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Determinants of working capital management efficiency: Case study of Pakistani automotive and engineering firms listed in Karachi Stock Exchange

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Abstract

This Study is conducted to determine the determinants of working capital management efficiency of automotive and engineering firms listed in Karachi Stock Exchange of Pakistan. Cash Conversion Cycle, Days sales Inventory, Days Payable Outstanding and Days Sales Outstanding are the explanatory variables. Whereas the descriptive statistics, Pearson's Bivariate correlation analysis and ordinary pooled least square with fixed effect model are applied to investigate the significance of panel data set. It is quarterly based and secondary data in nature that comprises of 9 firms for 5 years. The observations are taken from financial years 2006 to 2010 of the listed firms. In spite of these a questionnaire is also filled by the firm's financial representatives during the research on Enterprise Resource Planning (ERP) which shows positive results or the efficiency of working capital management. It is concluded that to keep the working capital efficient cash conversion cycle must be shortest. For this there is need of tight collection policy and liberal payment policy while the inventory management must be efficient by reviewing the inventory policy.

1. Introduction

Working capital management must be efficient because it is the key of prevention from liquidity crises and liable for solvency, profitability and survival of the company (Mukhopadhyay, 2007). Efficient working capital management depends upon the planning and controlling of current assets and current liabilities. As it is the most important factor responsible for elimination of risk of failure to meet short term obligations and additionally to avoid excessive investment in the assets (Eljelly, 2004). Working capital mainly manages the optimal difference between its components i.e. cash, receivables, payables and inventory etc which is the cause of success of any business (Filbeck and Krueger 2005). Investment in debt and inventory is the part of efficient policy of working capital management (Vijaya saradhi, 2009). High volume investment in inventory is helpful for a firm to reduce the risk of stock-out. Account payable is another important component of working capital and open handed trade credit from credits provides not only the opportunity of quality assurance of product or service before the payments through which customers ship increases (Maltiz and Ravid, 1993) but also to avail less cost finance but within due date (Deloof and Jegers, 1996). In addition to this collection period from debtors should be less than payables to creditors and the gap between these two durations known as float of comfort (Mukhopadhyay, 2007). In nut shell working capital is like life-giving force for an economic entity (Mukhopadhyay, 2007).

Working capital refers to a firm's investment in short term assets-cash, short term securities, accounts receivable and inventories (Weston & Brigham 2004) known as current assets (SEN and ORUC, 2009). To continue operations of a business financing of current assets (cash, bank, marketable securities, short-term loans and advances, payments of advance taxes debtors and inventories) is compulsory (Mukhopadhyay, 2007). It is the key factor to remain in the business for a longer time period and growth for a company (Zriyawati, et. al.).Working capital management efficiency can be measured though cash conversions cycle that is the time difference of investment in cash to the realization of cash from sales income. There is positive relation between cash conversions cycle and investment; for higher cycle large investments are required for working capital (Deloof, 2003).

Growth opportunities, financial management, specific characteristics affect the working capital (Appuhami, 2008). Working capital is the main vain in the body of a firm due to which it needs more and more care and improvement to meet the daily challenges with the passage of time. For this purpose only new and better changes can bring the potential in the firms. Enterprise resource planning (ERP) is the factor that showing better results in the working capital efficiency of the firm. ERP the computerized software interlinked all the departments of a firm through a single computer. This software saves the time of communication by linking all departments; managers, administration, human resource, marketing, sales, ware house, production and accounts etc. with each other for decision making, billing, arrangements of raw materials and management that leads the firm to

minimization of cost of various hidden expenses (Anjum and Rehman, 2010). Resultantly time reduces from the production to sale of product e.g. in maintaining record of inventory, production levels, orders situation etc. (Larsen and Myers, 1997).

1.1 Significance of Working Capital Management

Working capital management has so much importance in all the sectors of economic activity due to various reasons. Working capital evaluates the success and failure of the business. And it is the back bone of every enterprise (Meigs and Meigs). Profitability and risk as well as its value are depended of working capital in firms (Smith, 1980). More than half of the total assets of manufacturing firms are comprised on the current assets (Gill, 2010) but results of surplus investment in current assets are low profits whereas liquidity crises are being faced by the companies; having low investments in current assets (Gitman, 2009) and cannot maintain smooth business operations as a result of limits (Horne and Wachowicz, 2004). Accurate management of working capital is responsible for efficient cash management that helps out the firm to improve profit margins and share price (article 8) as cash is the most important factor to meet the daily and current liabilities with in dates and totally dependent on the cash flows generated by the working capital management effectively (Soenen,1993). Managers and accountants remained busy to solve the problems of daily needs related with the working capital because of transformation in the current assets from one asset to the other asset (Rao, 1989).

Moreover the following problems also influenced the working capital management, its performance and the profitability level of the firms.

- Developing countries are affected due to the small size of the firms which not support the firms to approach capital markets.
- Efficiency demands the skilled man power which is a problem for developing countries.
- Old technology produces on high cost due to which it is difficult to control the production cost and to meet customer demands at cheap prices.
- High rate of interest effect the debt policy which influenced the production and transaction cost of the firms.
- Lack of budget creates hurdles in performing the different productive and research development programs.

In addition of all these, firms working in Pakistan are facing more problems like unrelenting increase in petroleum and electricity prices, political instability, gas and electricity load shedding which holds inventories and production process that cause the late deliveries, increase in cost of production and decrease in sales etc. All these problems cannot be controlled and affect overall efficiency and performance of the firms specially the short-term performance. Resultantly firms can minimize these factors by managing the working capital efficiently.

That's why there is need of effective working capital management and to focus on its different dynamics. Because all of these, consideration on working capital is important and need of the time to give importance to all firms without limitation of firm size and structure.

1.2 Problem Statement

From the review of previous studies it is concluded that working capital management is the foundation factor of every business or economic activity so it needs much deliberation and focus to improve profitability, liquidity, efficient working at lowest cost and better return.For this sake our problem statement of this study is "**What are the determinants of working capital management efficiency. A case study of automotive and engineering firms listed in Karachi Stock Exchange (KSE) of Pakistan."**

1.3 Objective of the Study

Automotive and engineering sector has much share in the development of developing economies like Pakistani economy but in previous years sector faced serious problems for survival due to lack of attentiveness. The purpose to choose this sector for research is to determine the factors of working capital management and their efficiency of the firms listed in Karachi Stock Exchange, Pakistan with the following objectives.

- To investigate the efficiency of determinant factors of working capital management on quarterly based data.
- To build up a theoretical frame work in light of empirical outcomes of previous research studies on working capital management.

- To develop methodology for determining the efficient factors of working capital management.
- To investigate the relationship between the components of efficiency measure of working capital management and the independent variables.
- To explore new technique like Enterprise Resource Planning (ERP) either it has significant impact on the efficiency of the working capital management.
- To give the new horizons and directions on working capital management efficiency of firms in result and by keeping in view limitations of the study.

1.4 Hypothesis testing

Working capital management policies and techniques are developed to minimize the uncontrolled factors of the economy and to monitor the efficiency of its factors. The hypotheses are explained in this section which is developed for research and to examine the efficiency of determinants of working capital management.

The efficiency of determinants of working capital management is measured through following hypothesis.

Determinants of Working capital management have the significant effect with independent variables; Sales, Size, Growth financial leverage etc. of automotive and engineering firms.

Working capital of firms can be controlled by the efficiency of management and its components. For this managers make policies by controlling the factors of WCM as there is not any single variable to explain the overall working capital. Credit policy, investment policy and payment policy, inventory management, investments in current assets, policies for short-term financing explained the working capital. To explain the hypothesis about working capital management efficiency it is divided in the following sub hypothesis.

H_o: Null hypothesis

H_1: Alternative hypothesis

Hypothesis H_1

H_o: There is no relation between cash conversion cycle and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

H_{1a}: There is relationship between cash conversion cycle and profitability of firm.

Cash conversion cycle CCC is used as measure of the working capital management in the study. CCC is also de componentized in its components; Days sales inventory (DSI), Days sales outstanding (DSO) and Days payables outstanding (DPO).

Hypothesis H_2

H_{o2}: There is no relation between inventory turnover and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

H_{a2}: There is relation between inventory turnover and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

DSI days sales inventory is used for inventory turnover. Stock in trade (inventory turnover) management explains the efficiency of inventory that is helpful in keeping the cash conversion cycle short. Moreover it helps in reducing the carrying cost and holding cost which gives the result of increase in profitability of firms. Whereas the inefficient sock in trade management refers the firm to low profits.

Hypothesis H_3

H_{o3}: There is no relation between payment efficiency and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

H_{a3}: There is relation between payment efficiency and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

DPO days payables outstanding is used for payment policy. Payment policy of firms is extreme in nature because firms firstly follow earlier payments mode for cash discounts to increase their profit level. Otherwise firms used the late payment policy preferably.

Hypothesis H_4

H_{o4}: There is no relation between collection efficiency and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

H_{a4}: There is relation between collection efficiency and profitability, size, growth, leverage, age, investment in fixed and current assets' policy, sales of firm.

Credit policy helps the firms to increase their profit margins in shape of increase in sales, to control the bad debts opportunity cost. This policy must be liberal because due to this profitability of the firms will increase and if firms follow a tight policy it reduces the profitability level.

1.5 Assumptions of the study

Assumptions are considered in order to avoid the impenetrability in relationships between the variables. Certain assumptions given below are used in this study and also the recommendations for the future research.

- Unidirectional cause and effect relationship between dependent and independent variables are assumed in the research.
- Only firm's level cause and effects are considered in the study whereas industry level effects are assumed to remain constant.
- This study is based on quarterly basis data so the frequently changes in the political, economical, technological or legal framework are assumed to be constant over the quarters.
- Reporting of data in quarterly financial reports is assumed fair during the study as it is secondary in nature and errors in measurement or calculation.
- It is assumed that there is not only the strong relationship between proxy and true variables but even the proxy variables may describe the behavior of true variables.

The establishment cost of Entrepreneur Resource Process (ERP) establishment cost is fixed and assumed to be separate from the operating expenses.

2. Literature Review

Many descriptive, theoretical and empirical studies regarding working capital management and its determinants are being conducted by researchers with different point of views in different countries and contexts but only few researches were conducted on impacts of working capital management and its efficiency. For scope of the study, deep and strong knowledge about working capital management and limitations of previous studies have been reviewed.

Schiff and Lieber (1974) solved the problem, which arises from the integrated inventory and credit term policy used by the companies, through mathematical control theory. According to them firms' credit term and inventory policies are being changed due to the change in demand curve over the time. Moreover they observed that credit policy also changes due to the seasons cost association is not considered by this model but helps the manager in decision making about the inventory and credit term policy.

Nunn (1981) identified that factors related with sales, production and competitive position of the firm due to these working capital get effected. He used the PIMS database of sample size of four years averaged data for the method of factor analysis to determine the permanent working capital investment instead of the temporary. He also differentiated that why product lines having low or high working capital requirements.

Hawawini, Viallet, and Vora (1986) observed the effect of firm's industry on working capital management. By using the sample size of 1181 firms registered in US from the year 1960 to 1979 examined the ample effect on working capital management practices.

Shin and Soenen (1998) conducted a research on the working capital management and found that the cash conversion cycle has the positive relationship with the profitability and negative relationship with the value of the company. They concluded that working capital management is positively correlated with the size of firm. Furthermore the good facilities and rewards awarded to CEO of the company shows good and unexpected improvement in the working capital management and efficiency.

Lyroudi and Lazaridis (2000) used Cash Conversion Cycle as a liquidity sign of the firms. They tried to find out relationship between cash conversion cycle with current and quick ratios and also examined the implications of the cash conversion cycle in terms of firm size, profitability and debt ratios. They determined significant positive relationship between CCC and traditional liquidity measures of profitability as well as with return on assets and net profit margin. Besides all these they studied that current and quick ratios have a negative relationship with

the debt to equity ratio and positive one with the time interest earned ratio. This study specified that cash conversion cycle has not any linear relationship with the leverage ratios. All these results based on the sample of food industry exist in Greek and methods of correlation and regression analysis of financial data were used in their study.

Dittmar *et al.* (2002) did the research to find out the determinants of corporate liquidity. They found that agency problems are specifically the determinants of corporate liquidity. The results of their study showed that capital market development, opportunities to access capital market, net working capital to assets, research and development expense to sales ratios have positive effect on the liquidity of firms whereas size of firm and cash flow to net assets ratio have negative effect on firm's liquidity but market to book value. They used pooled date of sample size more than 1100 firms of 45 countries and the methods of regression and robustness test.

Deloof (2003) studied to examine sample of 1009 non-financial companies registered in Belgain America, the relationship between working capital management and firms' performance. Results of the study showed negative relationship between gross profits and the average period of receivables, inventories, payables. According to him mangers can generate the value for stockholders by reducing the time periods of inventories and receivables to the minimum level. Further he concluded that value of the firms maximizes only at a specific level of working capital.

Lazaridis and Tryfonidis (2006) did a statistical analysis on a sample size of 131 firms listed in Athens and suggested that managers can get more and more benefits for the companies through the acceptable level of Cash Conversion Cycle. He also concluded the negative relationship between profitability and working capital of the company.

Sayaduzzaman (2006) through the use of statistical formulas and tools; percentages, averages, trend analysis, and correlation found positive relationship between profitability and working capital management efficiency. They explained that any progress in WCM efficiency has positive impact on growth, profitability and liquidity position of the firms.

Padachi (2006) study the trend of working capital management. He used the financial data of 58 small manufacturing firms for the period of six years from 1997 to 2003. In his study he applied descriptive statistics test i.e. mean, standard deviation and also did empirical analysis like Pearson Correlation analysis and ordinary least square regression analysis. He concluded that measures of working capital management have negative relation with return on assets other than the cash conversion cycle. Results of regression analysis of all measures of working capital management ; Accounts Receivable Turnover in Days, Accounts Payable Turnover in Days and Cash Conversion Cycle reflected significant impact on Profitability of the firm with the exception of Inventory Turnover in days.

In another study Ganesan (2007) examined the association between working capital management and profitability of the firm. He chosen sample size of 349 firms related with the telecommunication and its equipment covered the duration of 2001-2007. ANOVA test, Regression analysis and Pearson Correlation analysis were applied in this study and conclude that in telecommunication sector working capital days vary from firm to firm which shows that every firm is using different techniques to manage their working capital activities.

Chowdhury and Amin (2007) investigated the impact of working capital management activities on financial and operational performance of pharmaceutical firms listed in Dhaka Stock Exchange, Bangladesh. They used primary and secondary data; they did survey of eight listed firms on Dhaka Stock Exchange for the collection of primary data and used annual reports. Cross sectional pooled data was analyzed with multiple regression models which show a positive association of working capital policies of firm with its profitability even in current assets management and performance of pharmaceutical firms as well. According to this study sampled firms are found efficient in managing cash, trade debtors, other receivables, inventory and payables.

Raheman and Nasr (2007) conducted a study on the sample size of 94 firms listed in Karachi Stock Exchange, Pakistan consist on six years duration from 1999 to 2004 and got the results that liquidity and profitability of the firms are strongly effected by the working capital management.

Nazir and Afza (2008) stated a range of factors that explained working capital requirements of manufacturing firms listed in Karachi Stock Exchange, in their study. Sample size of study was of 204 manufacturing firms listed in KSE, Pakistan covering duration from 1998-2006. They determined significant relation between working capital and internal factors of firms i.e. operating cycle of a firm, return on assets, leverage and Tobin's Q ratio. Finally they suggested that manufacturing firms listed in Pakistan can enhance their profitability by investing in short term assets.

Ranjith (2009) examined the role of working capital in service sector exist in Thailand. Financial data of 82 firms listed in Stock Exchange, Thailand for the duration of five years from 2000 to 2005 was being used as

sample size. This study exposed two results; first that net liquidity balance and corporate investments have significant positive relation and second is that corporate investments and working capital have negative relationship. Further he found that in Thailand service firms are efficiently running their working capital and producing high levels of liquidity to fulfill the requirements of investments.

Velez-Pareja and Magni (2009) conducted a study to observe the market scenario of surplus liquidity that remains the part of investment in shape of cash or short term investments. They observed that undistributed cash is the cause of agency problem. According to them market expects the greater value of the share than the dividends paid out in cash and due to this financial analysts should not consider the variation in undistributed liquid assets because market is interested in only which is really received not in the potential dividends.

Zariyawati et.al (2009) examined the determinants of working capital management of Malaysian firms for the period of six years. They used the Cash Conversion Cycle as major measure of the WCM and find out that firm size, debt ratio and growth of the company, economic growth and inflation all these have influenced on management of working capital. They conclude that during the inflationary period firms reduce the amount of working capital and inflation rate is inversely related. Their study comprised on 119 firms, five variables related to the firm and two macroeconomics variables. Secondary poled data is being used in the research.

Amarjit Gill et.al (2010) observed the relationship between working capital management and profitability. Secondary data sample of 88 firms listed in Malaysia has been used for the study. They used firm size, financial assets ratio as a control variable and CCC (Cash Conversion Cycle) as a proxy variable. Resultantly the study recommends that if the managers' efforts reduce A/R cycle than it can increase the shareholder wealth. Moreover profitability can be increased by managing firm's working capital management.

Huynh Phuong Dong (2010) stated that working capital matters a lot in the success or failure of the business. Study shows that working capital policies affects the profitability and liquidity. Secondary data based on Vietnam manufacturing firms has been taken from 2006-2008 to examine the relationship between profitability, CCC and its components. Gross operating profitability used as a dependent/major variable. He proved that if the duration of CCC increases then profitability will decrease. So managers should focus on CCC issues.

Hayajneh et.al (2011) in the article investigated the relationship between working capital and profitability. They took secondary data for the period (2000-2006) of 53 Jordanian manufacturing firms and proved their results from descriptive analysis. The results showed negative relationship between profitability and the average receivable collection period, average conversion inventory average payment period and cash conversion cycle along this research also showed some positive results between current ratio, size of the firm and growth of the sales. In addition they conclude that if the firms manage the working capital through reducing the time span of sales collection and raw material into finished goods these two factors leads to shorten the CCC and helps the firm to achieve the optimal level of profit.

Working capital management is where influenced by the sales, investment policy, payment policy etc mean while the advanced softwares and techniques also have much influence on the WCM. In light of all these, in this study the Entrepreneur Resource Process (ERP) impact is also studied on WCM and firm's profitability. The prior studies related with the ERP are reviewed below but all these are only about the ERP.

Danie (2004) l uses the warehouse data to examine the benefits of the ERP. ERP is beneficial due to various reasons time save, reeducation in the finance cost etc. although its benefits vary with the industries. Firms get independent tangible benefits from the Enterprise recourse planning. In conclusion ERP is the problem solving solution for the firms.

Hunton et al (2003) used the financial data of the firms to compare the before and after effects of the ERP. They found that the companies using ERP already there financial performance remain same where as those companies who didn't implement ERP there financial performance decreases. Hence he proved that in order to sustain in the market firm should adopt ERP.

Henderson and Davidson examined that firm's need to be successive and be a part of modern environment. This paper basically examined that due to implementing some feasible strategies that related with the E-Business then more benefits can be achieved by the firm's. Particularly Electronic Signature (E-SIGN) increased firm's activities without any hazard.

By reviewing the previous studies on working capital management and its impact on profitability of firms it is found that working capital management is significant with the profitability of firms but there are following deficiencies exist in the prior literatures which are studied in this study.

- Quarterly financial data is not being used in prior studies in context Pakistani listed automotive and engineering firms. Whereas quarterly based financial data is more useful and productive to analyze the frequent changes and fluctuations over a financial year.
- Panel estimation techniques are better to control the balanced data and its heterogeneity but no evidence

of the use of fixed and random effect to explain the effect of WCM and its profitability is found with respect to Pakistan.

- There is no evidence of study describing cause and effect of working capital and its components with the firm's profitability.

Resultantly, in light of all above, this study is about determinants of working capital and its components' efficiency in context of listed firms in Karachi Stock Exchange, Pakistan. It is conducted on the quarterly based financial information.

3. Data and Methodology

Review of previous studies explained the results about working capital management, how it is efficient? What factors and components are mainly involved in the improvement or deficiency? Though these studies were held in developed and developing both countries and in their own economic conditions but are helpful not only to understand the relationships and results which are already being concluded but even in developing the methodology for this research also. This chapter is based on detailed methodology, variables selection and model used in the study.

Engineering and automotive sectors are major share holder of the Pakistani economy but unfortunately has been ignored and none of the special step is taken for its improvement. Being a developing country it is very important that losses should be minimized and eliminated, in light of this our research is a little effort to find out the problems of the sector and its solutions. Working capital is the prime need of every firm and only its efficiency can save the firms from the hazards. For the study the following research structure is used.

3.1 Research structure

3.1.1 Data source

Data of Engineering and automotive firms listed in Karachi Stock Exchange (KSE), Pakistan named Honda Atlas Car, Atlas Battery Ltd, Indus Motors Company Ltd, Singer Pakistan, Dewan Farouqe Motors Ltd, Dewan Automotive Engineering Ltd, Bolan Casting Engineering Ltd, Gandahara Industries Ltd, Siemens Pakistan Engineering Company Limited, was collected from the financial reports of the companies. Detail is mentioned in appendix A.

3.1.2 Sample Size

Quarterly and secondary data in nature is used for this study. For balanced pool data observations of twenty quarters from nine engineering and automotive firms in which four are related to automotive sector and five are from engineering sector taken of 5 years i.e. 2006 to 2010 financial years. These two sectors are much closed to each other in nature and about manufacturing concern. 180 observations were examined in this study.

3.1.3 Variables

Variables which are cause of the working capital management and affect the profitability of firms are taken for the study. All these variables are subject to balance sheet and income statements heads of the firm's financial statements. Moreover the values of balance sheet were used after taking their average. Variables are also being used to calculate the ratios to conclude the comparative relation and effect of the different accounts. Variables and their detail description are explained below.

3.1.3.1 Dependent Variables

CCC: Cash Conversion Cycle of firm as dependent variable.

Cash conversion cycle is used as measure of the working capital management efficiency. CCC depends upon the inventory level, receivables and the payables. For efficient working capital management it should be shorter.

DPO:Days payable outstanding.

DPO days payable outstanding is used for payment policy. Payment policy of firms is extreme in nature because firms firstly follow earlier payments mode for cash discounts to increase their profit level. Otherwise firms used the late payment policy preferably.

DSI:Days sales of inventory.

DSI days sales inventory is used for inventory turnover. Stock in trade (inventory turnover) management explains the efficiency of inventory that is helpful in keeping the cash conversion cycle short. Moreover it helps in reducing the carrying cost and holding cost which gives the result of increase in profitability of firms.

Whereas the inefficient stock in trade management refers the firm to low profits.

DSO:Days sales outstanding.
Credit policy helps the firms to increase their profit margins in shape of increase in sales, to control the bad debts opportunity cost. This policy must be liberal because due to this profitability of the firms will increase and if firms follow a tight policy it reduces the profitability level.

3.1.3.2 Independent Variables
DER: Debt equity Ratio is used as proxy variable.
FATA: Fixed assets to total assets ratio is used as proxy variable.
FMITA: Herfindahl-Hirschman Index; firm sales to industry total sales ratio as proxy variable.
GROWTH: Difference of preceding years sales of firms to sales of previous year ratio used as proxy variable to determine the change and growth of the firm.
OPBTSR: Operating profit before taxation to sales ratio used as proxy variable to measure profit of firm against sales.

CATA: Current assets to total assets ratio to measure the firm's current position.
SLINS: Natural log of sales to measure the size of the firm.
AGE: No of days of firms from the amalgamation.

In order to find, determinants of working capital management and the factors which can be the cause of efficiency of it, two types of techniques for analysis are used. First one the quantitative (regression analysis) and second is the descriptive analysis by implementing of ERP in the firms.

3.2 Quantitative Analysis
Quantitative analysis of this study is based on results of two models of the regression. First the relationship of independent variables with the determinant of working capital management efficiency i.e. Cash Conversion Cycle (CCC) and second the relationship of the parts of CCC with the independent variables that are Days Sales Outstanding (DSO), Days Sales Inventory (DSI), Days Payable Outstanding (DPO). Whereas pooled ordinary least square along with fixed affect regression for cause and effect of independent variables on dependent variable is used because it helps in controlling the problem of heterogeneity. On the other hand correlation analysis is used to determine the strength of association between variables. As data of the study is in the form of interval and ratio data so the Pearson's Correlation Coefficient (Bivariate Analysis) is used for measurement of association between variables. Statistical software E-views 6 is used for the analysis.

3.3 Regression Analysis
Regression techniques are applied in this study as in previous studies of Padachi (2006), Rehman and Nasr (2007) and Gill *et al.* (2010) is used.

3.3.1 Advantages of Panel Data Analysis
Panel data analysis is better and superior as compare to cross sectional data analysis and time series analysis due to the following advantages.

- This can control the problem of heterogeneity of the data. (Gujarati, 2004)
- More efficiency and degree of freedom can be practiced in the analysis.
- Study of dynamic changes and multicollinearity problem can be reduced through repeated observations.
- Through ordinary least squares limitations firm specific and time specific factors can be captured.

All above advantages prefer the panel technique so the following panel models are used in this study.

3.3.2 Pooled Least Square Model (Fixed Effect)
This model is used by keeping in view that slope and intercept of coefficients are remain constant throughout the time and among all 9 of automotive and engineering firms because data is homogenous which create the problem of heteroskedasticity whereas the differences of the individual firms is explained by the error term of model. Following models of regression are used in the study.

MODEL 1

$CCC_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it}$

MODEL 2

$DSI_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it}$

$DSO_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it}$

$DPO_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it}$

Where

CCC (Cash Conversion Cycle) of firm "i" shows at time "t" (t=1, 2, . . . 20)

β_o stands for intercept term.

μ stands for residual term

4. Data Analysis Results and Explanations

This chapter comprises on results of the analysis done by the pooled least square method and other; Pearson's Coefficient Correlation, bivariate analysis. In spite of all these determinants of working capital their effects and cause, impact on the efficiency of WCM, association and deficiency as well. Explanation of variables in light of descriptive analysis with the help of mean, median, maximum, minimum and standard deviation is also the part of this heading.

4.1 Descriptive analysis

This analysis is done for the beginners of research and the persons who have less knowledge about the statistical analysis as it can be easily interpret and understand. It helps out in understanding the simple relationship between the variables of the study. Detail of dependent variable is given in Table 4.1 while independent variables are explained in table 4.2

The table is comprised on the simple results of quarterly data of firms which are listed in KSE, Pakistan. For 20 quarters of 5 years observations the following results are concluded.

Cash conversion cycle (CCC) with 91.70 mean value, 238.25 maximum value, -37.16 minimum value and 72.52 standard deviation shows that on average firms complete their complete cycle in almost 92 days. Firms have a wide range between maximum and minimum that is responsible of much variation in the sector whereas the high value of standard deviation represents that firm's routine and cycle is effected very sensitively due to which it get slower even the dead slow.

Cash conversion cycle is the measure of working capital and comprises on three factors i.e. DPO, DSI and DSO. Days payable outstanding explains the number of days in which payables are being paid to trade creditors. On average firms, by following the late payments policy, pay in 102 days to their payables with the variation of 86.42. Firms delay the payments up to maximum 405.23 and to minimum value of 7.95 on some special grounds. Second one is days sales outstanding that mention the receivables of the firms. By statistical analysis it is found 60.89 mean value that shows firm short time collection policy. So on average firms received payments within 61 days that is good for the CCC ultimately for working capital management WCM as the payable time is more than receivable time duration. There is less deviation in collection period as compare to the payable period from the average time period that shows firm's strong strategy about recovery method. Firms recover their receivables maximum in almost 242 days whereas in the sector collection needs at least 3 days for maturity. Third part of cash conversion cycle is days sales inventory. On average inventories turn into sales almost in 133 days whereas it deviates from its mean with the standard deviation value 93.21. Firms are in practice maximum up to 429 days to sale the inventories and did at least in 13 days.

Firms exist in the sector are 9 quarters older on average which shows that new firms are not exiting in this sector of the Pakistani economy. AGE has 4778.91standard deviation that indicates little variation from the average age of the firms in the sector. On the other side 2664.5 is minimum value and 20805.00 is maximum value.

Current assets to total assets ratio (CATA) has mean value 0.678, standard deviation 0.155, and 0.925, 0.353 are maximum, minimum values respectively. Less than 1 mean value of this ratio shows that on average current assets are the 60% in total assets of firms of the sector. Less difference between minimum and maximum values

is supportive in favor of the firms but due to remain positive this ratio is also better to meet the current requirements of the firms. Whereas the small value of standard deviation explained less fluctuations and a constant policy regarding the current assets.

Debt equity ratio (DER) the proxy variable has 2.37 mean value means the firms on average rely on the shareholders financing for their assets for the survival as majority of the companies of the sector are public limited. 5.76, 0.43 are the maximum and minimum values respectively that explained firms' dependence level on their shareholders but small value of standard deviations shows that this interval is not frequently changed with big interval.

The lower value of mean 0.32 of fixed assets to total assets (FATA) ratio indicates less contribution in the total assets of the firms of engineering and automotive sector of Pakistan. Less part of fixed assets to the total assets is an alarming position for the credibility of the firms in the financial market. Low standard deviation value 0.151 show less dispersion from the mean value within the maximum and minimum values. Ratio of fixed assets is slightly changed over the quarters of financial year.

Firm's sales on average in the sector are at 0.005556 mean value. This lower mean value explained that sector is not generating proper sales level and facing the problem of fewer sales. With the smallest value of standard deviation FMITA has 0.11, 4.35E-06 maximum and minimum values respectively. All these statistics show a minor change in the sales ratio in the industry.

This sector of the economy has 0.093 the mean value of the variable GROWTH. It depicts that growth on average is so slow and less in the sector. Firms are not getting growth with their average level. Maximum value 2.921 and minimum value -0.899 are clearly showing not only the limited positive effect but even the loss and the factor of deficit also as there is negative sign in minimum value.

Profit level of this sector is not in good position in fact it is in loss on average over the quarters. This is explained by the negative sign with the mean value of OPBTSR. On average firms are facing the loss as mean value is -0.228. Moreover standard deviation 0.685962 showed minor variations in this ratio over the period.

Natural log of sales is used to measure the size of firms which is 14.319 on average. Firm to firm and over the quarters it changes with the standard deviation 2.419. Maximum value 20.544 and minimum value 10.422 describes the range of size of the industry.

4.2 Empirical Analysis' Results and Explanations

Significance is determined between dependent and independent variables through pooled fixed least square regression analysis and for between each variable Pearson's Correlation is used. Results explained that Cash conversion cycle and its components which is being considered as the determinant of working capital has significant relation with the independent variables. Further detailed picture is given below.

4.2.1 Bivariate Analysis

For bivariate analysis Pearson's correlation test was applied to determine the level of significance of relationship between variables that independent variables of model are how much correlated with each other. Pearson's correlation results are given in Table 4.3.

Firstly the association of firm's leverage with the firm's profitability (OPBTSR) is measured. Debt equity ratio (DER) is used in the research to explain the financial leverage of firm. According to the results there is positive relationship between DER and OPBTSR with the coefficient 0.025 significant at 5% level of confidence. But negative relationship is found between the financial leverage and size of the firm. Firm size (SLINS) is measured by taking the natural log of the firm's sales.

DER is significant at 5% with the SLINS as it has the -0.286 coefficient value. Firm size is negatively correlated with the debt equity ratio as per coefficient's value. It means the firms which have large scale of sales are less dependent of debt to finance their assets and the firms which are facing low volume of sales can't survive without debt. Resultantly their assets are majorly financed by the debts or shareholder's equity.

Progress of any business is measured primly by volume of sales through which it earns and keep the business continue. To measure the sales volume of an individual firm across the sector FMITA ratio is used. It is positive correlated with the profitability (OPBTSR) and size of firm (SLINS) but has negative correlation with the DER. Value of coefficient between FMITA and OPBTSR is 0.139 which shows high significance at level of 5%. This proves that firms with high sales in the sector are earning much profit from their business activity. The coefficient of association between FMITA and SLINS is 0.749 significant at 10% level of significance. Between DER and FMITA -0.304 is the value of coefficient which gives result that firm with short of sales has more liability of debt.

Age is used in the study for the number of years of firm's life. There is positive relationship between AGE and OPBTSR but negative relationship with the SILNS, DER and FAMITA. Coefficient of significance between Age

and OPBTSR is 0.114 at 10% level of significance that shows older age gives the edge in earning the more profits to the firms. Coefficients of correlation between AGE and SLINS, DER, FAMITA are -0.244794, -0.082383 and -0.035 respectively. It explained that sales level and the debts are not bound with the age of firm. Briefly firms can enhance their efficiency within limited period with the efficient working capital management.

Growth is used in the study to check the sector's performance level and it is positively related, with the OPBTSR, SLINS, FMITA and AGE, except DER. There is negative relationship between DER and GROWTH whereas the coefficient of correlation is -0.033086 at level of 1%. It shows that growth minimizes the debt level of firm. Increase in growth reduces the firm's debt. GROWTH has positive relation with the values of coefficient correlation 0.1033, 0.122, 0.102, 0.0092 of OPBTSR, SLINS, FAMITA and AGE respectively. This result shows that growth of firm and all these are strongly related with each other and the increase in all these is the cause of growth of the firm.

Current assets to total assets ratio (CATA) is used to measure the firm's credibility. It is negative correlated with the GROWTH and has coefficient correlation value -0.0086 at 1% level of significance. But there is positive relationship between CATA and OPBTSR, SLINS, DER, FAMITA and AGE. All these are highly significant with the values 0.2409, 0.109, 0.282, 0.023, 0.203 of correlation coefficient with CATA. Current assets support the sales of firms and ultimately increase the profits as well. Policy of more investments in the current assets also increases the firm's liability of debts.

Fixed assets to total assets ratio (FATA) is used to measure the firm's credibility and how much these are efficient in generating the sales and business activity. FATA is negatively correlated with the OPBTSR, SLINS, DER, FAMITA, and AGE but positively related with the GROWTH and CATA. Coefficients of correlation are -0.247, -0.116, -0.273, -0.027, -0.2002 significant with OPBTSR, SLINS, DER, FAMITA, and AGE at 1% level respectively. Increase in sales, profitability and age are affected by the fixed assets increment. Moreover investments in fixed assets are the cause of debt and increase the debt ratio. GROWTH of the firm based upon the assets of the firm which are total of fixed and current both assets.

4.2.2 Regression Analysis

Panel estimation technique, least square regression and fixed effect regression with cross section are used to examine the determinants of working capital and efficiency of its factors.

Working capital measures through different parameters but here the cash conversion cycle is used to measure this. CCC is comprised on size of firm, share of fixed and current assets to the total assets, sales of firm, contribution of equity in the debt, profitability and the growth. In addition to this inventory turnover, policy of payments and recoveries are the factors responsible for its efficiency. Following regression analysis is performed to explain the effects of above variables.

4.2.2.1 Fixed effect (Cross Section)

Regression analysis Fixed effect model is applied after implementation of Hausman test. The test was applied to check the correlation between explained variables and explanatory variables.

Changes occur due to the different variables in the cash conversion cycle are explained by the equation 1 which is produced as follows.

$$CCC_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it} \quad \text{eq....1}$$

Summarized results of equation 1 are mentioned in Table 4.4 and detail explanation is given below.

Equation explained that all variables are significant with the firm's working capital measure "cash conversion cycle" except profitability ratio and age of the firm as per p-values in the model. Moreover value of adjusted R^2 is92%, F-statistics is 139.26 and Durbin Watson's value is 1.89. All of these statistics show the fitness of model.

Coefficient of debt equity ratio (DER) is -6.827. The negative sign indicates that any change in debt policy will improve firm's cash conversion cycle on average by 6.8%. Firm's investment policy in fixed assets is explained by the coefficient of FATA value that is -262.346. This means that any decrease or increase in FATA will significantly affect the CCC. Its negative sign shows that increase in fixed assets by 1% will defect the cash conversion cycle by 262 times on average. There is need of a better investment policy to this sector in Pakistani automotive and engineering sector to enhance the efficiency of working capital.

Sales ratio (FAMITA) of the industry has positive relation with cash conversion cycle and has coefficient value 703.02. It concludes that any increase in this ratio will improve the working capital management efficiency of the industry and if it decreases then it will cause for a decrease in efficiency too. This encourage for better policies regarding the sales.

Growth is compulsory and the primary target of every firm. Model indicates negative relationship of between GROWTH and CCC. This shows that firms should maintain the small value of cash conversion cycle for growth purpose. Precisely the shorter cash conversion cycle the more growth will be done. Coefficient's value -7.180665 shows that 1% increase in cash conversion cycle will ultimately effect the growth by coefficient value on average.

Coefficient of profitability is 4.393315 with t-statistics 1.426488 is found positive related with the CCC but has insignificant influence on it. Impact of this on profitability does not matter in the automotive and engineering sector of Pakistan. Cash conversion cycle is not influenced by the age of the firm as it is insignificant with dependent variable CCC by the result of p-value of the above panel least square model.

Firm's investment policy in current assets must be reviewed after some interval or even on quarterly basis. Coefficient -230.4684 with negative sign encourage the firms to invest more in the current assets to maintain the efficient cash conversion cycle because CATA has much influence on CCC. There is any change of 1% in CATA brings 230 times effect on average in cash conversion cycle.

SLINS the measure factor of size of firm has the coefficient value -13.35041. Negative relationship shows the good policy regarding sales that keeps the cash conversion cycle in favorable duration. From inventory to sales and then receivables to the payments of creditors, cash conversion cycle explains the working capital efficiency.

4.2.2.2 Components of Cash Conversion Cycle (CCC)

Cash conversion cycle is the measure of working capital management from which its efficiency can be easily measured. In this study significance of the components of cash conversion cycle with independent variables of the study also checked by using the same technique of panel least square regression with fixed effect.

Days sales inventory (DSI), Days sales outstanding (DSO) and Days payable outstanding (DPO) are the components of cash conversion cycle. Following are the equations which are used to analyze the relationship between components of CCC and the independent variables.

4.2.2.2.1 Days Sales Inventory (DSI) and regression analysis

Relationship between explanatory variables and DSI is explained with the given below equation 2 while the summarized results are given in Table 4.5.

$$DSI_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it} \quad \textbf{eq.2}$$

Results of adjusted R^2, f-statistics and Durban Watson are 82%, 54% and 1.525 respectively. These statistics of the model conclude it as fit model. P-values explain that DSI is insignificant with debt equity ratio, fixed assets to total assets ratio, firm's sales to industry sales ratio and growth. Although variables have both negative and positive relation but DER, FATA, FAMITA, CATA and GROWTH have not any influence on the days sales inventory. The remaining variables OPBTSR, AGE and SILNS have influence on DSI.

Coefficient of OPBTSR is 10.83083 with t-statistics 1.796708 has positive relation with DSI. It shows that 1% change in profitability before taxes will affect the days sales inventory 10 times on average. Age has 0.012334 coefficient with positive relation but DSI will affect slightly if there is any change by 1%. Only 1.23% change will show off in sales inventory of firms.

Sales inventory is highly significant with the SILNS as per the p-value i.e. 0.0000. Coefficient value is -59.31074. Due to negative relation it is concluded that one day change in inventory will bring 59 times change on average in the size of firm so firms must be careful about the inventory to change in sales.

4.2.2.2.2 Days Sales outstanding and regression analysis

DSO the second component of cash conversion cycle is used as the measure of firm's receivables. Equation 3 is applied for the significance and relationship of DSO with the other independent variables. Equation, summary of result and its explanation are given below. (Table no.4.6)

$$DSO_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it} \quad \textbf{eq.3}$$

Value of adjusted R^2 is 93%, f-statistics is 151 and Durban Watson statistics is 1.67. All these statistics declared this model as best fit model. P-values of the model indicate the high significance of the FMITA and OPBTSR whereas insignificance of DER, FATA, GROWTH, AGE, CATA and SILNS with days sales outstanding.

Coefficient value of FAMITA is 1369.451and t-statistics is 6.07. Sign shows positive relationship between DSO

and FAMITA means a unite change in industry sales ratio will bring change of coefficient value on average in the receivables. Profitability of firm has coefficient value 5.097 and t-statistics 1.755. This show that change in profitability policy will leave a significant impact on the receivables of firm.

4.2.2.2.3 Days payables outstanding and regression analysis

DPO is representing the policy of payments to the trade creditors. Relation and significance are presented below in equation 4 and Table 4.7

$$\mathbf{DPO_{it} = \beta_o + \beta_1 DER_{it} + \beta_2 FATA_{it} + \beta_3 FMITA_{it} + \beta_4 GOWTH_{it} + \beta_5 OPBTSR_{it} + \beta_6 AGE_{it} + \beta_7 CATA_{it} + \beta_8 SILNS_{it}) + \mu_{it}} \quad \textbf{eq.4}$$

Regression analysis explained that four variables of the model are insignificant and four are significant with the days payable outstanding. The statistics of adjusted R^2, f-statistics and Durban Watson statistics show that model is fit as per the values 85%, 65.35 and 1.87 respectively.

Coefficient value 9.415 and t-statistics 2.311 of variable DER show the positive relationship with the DPO and clears that change in debt policy will increase the days of payments to creditors which would be harm for the firm's cycle.

Sales industry ratio (FAMITA) is highly significant with DPO and has the coefficient value 1191.887 whereas the t-statistics value is 2.972. This show that increase in industry sales ratio will bring a change in the payment policy of firm. OPBTSR is also has positive relation with the DPO that is in the favor of the firm's efficiency. Coefficient value 11.535 and t-statistics 2.234 show much influence on the DPO by the policy of profitability of firm.

Size of firm in terms of sales SILNS has coefficient value, t-statistic value -45.497 and -7.802 respectively. All this statistics show negative relation between SILNS and DPO. If the firm's size reduces by one unit it will increase the payment days and ultimately sales volume will be reduced.

Cash conversion cycle as a whole is much affected by the independent variables of the study and has significance but its components DSI, DSO and DPO are not affected in equal percentage. DPO is the component of CCC which is affected more than the other two factors by the independent variables. Moreover the significance level is also in the favor of DPO which means that payment policy of the sector more effects in the cash conversion cycle of the firm. Firms should follow a strict payment policy for the efficient cash conversion cycle.

All above is the explanation of the regression analysis and descriptive analysis to find the association and significance between the variables. In addition to determine more factors which influence the working capital management efficiency and firm's profitability a questionnaire is developed to determine their impact. From the questionnaire we analyze that recently ERP is the system which has much impact on daily working of the firms.

4.3 Enterprise Resource Planning (ERP)

Firms used documentation for the internal communications, verifications and proper filing, vouchering system to precede their production and to meet the targets like payments to trade payables, receiving of payments etc. All of these are time consuming, expensive and less secured. But now due to the advance technology and modern era firms are switching to software's and paperless communication. Through this they are getting following benefits which cause the working capital efficiency and increase in profitability level of the firms.

- Decrease in cost of production and cost of finance.
- Efficient management.
- Less timing from the production to sales that cause shorter cash conversion cycle.
- Decrease in cost of man power.
- Transparency in the procedure as all the steps from the purchase of raw materials to production and then sales can be viewed and controlled through one system.
- Paperless transactions cause the reduction in the stationary expense.
- Increase in customer ship and ultimately the profitability of firm.
- Efficient cash management.

Results from the questionnaire which was conducted among the 9 firms listed in Karachi Stock Exchange is descriptively explained below in the Table 4.8. It is found that after the implementation of ERP firms are getting more profits, more efficiency in cash management.

5. Result of the Research Work

Purpose to conduct this study was to determine the determinants of working capital management efficiency of firms listed in Karachi Stock Exchange, Pakistan. Firms in the developing countries like Pakistan are certain to invest in the working capital because of uncertain political, economic conditions, load shedding persistent increase in prices, inflation, lack of access to capital market, corruption, defected and poor technology etc. but firms can reduce these effects by managing the performance of their working capital. In order to get efficient working capital management researchers are remain in search of new methods, techniques and tools. For this aim a conceptual framework about the working capital management, its definition, components, and measures of working capital is developed.

Cash conversion cycle is determined as the measure of working capital management. Independent variables used in the study are size of firm which is considered in terms of the sales of the firm, debt equity ratio, investment in cash and fixed assets to analyze the investment policy, firm's sales to industry sales ratio to analyze the contribution of individual firm's sales in the sector's sales, growth and profit before the tax. Impact and significance of cash conversion cycle are not only analyzed but even the components of the measure of cash conversion cycle CCC are also analyzed with the independent variables in the study to investigate the individual effect of days sales of inventory DSI, days sales outstanding DSO and days payables outstanding DPO. For this purpose fixed least square model is applied and the descriptive analysis is conducted. In addition to all these, impact of Enterprise Resource Planning ERP is also studied through a questionnaire which was conducted among the 9 listed firms by mailing and face to face interviews. This joint study was conducted by keeping in view the new and advanced procedures in the internal communication of the firms and need of efficiency.

5.1 Conclusion

From the descriptive analysis it is cleared that 70% automotive and engineering firms are involved in investing their 60% share of investments in current assets and are in practice of using the facility of short term financing in order to meet the daily expenses. Cash conversion cycle of the firms will shorter due to following reasons:

- Aggressive and tight policy of receivables.
- Sales and investments in current assets of the firms are the determinants of the working capital management efficiency.
- Due to liberal credit policy and it has positive relationship with the firm's profitability.
- Efficient management of inventory that also has significant positive effect on the profitability of firm.
- Fixed effect regression analysis showed that firms specific factors matters.

Moreover delay in the receivables cause the longer cash conversion cycle. It is also found that firms, which follow the cash payment policy, are in more benefit as this increase the profitability level of firms due to cash discounts. Positive significance of investment policy in the current assets causes the efficient cash conversion cycle ultimately shows efficient capital management. Age of the firm has only a minor effect on the working capital management efficiency. Increase in sales improve the profitability of firms and resultantly cause of the growth of firm. In addition to these debt from the shareholders is more beneficial than from the financing. Apart from the empirical analysis and descriptive study contribution by implementing the ERP system, firms are more secured and in benefit in order to meet the efficiency of working capital which ultimately enhance the profitability of firms. ERP influence the following factors of the firms and has the association:

- Decrease in finance cost
- Increase in sales of the firms
- Increase in inventory management efficiency
- Increase in profits of the firms
- Transparency in the internal documentation
- Cash management
- Timely delivery to customers
- Increase in customer relationship

It is concluded that it is also an efficient factor for efficient cash conversion cycle and working capital management efficiency. These are the reasons due to which many of firms are improving their working capital management and their efficiency.

5.2 Recommendations

For usefulness of this study following are the some recommendations forwarded for the managers and

management of automotive and engineering sector.

- Age of the firm does not matter in its efficiency so managers must be efficient in their own skills.
- Early payments policy must be followed for more profitability of the firm if the cash discounts or incentives are being offered by the trade creditors otherwise delayed payment policy is better in order to enhance the working capital.
- Collection policy should be reviewed properly. It should be tight in order to keep the cash conversion cycle shorter and for efficient working capital but keeping in view the market structure and intensity of competition among the firms.
- Efficiency in inventory turnover is also required for the efficient working capital management. For this managers and management should be aware about the economic conditions, persistent rise in prices, unexpected loss, seasonal ups and downs in the demand and supply.
- Managers should be careful while investing in the assets either in the fixed assets or in current assets. Adequate investments in current assets are only in benefit because the excessive investments are harmful for working capital efficiency.
- One time investment in developing the computerized system is better instead of using the keeping record in files or black and white because it decreases not only the cost but also the processing time of transactions.
- Briefly the efficiency of working capital is hidden in the advanced technology and changing of previous old methods that consume more time and are complex in used as compare to the new ones. Moreover timely reviews and decisions in the policies are necessary for the efficiency of working capital management.

5.3 Future Research Directions

Knowledge is not limited to any full stop and there it is the sea of unlimited depth. It increases with the new methods, technologies, inventions and discoveries. No study is complete as it has the directions for new researchers. On the basis of limitations and finding of this research following are the researchable points for new researchers.

- For more rigorous results, this research can be extended by increasing the number of firms in the sample size.
- There is a need of the primary research to find the differences between working capital management practices and policies.
- Future research can be conducted by visiting the firm to firm for the primary research about the Enterprise Resource Planning.
- This study can be more explored in determining the profitability of firms against the same hypothesis.
- More research can be conducted to investigate the effect of time by using time fixed effect regression techniques.

References

Appuhami, B.A. (2008). The Impact of firms capital expenditure on working capital management: An empirical study across industries in Thailand. *International Management Review*, 4(1), 8-21.

Chowdhury, A. and Amin,Md. M. (2007). Working capital management practiced in pharmaceutical companies listed in Dhaka Stock Exchange. BRAC University Journal, 2, 75-86

Calisir F, Gumussoy. A. C and Eris. U Ozgur (2005) Examining E-Business impact on firm performance through website analysis, Int. J Electronic Business, Vol 3, No 6.

Dittmar, A.,Smith, J.M., and servaes, H. (2002) Corporate Liquidity, Unpublished working paper, Indiana University e London Business School.

Deloof, M and Jegers, M. (1996) Trade credit, product quality, and intra group trade: Some European evidence. *Financial Management*, 25 (3), 33-43

Eljelly. A. M.A, (2004). Liquidity – profitability trade off: An empirical investigation in emerging markets. *International Journal of Commerce and Management*, 14(2), 48-61.

Ganesan V (2007). Analysis of working capital management efficiency in telecommunication equipment industry. *Rivier Academic Journal*, 3(2), 1-10.

Gitman, L. J., Mosses, E.A. and White, I.T. (1979). An assessment of corporate cash management practices. *Financial Managemen*t, 8(1): 32-41.

Kim. J.K, Xiang .Y. J and Lee S. (2008) The impact of IT investment on firm performances in china: an empirical investigation of the Chinese electronics industry, *technological forecasting and social change* 76.

Liang. P. T, Lin. Y. C and Chen. N.D (2004). Effects of electronic commerce models and industrial characteristics on firm performance, *industrial management and data systems volume 104.*
Nazir, M.S. and Afza, T. (2008). On the factors determining working capital requirements. *Proceedings ofASBB*, 15(1).
Padachi. K (2006). Trends in working capital management and its impact on Firms' performance: An analysis of Mauritian small manufacturing firms. *International Review of Business Research Papers*, 2(2), 45-58.
Raheman, A. and Nasr, M. (2007). Working Capital management and profitability – Case of Pakistani Firms. *International Review of business research papers*, 3(1), 279-300.
Rao, R. K.S.(1989). *Fundamentals of financial management* (3rd ed.) Macmillan Inc.
Ronald W. and Edgar A. Markets, Investments, and Financial Management.
Sayaduzzaman Md (2006). Working capital management: A study of British Amercian Tabaccoo Bangladesh Company Ltd. *The journal of Nepalese Business Studies*, 3(1), 78-84.
Scherr, F.C. (1989). *Modern working capital management, text and cases* (International ed.). Englewood Cliffis, New Jersey: Prentice-Hall Inc.
SEN, M. and ORUC, E. (2009). Relationship between efficiency level of working capital management and return on total assets in ISE. *International Journal of Business and Management*, 4(10), 109-11

Table 4.1 Descriptive Analysis of Dependent variables used in the study

Variables	Descriptive Statistics of Dependent Variables					
	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev.**	**Obs.**
CCC	91.69193	61.99951	238.2463	-37.15950	72.51870	180
DPO	101.8812	79.52292	405.2346	7.953566	86.41990	180
DSO	60.89233	21.93093	241.2576	2.615539	71.10340	180
DSI	132.6808	101.5589	428.4524	12.00829	93.21514	180

Table 4.2 Descriptive Analysis of Dependent variables used in the study

Variables	Descriptive Statistics of independent Variables					
	Mean	**Median**	**Maximum**	**Minimum**	**Std. Dev.**	**Obs.**
AGE	9948.386	9198.000	20805.00	2664.500	4778.907	180
CATA	0.678888	0.669562	0.925413	0.353908	0.155239	180
DER	2.372131	2.364707	5.764803	0.429717	0.164537	180
FATA	0.319712	0.325129	0.618800	0.087453	0.150809	180
FMITA	0.005556	9.32E-05	0.108194	4.35E-06	0.016127	180
GROWTH	0.093759	0.011032	2.921207	-0.899348	0.516915	180
OPBTSR	0.228445	0.013472	0.279541	5.306784	0.685962	180
SILNS	14.31925	13.48736	20.54468	10.42267	2.419195	180

Table 4.3: Pearson's Correlation Matrix (Bivariate Analysis)

	OPBTSR	SILNS	DER	FMITA	AGE	GROWTH	CATA	FATA
OPBTSR	1.000000 -----							
SILNS	0.399531 0.0000	1.000000 -----						
DER	0.024927 0.7398	-0.286050 0.0001	1.000000 -----					
FMITA	0.139211 0.0624	0.749269 0.0000	-0.304958 0.0000	1.000000 -----				
AGE	0.114922 0.1245	-0.244794 0.0009	-0.082383 0.2716	-0.035709 0.6341	1.000000 -----			
GROWTH	0.103316 0.1675	0.122029 0.1027	-0.033086 0.6593	0.101519 0.1751	0.009250 0.9019	1.000000 -----		
CATA	0.240910 0.0011	0.109142 0.1447	0.281891 0.0001	0.023307 0.7561	0.202883 0.0063	-0.008660 0.9081	1.000000 -----	
FATA	-0.247185 0.0008	-0.116651 0.1189	-0.273914 0.0002	-0.027670 0.7123	-0.200299 0.0070	0.005367 0.9430	0.995709 0.0000	1.000000 -----

Level of significance

*Significant at 1%, **significant at 5%, ***significant at 10%

Table 4.4 Pooled least square fixed regression analysis of WCM efficiency

Independent Variables	**Panel Least Square Method (Fixed Effect) (Dependent variable CCC of equation)**		
	Coefficient	**t-Statistics**	**p-Values**
DER	-6.827957	-2.809598	0.0056
FATA	-262.3463	-2.263117	0.0249
FMITA	703.0250	2.938471	0.0038
GROWTH	-7.180665	-2.199603	0.0292
OPBTSR	4.393315	1.426488	0.1556
AGE	0.003773	1.304405	0.1939
CATA	-230.4684	-2.008393	0.0463
SILNS	-13.35041	-3.835833	0.0002
Adjusted R^2		0.925114	
F-Statistics		139.2062	
Durban Watson Statistics		1.839774	

Table 4.5 Pooled least square fixed regression analysis of DSI and profitability

Independent Variables	Panel Least Square Method (dependent Variable DSI of equation)		
	Coefficient	t-Statistics	p-Values
DER	6.335954	1.332005	0.1847
FATA	-138.8568	-0.611983	0.5414
FMITA	525.4616	1.122101	0.2635
GROWTH	-2.648972	-0.414570	0.6790
OPBTSR	10.83083	1.796708	0.0742
AGE	0.012334	2.178665	0.0308
CATA	-230.1211	-1.024553	0.3071
SILNS	-59.31074	-8.706405	0.0000
Adjusted R^2	0.826361		
F-Statistics	54.24216		
Durban Watson Statistics	1.525761		

Table 4.6 Pooled least square fixed regression analysis of DSO and profitability

Independent Variables	Panel Least Square Method (Fixed Effect) Dependent Variable DSO of equation		
	Coefficient	t-Statistics	p-Values
DER	-3.748821	-1.635903	0.1038
FATA	-133.7751	-1.223818	0.2228
FMITA	1369.451	6.070249	0.0000
GROWTH	-3.606682	-1.171647	0.2430
OPBTSR	5.097548	1.755280	0.0811
AGE	-0.001589	-0.582480	0.5610
CATA	-100.0142	-0.924290	0.3567
SILNS	0.462976	0.141069	0.8880
Adjusted R^2	0.930737		
F-Statistics	151.3345		
Durban Watson Statistics	1.670902		

Table 4.7 Pooled least square regression analysis of DPO and profitability

Independent Variables	Panel Least Square Method (Fixed Effect) (Dependent Variable DPO of equation)		
	Coefficient	t-Statistics	p-Values
DER	9.415089	2.311708	0.0220
FATA	-10.28557	-0.052944	0.9578
FMITA	1191.887	2.972631	0.0034
GROWTH	0.925010	0.169076	0.8659
OPBTSR	11.53506	2.234861	0.0268
AGE	0.006973	1.438441	0.1522
CATA	-99.66687	-0.518255	0.6050
SILNS	-45.49735	-7.800211	0.0000
Adjusted R^2	0.851897		
F-Statistics	65.35127		
Durban Watson Statistics	1.866791		

Table 4.8: Descriptive results of impact realized due to the implementation of ERP system.

Sr. No	Firm's Name	Firms using ERP	ERP Maintain ace expense %	Cash Manage-ment Improv-ement %	Inventory Reduction %	Revenue & profitability Increases %	On- time Delivery %
1	**Bolan Casting Ltd.**	Yes	1.5	10	5	10	7
2	**Atlas Battery Ltd.**	No	--	---	---	----	---
3	**Indus Motors Company Ltd.**	Yes	2.0	15	12	15	9
4	**Honda Atlas Cars Pakistan Ltd.**	No	---	----	---	----	----
5	**Dewan Farooque Motors Ltd.**	Yes	2.5	8	8	10	8
6	**Singer Pakistan Ltd.**	Yes	1.0 – 1.5	12	10	14	10
7	**Dewan Automotive Engineering Ltd.**	Yes	2.0	10	9	11	10
8	**Gandhara Industries Ltd.**	Yes	1.0	14	10	15	5
9	**Siemens Pakistan Ltd.**	Yes	2	15	10	20	10

APPENDICES

Appendix A: List of firms and Data Sources

Engineering and automotive Sector listed in Karachi Stock Exchange of Pakistan

Sr. No	Firm's Name	Code	Web address
1	Bolan Casting Limited.	BC	http://www.bolancastings.com/
2	Atlas Battery Limited.	ABL	http://www.atlasbattery.com.pk/
3	Indus Motors Company Limited.	IMCL	http://www.indusmotor.com/
4	Honda Atlas Cars Pakistan Limited.	HAC	http://www.honda.com.pk/
5	Dewan Farooque Motors Limited.	DFML	http://www.dewan-motors.com/
6	Singer Pakistan Limited.	SNG	http://www.singer.com.pk/
7	Dewan Automotive Engineering Limited.	DAM	http://www.dewangroup.com.pk/dael.htm
8	Gandhara Industries limited.	GAI	http://www.gil.com.pk/
9	Siemens Pakistan Limited.	SIMN	www.siemens.com.pk/

AppendixB: E-BUSINESS QUESTIONNAIRE

Firm's Name: _____ Designation: _____

Q1. Is your company is using B2B or B2C E-business?

A B2B

B B2C

C Both

Q2. Describe your E-Business activity (E-Business Focus)

A. on line buying
B. on line selling
C. Supply chain management using internet system ERP, Etc.
D. other please specify_____

Q3. Explain the following terms that how E-Business is beneficial for the followings terms.

Questions	+++	++	+	-
Raising/improving company profile				
Increased sales / enquiries				
Extending customer base				
Improving customer relationships/interworking				
Improving supplier relationships/interworking				
Speed up process e.g. transactions, recruitment, marketing etc.				
Reduced costs e.g. transaction, marketing				
Internal processes/ communications				
Improve the internal efficiency				
Keeping up to date with products/services/market news				
Keeping ahead of / up to date with competition				
Identifying cheapest telecoms supplier				

Q4. Which benefit you are taking from your website?

	Yes	No
Provide information about company, products etc.		
Internet is using for interaction with customers .i.e. feedback		
Internet is using for transactions with customers.		
Internet is using for intercompany transactions		

Q5. Please mention which ERP system you are using?

1. Oracle_____
2. SAP_____
3. SCT_____
4. Other please specify _____

Q6. Why you are not implementing ERP system given a reason?

_____

Q7. What was your total turnover before using ERP? (Last three years)

A) 1 _____
2 _____
3 _____

B) What was your total turnover after using ERP? (Three years)

1 _____
2 _____
3 _____

Q8. If you are using ERP please tell the best use of it?

_____

Q9. Does you still expanding on E-business activities?

Yes/no

Q10. In your view was the implementation of the E-Business made your company beneficial?

Yes/no

Q.11 What is your internal management for sales?

- Booking
- Through dealers
- Through reference
- Other please specify_____
-

Q12. How many days you need to deliver the product?

Q13. Please mention up to what Percentage you are using the followings modules of ERP?

	10-20(%)	**20-40(%)**	**40-60(%)**	**60-80(%)**	**80-100(%)**
Customer Relationship Management (CRM)					
Sales Management					
Supply Chain Management					
Service Management					
Financial Management					
Governance, Risk and Compliance Management					
Product Data Management					
Planning and Scheduling					
Production Management					
Human Capital Management					
Master Data Management					
Enterprise Performance Management					

Please comment if any_____