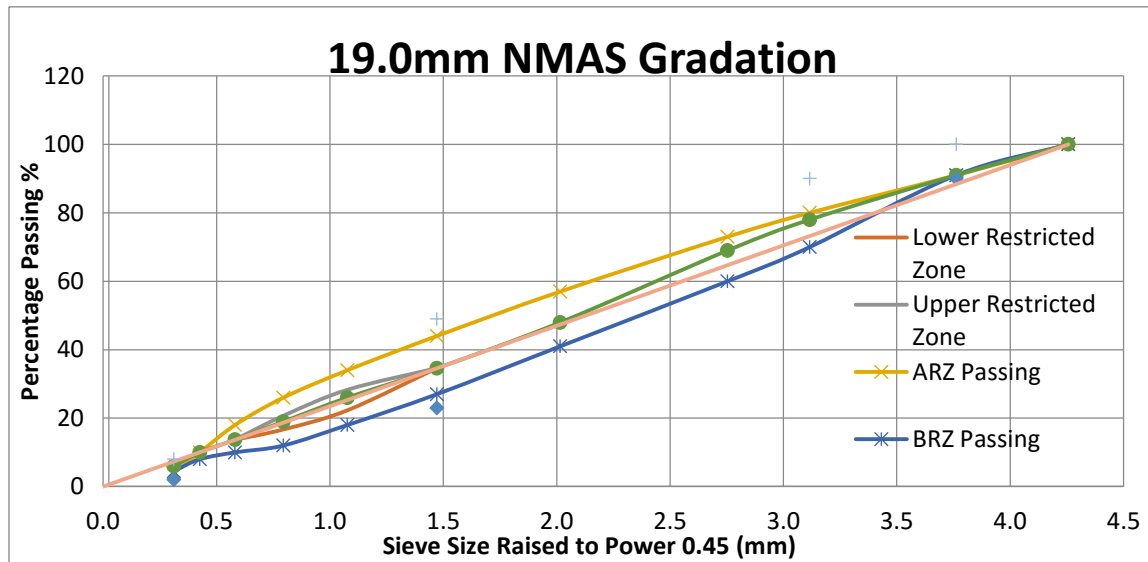


Figure 1: Gradation Chart

3. Mixtures Preparation

The procured gradation was sieved out and stored in respective bins, to achieve the required gradation as shown in the gradation chart was procured back from the sieved bins and gradations (ARZ, TRZ and BRZ) of one NMA5 were prepared in laboratory by using Superpave design method. The specimens were compacted by employing SGC that compacts each gradation at 125 number of gyrations that simulates the effect of 30 million ESALs for the period of 20 years. The optimum bitumen content and volumetric for each gradation is shown in below Table 1.

Table 1: Volumetric of Superpave Gradations

Gradation	% AV	% AC	% VMA	% VFA	% Gmm @ Nini
TRZ	4.00	4.00	13.21	69.70	85.60
BRZ	4.00	4.20	13.48	70.30	84.20
ARZ	4.00	4.30	13.40	70.20	87.90

As mention above the core cut and saw cut specimens for performance testing is shown in Figure 2 and Figure 3. Figure 2 shows the specimen used for strength and stiffness test whereas Figure 3 shows the specimen for wheel tracker test.



Figure 2: Specimens for IDT and MR Tests



Figure 3: Specimens for HWT Test

4. Analyses and Discussions

The results and its analysis are explained in subsequent headings:

4.1 Superpave Volumetric Analyses Results

The Superpave volumetric analysis was conducted only for % VMA and %Gmm @ Nini because VFA is function of VMA and VA, as all the mixtures are optimized at four percentage air voids and none of the mixture was failed at %Gmm @ Nmax.

4.1.1 ANOVA for Voids Mineral Aggregate

The primitive step in the analysis is analysis of variance to find out the gradation effect on VMA and %Gmm @ Nini. Results of one way ANOVA shown in Table 2 shows that gradation significantly affect VMA.

Table 2: Analysis of Variance of % VMA

Source	DF	SS	MS	F	P
Gradation	2	0.0784	0.0392	23.76	0.014
Error	3	0.00495	0.00165		
Total	5	0.08335			

Figure 4 demonstrates the effect of gradation structure on VMA. Each bar was the average representative of VMA. The figure depicts that BRZ has higher VMA as compared to ARZ and TRZ. TRZ provides lowest VMA because it was close to maximum density line.

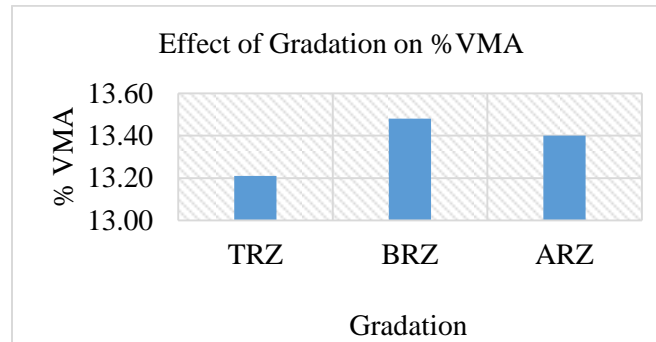


Figure 4: Effect of Gradation on VMA

4.1.2 ANOVA for %Gmm @Nini

One way ANOVA was conducted for evaluating the significance of gradation on %Gmm@Nini. and presented in Table 3.

Table 3: Analysis of Variance of %Gmm @Nini.

Source	DF	SS	MS	F	P
Gradation	2	19.373	9.687	21.13	0.017
Error	3	1.375	0.458		
Total	5	20.748			

The Figure 5 demonstrates the effect of gradation %Gmm @ Nini. ARZ has highest %Gmm @ Nini on average. BRZ yield lowest %Gmm @ Nini as compare to TRZ and ARZ. The reason ARZ has highest %Gmm @ Nini because ARZ is finest and finest gradation always has high %Gmm @ Nini.

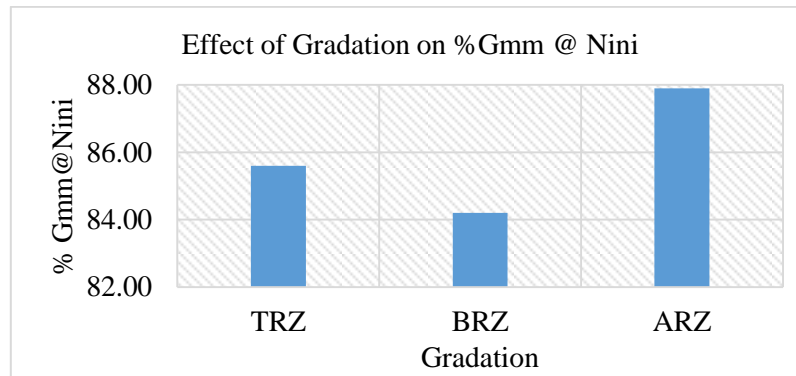


Figure 5: Effect of Gradation on % Gmm @ Nini

4.2 Hamburg Wheel Tracker

Result of Hamburg wheel tracker test results are tabulated in Table 4. The Hamburg wheel tracker test was conducted at 25°C. Volumetric properties as presented earlier shows that gradation passing BRZ has higher VMA as compare to gradation passing ARZ and TRZ, that is more likely the reason that gradation passing BRZ has higher rut depth.

Table 4: Rutting Test Results for Gradations

Gradation	% AC	% VMA	Rut Depth (mm)
TRZ	4.00	13.21	0.11
BRZ	4.20	13.48	0.19
ARZ	4.30	13.40	0.28

Figure 6 below shows the effect of gradation on rutting. Gradation passing BRZ has marginally higher rut depth as compare to gradation passing ARZ and TRZ. Gradation passing TRZ that was considered as rut prone performs best as compare to rest of gradations.

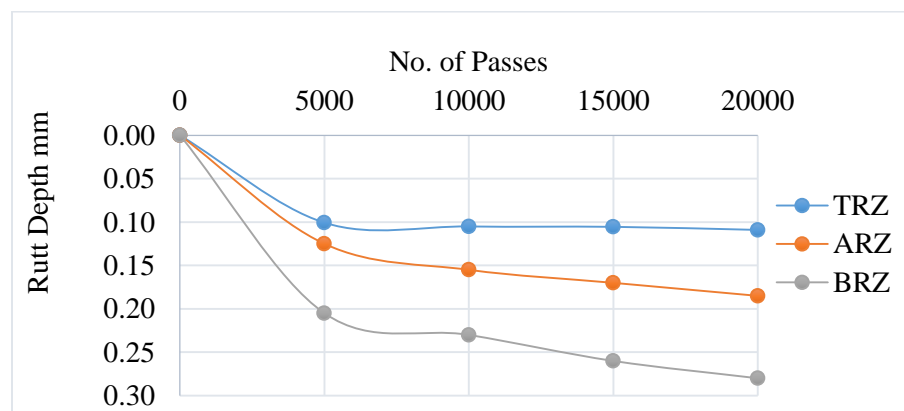


Figure 6: Effect of gradation on Rut Depth

Analysis of rut depth was evaluated by conducting one way ANOVA. Table 5 shows the ANOVA conducted on HWT test results. Which clarify that the gradation has significant effect on rutting propensity.

Table 5: Analysis of Variance of Rut Depth

Source	DF	SS	MS	F	P
Gradation	2	0.029108	0.014554	205.47	0.001
Error	3	0.000212	0.000071		
Total	5	0.029321			

4.3 Resilient Modulus (Mr) Test

The test results of resilient modulus obtained for three gradations at two different temperature and load duration is presented in the Table 6.

Table 6: Resilient Modulus Testing Results

Sr. No.	Name and designation of mixes	Resilient Modulus (MPa) at 25°C		Resilient Modulus (MPa) at 40°C	
		100ms	300ms	100ms	300ms
1	TRZ	6459	4323	2192	1003
2	ARZ	5246	3631	1521	773
3	BRZ	4756	2482	932	597

4.3.1 Analysis of Resilient Modulus Test Results

In this research, two factors were considered and are presented in Table 7 with their respective abbreviations including high and low levels. Design of Experiments was carried out using Minitab-15 statistical software separately for gradation passing ARZ, TRZ and BRZ.

In ANOVA, two F-tests were made and 0.05 was chosen as a level of significance. To evaluate the significance of these tests for gradation passing ARZ, TRZ and BRZ respectively, probability values are given in Table 7, 8 and 9 respectively.

Table 7: Analysis of Variance for ARZ

Source	D F	Sequenti al Sum of Squares	Adjusted Sum of Squares	Adjusted Mean Squares	F-Test	P-Test	Significan ce at 95%
Main Effects	2	36696327	36696327	18348163	880.47	0.000	Yes
2-Way Interactions	1	563767	563767	563767	27.05	0.001	Yes
Residual Error	8	166713	166713	20839			
Pure Error	8	166713	166713	20839			
Total	11	37426807					

Table 8: Analysis of Variance for TRZ

Source	D F	Sequential Sum of Squares	Adjusted Sum of Squares	Adjusted Mean Squares	F-Test	P-Test	Significance at 95%
Main Effects	2	51458190	51458190	25729095	1189	0.000	Yes
2-Way Interactions	1	672133	672133	672133	31.08	0.001	Yes
Residual Error	8	173011	173011	21626			
Pure Error	8	173011	173011	21626			
Total	11	52303334					

Table 9: Analysis of Variance for BRZ

Source	D F	Sequential Sum of Squares	Adjusted Sum of Squares	Adjusted Mean Squares	F-Test	P-Test	Significance at 95%
Main Effects	2	29551222	29551222	14775611	14831.23	0.000	Yes
2-Way Interactions	1	2818821	2818821	2818821	2829.43	0.000	Yes
Residual Error	8	7970	7970	996			
Pure Error	8	7970	7970	996			
Total	11	32378013					

4.4 Main Effect Plots

Main effect plots of gradation passing ARZ, TRZ and BRZ are shown in Figure 7. The conclusion derived from the temperature plot is that the resilient modulus of the asphalt concrete specimen is decreased with the increase of the temperatures, because stiffness of the specimen decreases resulting increase in the recoverable strains and decrease in resilient modulus. The inference drawn from the load duration plot shows that longer the load duration lowers the resilient modulus for gradation passing ARZ, TRZ and BRZ. This was obvious because due to longer load duration asphaltic concrete specimen experience higher strain for long period of time and in return reduce the resilient modulus.

4.5 Interaction Plot

Figures 8 shows the interaction plot of load durations and temperatures on ARZ, TRZ and BRZ. The conclusion drawn from the interaction of Temperature and Load pulse vs. resilient modulus of the mixtures shows that at low temperature and smaller loading duration has higher resilient modulus whereas at high temp and longer duration resilient modulus decreases, This is due to the reason that when load is applied for smaller duration at low temperature, asphaltic concrete mixture behave stiffer and the pavement surface is less prone to rutting, this HMA specimen has high resilient modulus. But when a load is applied for longer duration and at high temperatures the scenario is totally different, the asphaltic concrete specimen becomes less stiff at higher temperature and result in lower resilient modulus.

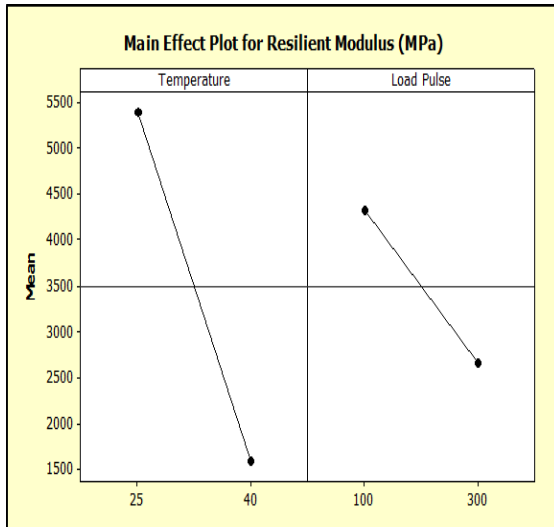


Figure 7: Main Effect plot

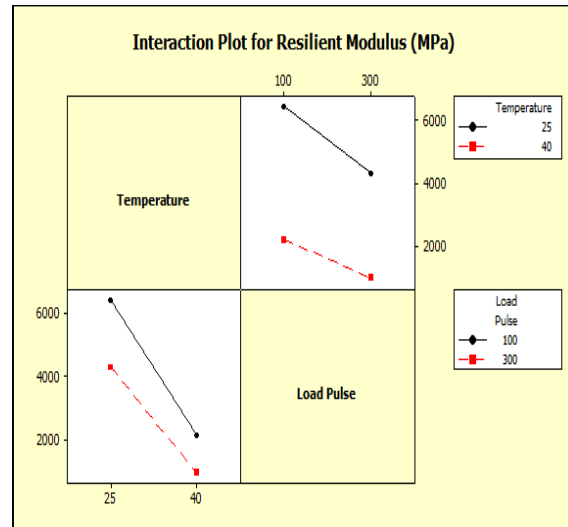


Figure 8: Interaction Plot

5. Summary and Conclusions

The conclusion is based upon the test results achieved from the testing and by doing statistical analysis.

1. It can be easily stated from the performance testing results that the gradation passing TRZ performs better as compare to gradation that are passing outside the restricted zone (ARZ and BRZ).
2. Statistical analysis on Superpave volumetric shows that the gradation has significant effect on VMA of mixes. The gradation passing TRZ has 0.27% and 0.19 % VMA values as compare to gradations passing outside the restricted zone BRZ and ARZ respectively.
3. Finer gradation (ARZ) has relatively higher $\%G_{mm} @ N_{ini}$ as compare to gradation passing TRZ and BRZ. It was observed that the gradation passing ARZ has 3.7% and 2.3 % higher Theoretical Maximum density at initial number of gyrations as compare to gradation passing BRZ and TRZ respectively.
4. The statistical analysis on the results obtained from HWT for the gradation passing ARZ, TRZ and BRZ shows that gradation has significant effect on rut depth. The gradation passing below the restricted zone produce higher rut depth as compare to the gradation passing TRZ.
5. Loading pulse has significant effect on the gradation passing ARZ, TRZ and BRZ. On average resilient modulus decreases 41% when load duration increased from 100 to 300ms. The decrease in resilient modulus is due to the fact that specimens experienced strains for longer period of time.
6. Temperature has pronounced effect on the gradation passing ARZ, TRZ and BRZ. On average resilient modulus decreases 74% when temperature is increase from 25°C to 40°C. The drop down in resilient modulus emphasized on the fact that asphalt concrete is temperature dependent. At higher temperature asphalt becomes viscous and aggregates contribution becomes more significant.

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TREATMENT & RECYCLING OF GREY WATER FOR SUSTAINABLE WATER MANAGEMENT

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Abstract

The world is facing lack of availability of abundant and sustainable fresh water supply. Population growth, house hold, increase in irrigated agriculture and industrial growth are the major factors that require increase in fresh water supply. Growing water demand than actually available, lack of access to fresh water supply and water pollution that restricts its use/reuse, create water scarcity around the globe. Recycling can be one of the best solutions to reduce stress on fresh water sources. Most of the water intake to domestic and commercial units end up in the municipal sewer as wastewater. The wastewater is categorized as black water and grey water. Treating black water is difficult and expensive, whereas, treatment of grey water is easy and inexpensive. Therefore, the aim of the research is to reduce load on fresh water resources through recycling grey water for secondary purposes. A prototype one sink system was designed, which consisted of collector, filtration and disinfection tanks. The performance of the systems was evaluated through testing parameters: Chemical Oxygen Demand (COD), Turbidity, Alkalinity, Hardness, Electrical Conductivity, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). The results showed 90% of COD, 80% of turbidity, 50% alkalinity, 40% hardness, 65% TSS, 40% TDS removal efficiencies. The treated water can be reused for secondary purposes, such as: car and floor washing, toilet flushing, gardening, and construction operations.

Keywords: Grey water, low cost water treatment, and waste water recycling

Introduction

Water scarcity has become a well-recognized global problem, there is a dire need to adopt and prompt measures like conservation of water, treatment of wastewater and reuse of grey water (Tiruneh, 2014). According to a study of multi-story residential building in Brazil, flushing in toilet consumes a high percentage nearly 32.8% of potable water. UK domestic consumption is 150 liters per capita per day out of which nearly 50 liters goes in toilet flushing (Wurts, 2013). Replacing toilet flushing by treated Grey water which is least polluted and requires little treatment could easily save 50 liters of fresh water per capita per day in domestic use (Wannawit, 2018). Another study reports that the domestic in-house water consumption nearly 100-150 liters per person per day, approximately 60-70% of it is converted into grey water. By treating and reusing this significant percentage of grey water stress on potable can be reduced substantially (M.Dakua, 2016). There is a strong need to find ways to reduce load on fresh water resources as they are only 1% (Eldessouky, 2006).

Reuse of treated grey water can be one of the best techniques to reduce loads on fresh water resources (Yi-Ka, 2016). Grey water is generally defined as: waste water collected from indoor sources other than toilet, such as, showers, bathtubs, hand basins and washing machines. Grey water collected from these sources are the least contaminated and polluted form of waste water in a house or building (Wannawit and Taemthong, 2018). Some researchers include kitchen waste in grey water as well. For simplicity, we have not included kitchen waste in grey water as it is highly polluted with organic loading and contains oils as well.

Water that comes to our home daily can be classified into (i) toilet flushing, (ii) drinking & cooking, (iii) household cleaning and (iv) other household uses like car washing, gardening etc. Among these, there are at least two types i.e. Toilet flushing and other households for which drinking water quality is not required and treated grey water can be used. The use of treated grey is increasing globally to decrease the stress on fresh water resources (L. Eric, 2018). North African Countries. Following figure shows the usage of fresh water that come to our homes:

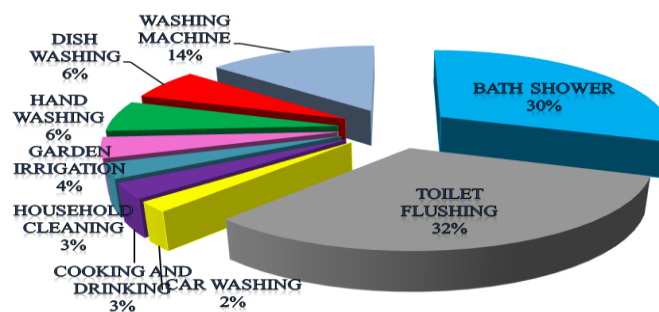


Figure 1: Usage of Fresh Water

Figure-1 shows that 43% of activities don't require water of drinking quality and this can be replaced by treated grey water thus reducing the demand of fresh water. According to Ghisi (2006) up to 35% of water can be recycled using grey water instead of potable water in Brazil. According to study by Ahmad Jamil (2008) grey water can be efficiently utilize in laundry unit. Nevertheless, there is a gap in literature regarding grey water treatment systems at low cost in Pakistan, which can provide recycled water to reuse for flushing and other non-potable uses. Thus, the study is undertaken to address that gap in the research area.

Methodology:

1) Collection of samples

Grey water samples were collected from Institute of Environmental Sciences and Engineering (IESE)-NUST boys and staff washrooms by placing buckets under the sinks. The soapy water samples were then tested in the laboratory for different parameters like turbidity, temperature, pH, COD, alkalinity, hardness, TDS and TSS. The results were carefully noted. These tests were repeated couple of times so as to get a know-how of the generalized properties of collected samples of grey water.

2) Preparation of synthetic samples

For better analysis, the operating conditions, treatment procedure, equipment and samples are required to be kept consistent for each test. Thus, it is better to prepare and use synthetic grey water samples to better assess properties of grey water and to treat it accordingly. Synthetic Grey water was prepared by following the composition discussed in Clare Diaper (2008) as tabulated in Table-1 below:

Table 1: Composition of Prepared Synthetic Grey Water

Ingredient	Amount in 100L	Product Used
Moisturizer	1	Dove
Toothpaste	3.25	Colgate Maximum Cavity Protection
Deodorant	1	Axe
Na ₂ SO ₄	3.5	Analytical grade
NaHCO ₃	2.5	Analytical grade
Na ₂ PO ₄	3.9	Analytical grade
Clay	5	Industrial grade
Vegetable Oil	0.7	Seasons Canola
Shampoo/hand wash	72	Palmolive
Laundry	15	Omo High Performance
Boric Acid	0.14	Industrial grade
Lactic Acid	2.8	Analytical grade
Secondary Effluent	2 L	From Treatment Plant

Characteristics of synthetic grey water

Table 2 shows the characteristics of grey water. Suspended solids (SS), turbidity, temperature, pH, conductivity, COD and total coli-forms were the main constituents of synthetic grey water. A study done in 2011 by Leal, Lucía of 32 houses in Sneek, The Netherlands also thoroughly characterized COD as and take it as one of the main parameter in the recycling of grey water. Tests are performed in the laboratory hereafter the preparation of synthetic grey water. This was done to design a proper treatment process that shows reproducible results and minimize any form of error or variance in the result due to changing composition of the samples.

Table 2: Characteristics of Synthetic Grey Water

Parameter	Value/Range
Suspended Solids (mg/L)	60-80
BOD (mg/L)	130-180
Temperature (°C)	25-35
pH	6.5-8.0
Turbidity (NTU)	50-70
Conductivity (uS/cm)	300-400
COD (mg/L)	250-400
TOC (mg/L)	50-150
Total Coli-forms (cfu/100ml)	10 ³ -10 ⁴
E. Coli (cfu/100ml)	10 ² -10 ³

Treatment process:

The system is based on three treatment process:-

Sedimentation:

Sedimentation process removes suspended particles that are heavier than water by gravitational settling. The density of mineral particles is usually between 2000 to 3000 kg/m³ and can easily settle out by gravity while organic particles have densities ranging from 1010 to 1100 kg/m³

(Tangki, 2012) and take a long time to settle by gravity. Generally, coagulants are used to destabilize particle to form larger and settleable floc.

Suspended particles, such as, clay or silts, may be originally present in the source water. It is accomplished by decreasing the velocity of the water being treated to a point below which the particles will no longer remain in suspension. When the velocity no longer supports the transportation of the particles, gravity will remove them from the water.

Filtration:

Filtration is one of the most common and oldest method to separating suspended solid particles from a liquid. Filtration is a process in which water is allowed to flow through a granular bed of sand or another suitable media, at a low speed. The media retains most solid matter and permits the water to pass. Filtration process is usually repeated to ensure adequate removal of unwanted particles in the water (Ontario, 2010). This kind of slow filtration over a granular bed is generally known as slow sand filtration. The separation is not complete and it will depend on the pore size and the thickness of the medium.

Disinfection:

Filtration is followed by disinfection and used to remove coliforms when the filtrate is mixed with appropriate concentration of the disinfectants.

Prototype:

The prototype is made from acrylic sheet. A sheet of 8 mm was used in making prototype. The top most chamber is the sedimentation/collection chamber, the second is the filtration chamber and the last is the storage/disinfection chamber. The dimensions of each compartment are given in the Table-3 and the prototype design is illustrated in Figure-2.

Table 3: Dimensions of Prototype

Dimensions (inches)	1 st Chamber	2 nd Chamber	3 rd Chamber
Length	24"	12"	10"
Width	12"	12"	12"
Height	06"	18"	18"

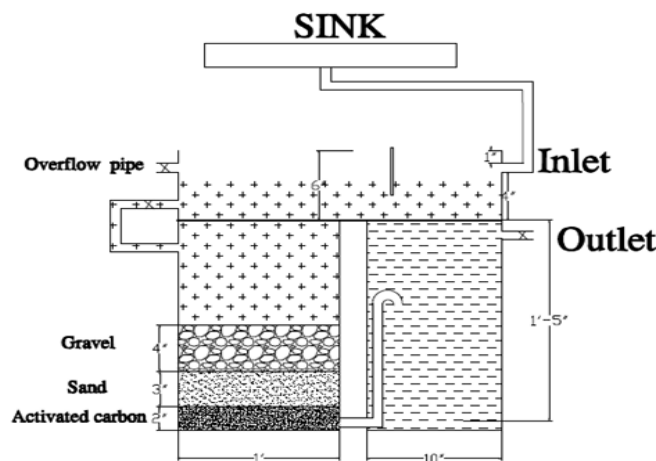


Figure 2: Proposed Equipment Design

Design of filter:

A multimedia filter composed of layers of gravel, sand and activated carbon was made for treatment of synthetic grey water samples. Depth of each layer is given in Table 4. It has the capability to reduce the COD, hardness, turbidity and various other characteristics in the samples by a considerable amount.

Table 4: Thickness of Materials Used in 2nd Chambers

Layers	Thickness
Gravel	4"
Sand	3"
Activated Carbon	3"

Process:

The grey water sample from the sink is collected in the sedimentation/collection chamber. In this chamber, the particles settle down. The lighter particles remain suspended in the sample. To settle the particles, velocity of the water being treated is decreased to a point below which the particles can no longer remain in suspension. These particles ultimately start settling in the sedimentation chamber. The settled water is then allowed to flow into the filtration chamber, where the water is going to pass through the filtration assembly. The filtered water is then allowed to flow into a clear filtrate where disinfectant is added. To achieve good disinfection, proper head was given to create a certain degree of turbulence (mixing) and suitable detention time for the disinfectant to mix with the filtered water. The pipe having a diameter of 0.5" allowed the water to flow when the level of water reaches up to 22 liter mark at least. Enough detention time is to be ensured for the mixing of the disinfectant with the water.

Cost and maintenance:

Although the proposed prototype is made using an acrylic sheet, it can be replaced by any plastic or cheaper materials. The cost of the prototype is Rs. 12000, for further reduction in cost it can be replaced with plastic amounting nearly Rs. 5000. It can be operated for two months without the need of maintenance and backwash. Cleaning of the system and backwashing can be easily done by any unskilled person. The media, consisting of gravel, sand and activated carbon are cheaply available and can be replaced or simply reused by washing. It can be cleaned and reused by taking out on a piece of cloth or a chart paper, washed with clean water and placed back according to the marked color instruction on the chamber.

Sampling and testing:

The prototype design is a small scale plant that is installed inside homes, so grab sampling technique was selected instead of composite sampling technique. Due to limited time, composite sampling would have been too hefty.

Samples of grey water were collected and analyzed for physical and chemical parameters to check the quality of sample and subsequently use the results for the design of the treatment system. Following parameters were analyzed during the experimentation.

1. pH
2. Turbidity, TSS and TDS
3. Alkalinity
4. COD
5. Hardness
6. Coliform Count

All the tests were performed in the laboratories of Institute of Environmental Sciences and Engineering (IESE).

Discussion:

Synthetic grey water was taken and tested for physical and chemical characteristics to find the efficiency of treatment process.

pH value:

The pH of the samples is checked and recorded. The PH was 8.0, which means it is alkaline. After treating the alkaline synthetic grey water through the treatment system, it was observed that the filtered water became neutral i.e. its average pH became 7.

Turbidity, TSS and TDS:

After passing the synthetic grey water through the treatment system, the turbidity, TSS and TDS of the samples reduced by 80%, 65% and 40% respectively.

Chemical oxygen demand (COD):

The treatment system reduced the COD to a minimum range, between 60 and 150 mg/lit. Removal efficiency came out to be 90%.

Alkalinity:

Treated samples showed 50% less alkalinity. As the pH decreased after the filtration process, it led to a reduction in the alkalinity of the synthetic grey water sample.

Hardness:

The proposed treatment system was successful in removing about 40% of hardness from the original sample. Upon further investigations, the ascertained range of hardness of the treated sample came out to be 50 to 80 mg/liter, which isn't high and fall in the acceptable limits.

Coliform Count:

Treated samples effluent was tested for the coliform count before and after the disinfection chamber. For every round of test, before disinfection the coliform count came out to be between 10.2 and 10.4. Whereas, after the disinfection treated water showed zero coliform count that is the required achievement.

Results:

The data of test results are presented in Table-5. Comparison on the basis of these studies led to the following results regarding the removal efficiencies.

Table 5: Removal Efficiencies

Parameters	Sample Water	Filtrate	Efficiency (%)
Turbidity (NTU)	9 and 16	0.3-4	97
TSS (mg/lit)	2.5-6.8	0.2-2.2	92
COD (mg/lit)	400-600	60-120	85
Electrical Conductivity(μ S)	900-2000	500-800	60
Alkalinity (mg/lit)	300-400	200-250	40
Hardness (mg/lit)	73-112	50-80	30
TDS (mg/lit)	306-380	220-329	30

The result data shows that the samples are alkaline in nature. The TDS and TSS of grey water is also high and which is due to soap and dirt contaminations present in the sample. The high content of TSS and TDS are also responsible for higher COD and BOD. In terms of volume of water: 22 liters of water needs 3 ml of Clorox. The disinfected samples of filtered water are tested and analyzed for the residual chlorine after 24 hours by the iodometric method. However, its concentration is found to be undetectable. The disinfected water is tested for coli-form counts after a period of 24 hours and it is found to be zero.

Conclusion and Recommendations

The purpose of the study is to provide low cost grey water treatment system to reuse water for non-potable uses. The filter system was designed, fabricated, constructed, and operated successfully. The system is reliable, cost effective and can be made mobile after further modification. It can be very economical in suburban areas where there is no direct supply of water. The water quality with reference to turbidity, COD and coli-forms, provided by the system coheres with National Environmental Quality Standards, Pakistan (Environment, 2000). The prototype costs for Rs.12,000/-, which was mainly the cost of acrylic sheet used for the purpose of presenting, which can be replaced with plastic to reduce the cost for almost 60% i.e. PKR 5000/-. The system can be improved by expanding the research and incorporating the following considerations. The proposed system is "One Sink System", for more economical use it can be constructed on large scale for a whole residence with separate pipeline systems for water recycling. This system can be incorporated in large buildings and hotels having connected sink systems as "Satellite Treatment Chambers". Glass body of the prototype can be replaced with the plastic one for cost benefits and easy handling. Further studies should be conducted for the disinfecting agents, Alkalinity, EC and hardness of treated water. More studies are needed for the use of treated water for irrigation purposes, which is a whole new perspective.

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SOLAR DRIVEN DESALINATION SYSTEM (SDDS) FOR SMALL SCALE DECENTRALIZED POTABLE WATER PRODUCTION

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Abstract

Potable water is the most significant basic necessity for survival. Nevertheless, access to clean drinking water is still a global challenge, thus, there is a call for action in Global Goals 2030. Pakistan is also facing the said problem; combined with current electricity crises, a weak economy and infrastructure, there is a dire need of an innovative solution. This study is focused on providing potable water in areas that have water with high Total Dissolved Solids (TDS). A portable Solar Driven Desalination System (SDDS) is developed with the goal that it can be used in remote areas. This system utilizes solar energy captured through photovoltaic (PV) panels to clean water having TDS percentage more than allowable limits. A PV module of a 230 watt is connected to a DC coil. The coil warms up through the supply of power from the PV module. Consequently, it raises the temperature of water in the first compartment. The vapors produced through heating are dense in the second compartment. Resultantly, the SDDS yields water within the allowable TDS percentage of the World Health Organization (WHO) limits. The outcomes range from 12 mg/L to 100 mg/L. The SDDS showed TDS removal efficiency of 94% to 98%. An average volume of water gathered during 12 tests is 0.482 Liter. Therefore, through this lab scale examination it is demonstrated that a decent scope of proficiency can be accomplished with a pragmatic and economical desalination system utilizing solar energy.

Keywords: Potable water, Solar Driven Desalination System (SDDS), Solar Energy, TDS

Introduction

Water, a finite resource, is utmost necessary to sustain life on Earth (NASA, 2018). This precious finite resource comprises of 97.5% salty water, whereas, only 2.5% is freshwater. The freshwater is further divided into: lakes and rivers, ground water, as well as, glaciers that contribute 0.3%, 30.8% and 68.9% respectively (National Geography, 2018). Thus, to deal with the global crisis, there is global call for action in terms of Sustainable Development Goal-6 (SDG) to save water.

Additionally, the third target of SDG-6 is specifically related to recycling and reusing wastewater. According to World Water Development (2017) report wastewater management is gaining attention to recycle wastewater. Similarly, Pakistan is suffering from dangerous water deficiency (Azizullah, 2011). The country is heading from being water stressed to the water scare (Hashmi et al., 2009a and WWF, 2007). The decreasing quantity of water accompanied by the growing demand is causing lack of water. The supply of water is decreased from 5000 m³ per capita per annum to only 1100 m³ per capita per annum.

Literature Review

Solar energy can be utilized as thermal energy when captured with the help of photovoltaic (PV) and solar collectors or through solar ponds (Quteishat & Abu-Arabi, 2012). Numerous studies had been conducted on humidification and De-humidification desalination systems with the help of different devices (Orfi *et al.*, 2007). The core idea of the process is to evaporate water initially and condense the humid air afterwards to obtain water having low TDS (Shatat, 2013). These desalination systems are categorized into two categories: direct systems and indirect systems. This research study experimentally evaluates a two-stage SDDS system to improve the process of humidification and De-humidification to produce potable water from a source having high TDS. According to Zamen (2014) based on the construction cost of the system, as well as, results obtained from the multi-stage process it is the most suitable option.

Methodology

The present research study is based on an indirect process of humidification and De-humidification. Using PV panels, the necessary thermal energy was provided to the humidification and De-humidification system. The water with high TDS, contained in the first compartment, was evaporated with the help of thermal energy and condensation of humid air consequently produced water with low TDS in the second compartment of the system. Water samples with varied TDS were tested and efficiency was noted. This system is maintained at atmospheric pressure.

Design

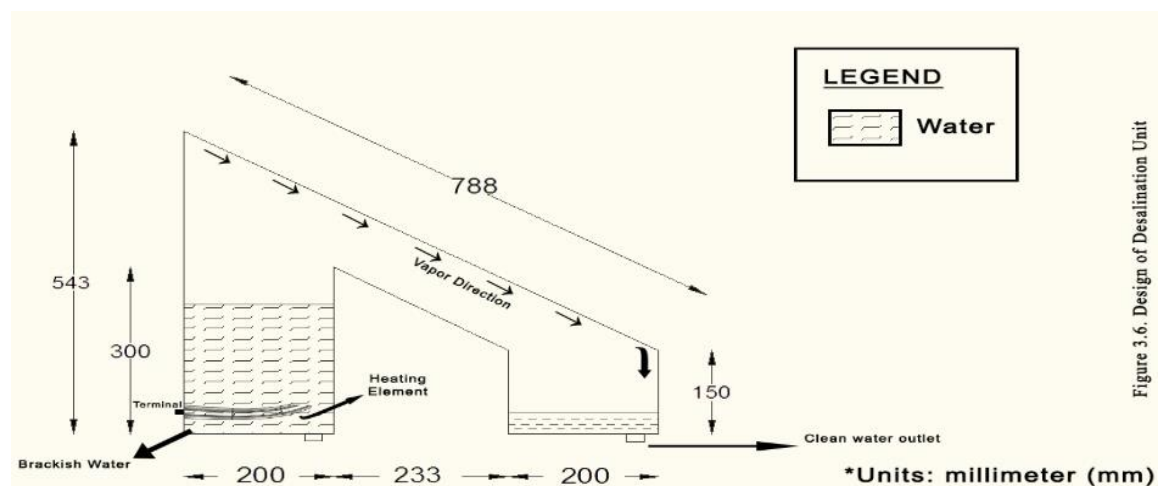


Figure 1: Design of Constructed SDDS

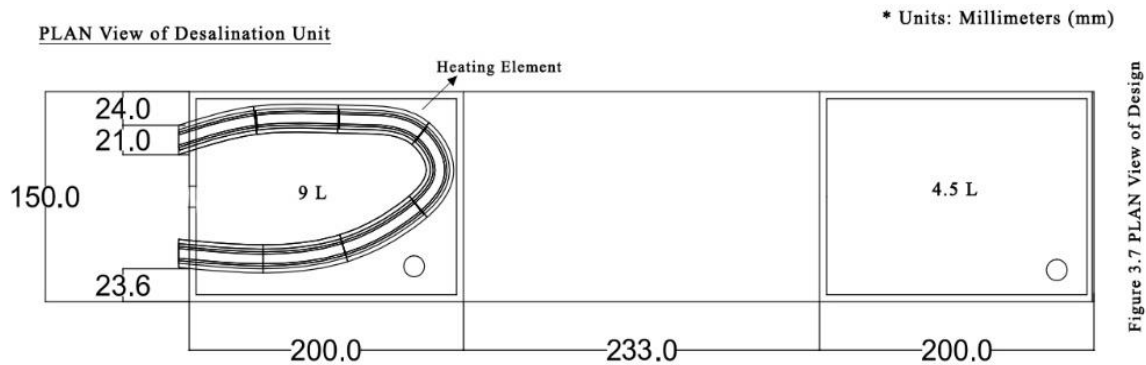


Figure 2: Plan View of Constructed SDDS

The operating chamber that contains the water sample with high TDS has the maximum capacity of 09 liters. The dimensions of the chamber are shown in the figure. It is made up of 6mm acrylic sheet which is bonded with GMSA Elfy and Chloroform. There is a small outlet provided at the base of this chamber to effectively remove the water. The heating element is also installed in this chamber. It is made up of silver and has a rating of 1000 W. Bakelite sheet is attached to the inside surface of acrylic sheet from which the element's terminals are coming out. Bakelite sheet helps providing thermal insulation for acrylic and prevents it from melting down. It also is used for removing any contact of the element with acrylic sheet.

A thermometer of -10°C to 110°C range is hung from the top of the chamber till it is submerged inside the sample to note the temperature. This chamber is well pasted with black matte paper from the outside which provides maximum heat trapping. As the water evaporates with the help of the solar energy through the PV module attached to the heating element, the evaporated water goes to the second compartment with the help of tilted duct. The duct has a total length of 788mm. The inside length of the duct is 290mm. The upper surface (rooftop) is made up of a 02 mm thick acrylic sheet. The roof sheet is kept sliding for maintenance and other utility purposes. Aluminum sliders are attached to the rooftop.

As the droplets hit the top surface of the tilted duct, they lose energy. After sometime humid environment is created inside the chamber. The droplets start to condense and through the duct they reach the receiving chamber. Receiving chamber is of 4.5 liter in volume with dimensions of 200 x 150 x 150 mm. It is also made of 6mm acrylic sheet and have a water outlet at the bottom to remove water. It is bonded with GMSA elfy and Chloroform acrylic powder solution to avoid and account for any leakages. This chamber is not protected by black paper or sheet.

The desalination unit must be well insulated and should have minimum vapor loss through any open joints. The terminal of heating element are subjected out through 50 cm^2 Bakelite sheet placed on inside of acrylic sheet to avoid any thermal damage.

Copper wire is connected to each terminal which is well insulated. The wire directly connects the element to a solar module. The two solar PV panels are used with the rating of 150 W and 80 W respectively with the collective output power of 230 W. The panels are connected in a series and 13 Ampere fuse on the live wire to avoid any damage to the panels.

Experimentation

Water samples, having high TDS, were prepared at IESE-NUST. Sodium Chloride is used to vary TDS concentration. Conductivity of samples were measured in $\mu\text{S}/\text{cm}$ and multiplied by a factor of 0.49 for TDS measurement. A measuring cylinder of 0.5 liter was used to have the desired quantity of water. According to the World Health Organization (2018) report "the palatability of drinking water has been rated by panels of tasters in relation to its TDS level as follows:

excellent, less than 300 mg/L; good, between 300 and 600 mg/L; fair, between 600 and 900 mg/L; poor, between 900 and 1200 mg/L; and unacceptable, greater than 1200 mg/L." Following high TDS concentrations, which are unacceptable for human consumption, were used to perform experiments.

Table 1: TDS Concentration Used

Sr. No	Conductivity ($\mu\text{S/cm}$)	TDS Concentration (mg/L)
1	2040.82	1000
2	2551.02	1250
3	3061.22	1500
4	4081.63	2000

The initial volume was also varied over constant TDS concentrations. Following volumes were used for testing each TDS concentration mentioned above.

Table 2: Initial Volume Used

Sr. No.	Initial Volume Used (Liters)
1	4
2	5
3	6

Constants and Variables

Constants and variables are very important whenever undertaking a research work. In this study following parameters were constants:

- Maximum constant Temperature (72 °C)
- Time for each experiment (6 hours)
- The initial volume (in case of varying TDS)
- The initial TDS (in case of varying volume)

Results

• Initial Constant TDS at Varying Initial Volume

Following final TDS concentrations were measured in the laboratory when initial volume was varied at a single constant TDS reading.

Table 3: Initial Constant TDS 1000 mg/L at Varying Initial Volume

Exp. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
1	4	2040	1000	26.0	12.7	98.73
2	5	2040	1000	44.1	21.6	97.84
3	6	2040	1000	53.3	26.1	97.38

Table 4: Initial constant TDS 1250 mg/L at Varying Initial Volume

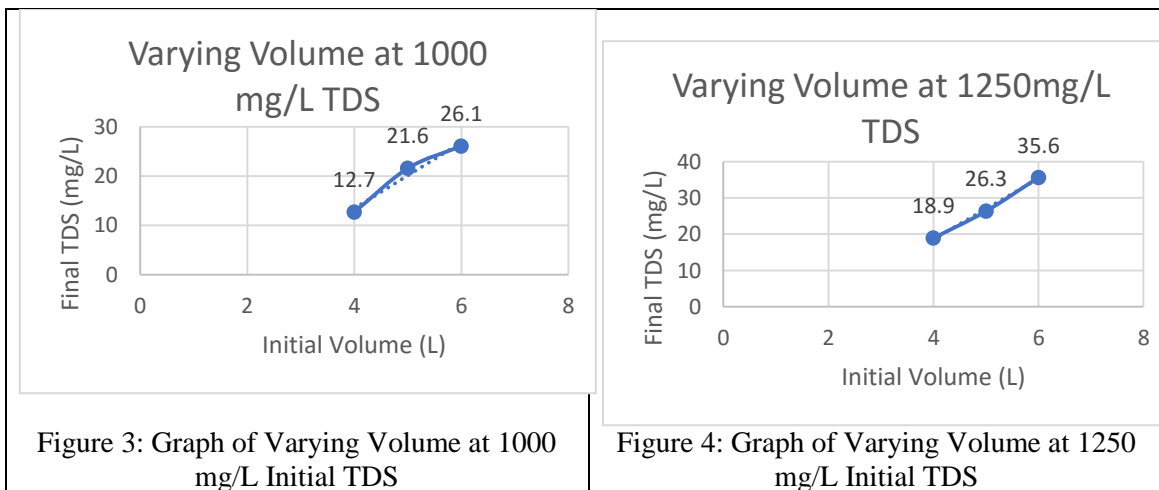
Exp. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
4	4	2551	1250	38.5	18.9	98.48
5	5	2551	1250	53.6	26.3	97.89
6	6	2551	1250	72.6	35.6	97.15

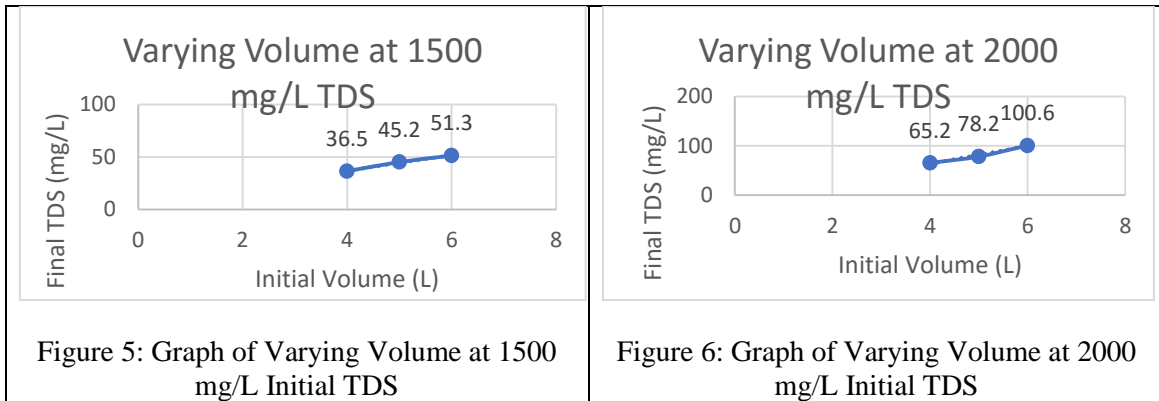
Table 5: The Initial Constant TDS 1500 mg/L at Varying initial Volume

Exp. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
7	4	3061	1500	74.4	36.5	97.57
8	5	3061	1500	92.2	45.2	96.98
9	6	3061	1500	104.8	51.3	96.57

Table 6: The Initial Constant TDS 2000 mg/L at Varying Initial Volume

Exp. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
10	4	4081	2000	133.1	65.2	96.73
11	5	4081	2000	159.6	78.2	96.09
12	6	4081	2000	205.3	100.6	94.97





As we increase the volume, final TDS values for the respective reading also increases as illustrated in the Figure-2, 3, 4 &5.

• Varying TDS at Constant Initial Volumes

Following final TDS concentrations were measured in the laboratory when initial TDS concentrations were varied at constant initial volumes.

Table 7: The Initial Constant Volume 4L at Varying Initial TDS

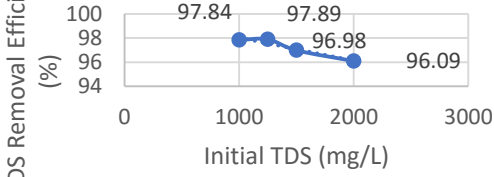
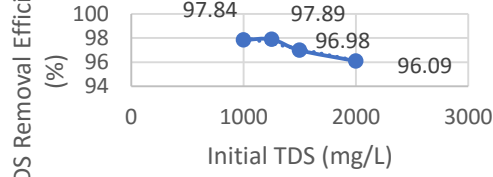
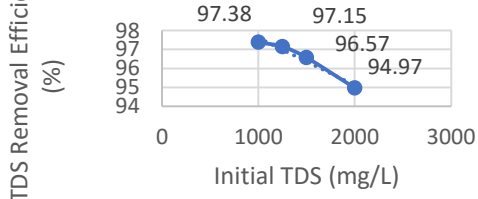
Exp. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
1	4	2040	1000	26.0	12.7	98.73
4	4	2551	1250	38.5	18.9	98.49
7	4	3061	1500	74.4	36.5	97.57
10	4	4081	2000	133.1	65.2	96.73

Table 8: The Initial Constant Volume 5L at Varying Initial TDS

Sr. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
2	5	2040	1000	44.1	21.6	97.84
5	5	2551	1250	53.8	26.3	97.89
8	5	3061	1500	92.2	45.2	96.98
11	5	4081	2000	159.6	78.2	96.09

Table 9: The Initial Constant Volume 6L at Varying Initial TDS

Sr. No	Initial Volume (Liter)	Initial Conductivity ($\mu\text{S/cm}$)	Initial TDS (mg/L)	Final Conductivity ($\mu\text{S/cm}$)	Final TDS (mg/L)	TDS Removal Efficiency (%)
3	6	2040	1000	53.3	26.1	97.38
6	6	2551	1250	72.6	35.6	97.15
9	6	3061	1500	104.8	51.3	96.57
12	6	4081	2000	205.3	100.6	94.97

<p style="text-align: center;">Varying Initial TDS at Constant Volume of 5 L</p>  <table border="1"> <thead> <tr> <th>Initial TDS (mg/L)</th> <th>TDS Removal Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>1000</td> <td>97.84</td> </tr> <tr> <td>1500</td> <td>97.89</td> </tr> <tr> <td>2000</td> <td>96.98</td> </tr> <tr> <td>2500</td> <td>96.09</td> </tr> </tbody> </table>	Initial TDS (mg/L)	TDS Removal Efficiency (%)	1000	97.84	1500	97.89	2000	96.98	2500	96.09	<p style="text-align: center;">Varying Initial TDS at Constant Volume of 5 L</p>  <table border="1"> <thead> <tr> <th>Initial TDS (mg/L)</th> <th>TDS Removal Efficiency (%)</th> </tr> </thead> <tbody> <tr> <td>1000</td> <td>97.84</td> </tr> <tr> <td>1500</td> <td>97.89</td> </tr> <tr> <td>2000</td> <td>96.98</td> </tr> <tr> <td>2500</td> <td>96.09</td> </tr> </tbody> </table>	Initial TDS (mg/L)	TDS Removal Efficiency (%)	1000	97.84	1500	97.89	2000	96.98	2500	96.09
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<p style="text-align: center;">Figure 7: Graph of Varying Initial TDS at Constant Volume of 4L</p>	<p style="text-align: center;">Figure 8: Graph of Varying Initial TDS at Constant Volume of 5L</p>																				
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Conclusion

In this study excellent TDS removal was achieved with this design. The TDS removal efficiency range was from 94% to 98%. At maximum initial volume (6L) and maximum initial TDS (2000 mg/L) TDS removal efficiency was minimum i.e. 94.97%. At lowest initial TDS concentration and the lowest initial volume the TDS removal efficiency was maximum i.e. 98.73%. Ali Samee *et al.* (2007) reported a TDS removal efficiency of 90% to 96% in a simple single solar still. The solar still efficiency was reported as 30.56% which is comparable worldwide. Our design has shown a TDS removal efficiency of maximum 98% which is better than results reported. Additionally, Adhikary *et al.* (1989) also reported the same pattern of TDS removal. The TDS removal efficiency reported in that study was about 60% to 65%. The present study shows results that are far better with an improved design.

As the solar radiation decreases in the day, the temperature began to decrease and we have a low yield of clean water as compared to peak hours of 1200 to 1500 hrs. Volume collection varies inversely as we increase the initial TDS and initial volume. As the salt concentration increases at constant volume evaporation rate slows down and less water is collected. The initial volume is increased from 4L to 6L, the clean water volume collection also slightly decreases. The maximum volume of 0.640 L was collected on the 1st test which was 4L (an initial volume), 1000 mg/L (an initial TDS) 72°C constant temperature within 6 hours of operation.

Applications

For this system certain important applications are present, especially in Pakistan. Some of them are listed below.

- Installation of this unit in an area like Cholistan Desert where high TDS rainwater is collected in ponds. Population is less and excellent sunlight hours are available throughout the day.
- It could be coupled with traffic warden stands where they can have clean water whenever they want.
- This system could be installed in far flung check posts where potable water availability is an issue.
- Areas with high TDS concentration in ground water can also be a target for this system. It could provide potable water for rural areas.

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EVALUATION STUDY AND IMPLEMENTATION OF ANALOG AND DIGITAL CLASS AMPLIFYING SYSTEM TOPOLOGIES

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Abstract:

Class D amplifying systems are preferable to all other classes of amplifying systems due to their low power dissipation and high efficiency. Interesting challenges are there in designing Class D amplifying systems due to their characteristics of high-frequency switching. In this research study different design strategies of analogue as well as digital class D amplifying system have been implemented and analyzed. For analogue systems all working blocks (Modulation, Switching-Output and Filter) have been implemented by using various approaches. An innovative design for gate driver for has been proposed in switching output block. Inside modulation block all types of modulations that are used for analogue class D systems (Pulse Width Modulation, Pulse Density Modulation, and Three State Modulation) have been discussed and analyzed. Similarly implementation of Digital class D amplifying systems has also been presented by using UPWM, DAC(N-Bit Digital to analog Converter), Direct Digital Modulation, Open loop Approach, Local closed loop Approach, Fully Closed Loop Approach. In this paper all simulations have been presented on MATLAB Simulink, Proteous, and Multisim along with the experimental outputs.

Keywords: Class D, PWM, Mosfets, Gate Driver, UPWM

1. Introduction:

The Class D amplifying system is one of the type of amplifying system. Pulse width modulation is used in this technology to retain the transistors in on and off mode. Amplifying portion of this class, then, enhance the pulses. Low pass filter is attached before the output speaker to recover back our signal and to minimize the Electromagnetic Interference.

In Class A, signals are transferred to the mid-point of transfer characteristic by adjusting bias point. It gives us good quality sound but due to the transistor operation in the linear part of transfer characteristic, it consumes large power. The dc biasing current is reduced reasonably in class B

amplifying systems so the power dissipation is also lesser. For this purpose the active devices are control in push- pull manner. The output signal of class B will comprise only a sequence of positive half-cycles as active device(s) will be conducting during half-cycles of the input waveform. When we talk about class AB amplifying systems, then that can be considered as a hybridization of class A and class B amplifying systems. This class requires lesser biasing voltage than class A. Due to less dc bias current, less cross over distortion occurs with good quality sound. In this class bias point is adjusted at projected cut-off point. In Class C, bias point is adjusted beyond the cut-off and output waveform comprises the series of quite sharp positive pulses.

There are three types of class D amplifying system

1. Analog Class D amplifying system
2. Digital class D amplifying system
3. Filter less Class D amplifying system

2. Analog Class D Amplifying System

There are three blocks in the block diagram of Analog Class D Amplifying System. Firstly, "Modulator" which turns the audio input signal into the pulses form. Secondly, "Switching output Stage", further enhances the pulses of previous block. Lastly, "Low Pass Filter" is for extracting the original enhanced signal back from pulses.

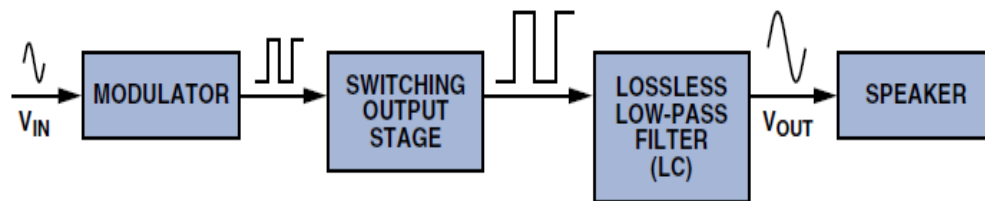


Figure 1-Block Diagram of Analog Class D Amplifying system[1]

2.1 Modulator:

When a low frequency signal is superimposed on a higher frequency signal, this process is called modulation. There are types of modulations commonly used in Class D Amplifying systems and these are

- 1- PWM
- 2- PDM(Sigma-Delta)

Pulse Width Modulation:

The most common modulation technique which is used in class D systems is pulse width modulation (PWM). It compares a triangular carrier signal to the original input signal and generates a stream of pulse by taking multiple samples according to the frequency of carrier and amplitude of input signal.

This block is very essentials as modulation turn ours analog signal into pulses form and due to this next circuitry operates in on and off mode, which, indirectly improves efficiency of class D and exponentially reduces the power dissipation. [1]

There are two approaches to implement this block

- 1- Using Comparator
- 2- Using Timer

Comparator Approach:

The circuitry of comparator LM 324 on Multisim is shown in figure below.

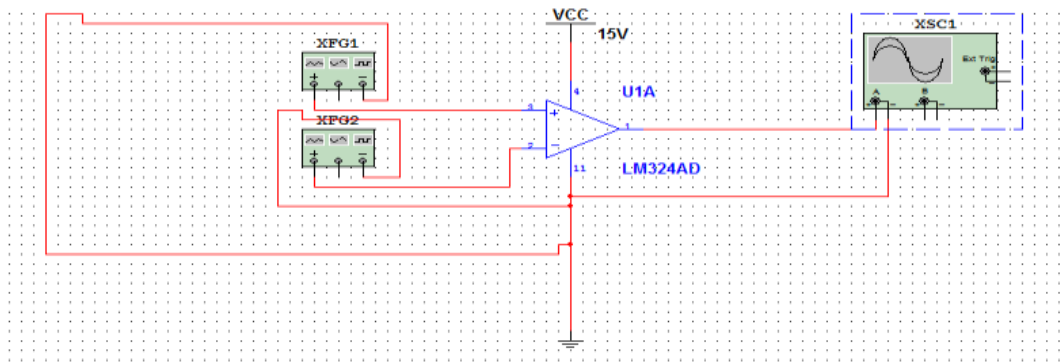
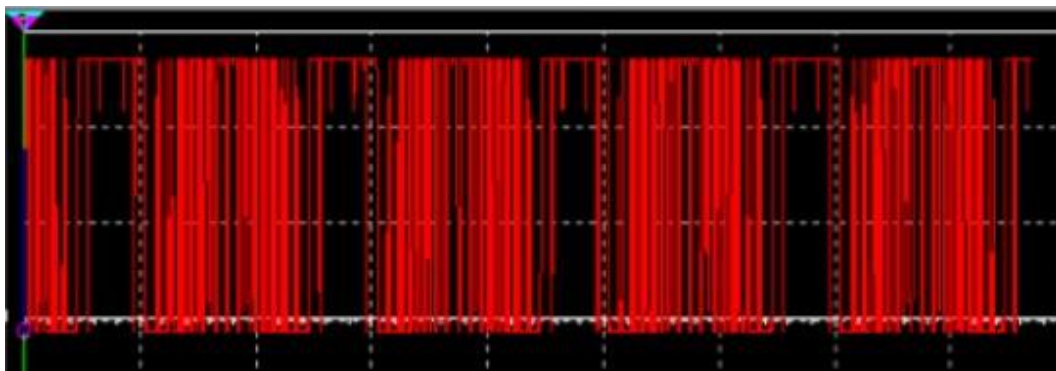


Figure 2-PWM using comparator LM324 [3]



Below figure is the output of comparator (PWM version of input audio signal)

Figure 3-PWM Output using LM324 [3]

The pulse width modulation output from hardware is

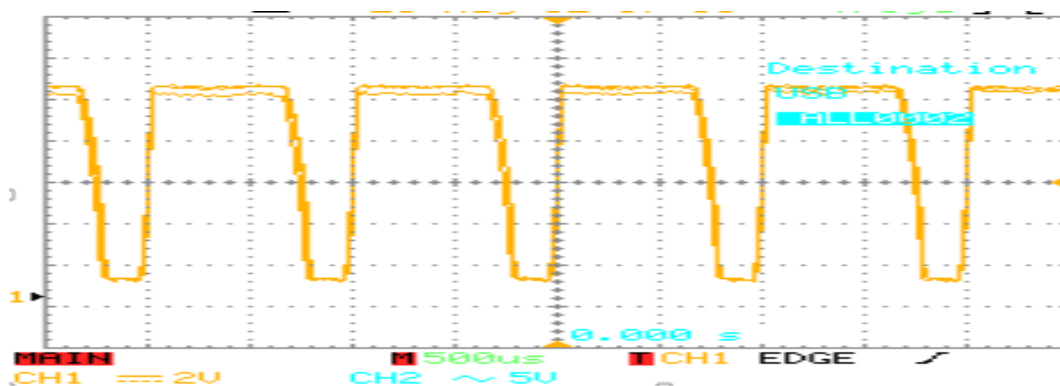


Figure 4- PWM Output [3]

Timer Approach:

Below is the circuitry of pulse width modulation using Timer approach

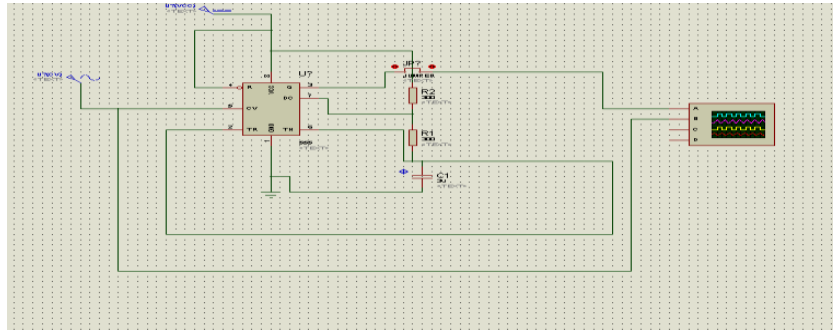


Figure 5-PWM using comparator 555 Timer [2]

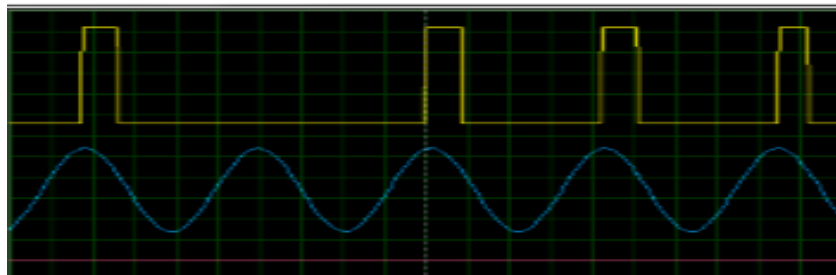


Figure 6-PWM Output using 555 Timer [2]

There are some problems with pulse width modulation. First, pulse width modulation inherently adds distortion of the carrier-frequency. Pulse widths of PWM become very small near full modulation finally. But these cause problems in at switching output stage. All these type of issues cause problem in switching output stage as switching speed practically is not as high as the speed of pulses from PWM. Following are the schemes, which try to overcome the issues caused by pulse PWM.

Pulse Density Modulation:

This one is the alternative to PWM. In pulse density modulation (PDM) average value of the audio signal depends upon the number of pulses in a time window. Quantization is done for modulator-clock-period multiples by using individual pulse.

Sigma-delta modulation of one-bit is the one of the type of PDM. In this scheme high-frequency energy is distributed over a range of frequencies that gives EMI advantage.

Another advantage is, in PDM, one sampling clock-period is pulse with, which allows the easier design of power efficient gate driver in switching output stage.[1]

2.2 Switching Output Stage

There are three sub-blocks in switching output stage.

1. Inverter
2. Gate Driver
3. Switching Mosfet's

Inverter:

This Block takes the output from the Modulator stage and inverts them. The design of class D demand that one of switching Mosfet's on at a time and this demand can only be done by adding

this block prior to the circuitry of actual amplifying portion. If one tries to run the circuitry without using this block, then, surely the shoot through will occur.

Shoot through is the scenario when both of the switching Mosfet's operates at a time and heavy current flows from the next circuitry, which will cause damages and burning.

There are two approaches to implement this block.

- 1- Using IC7404
- 2- Using BJT or Mosfet

IC7404 Approach: Software schematic of inverter using IC7404 is

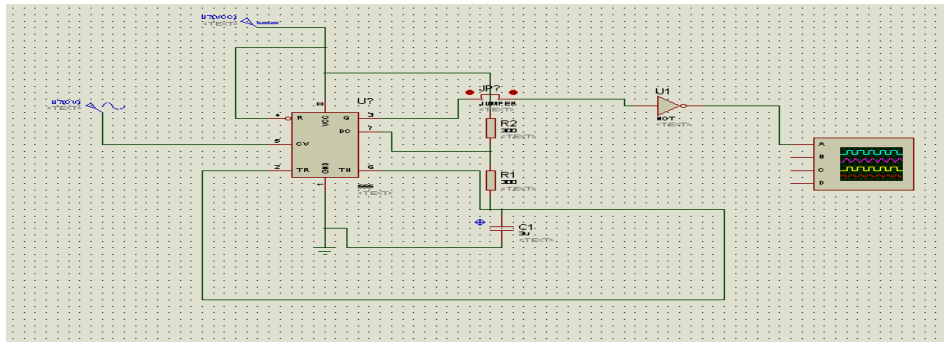


Figure7-Inverter schematic using IC7404 [2]

The output of inverter using this approach is

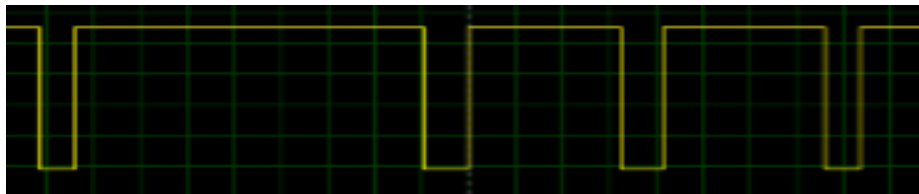


Figure 8-Output waveform of Inverter [2]

BJT Approach:

Software schematic using the transistor approach is shown in figure below

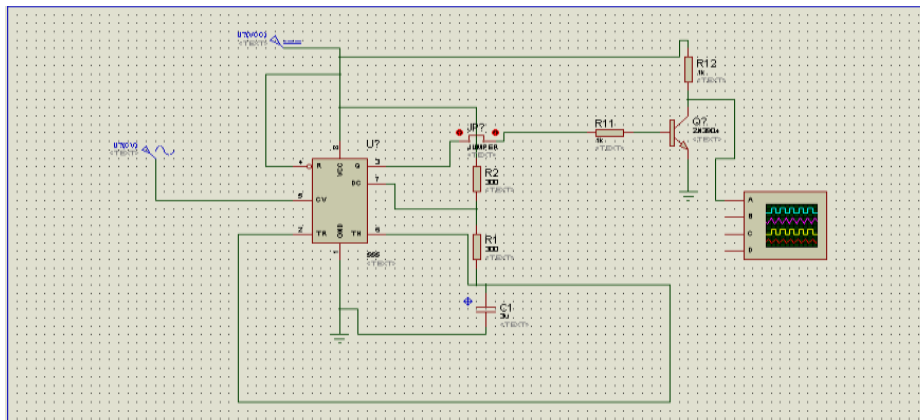


Figure 9-Inverter schematic using BJT's

The output of inverter using Transistor 2N3904 is

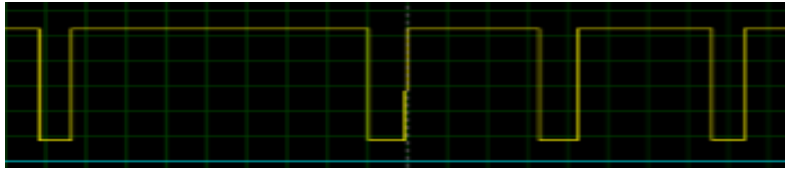


Figure 10-Output waveform of Inverter using BJT

The output of inverter at hardware level using transistor 2N3904 is given below

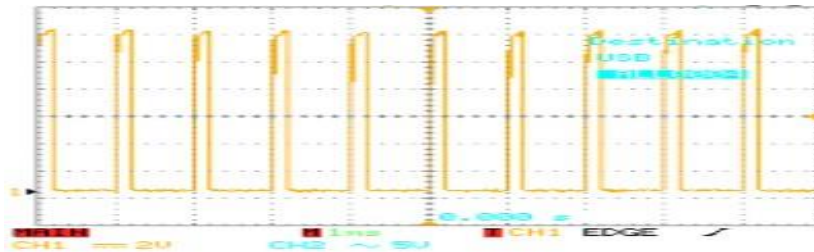


Figure 11-Output waveform of Inverter using BJT

Gate Driver:

The output coming from the Inverter and PWM stages are not able to operate the next circuitry. This block enhances the previous outputs that are coming from the comparator and inverter in such a way that they can easily be able to drive the next circuitry.

There are four important functions in IC of Gate driver. These Essential Functions are Level Shift, Gate Drive, Dead time Generation, Under Voltage Lockout.

As we know that any square wave signal not such a as we see but actually there is rising and falling edges.

Transistor cannot be switched on and off instantaneously.[4]

There are several types of time intervals that occur for the generation of pulse wave and square wave. These are delay time, rising time and decay time. [4]

Delay Time:

Time required between application of base current and reaching of collector current from the leakage current (I_{co}) to the 10 % of maximum collector current. The hardware level wave of delay time is shown in below figure. [3, 5]



Figure 12-Delay Time [3]

Rising Time:

Time required to reach collector current from the 10% of maximum collector current to the 90% of the maximum collector current. Figure below is showing hardware level waveform of rising time. [3, 5]

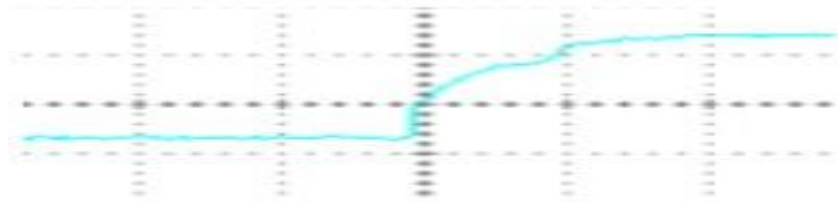


Figure 13-Rising Time [3]

Decay Time:

Time required for going collector current from 10% to the leakage current. [3, 5]

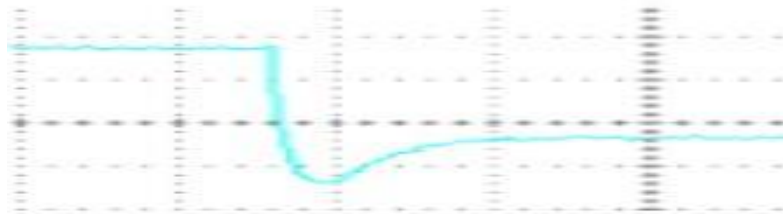


Figure 15-Decay Time [3]

Because of these time intervals pulse wave not on and off instantly and there is a possibility for the gate drivers that on pulse to drive the lower side Mosfet would have a rising edge and the off pulse for the high side Mosfet would have a falling edge and for a small instant of time both Mosfets on at a time and Shoot Through occurs.

For this thing removing we have to have to add a dead time between these two pulses that compensates this issue of shoot through during such a scenario.

So, the dead time is a time due to which surety of remains off of one the Mosfets.

Blanking time or dead time is a time period that is intentionally deployed between the ON states of low and high side Mosfets. This is a mandatory thing because of capacitive load nature of Mosfet, which cause delay in switching-time.

If dead time is not there then lower-efficiency will be a result, excessive heat and potential thermal failure.

Dead time is commonly estimated by turn delay on timing.

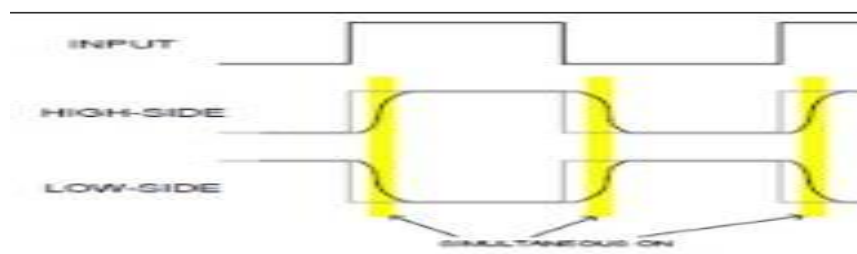


Figure 16-Without Dead time [4]

Undervoltage Lockout (UVLO):

When gate biasing voltage is reduced, the undervoltage lockout (UVLO) will prevent the Mosfet from region of half-ON, because the condition of half-ON can become a cause of higher power dissipation.

There are two topologies use for the gate driver

- Using IC2101
- Proposed gate driver using BJT's

Using IC2101 Approach:

Schematic of gate driver using IC2101 is shown in figure below

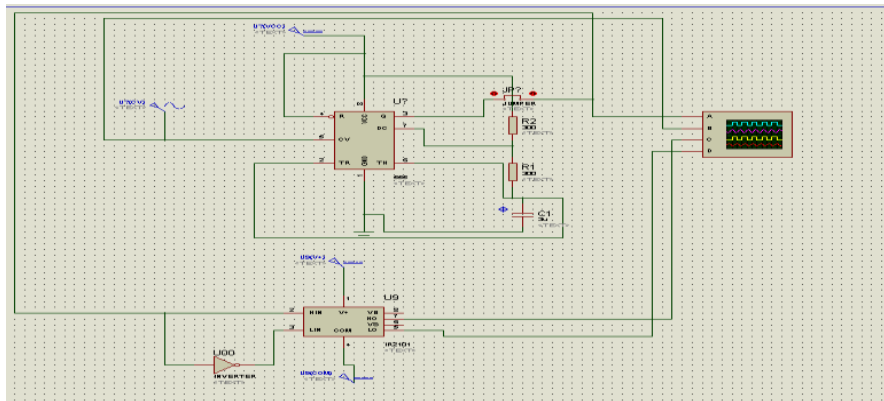


Figure 17-Gate Driver using IC2101 [2]

The figures below are showing the output waveforms of gate driver

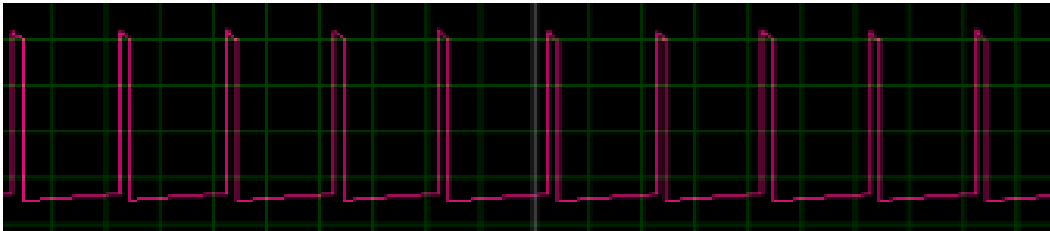


Figure 18-Low side output wave form of gate driver[2]

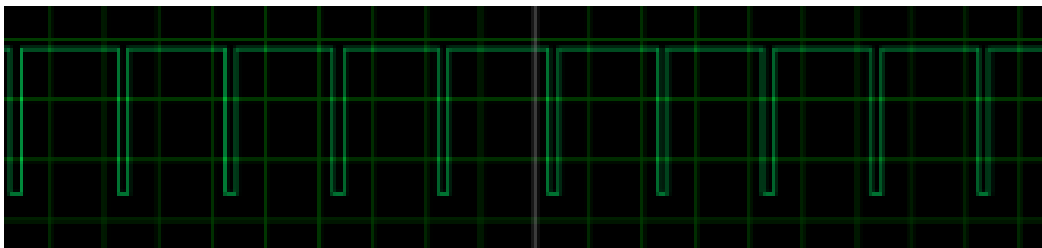


Figure 19-High side output wave form of gate driver [2]

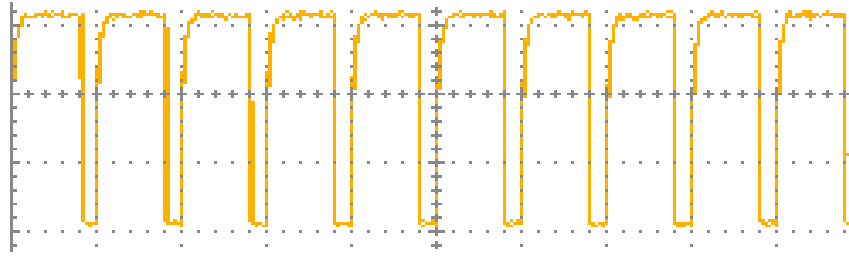


Figure 24-High side output wave form of gate driver [3]

There are two types of losses in BJTS

- 1- Static Losses
- 2- Dynamic Losses

Static Losses: This type of losses occurs when we place a transistor in a circuit and when circuit is not working but the transistor still sinking some amount of current.

This is neglected in the calculations but this type of losses also occurs in BJT.

Dynamic Losses: Consists of two types of losses

- 1- Conduction losses
- 2- Switching losses

Conduction losses: That is due to the resistance across the junction of BJT. And there is two possibilities in case of conduction losses

- If BJT ON
- If BJT OFF

$$\text{IF BJT ON: } P_{diss}=0.2\text{mW}$$

$$\text{IF BJT OFF:}=0.105\text{mW}$$

Switching losses: This include the followings

- Delay time
- Rise time
- Reverse Recovery Time (Storage Time)
- Fall time
- Decay Time
- Time instants power dissipation's.

In all time intervals there are significant power dissipations, so we look at this one by one

The total average power losses

$$P_T=P_{on}+P_n+P_{off}+P_d$$

$$P_T=0.119351\text{W}+0.105\text{mW}+37.69\text{uW}+0.63\text{nW}$$

$$P_T=0.119494\text{W} [3, 6]$$

The only drawback in the proposed gate driver approach is the addition of Total harmonic distortion. Below is the figure explaining the THD caused by the proposed gate drivers.

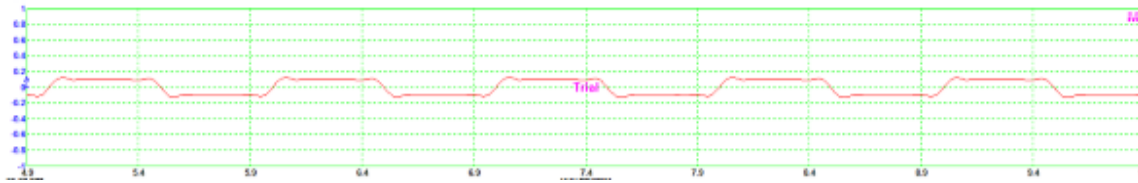


Figure 25-Gate Driver output in time domain [2, 10]

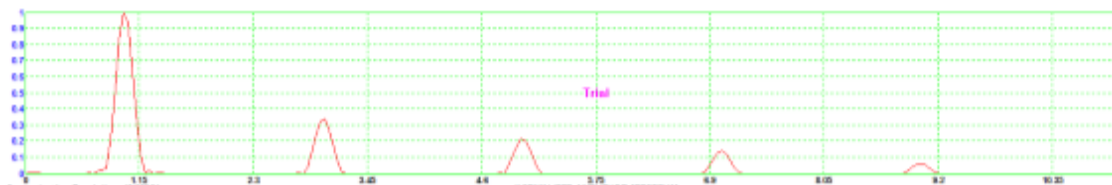


Figure 26-Gate Driver output in frequency domain [2, 10]

The advantages of proposed gate drivers are: No issue of dead time occurs, Shoot through scenario chances reduces and one can add level according to the requirements. The disadvantage is only the increase in distortion.

Switching Mosfet's: This is use to enhance the PWM signals that coming from the gate drivers and we use Mosfets because there is a less power dissipation across this when it can operate in triode and active mode.

There are two Topologies in class D according to the Mosfet adjustment in switching output stage.

- 1- Single Ended
- 2- Differential

Single Ended Approach: Half bridge Class D amplifiers have one output per channel. So this is also known as single ended output amplifier. The loudspeaker connection for a half-bridge is between this ground and single output in a dual-supply system. A large sized capacitor is to be used in a single supply system to block the VCC across the loudspeaker load and this is a major drawback of this topology. So we can say that half bridge amplifier is symmetrical dual-supply-voltage systems. [2]

Differential Approach: Bridge-Tied-Load (BTL) amplifier is another name of full bridge amplifier. It is also called a differential output amplifier. Per channel it has two outputs.

Implantation of Single ended approach is done by Totem Pole configuration. [8, 9]

Using Totem Pole configuration we enhance the output according to our requirement but the requirement of having the same voltage power supplies both in negative and positive that we want on the output pulses. As above we selected H-Bridge Topology, so there is only one approach for simulation and implementing this. [9]

Software simulation of this approach on Proteus is explained in below figure

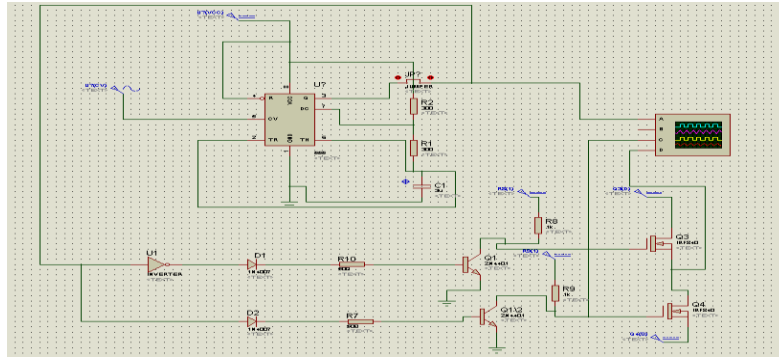


Figure 27-H-Bridge configuration of Switching Mosfet's [2]

The output waveform is

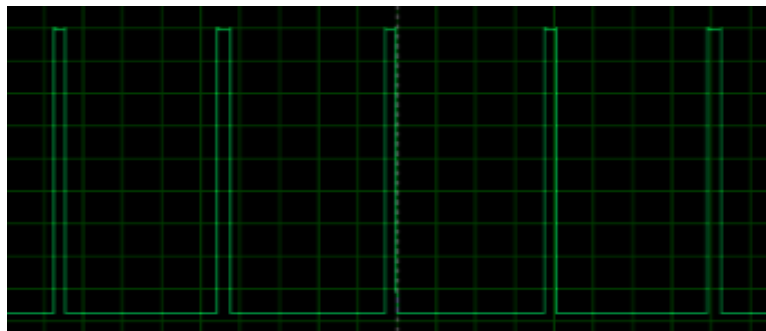


Figure 28-H-Output waveform of Switching Mosfet's Stage [2]

Software simulation of this approach on Multisim is shown in below figure

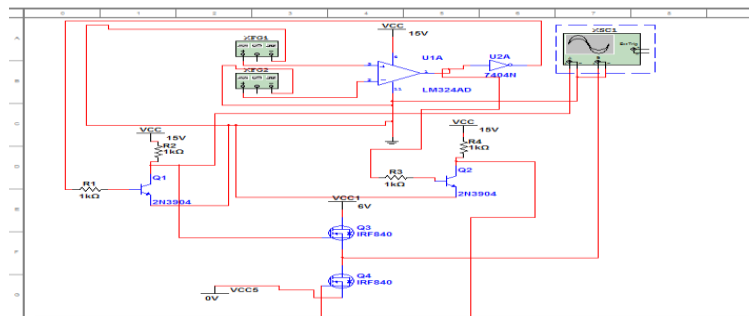


Figure 29-H-Bridge configuration of Switching Mosfet's [3]

Output of this stage is given in below figure

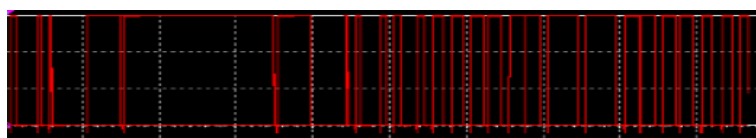


Figure30-H-Output waveform of Switching Mosfet's Stage[3]

At hardware level, the output waveform is shown in below figure



Figure31-H-Output waveform of Switching Mosfet's Stage[2,3]

1- Filter

We use low pass filter for extracting the actual random audio signal from the amplified PWM from the switching MOSFET's stage [10, 11]. Transfer function of LC filter is

$$\frac{V_o}{V_i} = \frac{1}{s^2 LC + 1}$$

Through Matlab Simulink Model we implemented this transfer function by using the appropriate value of inductor and capacitor. Below figure is showing the Simulink model.

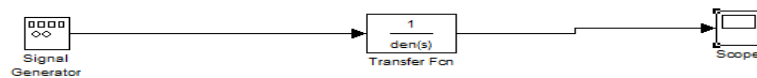


Figure 32-Simulink Model of LC Filter[2,3]

The Magnitude and Phase plots of filter are given in the following figures

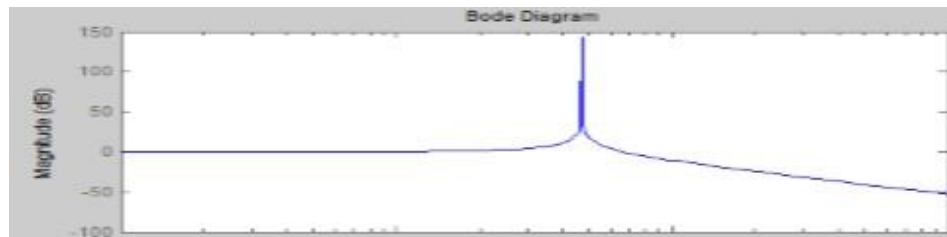


Figure33-Magnitude plot of LC Filter[2,3]

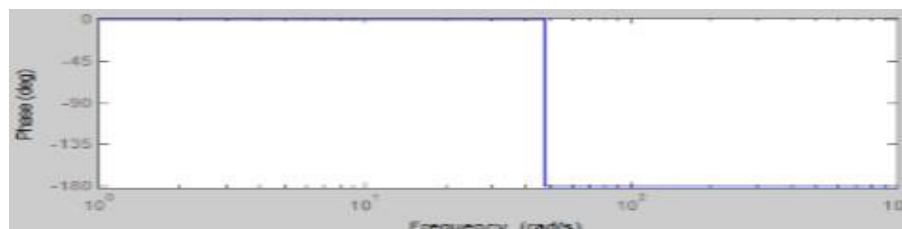


Figure 34-Phase plot of LC Filter[2,3]

Output waveform of filter is

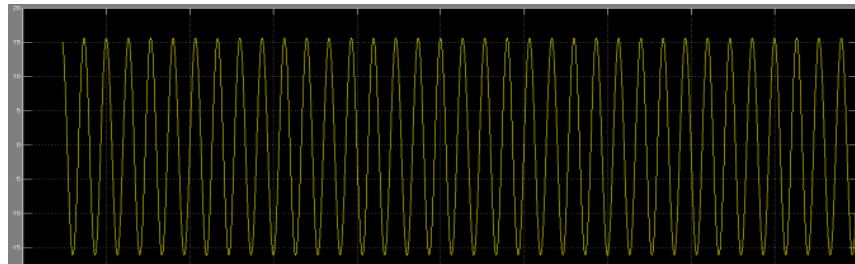


Figure35-Output wavefrom of Filter[2.3]

I. DIGITAL CLASS D AMPLIFYING SYSTEM

The following are the ways to implement Digital Class D Amplifying System

- 1- Using UPWM
- 2- Using DAC(N-Bit Digital to analog Converter)

UPWM Approach: Digital-input Class D amplifying system is elaborated in following block diagram,

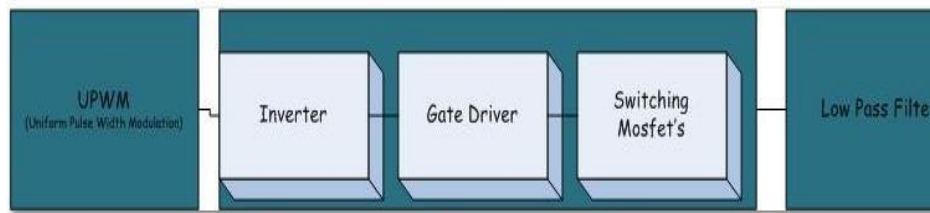


Figure36- Digital Class D system block diagram by using UPWM[2]

There are two sub-blocks in this Block

- 1- Sample and Hold Time Circuit
- 2- Comparator

This is used to convert the Digital input (Pulse Coded Signal) to the equivalent staircase wave. This blocks works by taking sample after a certain time from a digital input and then retain for a same time and then again taken a sample and retain for a certain time and so on. [2]
This block does a function of uniform sampling.

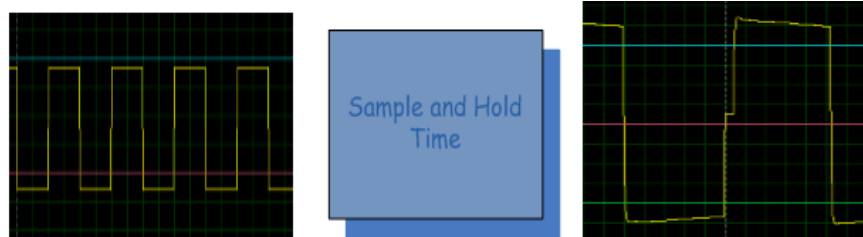


Figure 37-Sample and Hold Time[2]

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A COMPARITIVE STUDY OF LOCAL HYBRID POWER GENERATION SYSTEM

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Abstract:

Renewable energy resources especially biomass, solar & wind can play a key role to electrify the remote areas in the country. This description is fulfilled by renewable resources which have been mainly ignored in the past and is also available in enough quantities to deal with the energy crisis existing in the country. This paper presents a comparative study of the hybrid energy generation system, particularly solar cells, wind energy and biomass with renewable and distributed hybrid generation system. The model can analyze all available power technologies individually and in hybrid configurations to identify the least costly solutions to power needs. The result of simulation and optimization gives the best optimized result of Sizing of fuel cell, photovoltaic system and biomass production.

Keywords: Renewable Energy Resources; Photovoltaic System; Wind; Distributed Hybrid Generation; Solar; Biomass.

1. Introduction:

Development of a country is closely related to advancement of its energy sector. Traditionally, energy is mainly produced from non-renewable energy sources such as crude oil, natural gas and coal, and so on. These resources are now depleting at a steady rate due to continuous demand all over the world. Even if the supply of these resources is ensured, they have a significant negative impact on the environment producing toxic waste and gaseous emission such as Sulphur Dioxide and Carbon Dioxide. Alternative energy sources are renewable energy sources that are available in sufficient quantities. Renewable energy sources are mainly wind energy, solar energy, biomass, wave and tidal energy, geothermal energy and hydroelectricity. With the maturity of the technology, effective means have been used to extract electricity from these renewable sources. Many countries have been seriously interested in meeting their energy needs from available renewable resources.

Another solution is to use locally available renewable sources of energy (e.g: solar, wind, biomass, fuel cells, etc.) and combine to implement modular and extensible systems known as hybrid power systems. A hybrid system combining two or more energy conversion devices, that when integrated to grid and collectively detain the local power demand.

This research paper will be mainly focused for rural areas of Pakistan. Where these Hybrid Power Sources are in there to overcome the domestic needs of energy. Pakistan is located in South East of Asia and is mainly an agricultural country with population of over 180 million.

Most of the population of the country is living in rural areas. Pakistan is developing country and energy demand is increasing by time to time. And its major power generation is from hydropower and then from fuel engines. But these generating techniques are now unable to fulfill the need of energy demand.

One the other hand burning of fuels also pollutes the nature and their increasing cost has made it necessary to consider renewable energy sources as a future energy solution.

2. System Description:

The generalized hybrid power system may consist of various hybrid power/energy sources. These sources are in order to provide accumulated power to end consumers using local grid/ distributed network.

Figure 1 shows the basic and most generalized structure of hybrid power system. It consists of all hybrid power resources to facilitate the domestic consumers. Hybrid power systems AC power supply with a fixed rate is an emerging technology for the supply of electricity in remote locations.

Distributed power refers to the generation of electricity at the location of utilization. Generating power at remote locations, rather than centrally, reduces cost, control mechanism, interference and inefficiencies associated with transmission and distribution of energy.

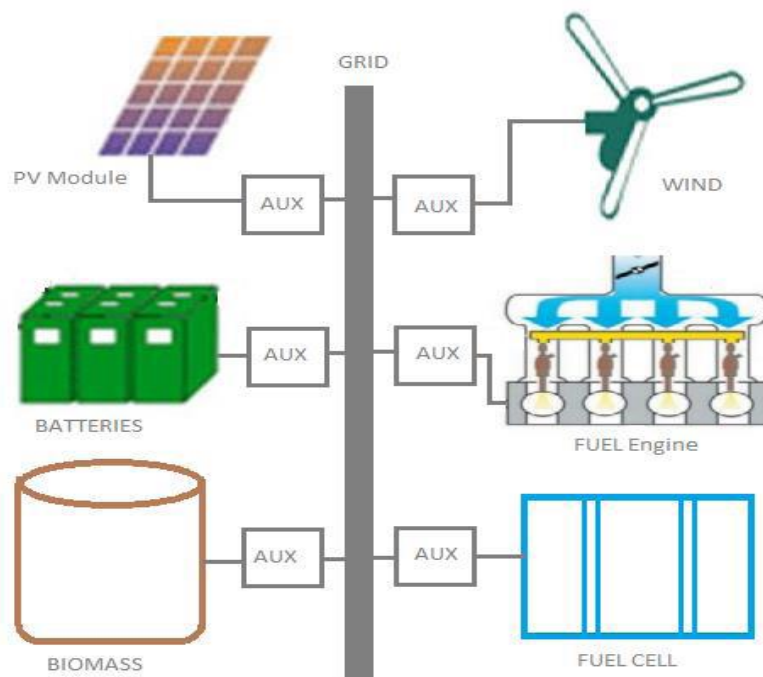


Figure 1: General Hybrid Power System

3. Distributed Generation:

The above figure shows all the available hybrid power/energy resources. This scheme sometimes refers to distributed generation because all sources are playing their role to overcome the energy demand of the consumer network. Here consumers will be attached to the grid and AUX box is the control block or conversion block.

It can be rectifier, converter, charge controller, speed controller, wind compensator etc. These blocks usually use digital control system circuitry to synchronise grid power parameters to Hybrid power system. These blocks may be further generalized in the scheme below.

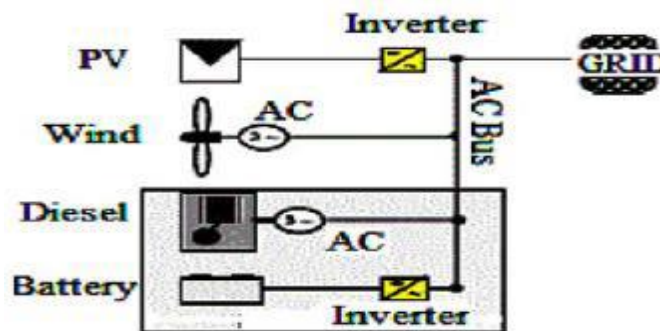


Figure 2: More generalized Hybrid System with control blocks

Distributed generation is defined on the basis of hybrid energy resources that integrated on the distribution level. Utility is of concern because of the high level of penetration of intermittent renewable energy resources in distribution systems as it may pose a threat to the grid in terms of stability, voltage regulation and power quality. Therefore, there should be a balanced system to ensure the reliability and efficient operation of the entire network.

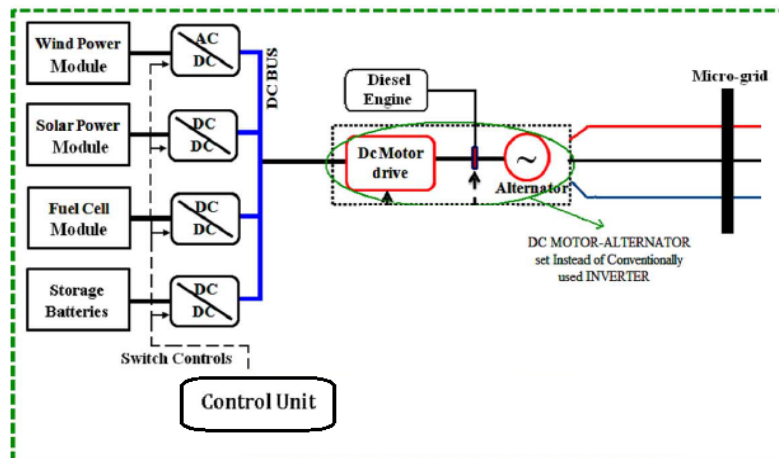


Figure 3: Integration to Micro Grid

Generally, Hybrid Power System uses a combination of conventional non-renewable energy sources such as fossil fuels, hydroelectric power, nuclear energy or a combination of renewable energy sources such as solar, wind, and so on. And can be a combination of renewable and non-renewable energy sources. The Hybrid Power System that will be discussed in this area is a combination of renewable energy sources such as solar cells, fuel cells and wind energy systems.

It is clean and abundantly available in nature. It has many advantages over conventional fossil fuel power generation systems such as low pollution, high efficiency, fuel diversity and on-site installation.

4. A typical case of Pakistan:

Energy crisis is the major issue of Pakistan. Due to this, development in agricultural sector is facing a major drawback and due to this growth rate of 2% has been examined during the period of 2009-2010. In Pakistan, 20% of foreign exchange is used for the import of fossil fuels. The estimate made by the topographer shows that by 2050, the energy demand is going to increase 3 times but the supply situation is still under development stages. Therefore it is necessary to explore the renewable sources to meet the demand situation.

Pakistan has also set a target of adding 5.0%, about 10 000 MW of electricity by renewable energy by 2030, in addition to replacing 10% diesel with bio-diesel by 2025. South Asian continent, located on the western side, the Islamic Republic of Pakistan is influenced by tropical desert climate.

The relative shortage of conventional energy resources in Pakistan, coupled with rising energy prices around the world, is causing tension in the country's power supply. It has become one of the main programs of the Pakistani government to find alternative energies, including solar energy. The Government of Pakistan has formulated a policy to encourage the participation of the private sector in the development and application of renewable energy. The Alternative Energy Development Board (AEDB), Ministry of Water and Power have been developed to organize the integration of renewable energy projects.

To implement the Hybrid Power System, the crude research yields that hybrid resources can be selected by seen the available energy resources.

In this paper a comparative study and analysis of PV model described on the basis of power output, cost and life span of the system.

These PV, Wind, Biomass and batteries models are implemented in HOMER.

The proposed system will finally be look like below Figure.

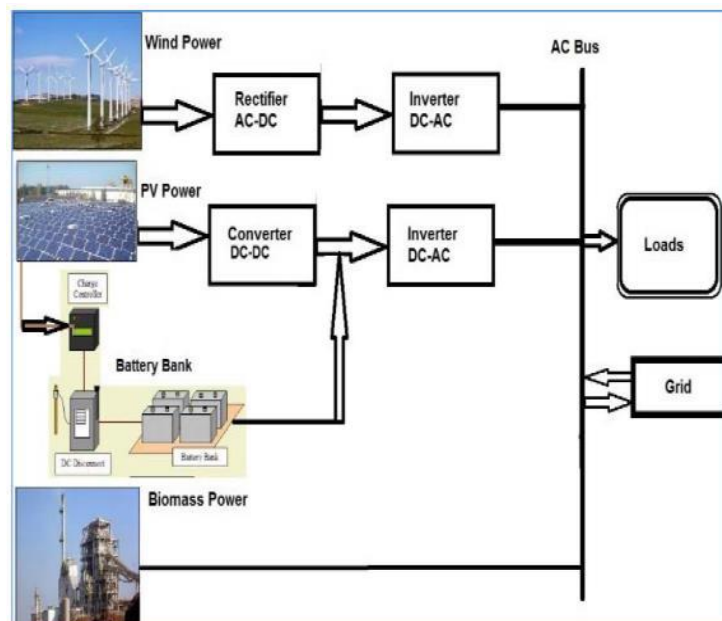


Figure 5: Proposed System

Proposed power system will be capable to provide sufficient information regarding power, cost and reliability to its consumers. And power capability of these Hybrid Power resources is according to the available amount of renewable energy resources.

4.1 Description of the Area Considered for Electrification and Metrological Data:

Maximum installation points for hybrid systems are characterized by a high potential for renewable energies. According to a preliminary study, it was found that the location chosen in this case study well has solar and wind potential.

In this hybrid system, meteorological data of the sun radiation, the monthly wind speed on the Kallar Kahar taken (latitude and longitude of the site is 32.7760 ° N, 72.7008 ° E, respectively).

Daily data of sun radiation were inserted into HOMER (software developed by National Renewable Energy Laboratory (NREL) in the United States (USA) for design and analysis of hybrid power system) to calculate daily radiation and monthly average values of clearness index. Figure I shows the variation of solar radiation.

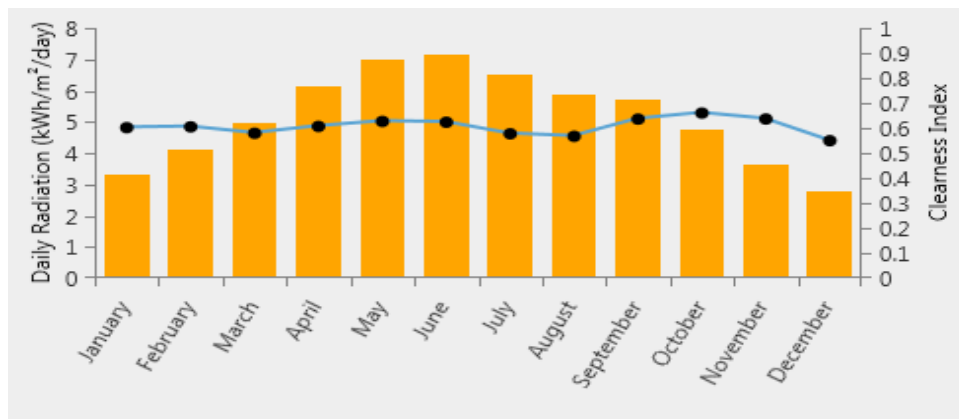


Figure 6: Variation of Solar Radiations

Wind speed also varies seasonally. Figure shows the monthly wind speed variation

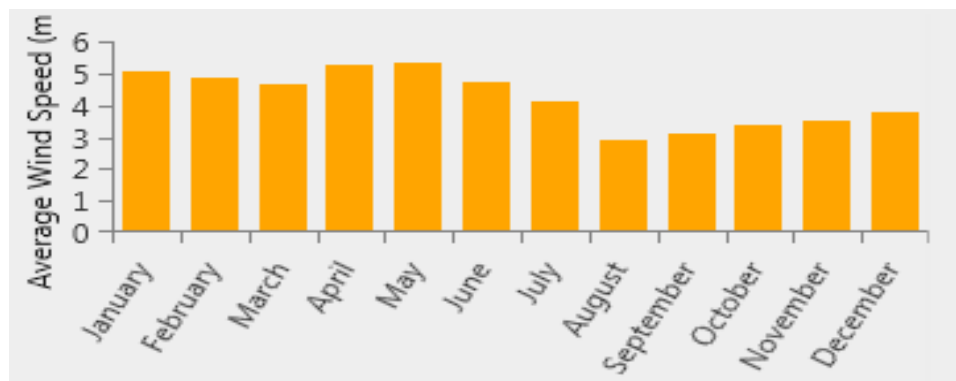


Figure 7: Variation of Wind Speed

5. PV and Grid Connected System:

Figure shows the PV and grid connected system configuration as implemented in Homer simulation software. Figure IV shows the HOMER output results of PV generation system to the simulation. HOMER uses the total NPC as its main selection tool.

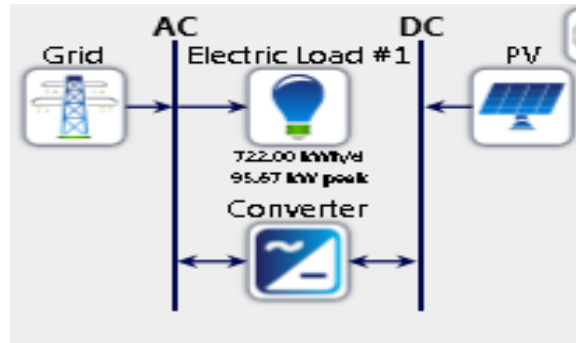


Figure 8: PV and Grid connected System

5.1. Sensitivity Analysis of PV and Grid Connected System:

Figure shows the sensitivity results of PV and grid connected system given by the HOMER. We can see that there is only one optimal system with a PV system. For optimal alternative system, Details of this configuration are shown in Table.

	PV (kW)	Grid (kW)	Converter (kW)	Dispatch	COE (\$)	NPC (\$)	Operating cost (\$)	Initial capital (\$)	Ren Frac (%)
	50.0	100	60.0	LF	\$2.43	\$8.60M	\$110,926	\$7.16M	28
	50.0	100	60.0	CC	\$2.43	\$8.60M	\$110,926	\$7.16M	28
	60.0	100	40.0	LF	\$2.39	\$8.66M	\$94,037	\$7.44M	32
	60.0	100	40.0	CC	\$2.39	\$8.66M	\$94,037	\$7.44M	32
	50.0	100	70.0	LF	\$2.57	\$9.09M	\$121,624	\$7.52M	28

Figure 9: Sensitivity of PV and Grid connected System

Table 1: System Architecture

PV	FLAT PLATE PV	30 kW
CONVERTER SYSTEM	CONVERTER	20 kW
GRID	GRID	100 kW

Table 2: Cost Summary

TOTAL NET PRESENT COST	4493387 \$
LEVELIZED COST OF ENERGY	1.317 kWh

Table 3: Electrical Specification

Component	Production (kWh/yr)	Fraction (%)
PV	50,758	19
Grid Purchases	219,364	81
Total	270,123	100

6. Wind and Grid Connected System:

Figure 10 shows the Wind and grid connected system configuration as designed in Homer simulation software. Figure 11 shows the HOMER output results of Wind generation system to the simulation. HOMER uses the total NPC as its main selection tool.

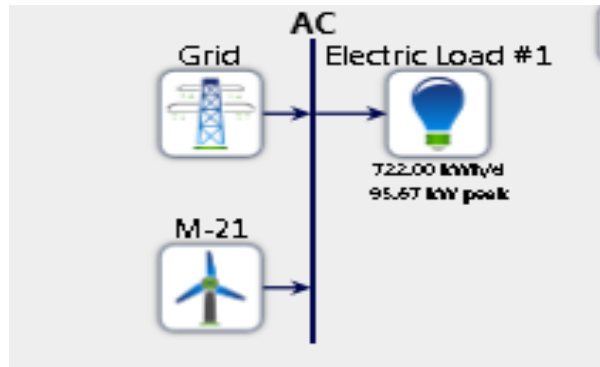


Figure 10: Wind and Grid connected System

		M-21	Grid (kW)	Dispatch	COE (\$)	NPC (\$)	Operating cost (\$)	Initial capital (\$)	Capital Cost (\$)
		10	80.0	LF	\$4.17	\$14.2M	\$77,888	\$13.2M	13,200,000
		10	80.0	CC	\$4.17	\$14.2M	\$77,888	\$13.2M	13,200,000
		10	100	LF	\$4.17	\$14.2M	\$77,889	\$13.2M	13,200,000
		10	90.0	LF	\$4.17	\$14.2M	\$77,889	\$13.2M	13,200,000
		10	100	CC	\$4.17	\$14.2M	\$77,889	\$13.2M	13,200,000
		10	90.0	CC	\$4.17	\$14.2M	\$77,889	\$13.2M	13,200,000

Figure 11: Sensitivity of Wind and Grid connected System

Table 4: System Architecture

Wind Turbine	Bergey Excel	5
Grid	Grid	900 kW

Table 5: Cost Summary

TOTAL NET PRESENT COST	8902799 \$
LEVELIZED COST OF ENERGY	2.613 \$/kWh

Table 6: Electrical Specification

COMPONENT	Production (kWh/yr)	Fraction (%)
Wind	61,286	23
Grid Purchases	2,092,667	77
Total	270,553	100

7. Diesel Generator and Grid Connected System

Figure 12 shows the Diesel Generator and Grid connected system configuration as designed in Homer simulation software. Figure 13 shows the HOMER output results of diesel generation system to the simulation. HOMER uses the total NPC as its main selection tool.

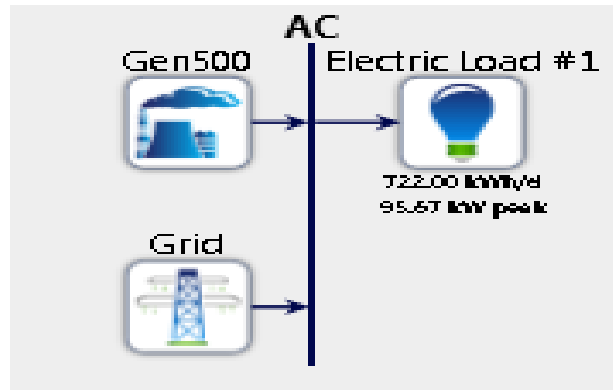


Figure12: Diesel Generator and Grid connected System

	Gen500 (kW)	Grid (kW)	Dispatch	COE (\$)	NPC (\$)	Operating cost (\$)	Initial capital (\$)
	40.0	50.0	LF	\$0.351	\$1.20M	\$50,043	\$550,000
	40.0	50.0	CC	\$0.351	\$1.20M	\$50,043	\$550,000
	50.0	50.0	LF	\$0.414	\$1.41M	\$55,883	\$687,500
	50.0	50.0	CC	\$0.414	\$1.41M	\$55,883	\$687,500
	50.0	40.0	LF	\$0.849	\$2.89M	\$170,569	\$687,500
	50.0	40.0	CC	\$0.849	\$2.89M	\$170,569	\$687,500

Figure 13: Sensitivity of Diesel Generator and Grid connected System

Table 7: System Architecture

Generator	500kW Genset	50 kW
Grid	Grid	40 kW

Table 8: Cost Summary

Total net present cost	2892540 \$
Levelized cost of energy	0.849 x\$/kWh

Table 9: Electrical Specification

Component	Production (kWh/yr)	Fraction (%)
Generator	28,481	11
Grid Purchases	235,042	89
Total	263,523	100

8. Conclusion & Discussions:

This paper provides an analysis of the technical and economic feasibility of hybrid systems for decentralized energy generation. The results of the study show that the remote sites considered in this work are future-oriented sites for the installation of hybrid renewable energy systems based on solar and wind energy. HOMER was used for analysis and viability was determined on the basis of the internal rate of interest, capital costs and the cost of energy. Simulation results show that the system is connected to the wind and with the gate is more economical among all the configurations that are considered in this study with reliability.

By adding alternative sources, we can also overcome the expected power outage. Successful implementation of large renewable hybrid energy systems requires the development of appropriate policies through reflections on local support, institutional barriers and other social factors. This requires the joint efforts of actors and modeling experts for a clear representation of the energy problem and effective implementation of the solutions, that some obstacles to the implementation of hybrid renewable energy systems in countries like Pakistan, for example, lack of technical support in case of repair and maintenance, lack of finance and grants for the creation of projects in rural areas, lack of policies and regulations to promote the hybrid systems Of renewable energy connected to the grid. This requires the need to promote hybrid renewable energy systems that can be local communities more effectively justice. In addition to creating a better quality of life for rural communities, they could have a significant impact on improving the rural economy.

Given the above, this work promotes hybrid renewable energy systems for remote locations of the type considered in this work as the most cost-effective solution. This would accelerate the overall development of underdeveloped regions with a number of programs such as electricity supply, business development and employment opportunities.

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MITIGATION OF DFIG STATOR OUTPUT VARIATION FOR STABLE BATTERY CHARGING

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Abstract

The increasing demand of power for consumers can be met by utilizing both the renewable as well as non-renewable energy resources. Among the renewable energy resources, wind energy is the second largest source, which is used for the conversion to electrical energy. Due the variation in wind speed, the output voltage and power of the wind turbine is not constant. Some loads are too much sensitive to the variation in voltage, obtained from the stator of Doubly Fed Induction Generator (DFIG). In this paper, a new model is proposed and modelled in MATLAB/Simulink using buck-boost converter connected at the input of lithium-ion battery charging system (LIBCS) to compensate the continuous variation of wind to reduce the fluctuations of the output power of wind turbine. The parameter of wind turbine along with our proposed model including buck-boost converter and battery are change such that to achieve the stable output from the system. The model is very effective regarding the reduction in output power fluctuation which leads to very best substitute for local grid user to use this green energy technology. The results are discussed with and without buck-boost converter. To get constant output using buck-boost converter.

Keywords: Wind Turbine, Doubly Fed Induction Generator, Lithium Ion Battery Charging System, Buck-Boost Converter

1.Introduction

Wind energy is a source of green energy which comes from the air current flowing over earth's surface. This energy can be converted into rotational energy by using wind turbine the mechanical energy is then converted into electrical energy using electric generator. This electrical energy is used for offices, school, Houses, or medium community and business applications on the small houses and large scales. These growing drifts can be linked to the multi-dimensional benefits related with wind energy.

Micro grid is directly connected with the stator windings of DFIG while rotor windings are connected with micro grid using converters. Converters near to micro grid or local load is called grid side converters (GRC), and which is near to rotor is called rotor side converters (RSC). The rotor voltage is provided by the back-to-back converters, the stator voltage is provided by the grid. When their fault is occurred from grid side the voltage of stator is change immediately because the stator windings is connected with micro grid is directly. Then, according to flux

conservation, the amplitude of stator flux will not change. But when the voltage drops, the stator flux linkage contains a DC component, an AC component which will induce overcurrent and overvoltage in rotor side with unlike frequencies. The rotor back EMF voltage is mainly decided by two parts. The 1st part in the stator flux (SF) is much smaller than rotor flux (RF), And the 2nd part in the stator flux which can be more than a few times the default value [1].

The advantage of Nickel Metal Hydride battery can be created in the cycle life (recycle after charging). The hundreds of times Nickel Metal Hydride Battery can be recharged to be potentially and equivalent allowing them. The total service of hundreds of alkaline batteries over their lifetime. But, the life of battery is restricted to less from 5 years. This Nickel Metal Hydride Battery rechargeable is used for many frequently and cost-effective power source battery devices functioned create in the office or home [2].

The overall system consisting with 3- Φ load, wind and battery hybrid energy storage system, filters, interfacing converters, and control system, whole scheme is shown in Figure 1.1. If the speed of wind is sufficient then overall system is supplied by the turbine; or else, the batteries are turned-on to supply the overall system. The 3-phase inverter system took the DC voltage from the battery system and converted in to the 3-phase AC voltage for the load. The output voltage of the 3-phase inverter is controlled and regulate to 380 Volts and constant frequency of 50 hertz. The 3- Φ voltages are converted into DC voltages by the fuzzy logic controller (FLC) and the PI controller. PWM signal is generate from the output of the controller. The output voltage of the inverter is controlled by these pulse-width modulated (PWM) signal. The frequency of the inverter is kept constant at 50 Hz at phase-locked process [3].

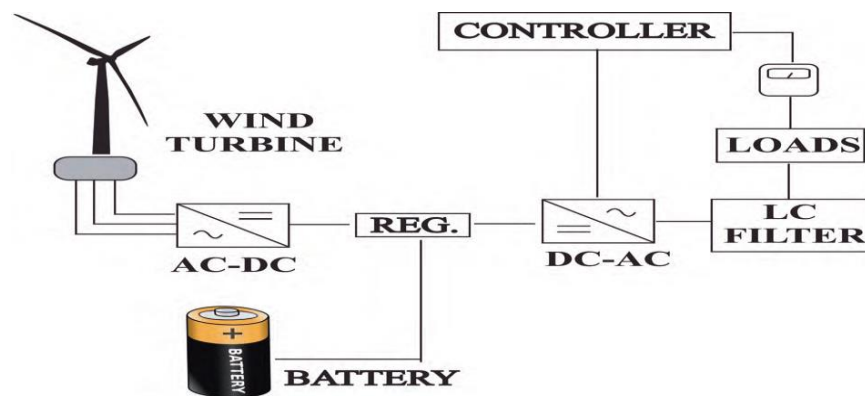


Figure 1.1 PV/battery renewable source.

Wind energy is a form of energy which can be used as: wind mills, wind drives and wind turbines etc. Doubly fed induction generator is used for adjustable wind speed acts which is used for Battery Charging (BC). Some benefits of the doubly fed induction generator, variable speed is compared to the fixed speed machine to reduce the dynamically compensate torque, reduce the rate of converter, less mechanical stress, improved the efficiency and reduce cost and losses. The doubly fed induction generator of the stator winding is directly connected to the local load and the rotor winding are connected with Nickel Metal Hydride battery through a universal bridge and Buck converter [4].

Doubly Fed Induction Generator is mostly use for wind energy and variable-speed applications. DFIG between the stator winding and rotor winding are connected with static converter. DFIG power range is greater than 3MW. The company wind energy conversion system Repower makings two models are design the based on DFIG. The first model design of the DFIG is 6 M and 6150 KW with a total output power and the second model of the DFIG is 5 M and 5 MW

with a total output power. The popularity of the doubly fed induction generator in wind energy application to compare small power converter is required to control the speed of the generator. DFIG of the rotor windings is connected to the power converter for control the speed range of the doubly fed induction generator. [5].

During the active performance of the Brushless Doubly Fed Induction Generator (BDFIG) throughout the local load faults which ahead to reduce the terminal voltage of the generator. Recently commonly used large wind turbine (WT) include DFIG with in part of rated converter. The main advantages of this formation to control the rotor speed and power factor with comparatively converter reduced the cost. This is however to reduced reliability, demanding, extra sources required to use of slip rings and brushes. But, here some changes to resolve brushless and adjustable speed process. BDFIG sustain all the worth of the DFIG without slip rings and brushes. The BDFIG resolve high reliability and low working amount while the action and converter rate of the BDFIG is like to the DFIG. The difference between BDFIG and DFIG are some mechanical changes to each other. squirrel cage rotor is use in BDFIG with a special structure and wound rotor use a DFIG. The BDFIG are two windings on the stator. Comparing the working situations, the output of a Conventional Induction Machine (CIM) is greater than BDFIG with the same capacity and It means both of same rating generator but the size of DFIG is small than BDFIG [6].

In [7], authors discussed a major problem faced DFIG i.e. Low Voltage Ride Through (LVRT). To resolve this problem commercially and simultaneously with the help of FCL–BESS, which is applicable for local load. The DFIG stator is direct connected to the local load and it is a very sensitive for a load. The sudden change in the local load voltage and as a result the flux direction opposite in the stator, which induce very high back EMF on the rotor, which mean that the overcurrent of RSC and over torque of the gear box which is destroy the WECS of the DFIG. To solve this problem into hardware and software base and there to solve this problem from hardware with help of crowbar circuit. The crowbar is turn on and the RSC is close quickly to identify the rotor overcurrent. Thus, the rotor is isolated from the RSC and quickly prevent from overcurrent. But, the LVRT a lot of act of the FCL more is greater at that time the crowbar circuit after all it avoids fascinating reactive power from the local load, that is not concede by the different local load. The BESS unit is recycling the uniform active power output of DFIG and more increase the LVRT efficiency of the DFIG by stabilize the DC-link voltage.

In [8], authors discussed two main problems faced by DFIG. The first problem is weak LVRT capability and the second is fluctuation of output power. These two problems are solved by the help of a Superconducting Fault Current Limiter Magnetic Energy Storage System (SFCL-MESS). The superconducting coil is used to store the energy for output power leveling along the normal action. The Fault Current Limiter Inductor (FCLI) to maintain the surge current of the stator or rotor at the time of grid fault. The Superconducting Coil (SC) can also weak the rotor BEMF voltage. Hence to improve the controllability of the (RSC), which save the gearbox and Rotor Side Converter.

The global warming and the shortage of fuels and crude oil have led to interest in green energies. Wind Energy Conversion Source (WECS) or green energy source is a most popular energy source for the future which is contributes to clean air and global safety. The generation of electrical energy from wind. Battery Energy Storage System (BESS) is play very important role in generation of green energy to stabilize and permits to run the wind power system variable and the fluctuation load [9].

Among several types of energy sources, wind energy source is one of the most effective energy sources due to its pollution free reasons and environment friendly. But due the variation of wind on wind turbine which Cause the frequency fluctuations and unstable out power of wind generator create several problems on the overall power system. Therefore, to solve these problems, there are many methods are used energy storage systems such as EDLCO, STATCOM and SMES [10].

In this paper is divided into sections, In Section I, discuss the simulation model design without Buck-Boost Converter and section II, with Buck-Boost Converter. In section III, discuss the results of without Buck-Boost Converter and section IV, discuss the results with Buck-Boost Converter. In Section V, comparison of section III and section IV.

1.2 Simulation Model design

I- Without Buck-Boost Converter

This model for controlling wind turbine variation using battery charging system with DFIG as shown in Figure 1.2. This simulation model system of the battery is not protected due to over current charging.

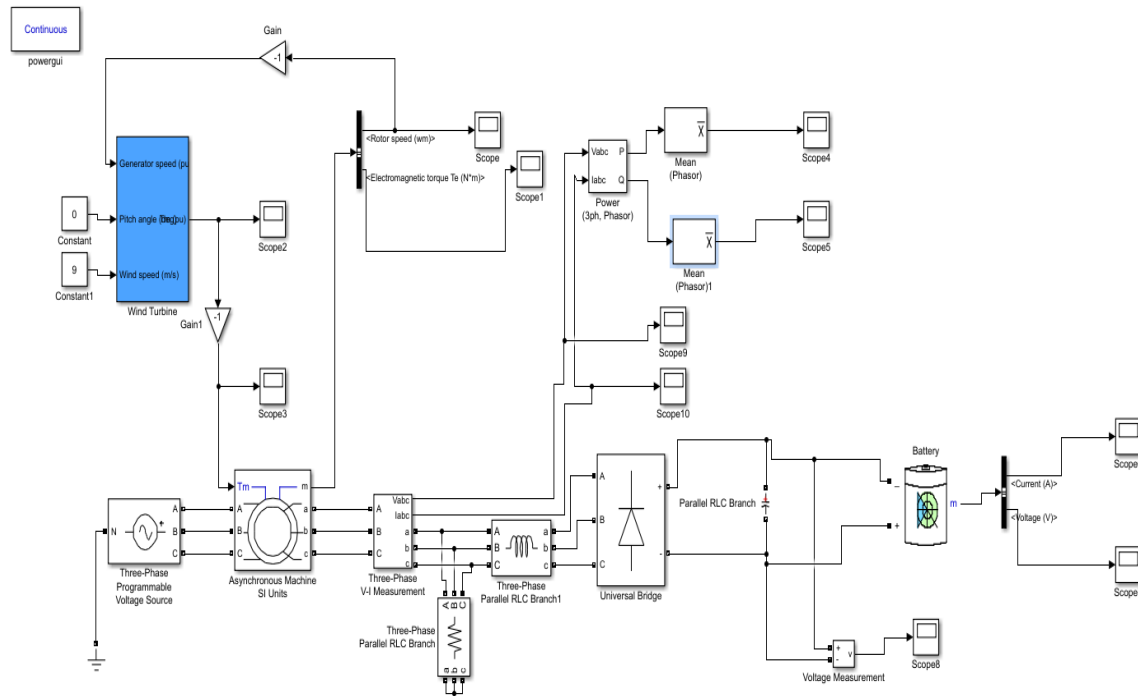


Figure 1.2 Simulink model

II- With Buck-Boost Converter

This model for controlling wind turbine variation using battery charging system with DFIG as shown in Figure 1.3. This simulation model system of the battery is protected from over current charging.

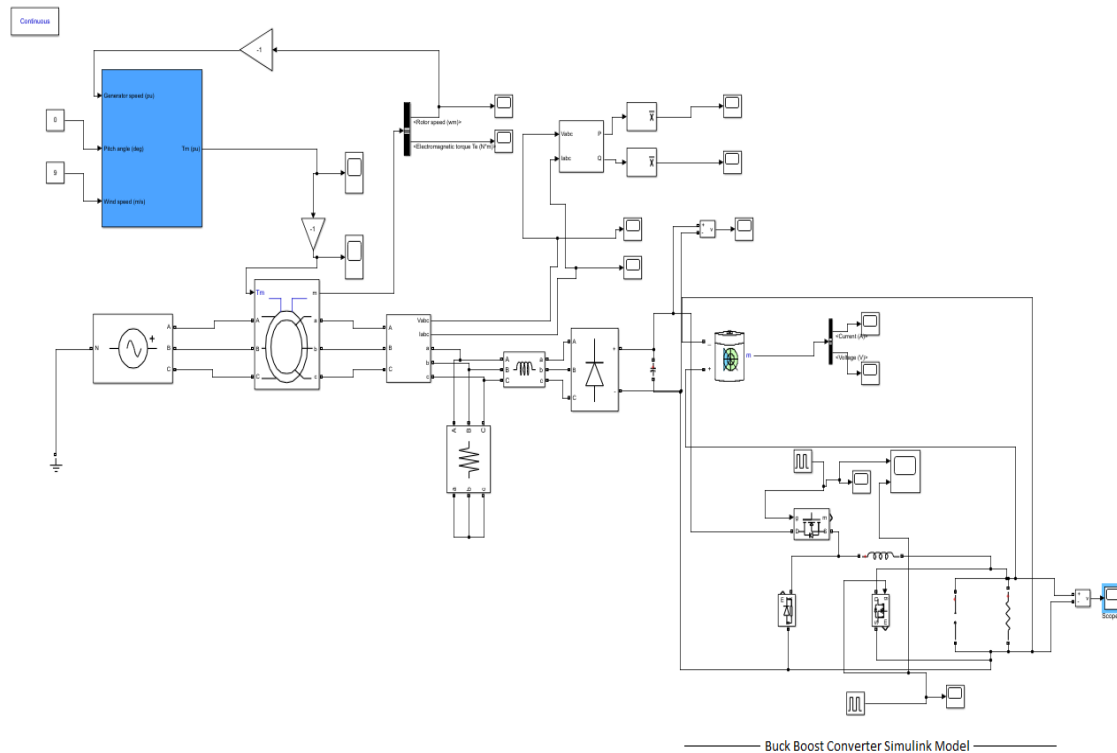


Figure 1.3 Simulink model

1.3 Results of without Converter and with Converter

III- Results of without Buck-Boost Converter

This waveform is shown the stator output voltage of the DFIG which the starting waveform many variations occurs from zero to 0.5 second after that the waveform of DFIG will stabilize due to the battery charging system as shown in Figure 1.4.

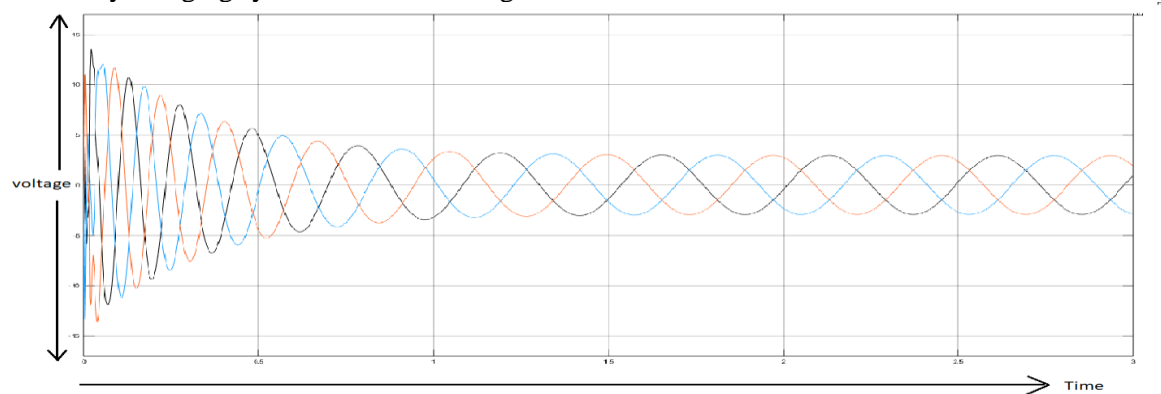


Figure 1.4 Output Voltage Of DFIG

The same phenomena occur with output current of the DFIG as shown in figure 1.5.

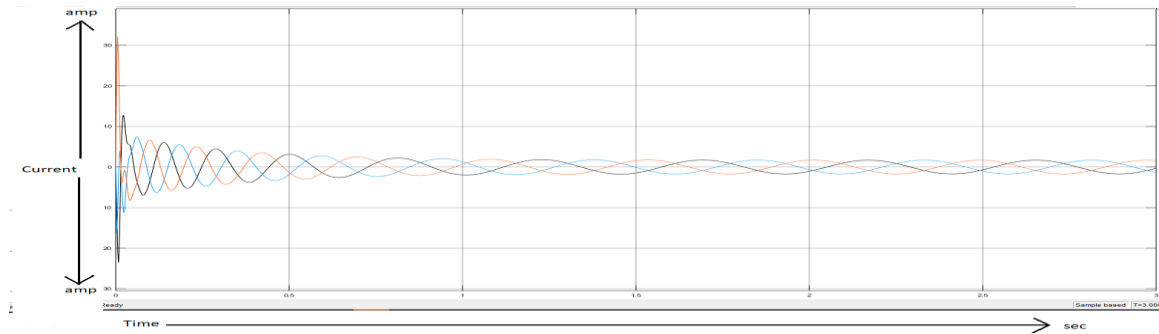


Figure 1.5 Output Current of DFIG

This graph shown is the rotor speed which is varied from zero (0) to 0.7 second after that point the speed of rotor of DFIG remain constant as shown in figure 1.6.

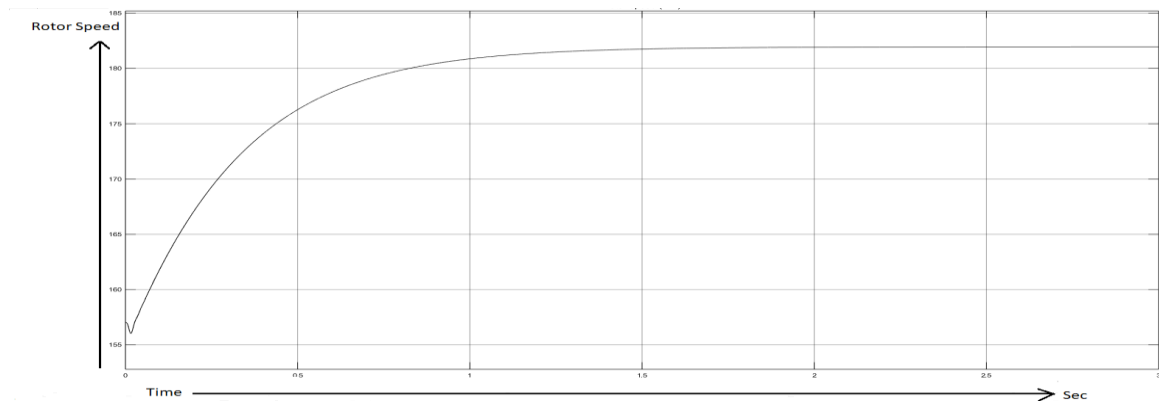


Figure 1.6 Rotor Speed of DFIG

The below Figure is showing the torque of the rotor which is initially is high because of the rotor speed is low when the rotor speed is varying to high at that time the torque will be reduce as shown in figure 1.7.

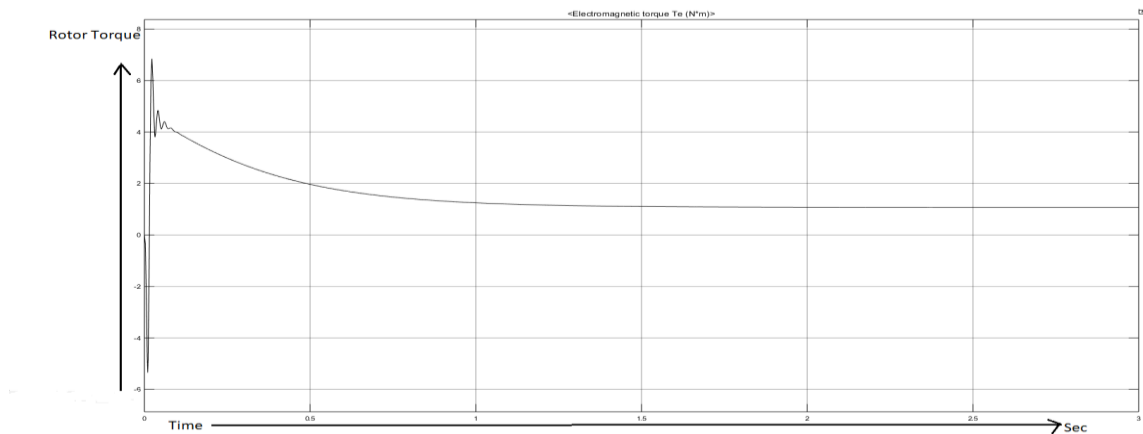


Figure 1.7 Torque Of DFIG

IV- Results of with Buck-Boost Converter

The input voltage of buck converter which is the output of universal bridge is shown in Figure. But here the Value of voltage is high with respect to the terminal voltage of the battery. So, we will design buck converter for the battery requirement as shown Figure 1.8.

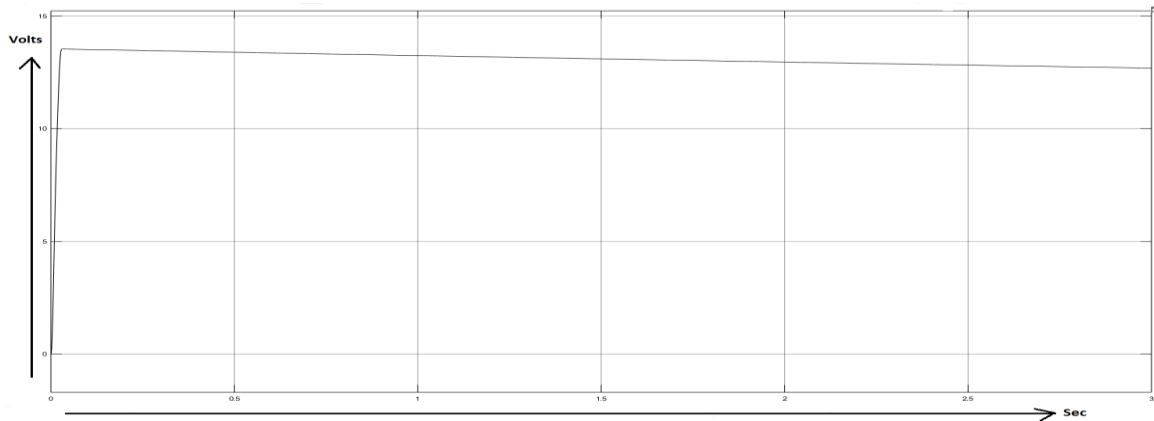


Figure 1.8 Output Voltage of Universal Bridge

The below Figure is showing the output voltage of buck converter which suitable for the battery charging system as shown in Figure 1.9.

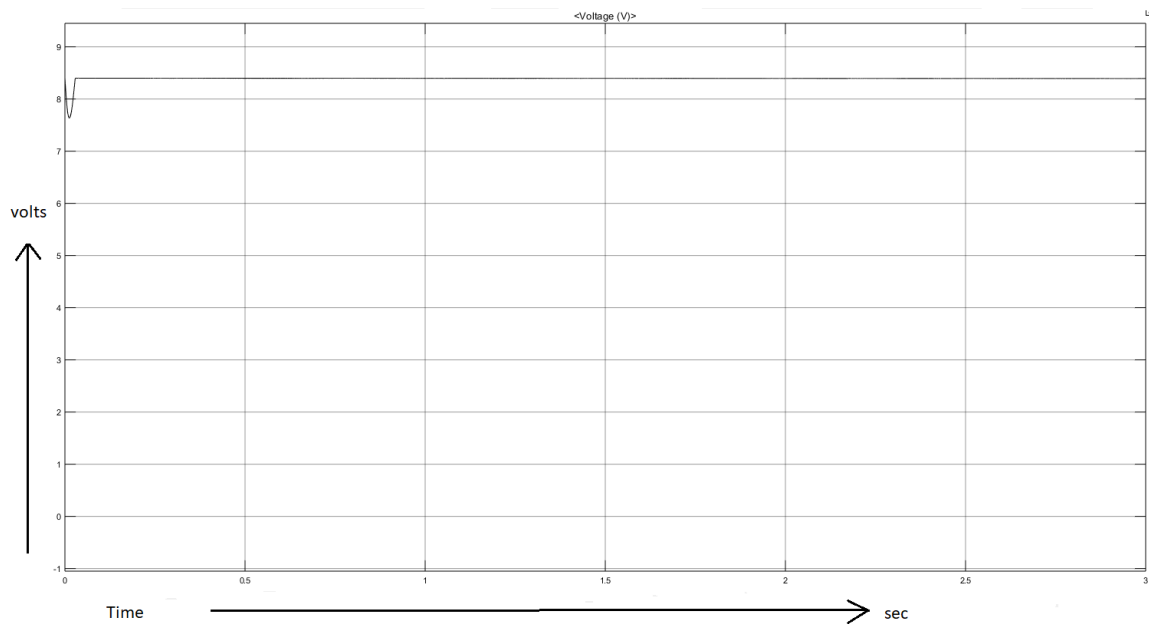


Figure 1.9 Output Voltage of Buck Converter

This below graph is showing the battery current which initially varied due the rotor speed and after stabilizing the rotor speed the battery current becomes zero as shown in Figure 1.10.

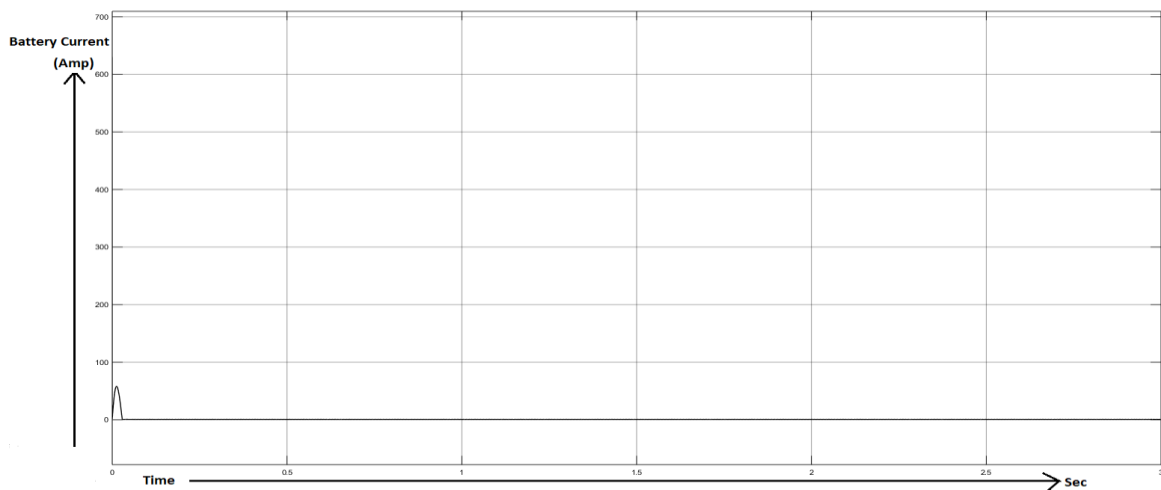


Figure 1.10 Battery Current

Here the battery terminal voltage which is varied due to battery current and when the current become zero the terminal voltage of battery constant as shown in Figure 1.11.

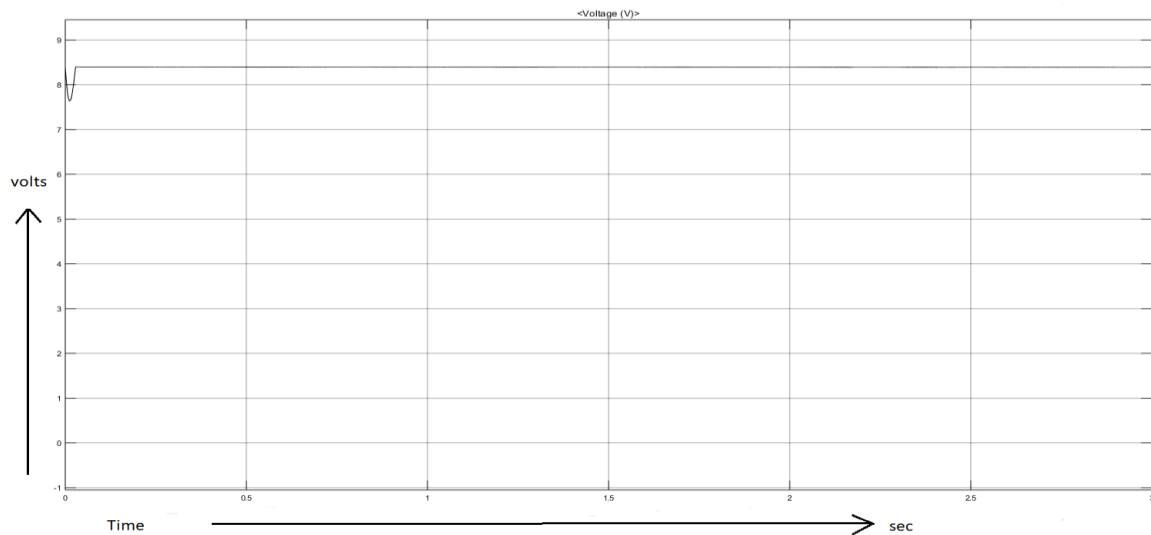


Figure 1.11 Terminal Voltage of Battery

But here is some problem occurs in this system because the buck converter performs only one operation to step down the voltage and some time the voltage is low from the generator side so the buck converter cannot perform own working which is suitable for the battery charging system.

The input voltage of boost converter which is the output of universal bridge is shown in Figure. But here the Value of voltage is low with respect to the terminal voltage of the battery. So, we will design boost converter for the battery requirement as shown in Figure 1.12.

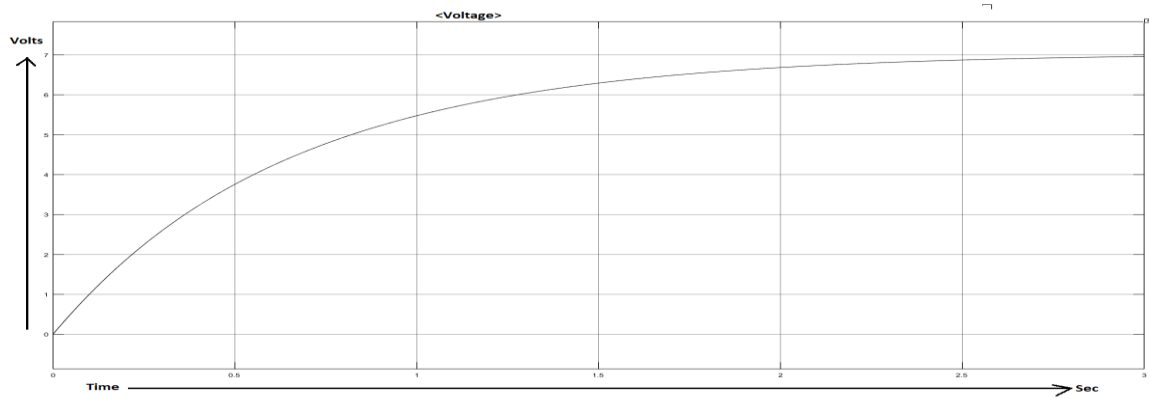


Figure 1.12 Input Voltage of Boost Converter

The below Figure is showing the output voltage of boost converter which suitable for the battery charging system as shown in Figure 1.13.

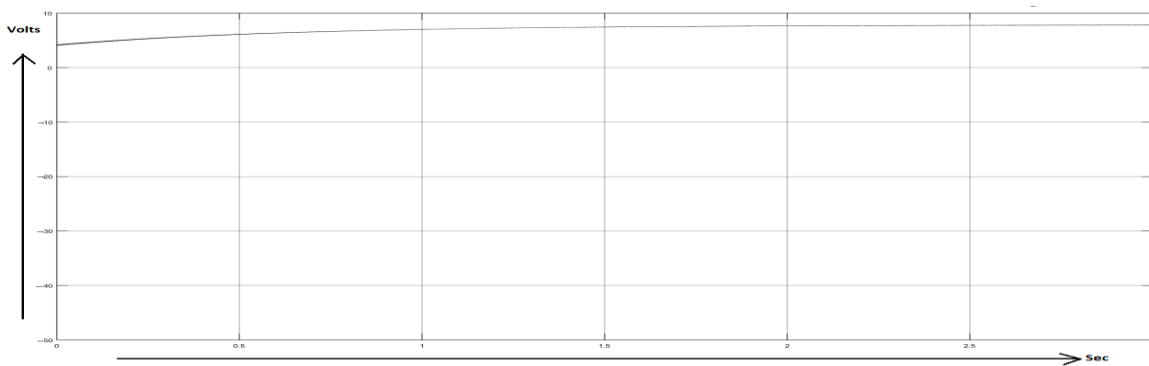


Figure 1.13 Output Voltage of Boost Converter/Input Voltage of Battery

Here the battery terminal voltage (TV) which is varied due to battery current and when the current become zero the terminal voltage of battery constant as shown in Figure 1.14.

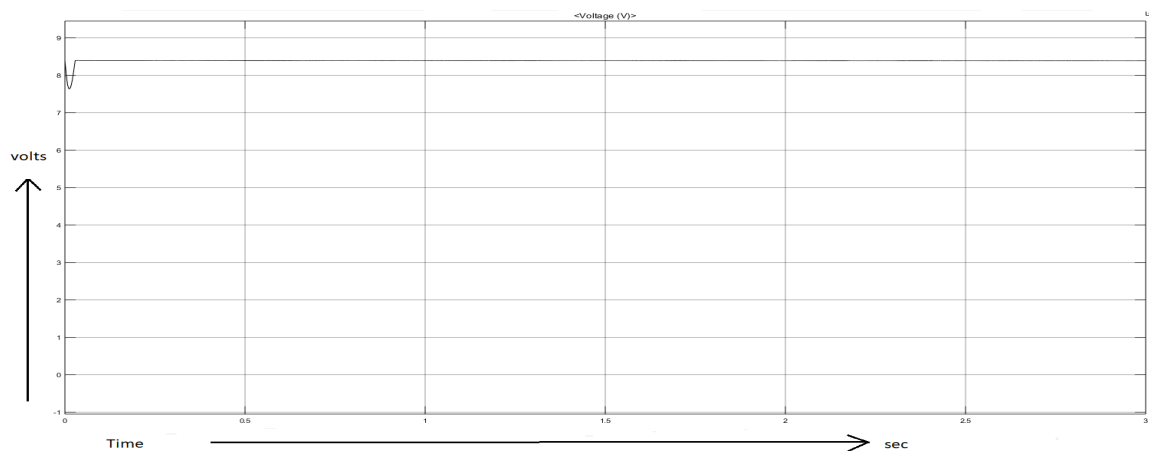


Figure 1.14 Terminal Voltage of Battery

V-Comparison of section III and section IV

The performance of the generator is remaining same without Buck-Boost Converter and with Buck-Boost converter like output voltage, speed and torque of the rotor.

Conclusion

Simulation study for 4.5HP wound rotor induction motor. Which take is a DFIG using MATLAB/Simulink and models for LIBCS for analysis and also used the buck-boost converter to protect LIBCS and the regulate the input voltage lithium ion battery charging system. For the simulation study, when the wind velocity is increasing at that time the rotor speed is also increasing and the battery of charging voltage is also increasing as well as its determine rating. If DFIG of the rotor voltage is higher, expected high wind velocity. For the simulation analysis the rotor speed is kept constant and the BCV is controlled using buck-boost converter. 9V is considered as the position and compared with the output voltage across the buck-boost converter.

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USE OF INDIGENOUS KNOWLEDGE AND CULTURALLY SENSITIVE ELUCIDATIONS FOR SUSTAINABLE DEVELOPMENT

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Abstract

Sustainable development is a development that fulfills the needs of the present environment without having to compromise with the ability of the future generation to meet their own needs. Indigenous knowledge refers to the knowledge possessed by different communities and societies across the globe over time and that continues to develop. It is based on the experiences often tested over centuries of use, adapted to local culture & environment, dynamic and changing. This paper aims to explore how effectively indigenous practices respond to ecological and sustainable-development agenda. At first, it will look into the characteristics of indigenous knowledge and at indigenous peoples' notions of development to understand the concepts in which traditional knowledge is rooted. It will then explore the relationship between indigenous knowledge of inhabitants and natural resources, current threats and challenges. This will be followed by an analysis carried out on-land, animals, and plants etc. which ultimately derive to the listing of some indigenous practices to be continued over time. The paper will then look at the contribution of indigenous knowledge to climate change adaptation and to disaster risk reduction. The paper will conclude with a reflection on the importance of indigenous knowledge and a reflection of the mitigation strategies to overcome these challenges and be of benefit to the sustainable development agenda.

Introduction

Humanity having a stressful relation with the earth and this situation has raised many questions like how to change this behavior towards earth? How should we reduce or eliminate our negative impact on the climate by changing our economic and financial activities? How can we develop a more suitable and sustainable relationship with other fellow creatures? Do we have enough knowledge and wisdom to overcome these issues? Increasingly, it has been noticed that for answer to these question we have to search for different sources. In the beginning it was assumed that science and technology will provide us with all the answers, but later we realized that indigenous knowledge also have a lot to offer. The important source of information is the indigenous knowledge of farmers about culture, institutions, local farming, experiences, patterns and practices etc. by the time it has been proved that this knowledge played important role in the establishing the basic or extensive services. In the system which is dominated by the western world these indigenous communities are trying to protect their rights, their traditions and knowledge. These communities are facing the challenge of survival between the two different worlds of indigenous and non indigenous. They were facing the suppression and invasion and sometimes their knowledge surpass by the westerns knowledge and imposed on them through western institutions. Survival of these communities had managed for centuries by modifying in different ways to changing climate conditions and trying to establish a sustainable livelihood system. This knowledge of diverse nature has strong connection with their environment and also with

cultural cohesion and provide an opportunity to these communities to maintain a sustainable use and handling of natural resources to secure their environment and to enhance their resilience, their ability to observe, adapt and mitigate has strengthened many communities to face different and harsh circumstances that have seriously impacted their way of living and habitat.

After an extensive literature review in this paper tried to understand how the knowledge of indigenous communities and their cultures play their role to global challenges strategies and risk reduction in disasters. This will be followed by a critical reflection of the impact of mitigation strategies on indigenous populations and territories and on the necessity of guaranteeing full access to lands and justice to allow indigenous peoples to realize their rights.

Indigenous people and their Knowledge

Indigenous means native, local, aboriginal or first who originally were the inhabitants of a region. The word indigenous applies to that which is not only native but also can be determined has never been introduced or brought from somewhere else. The term “indigenous peoples” is in itself a contested category of people; so too is indigenous knowledge. The former refers to “culturally distinct ethnic groups with a different identity from the national society, draw existence from local resources and are politically no dominant (Melchias, 2001:35). In 1991 World Bank gives them another angle of development by stating that indigenous peoples are “social groups with a social and cultural identity distinct from the dominant society that makes vulnerability to being disadvantaged by the development process.”

The UN has no universally accepted definition but thinks “indigenous communities, peoples and nations are those which, having a historical continuity with pre-invasion and pre-colonial societies that developed on their territories, consider themselves distinct from other sectors of the societies now prevailing in those territories, or parts of them” (Cobo, 1987). There are some similarities in these definitions which help us to conclude that community who live in a state prior to the formation of a state with in a area and identify with it and have sustained a great part of their different language, cultural, social and organizational characteristics. This may differentiate them from the rest of the nation in their culture and traditions this claim to be valid as others identify this community as indigenous.

Whereas, Indigenous knowledge on its part refers to what indigenous people know and do, and what they have known and done for generations – practices that evolved through trial and error and proved flexible enough to cope with change (Melchias, 2001). As compare to western modern knowledge which is supposed to be scientifically characterized and investigated. Indigenous knowledge is considered as a monopoly of trails and error. Whereas indigenous knowledge were also produced in after experimentations though these experiments were not documented and the knowledge systems were endorsed and protected under formal frameworks, culture and practices. This knowledge is passed on to other generations and have enabled these people to sustain, organize their natural assets and the ecosystems surrounding them like animals, plants, rivers, seas, natural environment, economic, cultural and political organization. It is important not only for the community or culture in which it is generated and also for those scholars and researchers who want to work for the betterment of these rural

localities. For instance by using this knowledge in the policies made for the climate change of any region will help us to generate successful adaptive scheme which should be supportive, affordable, participatory and sustainable.

Indigenous Knowledge and Sustainable Development

Every society has a history behind its knowledge resources, which indicates its evolution process. With time passes and interaction with others affect knowledge systems as well as a society's development. This indigenous knowledge is holistic in nature and having a very strong bound with the nature and creates an intense understanding and not snapshots of the inter-relationships between various elements of a natural environment. From different types of surveys doctored or un doctored it is concluded that they perform well in risk avoidance and management, eco-system maintenance and human health. They have connections and instructions for social equality, association with animals and other non-human beings, ecological responsibility and respect for super-natural. Different indigenous survival plans and adaptive responses are the most favorable to use against counter of environmental changes, developed on household and community level.

Sustainable development is a multi-dimensional concept that is comparatively new in the development debate. "Development that meets the needs of the present generation without compromising the ability of future generations to meet theirs" Leister Brown (1981) and later Brundtlandt Commission explain it as "development that meets the needs of the present generation without compromising the ability of future generations to meet theirs" (WCSD, 1987:8). Such kind of diplomatic definition is not enough to satisfy the meaning of sustainability. Despite of more than a half a century a very little has been gained by the development cooperation. Today, the earth is so polluted that the very survival of humanity is threatened as evidenced by silent emergencies like desertification, fast degradation of arable land due to abusive and inappropriate use of fertilizers, polluted rivers, air and soil caused by industrial effluents (Eyong et al., 2004). The biggest problem that the world has to face is the global warming. The life supporting system of the earth (seas, rivers, oceans soils, forests and air) can be likened to a boat; any leakage on one part of this boat will cost the entire boat and not only the affected part.

For decades, traditional knowledge has been compared and contrasted with scientific knowledge, putting the latter always in a position of privilege compared to the former. However, since the development of knowledge systems rarely occur in isolation, seeing indigenous knowledge and scientific knowledge as two separate and isolated entities does not describe the real situation (Agrawal, 1995, Anderson, 1990; Bravo, 2000, Ellen and Harris, 2000, in Bates, 2009). Additionally, literature on the topic has widely highlighted the fact that there is not a clear divide between the two, but on the contrary, the integration of indigenous and scientific knowledge is a very important issue to consider, as one knowledge systems may be used to fill in the gaps of the other.

Indigenous knowledge systems in food production

There is an example of special farming system practice by an indigenous community in the north of Pakistan. An international snacks company introduced a special seed in that area in order to increase the production and improve the quality of potato in that region because that land was famous for its potato production. But after using the seed provided by the multinational company they were bounded to use that specific seed because there

land stop growing any other crop and even local potato because of chemicals that they were using in that seed. That specific seed at one side provides you the crop with better quality and quantity but it will also change the characteristics of your soil and bound you to a specific kind of crop and seed and now that whole community have no other option instead of using their seed.

Indigenous knowledge systems in forestry development

In province of Punjab in Pakistan the provincial government has introduced some exotic trees which they have imported from another country and they have wasted million of dollars for the cause of green city but result was against their imaginations and all of those trees dried because they didn't survived in different climate and conditions. One other example is the use of Australian grass instead of local and most of time it will results in the waste of money when it get dried. After few years another province of Pakistan start a program of planting a billion tree project in there province to increase the forest and to fight with the climate change and they give trees to the locals which were according to their climate and in the result of that maximum number trees grow and cause 2 to 3 degree of temperature decrease, increase in average rainfall and increased the total covered area by forest or greenery.

Indigenous knowledge and climate change

In the northern areas of Pakistan many indigenous communities live in the most vulnerable ecosystems. Ranging from snow Cap Mountains, glaciers, rivers and streams and they were living there from hundreds of years but now because of the current ecological crisis main reason for climate change and loss of biodiversity these indigenous territories are directly affected like increase in rainfall in the mountains area of Chitral in the North of Pakistan became the cause of flood which destroyed dozens of houses, livestock and human lives. Global warming also increased the no. avalanche and GLOF (Glacier Lake Outburst Flood) in the northern areas of Pakistan and complete village of Hussani which is located near the Bathura glacier in Hunza is in high danger zone of GLOF. These climatic changes just not only affecting the northern mountain area but also the southern green plains of Punjab with floods and droughts in Pakistan.

Indigenous Knowledge and Disaster Risk Reduction

The integration of indigenous knowledge in disaster risk reduction has been slow compared to other disciplines (McAdoo et al., 2009). Indeed, only recently, research on disaster risk reduction has not only demonstrated the high value of indigenous traditional knowledge in preventing and mitigating the effects of natural disasters, but also in relation to early warning, preparedness, response and post-disaster recovery (Rautela and Karki, 2015).

Indigenous communities in all over the world have developed different techniques according to the natural hazard they were face in their regions. That's why most of them were living in different areas but in same hazardous conditions have same techniques. They have the knowledge of disaster prevention strategies like weather forecasting and modification in their agricultural practices to control the damage to their fields and crops and livestock.

Conclusion

Indigenous people view the world as an integrated whole. The present knowledge, arts and beliefs that we acquire and other forms of cultural expression have been handed down through the generations. The new sustainable development agenda encompasses many issues that are directly affecting indigenous peoples' lives. Education, poverty, access to justice and climate change are only a few challenges that indigenous people have been through and are currently facing. Their knowledge have been deeply rooted in the relationship of indigenous peoples with nature and community and has proven to be efficient to respond to some of these challenges; however, this is not enough. Trapped between several environmental hazards on one side and development initiatives on the other, if some solutions are not taken immediately, there will be negative consequences for the survival of these populations as well as for their knowledge systems. Knowledge loss has been already responsible for increasing the vulnerability and risk for indigenous populations. Therefore, it is important that the national and international community starts recognizing indigenous peoples and their knowledge as valuable allies in the fight against climate change and sustainable development challenges and in maintaining global biodiversity. In light of the new post- 2015 sustainability agenda, joint efforts are urgently required to develop and implement suitable initiatives to empower indigenous peoples to uphold and realise their rights and be involved in the decision making process, becoming in this way active agents of change. IK is environmentally sustainable in many cases. Also, it is an important source of local subsistence and food security. It has been produced based on local resources, technologies and local culture. In addition, it is equitable in terms of access to resources, decision- making and management. Nevertheless, IKS have been eroded due to many social, economic and environmental driving forces.

Therefore, it is really necessary to put the IKS back to work by undertaking the actions below:

Recommendations

- Collecting, analysing, documenting and disseminating IKS.
- Preserving and bringing back IKS into practice by empowering local communities and rediscovering the essence and values of IKS.
- Setting up, promoting and strengthening institutions relating to indigenous knowledge.
- Through the development of partnerships and stakeholder networks, promoting IKS & recognizing its market value.
- Various motivational steps need to be undertaken in the study area for popularizing and expanding ecofriendly indigenous farm practices for sustainable development.
- Demonstration, exhibition and replication of different techniques on indigenous farm practices should be conducted in the study area and also other similar parts of the country.
- Works of research related to the best technology for more improvement of the same can be conducted in the research institutional level.

- Lobbying with relevant departments of the government and also various policy makers at local and national levels in order to integrate common information and knowledge from communities in the execution of large scale.

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CONGESTION MITIGATION OF TAXILA INTERSECTION USING SYNCHRO

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Abstract

Pakistan has experienced a rapid motorization in last one decade as motorized vehicle population. Aging transportation infrastructure of cities like Taxila, is unable to meet the enhanced traffic demand due to increased motorization. A well-planned, efficient and sensible transportation system is necessary to ensure the better traffic movement and operational condition of road system.

The main objective of this research was to investigate and give possible or economical solution of the congestion problem of Taxila intersection. The basic aim of methodology was to focus on the determination of LOS for the existing and alternative conditions of the traffic on the intersections that were to be covered. Manual count method is used for traffic data of Taxila intersection, which was required for analysis using Synchro software. Among all the alternative the best economical solution is to transfer the heavy vehicle traffic to use bypass. The Level of service is improved from E to B, Intersection delay is also improved from 78.7sec to 18.2 sec and volume to capacity ratios is decreased from 1.72 to 0.68.

Keywords: Level of Service (LOS), Intersection capacity utilization (ICU), volume to capacity ratios, Synchro.

1. Introduction

Motorization and its growing use has been a major factor leading to an increased mobility of people, goods and services with a consequent development and economic progress. While this phenomenon has brought irrefutable benefits, it has not been without deleterious effects. On-field readings included manual counts performed, the basic inputs that were utilized by the analysis software SYNCHRO for outputs such as Level of Service (LOS), Intersection Capacity Utilization (ICU), travel delays at intersection and volume to capacity ratios. The analysis performed by the software was not limited to only existing/current scenarios but was broadened out to include future projected values for improved as well as unchanged scenarios. The improved scenarios drawn up included providing bypass for heavy traffic, signaling the intersection, providing the roundabout where possible to suggesting traffic management plans. These plans, if implemented and led to fruition by the concerned authorities would provide road users with a

general peace of mind associated with a smoother traffic flow and it will reduce traffic congestion that will save the fuel loss, time loss.

In the past research which was conducted in Rawalpindi, Golra intersection, GPO intersection, Honda intersection, GHQ intersection was analyzed using Synchro software. The traffic data was collected using Jammer Counter in all 4 legged of intersections. Among all the different Scenario, SB and NB traffic was directed towards their respective left turn free lanes in EB and WB roads u–turn was provided. After these changes level of service (LOS) improved from F to D, cycle length was reduced from 167 sec to 120 sec, signal delays were reduced from 371.4sec to 46.1sec, and intersection capacity utilization was reduced from 158% to 105.5% (Nasir Ali et al (2015). Another research Dennis D. Tantoy et al (2014) was conducted in Cagayan de Oro City (Phelpine), which is related to congestion mitigation. The data collection consists of queue length, parking data, traffic volumes at intersections using video recording. Average queue length was obtained by counting the number of standing vehicles at 30-second intervals and concluded that number of lanes were increased, traffic signals were provided while parking and pedestrian walkability was managed by enforcing the traffic rules.

In Taxila Intersection, illegal parking, bus stand and entry on wrong way to intersection, was also the problem for congestion. as show in the below figure 1 the huge amount of vehicles are parked. The intersection in Pabna city of Bangladesh was analyzed, and found that Illegal entry of the vehicles at intersection is the major cause of congestion Motiur Rahman et al (2013).



Figure 1: Illegal Parking

The service road is also provided on both sides for low speed vehicles, but due to the illegal parking and bus stands the service road is unable to use for low speed vehicle. The past research is related to traffic congestion at road intersections in Ilorin, Nigeria. The data were collected through direct field observation such as field survey on intersection characteristics, traffic volume and composition, traffic delay while In order to improve this situation it is required to evolve more effective traffic management method for the city. On-street parking of whatever types should be strictly restricted up to a distance of 200metres away from the intersections. Installing no parking and no waiting signs at the intersections to discourage arbitrary parking. (Dr. Adekunle and J. Aderamo 2012)

Traffic data collected for measuring and assessing traffic congestion included the volume to capacity ratio, LOS, timing data for the intersection (Akçelik, et al 1998) were collected at the intersection. Using these data, the Synchro software was employed to develop a detailed network model of the intersection and the upstream basic freeway section.

2. Objectives

The objective of this research is to highlight the difficulties that road users face on a constant basis while travelling. Congestion in time loss, fuel loss also affects the environment badly and results in pollution. Our objective is to focus on intersection delays, uniform delays, Intersection capacity utilization, v/c ratio, level of service. The specific objectives of this research can be summarized as the following:

- To study the main factor of congestion on Taxila intersection.
- To determine the capacity and v/c ratio of urban intersection before and after optimization with existing and improved geometry.
- To determine control delays before and after optimization. It is important in determining the level of service of the intersection.
- To determine intersection capacity utilization.
- Recommend alternative solutions based on results obtained from analysis

3. Methodology

The scope of the project is limited to Taxila Intersection. First of all the intersection was investigated on field for the major cause of congestion. Then the traffic counts will be performed by manual method, the intersection data i.e. No. of lanes, width of lane and leg of intersection and all necessary data required as an input for Synchro software. After the data collection, all type of vehicles are converted into passenger car units (PCU) to bring the data into one form and will be used as an input for volumes in Synchro. For outputs such as Level of Service (LOS), Intersection Capacity Utilization (ICU), travel delays of intersection and volume to capacity ratios will be calculated. The basic aim of our methodology is to focus on the determination of Level of Service (LOS) for the existing and projected conditions of the traffic. It consists of the collection of traffic counts for the turning movements and through movements at intersections. Subsequently from this data, the peak hour volumes and peak hour factor will be determined for intersection. This peak hour volume and peak hour factor will further be used along with the existing cycle length to determine the existing overall delay, capacity of each movement and level of service, intersection capacity utilization with the help of software Synchro. Comparison will be made between the current scenarios and all suggested improvements and then final solution is recommended.

4. Results and Discussion

For analyzing the intersection, we have taken different scenarios for improvement in geometry and reducing traffic congestion. The following three different improvements were taken for analysis.

1. Signalizing of Intersection.
2. Provide Roundabout on intersection.
3. Restrict Heavy vehicles on intersection.

4.1 Signalizing

In the first alternative, the intersection was signalized on all 3-leg to control the entry of vehicles. The below figure 2, shows the Synchro analysis and summarized the result in table 1.

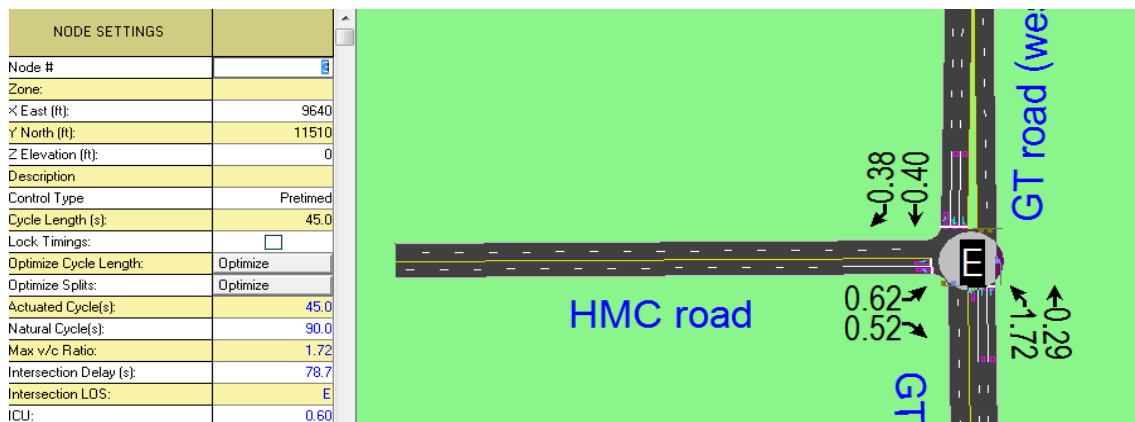


Figure 2: Improvement after Signalizing

Table 1: Summary on signalizing improvement

Before Improvement		After Improvement	
Intersection Delays	78.7 sec	Intersection Delays	72.8 sec
LOS	E	LOS	E
ICU	0.58%	ICU	0.57%
V/C Ratio	1.72	V/C Ratio	1.70

Before improvement the level of service of intersection was E, Intersection delay was 78.7 sec , Intersection capacity utilization was 0.59% whereas V/C ratio was 1.72 after signalizing intersection delay little improvement from 78.7 sec to 78.2 sec , ICU changes from 0.58% to 0.57% but LOS remains the same which means we should implement any other improvement.

4.2 Roundabout

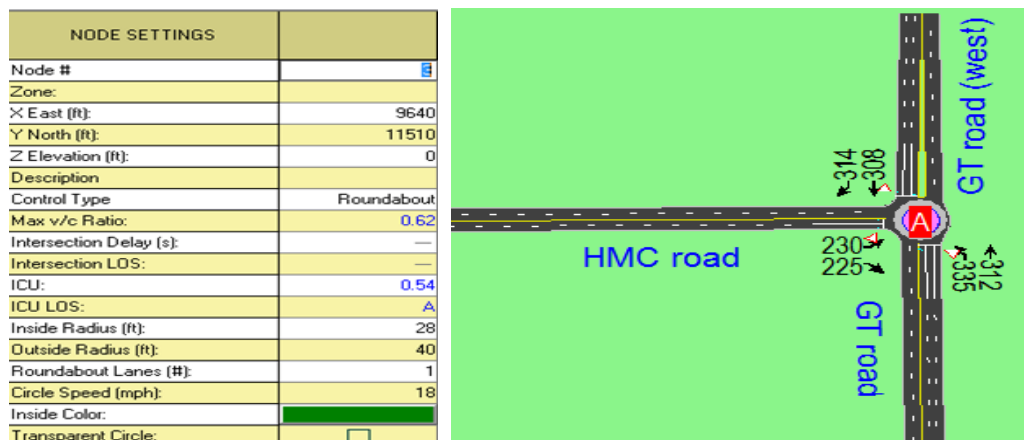


Figure 3: Improvement after Roundabout

Table 2: Summary on Roundabout Alternative

Before Improvement			After Improvement		
Intersection	Delay	78.7 sec	Intersection	Delay	14.8 sec
LOS		E	LOS		A
ICU		0.58%	ICU		0.54%
V/C Ratio		1.72	V/C Ratio		0.62

After providing roundabout, intersection delay changes from 78.7 sec to 14.8 sec, ICU changes from 0.58% to 0.52%, Level of service is also improve from E to A and V/c Ratio reduce to 0.62.

4.3 Restrict Heavy Traffic

The third alternative is very different among the two roundabout and signalization. Because Taxila is an industrial city. The heavy vehicle traffic ratio is high. If we restrict these vehicle to use bypass instead to enter in the main bazar or intersection to disturb the traffic flow. The below figure and table shows Synchro detail and summarize result.

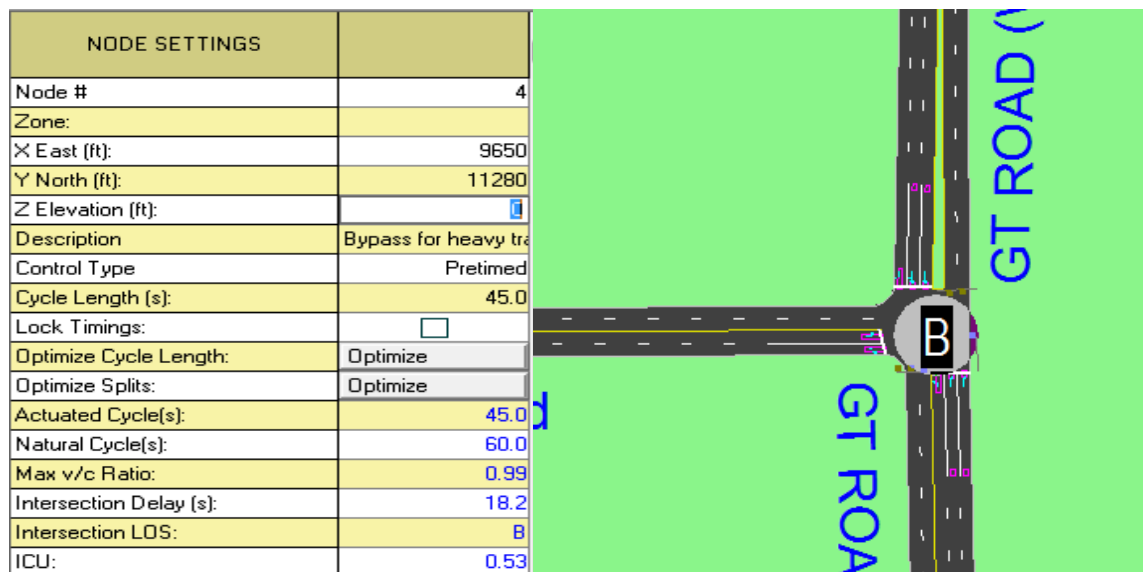


Figure 4: Improvement after Use of Bypass

Table 3: Summary on Bypass Improvement

Before Improvement			After Improvement		
Intersection	Delay	78.7 sec	Intersection	Delay	18.2 sec
LOS		E	LOS		B
ICU		0.58%	ICU		0.5%
V/C Ratio		1.72	V/C Ratio		0.68

After using bypass for heavy traffic intersection delay improve from 78.7 sec to 18.2 sec, ICU changes from 0.58% to 0.5% LOS improve from E to B. Although this solution reduces less congestion as compared to roundabout but it is economical then roundabout, as bypass is already available only sign boards are required to guide heavy vehicles to use bypass.

5. Conclusions

High number of intersection are face congestion problem. We recommend study each intersection and analyze every possible alternative for better and economical solution. In this research the intersection are facing illegal parking, illegal bus stand, and due to illegal parking the service road is unable to use for slow speed vehicles. Among all the different alternative roundabout is better solution to reduce intersection delay and improve level of service (LOS) but it is not economical. The third alternative is much better than existing condition because the LOS is improve from E to B and intersection delay is reduced to 77%.

6. Recommendation

We recommend to use by-pass for heavy traffic because it is almost costless as bypass is already available, only sign boards will be required to divert heavy vehicles to use bypass.

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FINITE ELEMENT ANALYSIS OF PILED-RAFT FOUNDATION IN CLAYEY SOIL

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Abstract

Foundations design related problems are generally becoming common due to increasing demand of high rise buildings. Piled-raft foundations (PRF) has been used for high rise building for reducing settlement and to enhance the load carrying capacity of underlying soils. These advantages are indorsed to the involvement of raft to the loading capacity and to efficient use of piles to reduce the settlement. The use of piled raft foundations for tall buildings has been increasing in this decade as it is an economical alternative to conventional piled foundations. Piled rafts are composite structures comprised of the piles, raft and soil and so soil-structure interaction is important in computing the behavior of the foundation. The evaluation of performance of pile raft foundation is important due to the complex behavior of such mechanism. This paper present finite element analysis on piled-raft foundation with studying the effect of some important design parameters such as shear strength of soil, diameter and length of piles, and effect of raft thickness. The results of piled raft foundation were compared with unpiled raft foundation and conclusions were made accordingly.

Keywords: Piled Raft Foundation, Settlement, Finite Element Method

Introduction

Now a day's foundation related problems are very common. Mostly when the sub soil consists of clayey soil. Clay offers many problems to the foundation because in clay, due to water holding capacity it causes swelling or shrinkage. To cater these problem now a day's trend of raft footing is very common. Due to high cost of land, restricted space & lack of land, people extend their building vertically instead of horizontally. So for high rise building raft footing is suitable. But sometime it does not provide sufficient bearing capacity and excessive settlement or differential settlement occur. So to increase bearing capacity and to reduce settlement up to desire limit, piles are provided to enhanced the bearing capacity of soil and to reduce settlement. The combination of raft foundation and pile are new concept, in which all load coming from superstructure is partially distribute by the raft through direct soil contact with raft and the remaining are shared by the piles to the soil through skin friction and pile tip. These Piles raft system undergoes more settlement then pile footing but less from only raft footing. Pile enhanced raft or pile raft footing are widely used in Germany and others country, where thick layer of clay exist to higher depth. Franke (1991), Yamashita (1994).

Many authors work on pile raft footing or pile enhanced raft. Pile raft footing setup is very economical and effective for tall buildings as compared to pile footing or only raft footing Poulos et al. (2011). Skempton (1953) and Meyerhof (1959) work on settlement of pile group, which is empirical in nature. A variety of methods for the analysis of piled enhanced raft foundations was described by numerous authors, including Randolph (1994), Chow et al. (2001), Poulos (2001), Small and Zhang (2002), Reul (2004), and Maharaj & Gandhi (2004).

Poulos (2001) studied a variety of idealized soil profiles, and obtain that following condition are favorable: (a) Soil profiles include moderately stiff clays (b) Soil profiles include moderately dense sands. In both situation pile raft foundations provide satisfactory load capacity and stiffness. On the other hand, there are some situations that are critical, including: (a) soft clays near the surface in soil profile, (b) Loose sands near the surface in soil profile, (c) Soft compressible layers at comparatively low depths, (d) Soil profiles encounter consolidation settlements, (e) Soil profiles which cause swelling movements due to external causes. The International Society for Soil Mechanics and Foundation Engineering (ISSMFE) paying attention towards piled raft foundations in the phase 1994±7, collect information on case histories and methods of analysis and design, and prepare reports on these activities (O'Neill et al., 1996; Van Impe & Lungu, 1996). Also, an independent article on numerical modeling of piled rafts was presented by El-Mossallamy & Franke (1997).

Regardless of this recent activity, the concept of piled enhanced raft foundations was described by numerous authors, like, Davis & Poulos (1972), Burland et al. (1977), Sommer et al. (1985), Price & Wardel (1986) and Franke (1991). Randolph (1994) give idea about the design of piled enhanced raft and mention that pile work as settlement reducer. Cooke (1986) gives the idea that overall settlement has less effect on multiey storey building performance as compared to differential settlement. Horikoshi and Randolph (1998) also give design method and these designs are based on the fact whether pile work as overall or differential settlement reducer. Butterfield and Banerjee (1971), Cooke (1986) and Maharaj and Gandhi (2004) also studied the mechanism of load transfer between piles and raft. Horikoshi and Randolph (1998) Poulos (2001), Prakoso and Kulhawy (2001), and Noh et. al. (2009) performed analysis on different parameters of pile raft such as pile spacing, pile location, pile length, raft elastic modules, raft thickness etc, and find different aspect on the performance and behavior of pile enhanced raft foundation.

Poulos (2001) stated some issues related to pile raft foundation design which are discussed as: (a) Ultimate load capacity for vertical, lateral and moment loadings, (b) Maximum settlement, (c) Differential settlement, (d) Raft moments and shears for the structural design of the raft, (e) Pile loads and moments, for the structural design of the piles.

Randolph (1994) give three different design philosophies related to piled rafts foundation: (a) the "conventional approach", in which all the load from superstructure was carry by the piles and some of the total load are carry by the raft, primarily to ultimate load capacity, (b)"creep piling", in this method the piles are designed to work at a working load at which considerable creep starts to occur, usually 70±80% of the ultimate load capacity; sufficient piles are included to decrease the net compression between the raft and the soil to below the pre-consolidation compression of the soil, (c) Differential settlement control, in which piles are arrange in that manner to control only differential settlement not over all.

Piled-raft foundations offer some advantages such as reducing settlement and increasing the bearing capacity of the foundations. Such advantages are attributed to the contribution of the raft to the load carrying capacity and to the efficient use of the piles to reduce the settlement Omeman (2012). There are many efficient factors on relationship of load-settlement of piled raft foundation. For example, as the number of piles increases in the pile group, the bearing capacity of foundation increases and finally settlement of system decrease Fioravante at el. (2008) but, it has been see that beyond an optimum number of piles, the settlement reduction factor almost kept constant.

Freitas Neto et al (2014) studied effect of spacing (S/D), relative length (L/D), relative stiffness between piles and the soil (KPS), and settlement of piles and the raft. They concluded the spacing between piles is effective on load distribution between piles and the raft. Very small distance provides stiffness to the foundation, which then works as a conventional pile foundation, in which only the piles imbibe the pressure from the superstructure. In addition, there are other efficient factors on settlement of this type of systems of foundation that were presented by the researchers Tran, T., et al. (2012) Chaudhari, R et al. (2013).

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English

THE IMPACT OF CULTURAL SYMBOLS ON IDENTITY AND MEANING FORMATION: A SYMBOLIC INTERACTIONIST APPROACH TO CHINUA ACHEBE'S *THINGS FALL APART*

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Abstract

‘We shaped our buildings and afterwards our buildings shaped us.’
Winston Churchill (October 1943)

The present paper attempts to examine how George Herbert Meade's theory explains people's use of symbols as a sense-making tool to elucidate the socialization process, role performance, identity, and meaning formation within the Igbo society to explain various aspects of human life in the novel *Things Fall Apart*. This study is significant as it deals with character analysis of Okonkwo, to see how various roles of son, warrior, husband, father and a clansman are defined in Igbo culture during different phases of family and social life to clarify how Symbolic Interactionism has given a new impetus to see society, culture, psychology and relationships. It argues that the physical setting is significant to human behavior and human actions can be interpreted by the critical analysis of cultural symbols and the way they are deployed. It concludes that human behavior is based upon assigning meanings and their symbolic interpretations of the objects that surround them. The SI analysis of the novel clearly indicates that Okonkwo's self and meaning formation is built on perceptions of the reactions of his clansman, consequently his self-concept functions to direct his behavior. The development of different roles changes role and behavior patterns. The internal and external happenings influence role performance, conflict, struggle and affect the nature, attitude, and self-image of Okonkwo. Moreover, it also affirms that the cultural symbols for honor, respect, and manliness etc. are not fixed naturally rather these are the constructions of the mind and are given meaning through interaction of the people.

Keywords: Symbolic Interactionism, Language, Culture, Symbols, Self, Identity

Introduction

George Herbert Meade (2005) in his symbolic interactionism theory explains people's use of symbols as a meaning-making tool to describe the role of communication in different areas of human experience and explains society, culture, psychology and human relationships. The principal point of Symbolic Interactionism is that human's language is symbolic form and life is lived in a symbolic domain: through symbols, humans create shared meanings and maintain it through social interactions (as symbols are culturally derived) and form relationships. The goal of

our interactions is to construct reality through language by providing cultural meanings to symbols as reality is primarily a social product. In *Language and Culture* Claire Kramsch says that language expresses cultural reality because it is bound up with culture in complex and multiple ways as words communicate facts, events and ideas and it also reflects authors' beliefs, attitudes as well as their point of view about any affair (2001,8). Interactionists believe that individuals being social actors act and reacts in the shared symbolic world of created meanings. Meanings are developed through the internally interpretive process and then checked externally to understand how feelings, realities, values, behaviors and perceptions are influenced by a social and cultural process within the moment of contact between people (Blumer, 1969).

The Concept of Self in SI

The self which is dialectically related to the mind is a crucial concept of Mead. Mind and self cannot exist without each other thus, without a self one cannot have a mind to converse with oneself, and without a mind, one cannot take oneself as an object. (Ritzer, 2004:56). Mead's notion of the self is important to comprehend human performance. The self is a basic concept along with symbols, meaning, and interaction in symbolic interactionism, as the social object self is lodged in social group membership and activities; it remains stable as these membership and activities are stable. The content of self reveals the organization and content of society. The self as a social product is a link between a personal and social organization that is manifested with reference to the internalized role (role identities e.g chieftain, husband, son) that emerges from social expectations related to a character position within a system of relationship. (Turner,2004: 345).

Symbolic Interactionism thus helps explain the self which work as stimuli that initiate behavior. In this dimension symbols and their meanings can aid self-attributions, performing roles, and the formation of self-images in various situations. The symbolic qualities of objects and actions have implications that are common within a cultural context. People go through a self-interactive, reflexive assessment of the meanings given by others to symbols and fit in this understood evaluation by others into the self-concept. The author of this paper asserts that symbolic interactionism contributes to the study of human self and behavior and explains human actions that why people do what they do by examining symbols, objects and their assigned meanings in the relation between culture and human conduct. In this qualitative research, the symbolic interactionism theory has been used in the textual analysis of *Things Fall Apart* to understand how individuals find and create meanings of cultural symbols through social exchanges in their lives and society and how these interpretations resultantly influence their identity and meaning formation. The researcher analyzed the work with its focus on cultural symbols and its role on identity and meaning formation to explain how Okonkwo develops his sense of self and connects to the social actions to acquire and use symbols and shape and reshape implications for objects and himself in communal context including his own experiences.

SI Analysis of Things Fall Apart

It is imperative to know, on the background of the novel that, *Things Fall Apart* is about a clan which shared common awareness, once thought like one, spoke like one and acted like one. Then the coming of Whiteman broke this unity and changed the meaning of cultural realities of Igbo society. The Igbo society which was communal, tribal and religious, plays a vital role in the lives of the people and was a source of inspiration for the natives. The members of the society, without questioning or reconsideration, observe the instructions of Igbo gods and goddesses. While Achebe incorporates numerous stories to prove nature as a living entity for the Igbos, he also indicates that the colonial rulers discarded its spiritual value as they did not find it beautiful and welcoming.

Things Fall Apart as a novel about a culture on the edge of conversion portrays how the prospect and reality of change affect different characters and the meaning and worth of objects. The novel

can also be an interpretation of the first European penetration of Igbo land in the eastern part of Nigeria centering mainly on the manner which affects Okonkwo, a reactionary tribal leader, who failed in his offer to win the support of his clansmen to fight the Whiteman who invaded the religion and culture of Igbo society. Becker and McCall in book entitled, *Symbolic Interactionism and Cultural Studies* are of the view that "if we treat religious movements as cultural movements, we will begin to give more attention to symbols and rituals within each religion in order to explain what they are and what they stand for" (3). Okonkwo, for example, battles the new religious and political systems because he senses that he himself will not be manly if he approves to join or even tolerate them as they are not manly. Okonkwo perceives Nwoye as dead, he ceases to be Okonkwo's son as soon as Nwoye converts to Christianity, Nwoye becomes a source of continuous disgrace and humiliation for him and the entire family. But on the other hand, the self-evaluative system motivates a lot of the clan's lepers to embrace Christianity; especially, long despised those outcasts who were placed below everyone else in Igbo cultural values catch in the Christian belief system a haven to enjoy a more elevated status in the new community.

Achebe elaborates that the most awful thing that anyone can experience is the loss of respect and self-worth. As socialization is an active process of conforming to other's expectation and learning roles; Okonkwo builds his sense of self-esteem upon the cultural ideals by which society and religion judges him. His resistance of change in culture and religion is also due to his fear of losing religious and social values 'We look at objects and assign meaning to them, but in many cases, certain objects take on special meanings due to when, why and how they were placed in someone's life' (Christopher, 2004: 8) which then directs into the interpretation of role performances and social actions within society. Okonkwo, the son of the effeminate idle, poor, profligate, cowardly, gentle and lazy Unoka, achieves great social and financial success by rejecting everything that he thinks to be "soft," such as emotion and common chat and for which he believes his father had love. He deliberately embraces his opposite standards and becomes violent, prolific, affluent, thrifty, brave and obstinately opposed to music and anything else. The self-being active and selective interprets, constructs and expresses its roles and influences its environment and itself. The self actively engages in the unpredictable process of its own development. It may dissociate itself from a role when they perceive incongruities between some valued aspect of self-conception and the role imposed on them (Cooley, 1902) therefore, one can argue that Okonkwo's relationship with his late father could be the reason that forms much of his fierce and aspiring behavior. He does not want to be like his father and wishes to go beyond his father's legacy of extravagant, lazy behavior, which he considers as frail and therefore womanly. Okonkwo does not want to be like his father as he fears failure.

"His whole life was dominant by fear, the fear of failure and of weakness. It was the fear of himself, lest he should be found to resemble his father...he had suffered when a playmate had told him that his father was agbala. That was how Okonkwo first came to know that agbala was not only another name for a woman, it could also mean a man who had taken no title" (P.15). Igbo's veracity of a man lies in his daring and brave acts. It is no coincidence to refer to a title less man with a word which also means "woman." This is an inherent association in the clan's language and the relator mentions that the word for a man who fails to win any of the lavish, prestige – indicating, honorable titles is *agbala*, which also stand for "woman."

We see that an account of men in *Things Fall Apart* is that of inhuman, brutal and wicked every man was supposed to be like that, even though at about the time of the setting of *the novel*, for instance, any man who could bear the look of blood, or a man of achievements or a man of hostilities is a man. In Achebe's words, Okonkwo was the first who brought home a human head in Umuofia's latest war. It was his fifth head in a very young age. *'He drank his palm-wine from his first human head on great occasions such as the funeral of a village celebrity'*. The narrative represents the way the society built up the image of men, someone who can drink from a skull of a fellow human being. Bravery is appreciated of a man when he could, all in the name of

tradition, put to death a fellow human being as was seen in the traditional sacrifice of the poor boy Ikemefuna who was beheaded by someone whom he called a father.

In *Self and Society*, Hewitt claims that "meaning lies within the way we behave. Meanings are not fixed or unchangeable, but are determined by how a person acts toward an object"; Okonkwo's notion of manliness is not the similar with the clan's rather, he links aggression with masculinity and believes that he should display the only emotion of anger to display his masculinity. For this reason, he frequently threatens his wives to kill and beats them time to time. Mead makes it clear that "People anticipate responses from their own individual acts and through the process of minding can have control over their own actions" (15). The process of minding is dependent upon a basis of consciousness, and our consciousness enables us to better understand people and respond towards their actions in social settings (2005,15) but in case of Okonkwo we have seen that he does act rashly and impulsively and does not reflect about things. Yet others do not behave in these ways that are in no way having the fear of being called effeminate. Obierika, unlike Okonkwo, "was a man who thinks about things and matter before act." Whereas Obierika excuses joining the group on the trip to murder Ikemefuna, Okonkwo simply afraid of appearing weak, not only voluntarily joins the men that will kill his surrogate son but also with his blade brutally kills him.

In Igbo society, aggressiveness is considered an important symbol of masculinity which increases relative social dominance. Aggression is a hostile, forceful or attacking behavior. In many cultures 'Military virtues such as violent behavior, power, bravery, and stamina have constantly been defined as the usual and essential potentials of manliness (Graham Dawson, 1994). Okonkwo as an aggressive man asserts his manhood in a variety of forms i.e physical, verbal, nonverbal: "*And he did pounce on people quite often... he was angry and could not get his word out quickly enough, he would use his fists*" (P.4). He perceives affection a mark of weakness and remains unemotional and unmoved. "*Okonkwo never showed any emotion openly, unless it be the emotion of anger. To show affection was a sign of weakness*" (P.30). He exercises his aggression not only publically to express his dominance but also in domestic sphere on his wives and children. He beats his wives without any legitimate reason and his son Nwoye as well for being lazy like a female. He "*ruled his household with a heavy hand. His wives, especially the youngest, lived in perpetual fear of his fiery temper, and so did his little children*" (P.14) Okonkwo cannot deal with weakness; he seems to think his son resembles his grandfather and that is something which fills him with fire. Unoka is considered weak even by him because of his idleness, talking and love for music which are believed the feminine domain of activities. He fears losing community respect by being effeminate.

Social repute has an important meaning in Igbo culture. Personal reputation is based on the number of publicly earned titles which is significantly indicated by the ankle bracelets men wear. Generally, Men gain reputation through the production of their yam crop, talent at wrestling, bravery in battle, and hard work as these were the symbols of power and status. Status depends on merit and earns men influential position and authority in the clan as well as number of wives. Wealth and prosperity are the symbols of worth and value of a man in Umoufia- a patriarchal society. A man with the number of titles and number of barns who is wealthy enough to take care of his many wives and children is a source of attraction and attention in Igbo society "*There was a wealthy man, in Okonkwo's village, who had three barns, nine wives, and thirty children...but one title which a man could take in the clan*" (P.20) A man should be domestically, socially, and economically prosperous in order to be admired as respectable and honorable in that society, Achebe shows this behavior and reality of Igbo society by portraying male characters in terms of prosperity, wealth and success as they believe a 'man' is worthy to be called a man when he has good status and enough wealth and who has never experienced failure in any way in society. "*Okonkwo's prosperity was visible in his household. He had a large compound enclosed by a thick wall of red earth. Each of his three wives had her own hut. The barn was built against one end of the red walls, and long stacks of yam stood out prosperously in it*" (P.16), but on the other

hand people laughed at poor and treat them like a woman who is unable to support his family e.g Unoka-father of Okonkwo, who was a failure, a debtor, a poor man who 'owed every neighbor some money' and whose 'wife and children had barely enough to eat' (P.6).

In the Igbo culture, the wrestling contests are occasions which confirm the masculine attribute to continue leadership and virility for the men, even women of that culture love wrestling. They clap their hands and sing the praise of victorious warrior and honor him in a heroic way. The people of Umuofia and neighboring tribes are strong combatants and they love to be violent and battle against their opponents. Okonkwo is really concerned with reputation and works hard to gain respect for his village and himself by a physical contest of wrestling because he grew up with a father who was lazy and shameful. It is due to the courage and warrior ship of Okonkwo that the people of Umuofia not only pay him respect in his own community, but he was also respected in neighborhood.

Traditionally speaking, wrestling and fighting are the passions of Igbo culture for which man's manliness appreciated in Igbo society. Strong physique and robust body are considered important traits to build a great image of a man. The igboonian construct of the male is that of emotionally strong man, who is not the subject of his emotions rather he has good control over his emotions and feelings. Igbo culture presents emotions as feminine trait. Achebe represents his 'tall and huge' protagonist Okonkwo through his power and bodily strength and power whose 'bushy eyebrows and wide nose gave him a very severe look' (p.4) 'He was a very strong man and rarely felt fatigue... (p.16). Okonkwo who 'was as slippery as a fish in water', his manly figure makes him the center of attraction and Achebe compares with 'Amalinze a wily craftsman' (P.15.) He loves to be and called a brave man who has the daring heart to face the world and has a potential to be on top. It is him who defeated seven years unbeaten wrestler Amalinze the cat and won in an intertribal fight to bring first human head. 'He was a man of Action, a man of war. Unlike his father, he could stand the look of blood.' (P.11) Bravery for him is a quality, he dislikes Abame folk for not being valiant enough and when his clansman fails to join him in battle against invaders he is not scared to take on the white man individually and says: 'We must fight these men and drive them from the land' (P.182.)

Conclusion

Throughout the novel, Okonkwo's image of the self is more an image of the socially dictated image of a man. He reminds himself to act like an honorable brave man because for him the meaning of man parallels social status as a man. He prefers to remain unmoved, stern and unemotional to express his feelings at times, as his "manly" values conflict with his "unmanly" ones. He proves himself a tragic hero who finds himself unable to adapt to changing times, incapable to perform within his changing society as the white man comes to live, inspire and alter the lives, meaning and culture of Umuofians.

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