

Identification and Estimation of the Role of Internal Micro Level Factors Towards Efficient Working Capital Management

A case study based on the experience of manufacturing firms in Pakistan.

By
Shahid Ali

A research thesis submitted to the Department of Management & Social Sciences,
Mohammad Ali Jinnah University, Islamabad
In partial fulfillment of the requirements for the degree of

**DOCTOR OF PHILOSOPHY IN MANAGEMENT SCIENCES
(FINANCE)**



DEPARTMENT OF MANAGEMENT & SOCIAL SCIENCES
MOHAMMAD ALI JINNAH UNIVERSITY
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ACKNOWLEDGEMENT

I am most thankful to Allah for bestowing all the blessings and for enabling me finish this thesis with humility. Higher Education Commission of Pakistan deserves my emotional praise as it would have been very difficult completing this thesis without its support. I don't have words to thank Professor Dr. Muhammad Ramzan Akhtar, who has really inspired me with his continual support and guidance in this work. I have learnt a great deal from him as his supervisee and I will always remember the relentless encouragement, support, help & guidance provided to me by Dr. Sahib. He never dwindled due to his personal or professional constraints and gave me his time and insights in this research thesis. I would also appreciate the most valued contribution of the co-supervisor Dr. Atta Ur Rehman in the econometric modeling of this research work. I have a deep sense of appreciation and regard for Dr. Nasser Ali Khan who made me realize to go for my PhD, I cherish his gentle inspiration. The Institute of Management Sciences is a second home to me; it has a great contribution in my personal and professional development. I highly appreciate my Institute and all my colleagues at this amazing place. My dearest friends and colleagues Dr. Muhammad Ali, Dr. Shuja, Dr. Rafiq, Saleem Gul, Adnan Javaid, Amir Hussain are my strength, their encouragement and support has been outstanding. I am lucky to have them and I really value their presence in my life. All my teachers at MAJU have been outstanding; they have a huge contribution in my learning and knowledge. I am thankful to all of them but I reserve special praise for Dr. Safdar Butt, Dr. Anwar Fazil Chishti, and Dr. Arshad Hassan.

I am sure my late father will be proud and happy in the Heavens on my achievement. I don't know how to appreciate the role of my mother in my success, as she has been the one blocking all the evils coming my way through her untiring prayers and endless *ibadaat*. All that I have achieved in life is because of her. My brothers stand behind me in my hard times, their love is my most valued asset. I am happy and satisfied that I have Muhammad Javaid in my life, as he is not only very close to my heart but I find him very close in all my good and bad times. My love for my wife Saima and my two little angels Shayan and Washma knows no limits, their love fuels me with the much needed emotional strength to take hard challenges head-on in life. I wish them all good things in the times ahead.

Shahid Ali

ABSTRACT

Pakistan is a developing country and for the accelerated growth of its economy an effective route is through proliferation and growth of commercial firms by enhancing their profitability. However, this requires reduction in the marginal cost of output of these firms. Therefore, the most important consideration is to find ways and means of reducing cost in the components of working capital. This thesis aims to look into firm-specific internal micro level factors that may impact the working capital efficiency of large scale manufacturing firms in Pakistan.

The study is empirical in nature and attempts to check working capital efficiency standards for firms of different sectors. In addition to this, economic effect of micro level factors on business performance is investigated. Working capital requirements, liquidity requirements, and working capital efficiency of business firms are examined on the basis of firm-specific internal micro level factors. All findings are based on an objective sample of 207 non-financial business firms listed on Karachi Stock Exchange from thirteen large scale manufacturing sectors of Pakistan. Reliable sources that are used for secondary data include State Bank of Pakistan, Ministry of Finance, Federal Bureau of Statistics, Business Recorder, websites of sampled firms, Trade Associations for some sectors etc.

The thesis relies on using fixed effect method after controlling multicollinearity, autocorrelation, hetroskedasticity, and misspecification biases. Firms of different sectors are found more inclined towards improving their business performance through the use of current assets. Few firms in a sector are found improving their efficiency standards and are in status-quo with respect to their working capital strategies. Cash conversion cycle and size of the firm are identified as some main firm-specific internal micro level factors having significant influence on business performance of firms in most of the sectors. Leverage, cash flows, and growth of the firm are found to significantly influence the working capital requirements of firms.

Liquidity needs of the firms are found to take significant influence of firms' profitability, leverage, cash flows, and growth of the firm. It is observed that liquidity requirements and working capital requirements of business firms increase in poor economic conditions. A notable finding in the thesis is that receivables management, inventory management, cash conversion cycle, and firms' growth have significant influence on the efficiency of working capital management in all economic sectors. This finding confirms that there exist internal micro level factors which impact the working capital efficiency of business firms.

CHAPTER 1

INTRODUCTION

1.1 Chapter Overview

This chapter is going to present the rationale of this research thesis by introducing a considerably important topic in corporate finance. This thesis intends to explore working capital efficiency and its dynamics in the non-financial listed corporate sectors of Pakistan. Initially, this chapter sets the stage by creating interest in the topic by presenting the importance of working capital management and to any potential benefits by improving its efficiency. Managing working capital bears considerable management importance as most of the managers are busy in the petty management of maintaining liquidity and providing the fuel of cash to positive net present value projects. There are visible trade-offs between the two and it is imperative to know their business effects. This chapter points out the research vacuum of the reviewed literature and sets research objectives. A list of hypotheses is provided which are to be tested in light of data analysis. Section 1.2 formulates the topic, Section 1.3 discusses nature of the study, Section 1.4 sets the objectives of the study, Section 1.5 is about the study design of the research, Section 1.6 lays out scope, assumptions and limitations of the research.

1.2 Formulation of the topic

The economic significance of large scale manufacturing sector is relatively small because it contributes only 18.4% to the overall GDP of Pakistan¹. In contrast, Malaysia's manufacturing sector accounts for 28% of total GDP, Indonesia's 27.1%, Thailand's 34.9%, and Taiwan's 27.1%². The GDP of Asian emerging markets including Malaysia, Indonesia, Philippines, Thailand, Singapore and Korea increased 24.3 times in the last 43 years. The amazing experience of Asian Tigers has set examples for many countries including Pakistan. In comparison to this Pakistan's GDP increased only by 4.3 times. Nevertheless, had Pakistan's GDP per capita increased by the same rate, each Pakistani today would have been earning 5.6 times of what he or she is earning today. Hence there is need to raise contribution of the large scale manufacturing sector in Pakistan through adaptation of technology and improved corporate decisions. This in turn will increase production and its share in GDP.

¹ Economic Survey of Pakistan 2008-09, Ministry of Finance, Government of Pakistan

² World Bank, <http://data.worldbank.org>

This seems to be a sizeable challenge under prevailing poor economic conditions. Pakistani economy has been subjected to ineffective policy making due to fragile political conditions. This has prompted energy crisis, poor infrastructure development, poor resource mobilization, worsened law and order situation, etc. Pakistani manufacturing firms face fierce international competition generating pressure for cost-reduction while maintaining product quality. Growth of manufacturing business firms in Pakistan depends on the profitability notion; it is imperative for firms to adopt strategies towards reducing marginal cost of production and using effective resource management policies to enhance expansion of the sectoral economy. Financial managers in Pakistan are formally required to arrange relatively cheaper finance and to devise strategies that bring higher expected returns. Research scholars on working capital management (WCM) opine that there is a neglect of research work relating to the efficiency of working capital management. The efficiency of WCM by manufacturing firms bears considerable interest which should be explored for different sectors. Hence, this thesis is essentially interested in studying the most important internal micro level factors that could have a significant impact on the WCM of manufacturing firm in Pakistan.

According to Economic Survey 2007-08 published by Ministry of Finance, manufacturing is the second largest economic sector of Pakistani economy. This sector achieved 19.9% growth in year 2000-05 which is its highest in a decade. Its contribution in employment is over 13%¹. Over time, this sector has added more to the GDP, but its share in the economy has gone down as it failed to attract new fixed investments and to sustain or create more jobs. Little is known in Pakistan about how financial decisions are made by both the large and small scale industries and there is an exceptional room in investigating a wide variety of factors that translate in financial decisions which ultimately affect the growth, employability, and other economic inputs of this sector. According to valuable study by Kemal (2006) some genuine questions are asked about industrial growth and its limitations in Pakistan. Pakistani products are uncompetitive in the global markets for which the author identifies high production costs due to technical, allocative, and X-inefficiencies. The higher cost of input, cumbersome procedures, and low levels profitability resulting from higher production costs are highlighted. This study clearly directs a future research to dig deep into all those factors for the industrial sector which are responsible for poor business decision making resulting in poor business performance, low growth and low investment attraction. Burki and Khan (2004) are of the view that manufacturing firms in

Pakistan have input mix inefficiency which takes the form of over-utilization of raw material and capital vis-à-vis energy and labour.

With the advancement in information technology a number of public and private indigenous entities now publish their data and reports for the general public. In presence of available data and development of financial theory there is a greater need to investigate the manufacturing sector of our economy. Addressing gaps in financial decision making can provide input to policy and can generate healthy academic debates for further development. State Bank of Pakistan has categorized the entire industries in the country in thirteen sectors namely Cotton Textile, Other Textile, Sugar, Jute, Engineering, Transport & Communication, Chemicals, Paper & Board, Tobacco, Fuel & Energy, Vanaspati & Allied, Cement, and Miscellaneous. According to Federal Board of Revenue, sales tax recorded more than 45% growth from 2000 to 2008 showing the real potential of indigenous large scale industries in terms of contribution to national revenues.³ Capital employed by these economic sectors increased by a net 7.45%. For an insight on the importance of current assets; it is revealed that the total capital employed by manufacturing sector is 1413209 million rupees in the year 2008. On the average listed companies in Pakistan manage 45 to 52% of their assets in current form³. Table 4.2.2 in Chapter 4 shows the sectoral break-up of current assets for different manufacturing sectors. These figures reflect upon the importance of managing current assets and their implications on manufacturing businesses in terms of costs.

Some local studies have also identified the over and under-utilization of resources in the form of raw material, labour, energy, and capital. Keeping in view the significance of such an important sector of the economy this study is going to investigate the indigenous manufacturing sectors with a view to understand their short term financial decisions, identify some shortcomings in their working capital decisions and give some recommendations in light of the findings.

The profitability and business sustainability of a typical firm is affected by both macro and micro level factors. While macro level factors set the stage and environment within which a typical firm makes micro level decisions that best serves its goals. There is not much that a firm can do about the macro framework. Therefore, crucial factors from the firms' point of view are micro level decisions. From this standpoint, the focus of the study is in investigating the micro level

³ Balance Sheet Analysis of Joint Stock Companies Listed on Karachi Stock Exchange (2003-2008) by State Bank of Pakistan

factors. These could be split into two parts (i) internal micro level factors (ii) external micro level factors. Studying both internal and external micro level factors is both time consuming and expensive. Therefore, the focus is on investigating the internal micro level factors impacting the working capital policies of manufacturing business firms in Pakistan. The analysis will increase our understanding that how finance managers in Pakistan are managing working capital and how the marginal cost of working capital could be further reduced to increase the profitability and further improve efficiency of WCM for indigenous manufacturing firms.

After examining literature there seems considerable research gap on this topic. One identifiable gap that attracts research investigation is the liquidity-profitability trade-off; a phenomenon with which business firms are usually faced. There is no business specific or sector specific model in the established finance theory. The second major gap identified from the literature is the identification of internal and external micro/macro level factors that cause significant variation in WCM. This vacuum needs a bigger research attempt as the topic can be broken into four main researchable areas for finding effects on WCM like (i) the identification and estimation of internal micro level factors (ii) the identification and estimation of external micro level factors (iii) the identification and estimation of internal macro level factors, and (iv) the identification and estimation of external macro level factors. There is a dearth in literature that can address questions on the social responsibility of WCM as well, even the impact of regulatory framework on WCM needs to be explored. In the review process it was also realized that there is no established theory that could inform academia about how short term financial decisions are affected by the prevailing macroeconomic conditions in the economy. Valuation of liquidity is yet to be resolved in finance theory as there is little research insight available on it.

This thesis tries to address one identifiable gap i.e. identification and estimation of internal micro level factors towards efficient working capital management by large scale manufacturing firms.

This study is significant because it will benefit all stakeholders. The analysis and findings would enable native financial managers in understanding the key dynamics while designing strategies for WCM for manufacturing sectors in Pakistan. The findings can also enable in designing effective short term working capital strategies that could benefit regulators and corporate policy makers. Not only that, findings may prove fruitful in making more effective corporate decisions. Hence, the study is focused on identifying and estimating the impact of internal micro level factors on WCM in Pakistan.

1.3 Nature of the Study

This study is essentially micro in nature. It focuses on the decision making by the management of a typical manufacturing firm regarding efficient management of working capital. For this purpose, it concentrates on identifying and estimating firm-specific internal micro level factors. It uses secondary level data in the estimation process. For this purpose it provides an empirical investigation in some major aspects of working capital dynamics for business firms in Pakistan.

1.4 Objectives of the Research Thesis

This study intends to achieve the following objectives after a critical review of the existing literature on this topic. The objectives also take into consideration the need realized after assessing dearth of research on industrial sector of Pakistan. The following objectives are set for analyzing working capital management and its relation with the internal and external environment of the firm and the macroeconomic conditions in the country.

- (i) To build a conceptual framework on firms-specific micro and industry-specific macro level factors.
- (ii) To examine efficiency of WCM for the large scale manufacturing sectors of Pakistan
- (iii) To identify significant firm-specific internal micro level factors leading to the efficient management of working capital in Pakistan.
- (iv) Using the derived significant internal micro factors towards projection of efficient working capital needs of indigenous business firms
- (v) To derive policy implications towards efficient WCM in Pakistan.

1.5 Study Design of Research

The study proceeds further where Chapter 2 examines existing literature on different aspects of WCM. The examination is done rather critically to find out any likely gaps in available studies on WCM. A stock of literature that covers micro and macro level factors is carefully categorized in the next chapter. Chapter 3 presents the theoretical model of the study. Chapter 4 outlines the methodology used by the study and presents discussion on results. Chapter 5 summarizes findings, provides recommendations, and inserts conclusions.

1.6 Research Scope, Assumptions and Limitations

As mentioned in Section 1.2 the scope of the study is limited to the investigation of the firm-specific internal micro level factors that can impact efficiency of WCM. It analyzes experiences of listed companies of the manufacturing sector in Pakistan. Therefore, the findings so derived

may not be applicable to non-listed sectors. The scope is limited to those businesses which are heavily invested with capital. The sampled firms strictly adhere to the criteria as only the top capital employed firms from each business sector are selected. Currently available standard text and relatively modern literature is incorporated to study the topic. Data availability is a major constraint in Pakistan, there is hardly a pool of financial database that caters to the needs of research projects in the country. A large sample of 207 firms is used where mostly secondary data is used in the analysis. A number of sources are used to gather important variables. Some of the sources include State Bank of Pakistan, Ministry of Finance, Federal Bureau of Statistics, Business Recorder, websites of sampled firms, Trade Associations for some sectors etc. Most of the data gathered is from these sources which may be subject to misreporting, errors etc. There were missing values in creating a balanced panel of data for some sectors. Such missing values are estimated using standard statistical methods. The variables used in the models are assumed to be normally distributed with low variation and having negligible influence of outliers. For testing a significant impact of internal micro level explanatory variables on operating profits pooled OLS is assumed to be a poor fit as it is subject to the problems of autocorrelation, multicollinearity and heteroskedasticity. Therefore, using standard econometric guidance, sector specific models are used after properly catering to econometric modeling constraints.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Chapter Overview

There is a vast literature that has examined various aspects of the theory and practice of WCM. In recent years the topic is more deeply studied and especially the effects of working capital and its determinants have been in focus. Interestingly, most of the writers have identified almost similar determinants for the management of working capital. There are studies that have found positive relationship between efficient WCM and profitability. But some authors have concluded a negative or no relationship at all. The authors differ on the subject though and have cross examined the topic from varying perspectives. Hypotheses are inserted by this thesis under relevant sections where a research vacuum is identifiable relevant to the objectives set earlier. Within the above framework, the review is organized as follows; Section 2.2 examines micro level factors internal to a firm. Section 2.3 take a stock of micro level factors which are deemed external to a firm. Section 2.4 gives a summary of macro level factors internal to a sector. Section 2.5 outlines a review covering macro level factors external to a sector.

2.2 Internal Micro level factors

The concept of efficiency in working capital has to be considered in light of discussions made by different researchers on the topic. The next section explores literature on efficiency and gives a critical justification for identifiable gap on this topic.

2.2.1 Working Capital Efficiency

Most of the authros seem to be focused on investigating the efficiency of WCM and there is considerable literature available on this topic. Raheman, Afza, Qayyum and Bodla (2010) are of the view that manufacturing firms in Pakistan can improve efficiency in WCM if these firms hire qualified finance individuals and improve their collections from customers. The payment patterns are a problem for these firms and efficiency can be improved if the individual components of working capital are concentrated upon. Using a panel of 204 listed manufacturing firms of Karachi Stock Exchange the authors derive that net operating profits could be improved with improvements in WCM. They report that net trade cycle, inventory turnover and cash conversion cycle are notably significant factors having an impact on operating profits. Appuhami (2009) believes that liquidity is an important factor for firms thinking of undertaking

investments for achieving growth prospects. The author reports that liquidity proxy had a positive significant relationship with investments.

Siddiquee & Khan (2009) examine the case of working capital efficiency by taking 83 listed firms from different sectors of Dhaka Stock Exchange. The authors consider a panel data set from 2003 to 2007 and follow the methodology devised by CFO Europe Magazine and REL Consultancy Group. The authors conclude after analysing the data that there are significant visible differences in working capital measures but there is no dominance visible of one firm over others in the study period. There is evidence of stacking up by firms against each other in terms of working capital measures. The authors are of the view that if working capital is managed inefficiently it would not only harm profits but also would contribute to financial crisis of business firms.

Sen and Oruc (2009) takes interest in investigating a relationship between efficiency in managing working capital and the returns they earn on total assets. For this purpose they take panel data from listed 49 production firms of Istanbul Stock Exchange. They find a significant negative relation between indicators of WCM and the returns these firms generate on their total assets. The indicators used for measuring efficiency in WCM by authors are the net working capital level, average collections period, average inventory period, current ratio, and cash conversion cycle whereas a standard procedure for calculation of return on assets is used.

Ramachandran and Janakiraman (2009) conduct a study for investigating a relationship between the efficiency of WCM with EBIT. The researchers rely on a data taken from the Paper Industry of India from 1997 to 2006 and use different indices as proxies for efficiency in WCM. They compute indices on performance, utilization, and efficiency of WCM by associating them with the conventional cash conversion cycle, days receivables days payables and days in inventory, The study introduces the control variables of size of the firm, financial debt ratio and fixed financial assets ratio. The study shows a satisfactory performance of paper industry in India in terms of efficiency of WCM. Other findings of the study include a negative relationship of days payable with EBIT and delay in payables by less profitable firms and there is a visible decrease in their cash conversion cycle.

Noreen, Khan and Abbas (2009) conduct a study for multinational firms in Pakistan. The researchers make an investigation in the international WCM practices of the said firms. The authors address the areas of sales and cash management at international level and also focus on

the foreign exchange activities of these firms. Following Ricci and Vito (2000) the authors survey four industrial groups in the twin cities of Islamabad and Rawalpindi. The research findings include that mostly firms manage working capital at the corporate level and it is generalized that firms are more interested in low cost arrangements in order to achieve greater efficiency.

Ganesan (2007) finishes a research study by taking a sample of 349 listed telecommunication equipment companies in USA for making an understanding about efficiency of WCM. Using conventional correlation and regression analyses the study finds that days in working capital has a negative relationship with profitability however the study also informs that there is no significant impact of days in working capital on profitability for the sampled firms. Banomyong (2005) shows his interest in the topic of WCM by measuring cash conversion cycle in an international supply chain. The author believes that cash conversion cycle is an efficiency measure as it shows the number of times cash cycles in a business. More cycles means more value generated for a business. In terms of managing capital the author stresses the use of cash conversion cycle calling it a 'powerful performance metric. The research work is directed at an investigation of cash conversion cycle from an international supply chain perspective. The author takes the supply chain from suppliers in Thailand to retailers in US. The product considered in frozen shrimps. The findings of the author are that the US retailers are more efficient than their Thai counterparts in the international supply chain.

According to Sayaduzzaman (2006) inventory period, receivable period and payable period are the components of working capital and in order to manage working capital efficiently we have to manage these three efficiently. According to him receivables can be managed efficiently by following a good credit and collection policy. He conducted a research on British American Tobacco Bangladesh Company Ltd (BATBCL) in order to find out that whether BATBCL efficiently manage working capital or not. Findings suggest that BATBCL efficiently managed the working capital by managing receivables, inventory and cash balances.

Because of the efficient management of these three components of working capital the company experienced higher growth and profitability. The author calls the working capital policy as highly effective and traces ample internal funds for working capital needs at the time of the study. The author recommends the following points for improving efficiency of WCM by firms "(a) Particular norms for WCM should be followed to reduce the market risk. (b) Liquidity

management activities may be more organized through using idle funds for productive investments. (c) Inter firm comparison should be made from time to time with similar organization. (d) Horizontal analysis and vertical analysis through ratio techniques would be more meaningful. (e) Financial information system should be introduced to develop financial discipline in WCM. (f) Working Capital Norms for maintaining optimum quantity of raw materials, Work-in- Progress, Finished goods & store and spares are to be developed. (g) Financial forecasting, planning and control devices are to be more intensive to enhance the efficacy of cash management.”

Shin and Soenen (1998) conduct a study to search for the efficiency of WCM. By taking accounting measures of profitability with net trade cycle they report that firms with shorter trade cycles seem to be more valuable as they have lengthier operating cash flow. The return on investment if firms do invest in short term assets is an implication that remains a question in this study. Ghosh and Maji (2004) conduct a study for listed Indian cement companies for a period from 1992 to 2002 and examine the efficiency in the WCM. Breaking the tradition of using conventional measures the efficiency of WCM is measured through computed indices on utilization, performance and overall efficiency. Their findings suggest that a portion of sampled firms did improve efficiency in terms of WCM.

In view of the above reviewed literature on efficiency it look pertinent to test some hypotheses which could inform that how firms of different sectors perceive the concept of efficiency in Pakistan, is efficiency in working capital absolute or is it relative? Most of the earlier reviewed studies take into consideration the internal performance benchmarks for checking efficiency. None of the research stock reviewed above takes into account this aspect where the efficiency in working capital of a firm can be related to the overall efficiency standards of the sectoral standards. In view of this, the following two hypotheses can be formulated on efficiency levels of manufacturing firms for managing working capital;

H₀₁: The working capital efficiency responsiveness of a firm improves in relation to its business sectors' efficiency standards with the passage of time

H₀₂: Firms of different sectors are efficiently managing their working capital

2.2.2 Credit Policy of a Firm

The credit policies of business firms significantly affect efficiency of WCM. This aspect has been considerably researched with divergent results. Michalski (2007) talks about managing

trade credit and believes that it is essential for firms trying to increase firm value. There is a debate in this work on maximizing firm value using risk and return characteristics by criticizing conventional book profit models. The implications of payment delays by firms are discussed and it is concluded that by devising a portfolio management solution the firm value can be increased. Summers and Wilson (2003) take a review of different theories towards credit extensions by business firms. The authors opine that credit extension has novel motivations than those explained by existing theories. There is agreement on the view that credit extension by corporate firms has a key marketing and relationship motivation along with sending signals to market and to potential buyers in the market. Credit extension is deemed as a simple mechanism of product promotion and of showing future prospects for such products. Another important motive for extending credit to firms is to provide finance for helping other producers produce their product by making business relationships through credit extension.

It is also observed that bigger customers can exert their influence on other firms to have more credit. Firms extending credit often vary their terms of extending credit as they hunt for more business and work towards their marketing and customer relationship ambitions. Pike and Cheng (2001) conclude a rich diversity in credit policies and practices for 154 large UK companies. The findings of their study does not support the theory of transaction economics in the context of credit management policy which suggests that credit management activity is a strong candidate for sophisticated management activity rather than hierarchical controls. This work explores the untested hypotheses of Mian and Smith's seeking to explain the diversity in the firm's use of specialized contracts and intermediaries in accounts receivable management policies; according to their analysis none of them are significant. They suggest that the contextual variables (e.g. customer concentration, marketing channel, and industry sector) and specific credit policies (e.g. credit screening, monitoring and collection policies) adoption influence the credit period taken. Longer period for credit is taken from firms which are smaller in size, customer concentration is lower, the market is highly competitive, and customers are end-users.

Peterson and Rajan (1997) emphasizes from a research work on the theories of trade credit, that there are many theories available on the subject; however there are few comprehensive empirical investigations conducted. The study focuses on small firms and finds evidence that firms having limited access to capital markets have a tendency to go for more trade credit where options of availing credit from financial institutions is scarce. The cited study presents a case of suppliers'

extension of lending to firms which are constrained for the reasons of comparative advantage in availing information about buyers. Such borrowing firms have low level of reservations in liquidating assets or in diluting equity stakes. The cited study outlines theories of trade credit namely as (i) financing advantage theory of trade credit (ii) price discrimination through trade credit (iii) transaction cost theories etc.

It is also emphasized in the cited study that suppliers usually extend trade credit to highly rated credit quality firms but use institutional finance instead if avail access. A number of reasons are provided by the researchers about extension of trade credit by suppliers like having a ready and current access to information about their credit buyers, financial distress due to declining sales, etc. The researchers conclude financing advantage for suppliers especially under the conditions of financial troubles. Such firms tend to have a direct correlation between margins and receivables and offer trade credit for price discrimination, according to the findings of this work.

The literature on this factor suggests that firms are under business pressure to accelerate their businesses by extension of trade credit. It is thought to promote the business and to send signals of sound business relationships to the market. Firms will have to be intelligent enough in extension of trade credit and optimum decisions have to be made. As tying up cash in the form of receivables can be costly, if not done wisely. The real question for a firm is how to keep a balance by announcing a winning trade credit policy that achieves objectives for a firm.

2.3.3 Inventory Management

Inventory management is regarded as key component that contributes to the costs of WCM. Scholars have come up with differing findings on this topic and its links to WCM. Michalski (2007) believes that the system of inventory management at a firm should be directed to the value maximization of the firm. It is argued that many contemporary models of managing current assets had the basic philosophy of enhancing the book value of the firm and were not essentially in conformity with the realization of enterprise value. The author presents in his research article a modified value-based inventory management model through modifications in the value-based economic order quantity and production order quantity models. The work shows that tying excess cash in inventory means higher inventory servicing costs and increased opportunity costs. The proposed valued-based modified model is aimed at helping managers in making value driven decisions towards optimal economic benefits.

Yang, Ronald and Chu (2005) conduct a study for examining WCM as an important micro level internal factor. This study presents a mixed inventory model in order to find a suitable reorder point and to develop some method to insure uniqueness of a reorder point in order to locate the optimal answer. This study emphasizes that inventory carries a huge proportion of working capital; therefore, at the micro level firms need to signify the importance of inventory management in studying WCM.

Buzacott and Zhang (2004) conduct a study on the interplay of production decisions and corporate finance. The authors view this as a limited researched area. The authors believe that there are discrepancies in the realistic application of theories as conventional models in inventory management and production ignore the financial state of a business firm. The use of asset based financing is suggested by the authors in decisions pertaining to production. In addition to budgetary constraint the researchers add cash as it is viewed to be updated period wise depending on the dynamics in production jobs.

They further make a model modification in terms of interest rates, as they differ on outstanding loans and cash balances. The authors argue that their proposed model makes an enhanced picture over conventional models in corporate finance where financing inventory by bank loans may be expensive than relying on internal cash resources. Their research work jointly considers financing and production decisions for start-up business where firms are constrained by capital reserves and they mainly depend on bank loans. The authors call asset based financing as “In asset-based financing, a lender (usually a bank) loans money to a firm with the maximum amount of the loan linked to the firm's assets in the form of cash, inventory, and accounts receivable.” This paper makes a noteworthy observation for firms seeking asset-based financing. In usual course of business, firms need asset-based financing to purchase inventory. It is important for them to know how much they should order and what level of asset-based finance should be employed. The decision of the lender (bank) and borrower (firm) depends on differing objectives. Banks do not like to be in a riskier than average position whereas firms do not like higher interest rates. The paper suggests that in face of market competition and government regulation this is a complex situation for both the parties. Banks do not want to lose business either but extending more finance to less wealthy customers is troublesome and the price of loan has to be set high. This can cause lost sales for the lender of wealthy customers.

Their research work calls for introduction of such financial constraints on production decisions. The operation decisions of a business firm are affected by such financial constraints and in determining the employment of inventories and the process of production. The authors conclude through their analysis that since banks have set parameters to extend asset-based financing they are usually well-off whereas firms would be well-off if they revert to using only their own capital.

Raman and Kim (2002) study the impact of inventory costs on the apparel manufacturing firms from the operational problems perspective. By making Northco – a US based school uniform manufacturer- the case of their work, they suggest that such firms have to consider inventories important for overcoming under-stocking and over-stocking problems. They suggest in their work that firms experiencing inventory problems should achieve lower capacity utilization and should target higher stock-out costs. This study regards WCM an important micro level factor on inventory management and presents that higher working capital cost a threat to supply chains. Holdren and Hollingshead (1999) investigate the commercial lending practices with inventory control issues and financial management practices by corporations. The authors introduce inventory management issues and then discuss inventory control procedures matching different risk and return levels.

A good review of different inventory costs relating to ordering and maintenance of inventory are prescribed in the work. According to the authors these include administrative, storage, taxes, insurance, shrinkage and capital costs. The work demonstrates the differing needs of inventory by manufacturers, distributors and retailers. It is argued that a higher turnover of inventory marks a more efficient handling of inventory by a firm. Referring to Coyle, Bardi and Langley (1992) the authors demonstrate their views as “customer service sometimes suffers if the result is the unavailability of inventoried items when needed”. There is emphasis by the authors on cost minimization of keeping average level of stocks in the firm.

A few methods are suggested by the authors for inventory segregation that would lower down the cost of holding desired level of inventories, the methods proposed are ABC classification system, criticality analysis etc. Their research further discusses the financial risk classification for inventories and argues that like any investment different levels of risk can be defined for it. Taking turnover, inventory type, product life-cycle stages a sensible discussion follows that

shows that shorter turnover reflects a lower level of financial risk whereas a longer turnover marks a higher level.

Product life-cycle stage brings a financial risk associated with inventory held for sale. It is high when the product is relatively new in terms of market acceptance and is being recently introduced. With acceptability of the product in the market with the passage of time, sales increase and this risk lessens. Once the product gets mature this risk remains nominal, in the product decline stage the risk increases again. The raw materials held would have risks depending on the alternative uses that could be had from raw materials in store. Risk on finished goods would depend on the demand for the product at the stage of its life-cycle. The author presents a scenario in which firms are encouraged to use a multiple factor analysis in assessing the risk of each category and in making a composite risk factor.

Next, the author determines interest rates for financing inventories by computing profit margin for a borrower. Maturity risk is also discussed and it is argued that shorter the maturity of a loan maturing lower is the risk and finally the author emphasizes on the improvements in the inventory control techniques towards higher efficiency and value addition.

2.2.4 Employees' Capability of Decision Making

Managers working for a firm make decisions which determine the cost and benefit of available resources. It is important to understand that people employed by a firm are capable in making profitable decisions. Key business managers have to be trained and skilled when making use of economic resources. The business orientation, personal psychology, background, experiences in life, and sense of ownership with the business interact at workplace while they make decisions. Bhattacharya (2007) makes an interesting distinction for WCM from an accountant's and finance manager's perspective. He believes that an accountant will regard working capital as current assets minus current liabilities and terms it as net working capital, a finance manager considers gross current assets as the working capital.

The concern of the two is argued as the accountant's concern is arithmetical accuracy whereas the concern of a finance manager is to find fund for each item of current assets at such costs and risks that the evolving financial structure remains balanced between the two. Another aspect described from the aspect of production controller is that working capital is the fund needed to meet the day-to-day working expenses i.e. to pay for the materials, wages and other operating expenses. It is argued that the notion of liquidity has undergone considerable changes with

advances in financial management during the recent years. Working capital structure is being so designed today in efficient organizations as to take care of this fundamental liquidity of an enterprise with zero or even negative working capital. With the evolution of the concept came the controversy about the definition of the working capital.

Ross, Westerfield and Jordan (2001) while discussing the fundamentals of corporate finance present a three tiered view of corporate finance. They break the financial decisions by a financial manager as capital budgeting “the process of planning and managing a firm’s long-term investments”, capital structure “the mixture of debt and equity maintained by a firm”, and WCM “A firm’s short-term assets and liabilities”.

Gentry, Mehta, Bhattacharyya, Cobbaut and Scaringella (1979) try to fill the literature gap by studying the management perceptions on the working capital process. The study conducts surveys in large companies of Belgium, France, Indian and the United States of America by collecting information from a sample of production, marketing, and finance executives. This interesting work evaluates the interrelated roles of company executives towards framing short term financial strategies and their understanding towards working capital process. The authors believe that there is a need to improve short term financial models and there is an explicit need to include the short term objectives in devising such models. Their study builds the importance of long term objectives by addressing the short term financial objectives. One of the important finding of this study, according to the executives of the four countries is that sales should be supported with cash, account receivables and short term borrowing in order to achieve short term financial objectives. Another rather interesting finding is that short term financial objectives does not conform to long term objectives, this looks a deviation of practice from theory.

Ricci and Vito (2000) conduct a survey for top 200 UK companies and makes an exploratory research on WCM practices on international aspects. The research paper puts forward the idea of international business and of the increasing number of US firms getting into global business. This has opened new research openings from the view fact of global financial management. The authors refer to Soenen and Aggarwal (1987) who state that “Very little is known about actual corporate practices in the areas of cash and foreign exchange management, particularly outside the US”.

Referring to the gap between international working capital practices and current research endeavors the researchers believe that this gap needs to be addressed in light of steady research.

The research design takes into account major British firms due to the reasons as UK is a top financial center in the world and is the largest trading partner of USA. This research article presents findings of a survey by Soenen, which he finished in 1986. According to Soenen in a sample of 200 firms in London, an under 70% of the firms were having a centralized cash management system. To hedge against foreign exchange exposure 83% of the firms used forward contracts. This survey did not study collection methods by firms neither it studied the credit methods nor international cash management. This gap was filled by the authors after getting responses from 102 respondents. Some key findings of the survey were that majority of the surveyed firms were making the international WCM decisions at the corporate level, a 57% response rate was recorded. For larger firms international sales are a bigger component of total sales i.e. 86% which shows a higher degree of internationalization. 68% of the surveyed firms use wire transfers despite of higher cost of such transfer mechanism. The percentage of firms that transfer funds electronically is observed from the sampled firms as 61%. More respondents favored using simple method of cash netting for effective cash management. The authors argue about international credit and cash collections management and report that in the UK open account sales is the most used procedure. Most of the respondents used more secure methods of sales through letters of credit in case of risky international customers. The use of spot markets and forward contracts is common in terms foreign exchange handling. Respondents use swaps often and sometimes or rarely use currency options may be due to higher costs. Finally the authors show that sales level on the international level have little impact on the use of vehicles used for WCM.

2.2.5 Payables Management

There is considerate understanding between practitioners of payables management that delaying payables is a good strategy to maximize value of the firm. There is negligible research on the topic. This form of short term financial management needs more research attempts.

Rafuse (1996) discusses creditor management in his work and calls it the “Darwinian Situation” implying a stage for survival of the fittest. The author views it the enforcement of terms of large companies on small companies on the basis of his knowledge.

In his view many UK companies defer account payables beyond agreed arrangements. They delay payments as long as possible and in a typical monthly payment arrangement payments beyond a month rarely are made according to promises. In his research work the author work

towards showing this as an inefficient and business damaging practice. The stance of improving working capital through delaying payables is criticized and viewed as flawed practicing strategy affecting business and economy as a whole.

The author suggests that rather a reduction in stocks and going with a “lean production” is a more effective strategy towards improved working capital. Referring to a report by UK small-business trade association, the author reports that payables are paid usually more than 50 days beyond agreed terms by business partners. A note is made about the SMEs who are effectively funding £20 billion of sales made to their larger business counterparts as their payments come late. Many SMEs vanish in the attempt of pursuing recoveries due to delaying tactics by their larger business counterparts.

The author discusses the repercussions of tying such huge amounts, had they been placed in other productive uses, it would generate larger benefits to all parties. The example of Toyota is quoted who developed a “lean” value system as described by the author “These systems, as so much else, were developed by Toyota and others in Japan over a period of 20-30 years. They entail tightly controlled, prevention based processes; no duplication of effort or capability; shared continuous improvement; and more technical (and more relevant) aspects such as extensive data sharing, EDI, paperless ordering and delivery systems, automatic payment techniques, etc.”

The author believes that a “lean” production and distribution is technically superior to a more traditional “mass production” and is adopted by many leading manufacturing firms around the world. It is argued that there is hardly any direct causal relationship between achieved margins and creditor days as there are numerous operating factors, however, for many world-class companies a substantial lower level of creditors in an undeniable fact that shows a particular accounts payable approach of these firms. The names of the some of the companies sticking to this particular approach of payables management is Beecham, Glaxo, Welcome, Sainsbury, Tesco, Boots, Great Universal Stores, Marks and Spencer. According to the author, to comparable firms in their sectors the creditor levels were 30% lower in terms of payment days outstanding while in term of operating margins they ranged 40-50% above their comparators. Most of these companies are also marked at maintaining lower stock levels. The article compares US giant Wal-Mart with K-Mart where 30 years ago K-Mart was having eight times as many stores stands second now. Wal-Mart has specialized in many respects but especially in its dealing

with its suppliers, it has an average 29 days payable period compared to 45 days payable period of K-Mart.

2.2.6 Receivables Management

Like payables management little evidence can be quoted for the impact of receivables management on the overall WCM policies and strategies of a business firms.

Zainudin (2008) conducts a study for 279 firms in Malaysia to study their credit collection practices. The author believes that profits are dependent on turnover of capital for the said firms. By taking financial data for the period 1999 to 2002 the author examines the collection periods and relates it with profitability. The author presents in his conclusions that effective management of trade credit brings economic value and some industry sectors are better than others in collection to trade credit. A negative relation is also reported between financial performance and trade collection period. Firms with better collection mechanisms are found to have better reinvestment position. It is also found that trade collection period has negative association with company size and smaller firms take long to clear their bills. The study further reports that larger firms dictate their smaller counterparts in trade credit relationships.

Michalski (2007) views maximization of the firm value as the main financial purpose of a business organization. The research work analyzes that conventional models of managing current assets are directed towards book profit maximization which shows a limited sense towards optimization of enterprise value which should be built on notions of risk and uncertainty. The research focuses on operating risk that builds due to purchasers' postponement of due bills to the enterprise. This work builds a portfolio management model that ensures the level of accounts receivables deemed as a most significant factor towards efficient WCM. An increase in the level of accounts receivables is a dangerous proposition as it contributes to cost of holding and managing of an important ingredient of working capital. This is considered as a threat to the value of the firm.

The authors suggest that a portfolio management approach in addition with a liberal policy of accounts receivables could enhance value of the firm. This research work shows that free cash flows to a firm reduce as receivables enlarge and a firm if reverts to portfolio management approach and evaluates customers with informed credit risk, it would be able to add more value by determining both an optimal level of receivables and minimizing costs and bad debts. Holding receivables longer is costly and higher levels increase the net working capital of a business firm.

The author concludes that the value of a firm lowers down due to higher levels of accounts receivables and a liberal policy in collecting accounts is detrimental for business objectives. For this the author presents a portfolio management solution which can work towards increasing firm value.

2.2.7 Profitability

The most important consideration for obtaining efficiency of WCM of a firm is the issue of profitability the literature has extensively discussed. Therefore, the review on this factor naturally turns out to be relatively large. Profitability of a business as an internal micro level factor is the net result of numerous internal strengths and weaknesses of a business organization. For instance, a typical organization has to convert its strengths into profits and has to avoid its weaknesses to fade its profits by increasing costs of the business. Profitability of a manufacturing firm can be attributed to a number of factors, however with respect to WCM, it has been investigated by many scholars around the world.

One of the latest study by Gill, Biger and Mathur (2010) following Lazaridis and Tryfonidis (2006) investigate firm profitability linked to its WCM. In their study they consider relevant data from 88 US listed firms for a period of 2005-2007. The panel dataset from New York Stock Exchange is studied only for 3 years. The study relies upon the proxy variables of accounts receivables and payables, cash conversion cycle, inventory, debt ratio, fixed financial asset ratio, size of the firm, and operating profit (gross). The authors are of the view that their study investigates the influence of working capital on profitability for American manufacturing business. They find a significant relationship between the indicator of profit taken as gross operating profit and cash conversion cycle which is taken as a proxy for WCM. Their findings suggest that firms can increase profitability if receivables are handled optimally and cash conversion cycle is reduced to a minimum.

Another significant study by Dong & Su (2010) investigate the relationship of working capital with profitability by taking a data from listed firms of Vietnam Stock Exchange. Using a panel from 2006 to 2008 the authors report, on the basis of their analysis that an increase in the cycle of cash conversion has a negative association with the profitability of firms. The conclusions of the work are that firms have to optimize different components of cash conversion cycle. The findings of this work are in conformity with other contemporary research that supports a strong negative relationship of average days receivables, cash conversion cycle, and average days in

inventory with profitability of firms. This study shows an opposite finding compared to the earlier study.

In line with the above study Falope and Ajilore (2009) study the same research question for a sample of Nigerian non-financial firms. Using a panel of 1996-2005 period for 50 sampled firms they find a significantly negative relationship between their proxy of profitability, in this case taken as net operating profit, with proxies of working capital i.e. receivables period (in days), inventory turnover (in days), payables period (in days), and cash conversion cycle. The study further adds the negation of any significant variations in working capital effects between small and large firms. Further, breaking new ground on the issue of profitability Zariyawati, Annuar, Taufiq and Rahim (2009) maintain that there is neglect of working capital in terms of financial decision making by practitioners as most of the managers worry about capital investments rather than current investments. The researchers emphasize on balancing the liquidity-profitability trade-offs and investigate the relationship of profitability of firms in Malaysia with the way they manage their working capital. They consider a panel dataset from 1996 to 2006 consisting of six industrial sectors for Malaysian firms listed on Bursa Stock Exchange. Considering a 1628 firm-year data their study concludes that cash conversion cycle is significantly negatively related to profitability for the sampled firms. This implies for the firms that a decrease in cash conversion cycle results more in profitability, therefore, managers should concentrate on reducing cash conversion cycle.

Mathuva (2009) checks the relationship between corporate profitability and WCM. This is done by taking a financial data on 30 listed firms from Nairobi Stock Exchange from 1993 to 2008. Using fixed effects and OLS regressions the author reports a significant negative relationship between accounts collection period and profitability. The findings include a statistically significant relationship which is positive between days in inventory and profitability for firms. This is a confusing finding as previous research shows a negative relationship. The study also reports a significant positive relationship between average payable days and profitability. The implications of the study are that firms that hold higher level of inventory seem more profitable, it also seems that delaying payments to suppliers and faster collection of due bills from customers are strategies directed towards increasing profitability.

Nobanee and Al Hajjar (2009) conducts a study for manufacturing firms listed on New York Stock Exchange, American Stock Exchange, NASDAQ Stock Market, and OTC Market for an

investigation of the relationship between working capital, operating cash flows and company performance. After taking a panel dataset from 1990 to 2004 for 5802 firms, the researchers analyze the underlying relationships and are of the view on the basis of their findings that if cash conversion cycle could be shortened by financial managers, it would pay economic dividends in terms of increased profitability and improved operating cash flows. For doing this they believe that only if firms could concentrate on reducing average receivables period the performance notion could be drastically improved. Another considerable finding reported by the authors in their work is that prolonging the average payable period and reducing conversion period is a dangerous proposition towards profitability and has a negative effect on operating cash flows of firms. This is interesting in the sense that mostly researchers have been concluding that average payable period and inventory conversion period should be short.

Samiloglu and Demirgunes (2008) study on a sample of companies listed on Istanbul Stock Exchange for the period of 1998-2007 in order to find out the relation between WCM and profitability of firms. Using ROA as a dependant variable and inventory turnover, receivables turn over, cash conversion cycle as independent variables the study finds that inventory turnover, receivables turnover and leverage is negatively where as growth in sales is positively related to the profitability of firms. Their used models controlled the effects of firm size, sales, leverage and fixed financial assets. The results suggest that cash conversion cycle, size of firm and fixed financial assets don't have any significant relationship with profitability. Firm can increase profitability if it shorten receivable and inventory period.

Anand and Malhotra (2007) attempt to study performance of WCM by developing objective metrics at the firm and industry level for Corporate India for the period 2001-02 to 2003-04. In their study they use data from 339 non-financial companies. On the basis of the estimated results their study reports that the length of operating cycle and cash conversion cycle have reduced for Corporate India. Further, their study finds little evidence on the positive relationship between WCM and firm profitability. The study further reports that operating cycle and cycle of cash conversion have reduced during the study period which indicates improvement in managing working capital. Raheman and Nasr (2007) initiate a study with a premise that management of working capital affects both profitability and liquidity and concludes that WCM is an essential tool for measuring the operational and financial efficiency of a company and involves a great deal of strategic and operational thinking before adopting a particular strategy. Their study

analyzes behavior of 94 Pakistani listed firms on Karachi Stock Exchange for a period of 6 years from 1999 to 2004. This study finds a significant negative relationship between liquidity and profitability. By using size of the firm and debt ratios as control variables it also reports a strong negative relationship between variables of the WCM and profitability of Pakistani firms. They opine that an increase in cash conversion cycle will have negative implications on profitability of firms and it is possible to increase shareholders value by working towards reduction of cash conversion cycle. This work also demonstrates that size of the firm is in positive relationship while debt used by a firm is in negative relationship with profitability.

According to Vishnani and Shah (2007) the inventory holding periods, debtor's collection period and net working capital cycle are the indicators of operational efficiency of a company, hence lower these three figures better is the operational efficiency. They carried out a study by using a sample of 23 Indian listed companies of electronics industry for the period 1994-2005. Results showed that there is negative relation between ROCE and inventory holding periods, debtor's collection period and net working capital cycle; and positive relation between ROCE and creditors payment period.

Lazaridis and Tryfonidis (2006) in their work investigate the relationship between corporate profitability and WCM by analyzing experience of 131 companies listed on the Athens Stock Exchange during 2001 to 2004. They find that if the cash conversion cycle is reduced and if different components like accounts receivable, accounts payable, inventory are kept to an optimum level, then profitability increases which increases value of the business.

Padachi (2006) conducts a study to examine trends in WCM and its impact on firms' performance by using panel data analysis for the period 1998-2003. This study is based on 58 small Mauritian manufacturing firms and has taken an unbalanced panel data set of 340 firm-year observations. The study finds high investment in inventories and receivables is associated with lower profitability. This work performs a comparative analysis of five major industry groups and finds that there is a significant positive correlation between operating profit margin and return on total assets whereas a negative correlation between WCM and return on total assets. The author observes that there is a positive impact of WCM on profitability.

There are a few studies in Pakistani context like Khan, Shah and Hijazi (2006). They take a dataset on 30 listed Pakistani non-financial firms and investigate the relationship between WCM and the corporate profitability of the non-financial firms. The study analyzes the effects of

working capital on the profitability of firms; their results show a significant negative relationship between firms' gross profit and the number of days inventories, accounts payable and cash conversion cycle.

Shah and Sana (2006) analyze the relationship for the listed Oil and Gas sector of Pakistan for the period 2001-2005, their analysis show that managers can generate positive returns for the shareholders by managing working capital and such management practices adequately explain changes in profitability of the firm. Their study involves the application of correlation and ordinary least square method using fixed effect estimation model. The results of this study show that there is a negative relationship between gross profit margin and number of days inventory and number of days accounts receivable, cash conversion cycle and sales growth. The regression analysis used in the study shows that joint effect of all coefficients is significant thereby indicating that WCM affects profitability of the firms. The analysis shows a positive relation between gross profit margin and the number of day's accounts payable and they reported about the existence of firm effect. Moreover the study indicates that WCM practices adequately explain changes in profitability of the firms in Oil and Gas sector of Pakistan. Martinez-Solano and Garcia-Teruel (2006) study to find a relationship between the working capital and profitability of SMEs of Spain. They take a sample of 8,872 SMEs for the period of 1996-2002 and panel data methodology was used. Return on assets was used as dependant variable to determine profitability. Number of days inventory, number of days receivable, number of days payable and cash conversion cycle was used as an independent variables and control variables are growth in sales, size of the firm, leverage and gross domestic product. The study finds out that managers can increase firm's profitability if they succeeded to reduce cash conversion cycle. As reduction in cash conversion cycle indicates efficient management of working capital. So from this it can be concluded that WCM is positively related to profitability.

Deloof (2003) suggests on the basis of 1009 non-financial Belgian firms over the period 1992-1996 that managers can create value for their shareholders by reducing the number of days accounts receivable and inventories to a reasonable minimum. According to the findings by the author there is a negative relation between gross operating income and the measures of WCM i.e. number of days account receivable, inventories, accounts payable and cash conversion cycle. The study reveals that there is a negative relation between accounts payable and profitability, and

is consistent with the view that less profitable firms wait longer to pay their bills. The study also informs that the coefficient of the accounts receivable is negative and highly significant.

The literature review given above examines profitability of a firm can be positively or negatively related to efficiency of WCM. Some studies support a positive relationship while there are others that conclude a negative or no relationship. Again, the literature either takes random sample of firms or concentrates on a single sector. There is dearth on the question of relating performance with working capital in light of most plausible internal or external factors affecting the business performance. This creates a vacuum which could be addressed by putting a proposition to test the similarity of factors in different manufacturing sectors. This could enable us to understand that are the factors uniform across different sectors or they are different. Some of the factors in this respect could be the components of working capital, fixed asset turnover, level of debt employed, size of the firm etc. In light of the reviewed literature in the preceding section the following null hypothesis can be formulated for indigenous manufacturing firms;

H₀₃: There are similar firm-specific internal micro level factors of working capital which significantly affect business performance of firms in manufacturing sectors

2.2.8 Liquidity Needs

Business firms need to have ample liquidity to smoothly perform the business activities. Scholars have extensively researched this aspect and have reached to different findings on it. Liquidity is generally known as the ability of a firm to meet its short term obligations which may be interest or non-interest bearing. Liquidity measures the ability of a company to fulfill all of its obligations. No firm can operate without liquidity. Profitability is the rate of return on company's investment. Liquidity can be increased by investing in current assets but an unnecessary high investment in short-term assets would reduce profitability.

Kaur (2010) while emphasising on the significance of WCM takes a dataset of 8 years from 1999 to 2007 for Indian Tyre Industry. The author performs a number of analysis aimed at studying working capital practices. The author believes after findings that the trade off is visible for firms in the said industry. Being more liquid is taken as one end which indicates lower investment in other business projects while firms with low liquidity are taken on the other end where the risk of dues clearance is believed to be detrimental in the survival of the business. The author also finds a direct relationship between efficiency in WCM and the profitability indicators of the said industry. The study is found limited in many respects, the results of Tyre Industry cannot be

generalized to other sectors of the economy. A direct relationship between WCM and profitability will depend on a number of indogenous and exogenous factors that are not incorporated in the study.

Dash and Ravipati (2009) suggest a goal programming model for creating a balance between profitability and liquidity by effective working capital decisions while minimizing the opportunity cost of excess liquidity. Goal programming is a multi-objective optimization technique widely used in operations management. This study is aimed at mechanizing profitability and liquidity whereas theoretically it is believed that they are usually in a reverse relationship. The usual recorded proxies for liquidity are year-end figures from financial statements, but liquidity is more dynamic than that. Firms need liquidity when there is a need for it. A suggested goal programming model is going to have a short coming of having a static picture of rather a dynamic scenario. The authors of this study developed this model in light of a study earlier conducted by Uyar (2009) that provide industry benchmarks for cash conversion cycle so that firm can evaluate their performance against benchmarks and can protect themselves against possible liquidity problems.

Uyar (2009) conducted a research on 166 merchandising and manufacturing corporations listed on Istanbul Stock Exchange for the year 2007 in order to find out a relationship between CCC and profitability and size of the firm. The study reports a negative relationship between cash conversion cycle and firm size. The study further finds that there is a negative relationship between cash conversion cycle and profitability of a firm. This study again limits itself in putting a wholistic view of working capital and its effects on profitability. The cross-sectional study will have little understanding for the time variance in working capital. There could be a number of internal or external circumstances that affect any such relationships. Sushma & Bhupesh (2007) are of the view that liquidity and profitability are two vital aspects of corporate business life. Zainudin (2006) examines the relationship between profitability and liquidity by taking financial data from manufacturing sectors of Malaysia. The author reports a positive association for liquidity levels and concludes that larger firms tend to have bigger liquidity levels. Liquidity levels are also reported to be different for different sectors. Another important finding reported by the author is that more profitable firms keep higher levels of liquidity which supports the argument that liquidity needs can be easily linked to the efficiency of WCM.

The ratios introduced by Gitman (2005) for assessment of liquidity of a firm are the current ratio and the quick ratio or the acid-test. According to this author "Financial ratios can be divided for convenience into five basic categories: liquidity, activity, debt, profitability, and market ratios. Liquidity, activity, and debt ratios primarily measure risk. Profitability ratios measure return. Market ratios capture both risk and return." The book further introduces inventory turnover, average collection period, average payment period, total asset turnover as activity ratios, it presents debt ratio, times interest earned, fixed-payment coverage ratio as debt ratios with common size income statements, gross profit margin, operating profit margin, net profit margin, earnings per share, returns on total assets, return on common equity as profitability ratios. Finally the book introduces market ratios as price/earnings ratio and market/book ratio. The authors conclude financial assessment of a company on Dupont and Modified Dupont systems. The author is of the view that "Current assets represent about 40% of total assets, and current liabilities account for 26% of total liabilities in U.S. manufacturing firms." This information shows the weight of managing current assets and current liabilities.

It is further argued in the text that a firm with more predictable cash flows is better placed in terms of managing working capital. Business firms are more liquid if they level of net working capital is high, which suggest more current assets than current liabilities are available to meet short term maturing obligations. However, the book raises an important concern about the liquidness of current assets since some are more liquid than others. Prepaid expenses and inventory are regarded as less liquid current assets as firms need liquidity to remain in business. In such cases even with high level of a positive net working capital business firms may be facing difficulties in meeting short term payments and may opt for financing working capital with long term funds. Gitman calls it technical insolvency. High level of current assets in ratio to total assets is thought to be a low profitable state of business affairs. The short term financing strategy of a firm is deemed dependent on seasonal or permanent requirements. In such a case firms may pursue aggressive or conservative financing policies.

According to the author "An *aggressive strategy* finances a firm's seasonal needs, and possibly some of its permanent needs, with short-term funds, including trade credit as well as bank lines of credit or commercial paper. This approach seeks to increase profit by using as much of the less expensive short-term financing as possible, but increases risk since the firm operates with minimum net working capital, which could become negative. Another factor contributing to risk

is the potential to quickly arrange for long-term funding, which is generally more difficult to negotiate, to cover shortfalls in seasonal needs.

The *conservative strategy* finances all expected fund requirements with long-term funds, while short-term funds are reserved for use in the event of an emergency. This strategy results in relatively lower profits, since the firm uses more of the expensive long-term financing and may pay interest on unneeded funds. The conservative approach has less risk because of the high level of net working capital (i.e., liquidity) which is maintained; the firm has reserved short-term borrowing power for meeting unexpected fund demands.”

The emphasis on cash conversion cycle is note worthy and it is viewed that extension in this cycle is costly for firms as it may tie up current assets. The debate on investment in current assets extends to the competing objectives of different managers like the financial, purchasing, marketing, production managers. These managers have their own agenda for enhancing the firm value. Purchasing managers optimize purchasing decisions through availability of trade discounts therefore buying in bulk makes sense to them for value enhancement. Financial managers are interested in keeping inventory levels low so that financing costs may be reduced. Marketing managers usually are interested in more finished goods so that firm value could be enhanced through the offer of sales incentives. For manufacturing managers the notion of increasing firm value is in the smooth production function where there is no shortage of raw materials and no shortage in meeting demands of customers. The interplay of these managerial objectives put unseen pressures on the WCM of a firm. Finally the book presents different inventory models like the ABC model, the JIT model, the EOQ model, and the MRP model.

Bruinshoofd and Kool (2004) conclude that the corporate liquidity ratio is an actively managed financial ratio and does not passively adjust to financial decisions taken elsewhere in the firm. According to them based on long run evidence, a pecking order theory of corporate liquidity holdings must be rejected for a balanced panel of large Dutch non-financial firms during the period 1977-1997 using an error-correction framework. The authors report that firms tend to keep long range liquidity targets and they adjust to liquidity shocks which occur in the short run, but in the long run they revert back to long term targets.

According to Afza and Nazir (2007) short-term assets and liabilities are important components of total assets and needs to be carefully analyzed. Management of these short-term assets and liabilities demands a careful investigation as managing short term assets means managing

working capital and the WCM plays an important role for the firm's profitability and risk as well as its value. Efficient management of working capital is a fundamental part of the overall corporate strategy as it plays an important role in creating value for the shareholders. Firms try to keep such an optimal level of working capital that keep balance between liquidity and profitability and maximizes their value.

Eljelly (2004) gets in the investigation of profitability and liquidity through an empirical examination by taking dataset on financials of 929 firms in Saudi Arabia. The proxy for profitability used in this research work is cash conversion cycle termed as cash gap whereas current ratio is used as an indicator of liquidity for the said firms. The author of this research finds a significant negative relationship between the liquidity level a firm maintains and the profitability it generates. The findings are indicative of firms having lengthy cash conversion cycles and higher current ratios. Though this study conforms to pragmatic finance thinking, however the study does not go beyond it and neither identifies what are the most plausible factors that is behind this relationship neither it talks about how to manage the inverse liquidity-profitability trade-offs.

At the industry level the findings suggest that cash gap bears more importance compared to current ratio as a measure of liquidity. It is also found in the analysis that firm size is significantly related to profitability suggesting that higher sales tend to increase profitability. Kim, Mauer and Sherman (1998) conduct a study to model a business firm's decision for liquidity when employing external financing is a costly option. This work portrays a tradeoff for optimizing liquidity through minimizing external financing as it is costly and smaller returns realized on liquid assets.

Their model shows using large panel of US industrial firms from 1975 to 1994 that there is increase in optimal investment of liquidity whenever there is more variance in future cash flows, need for external financing, and a speculative need for liquidity like future investment projects. The research further asserts that investment in liquidity decreases for these firms when differentials exist between returns of physical assets and liquid assets. Further findings of the research are that a high portion of liquid assets is kept by those firms which have a higher market-to-book ratio.

There is a negative relation between liquidity and firm size and the model suggested in the research article shows positive association between cost financing (external) and liquidity level

maintained. Other findings of their research include a finding that if a firm is earning low returns on its employed physical assets compared to returns from liquid assets and has volatile earnings; such firms have a tendency to invest more in liquid assets. The final finding reported by the article is a significant positive relationship between promising future macroeconomic conditions and liquidity.

The store of research reviewed in the preceding paragraphs clearly demonstrates that there is enough room to address the gaps. Most of the studies are either validating or negating the existing theoretical understanding between liquidity and profitability. Little work is found on addressing the liquidity-profitability trade-off. For building a rational modal on this issue, it is a must that the underlying factors that influence liquidity are identified and their significant influence gauged. This thesis is not going to attempt building a model that creates a balance between liquidity and profitability. However, this thesis can formulate the following hypotheses to identify the most significant internal micro level factors affecting liquidity and working capital requirements. There are possible firm specific internal or external factors or industry level internal or external factors that influence the working capital requirements or liquidity needs of firms, in view of that the following hypotheses are formulated;

H₀₄: Firm-specific internal micro level factors significantly impact the working capital requirements of business firms

H₀₅: Business level internal micro level factors significantly impact the liquidity needs of business firms

2.2.9 Corporate Governance

Researchers in corporate finance have explored the implications of corporate governance and international practices on WCM. Kieschnick, LaPlante and Moussawi (2006) report for US public corporations from 1990 through 2004 that industry practices, firm size, future firm sales growth, the proportion of external directors on a board, executive compensation (current portion), and chief executive officers' share ownership significantly influences the efficiency of a company's WCM. Their study finds that on average such firms have over-investment in their working capital. The study finds that the inefficiency of a firm's WCM is positively correlated with firm size and uncorrelated with its industry concentration. The interpretation suggests that firms are not using their market power at the margin to improve the efficiency of their WCM performance that is consistent with the monitoring of management role of outside directors.

Stock ownership and chief executive officers' compensation are also deemed important. The chief executive officers' current compensation effectively improves the firm's WCM performance but on the contrary if a chief executive officer holds a larger share of firm's stock it worsens the working capital performance of the firms, the study concludes. The findings emphasize the role of board monitoring of management and management's compensation in its control of the firm's working capital. Changes in economic activity may potentially affect the WCM of small or large scale firms. Sathamoorthi (2002) emphasises on the effects of good corporate governance on management of assets in business. The author favors the idea that more importance has been given to fixed asset investments. Research and practice both are in favor of the topic. The study highlights the neglect of effective WCM that has been making a significant difference. The study also works towards aggressive-conservative approaches after analyzing sampled Botswanian firms from 1993 to 1997. The conclusion reported is that the sampled firms use aggressive approaches for managing working capital.

2.3 Micro Level Factors – External to a firm

2.3.1 Customer Needs

In the task environment of a business the most considerate factor is to keep the customers loyal and happy. The differing needs of customers have to be looked into while producing or marketing different products. Some researchers have their conclusions on this topic. Bielenberg (1993) addresses WCM from the customer's perspective. In this study problems faced by firms of seeking cost-effective methods of attracting customers is explored. Such firms emphasize on loyalty of customers and identify ways through which firms can deflect becoming slaves to price wars, marketing gimmicks or the hype of technology. The study justifies that firms in maturing markets should depend on every aspect of organization ensuring service quality and identify WCM as an important external micro level factor.

2.3.2 Supplier Covenants

Business to business transactions subject the buyers and sellers to observable constraints. Delayed or sub-standard supplies result in late production schedules and lost sales. The supplier covenants have to be considered while designing working capital strategies. Little research input is observable in this regard. DeAngelo, DeAngelo and Wruck (2001) find supplier covenants collaboration as a major micro level external factor affecting WCM. This study takes the case of L.A.Gear, a hot stock in 1980's. The paper presents an insight in operating discretion of

managers during financial distress. It directs attention to maturing debts, cash balances, and debt contracts. L.A. Gear is presented as a lesson for companies where supplier covenants collaboration mechanisms exist. The company with equity worth of over one billion US dollars turned to a zero market value in less than ten years due to such covenants.

2.3.3 Shareholders' Wealth

Business firms exist to maximize the wealth of its owners. It is important to consider this in every form of management. Some scholars have taken a note of this. Vernimmen, Quiry, Dallochio, Le Fur and Salvi (2005) believe that investment is the key to value creation where investment is either creation of new fixed assets or generation of working capital. The book makes enlightening observations regarding the interest of shareholders and debt providers towards a business firm. Shareholders' want to see their companies creating more and more value whereas the debt providers interest differ in the sense that they want a firm to remain liquid enough to pay back their debt along with interest.

Another considerable observation is the nature of working capital where the authors argue that though it is liquid and components of working capital vanish in an accounting period; however working capital is a permanency that resurges in every accounting period. The authors describe it as "Working capital is two-sided. From the point of view of balance sheet value, it is liquid. From a going concern point of view, it is permanent."

2.3.4 Financing Opportunities and Requirements

Business firms need finances to support all business needs. Financial markets offer a number of short term and long term financial incentives. It is important to look into financing arrangements for WCM. There is significant insight of scholars available on this topic. Banos-Caballero, Garcia-Teruel and Martinez-Solano (2010) consider whether information asymmetries determine WCM of a firm. The study informs that in firms with financial constraints there is a competition between funds of working capital funds and investment in fixed assets. The study further reveals that WCM depends on cost of financing, internal financing options and access to capital markets. Boisjoly (2009) conducts a study for checking the influence of an aggressive working capital policy on the financial ratios of a company. He finds and reports the importance of payables management and cash flows in the overall financial management of a firm. The findings are based on financial data of 50 largest non-bank companies from 1990 to 2004. The emphasis in this study is to determine an impact between management practices and financial ratios. The

author reports that cash flow per share significantly improved for these companies due to aggressive management of working capital and increased productivity.

Nazir & Afza (2009) in their research endeavor test the traditional relationship between a firm's profitability and its WCM. The researchers use a balance panel data set from 1998 to 2005 using 16 industrial groups of Karachi Stock Exchange towards checking the impact of aggressive investment in working capital financing policies of firms. Using Tobin's q and return on assets the authors conclude that managers if stick to a conservative approach will be better placed in terms of creating value for the firm. The authors also conclude that firms that stick to aggressive management of short term liabilities are highly weighed by investors. A negative association between the aggressiveness degree of working capital investment and profitability measures is reported. Appuhami (2008) attempts to explore the relationship using financial data collected from listed companies of Thailand Stock Exchange. His study follows the work of Shulman & Cox (1985) and takes into consideration the suggested proxies for measuring WCM. Using multiple regression models in light of working capital requirement and net liquidity balance the research reports that the capital expenditure of firms listed on Thailand Stock Exchange significantly affects the WCM. Using operating cash flow as a control variable it is also reported that it is significantly related to WCM which is believed to be consistent with previous conducted studies on the topic.

Nazir and Afza (2008) view that contemporary research in finance has been mainly taking an examination of main theme topics only such as investments, dividends, valuation decisions, capital structure etc. They emphasize the importance of short term financial decision making relating to current assets and current liabilities. Referring to Smith (1980) the authors signify the implications of WCM on the value, risk, and profitability of firms. Referring to their earlier studies, the authors search for factors that might determine working capital requirements of a firm; they use a data of 204 manufacturing firms from 1998 to 2006 from Karachi Stock Exchange of 16 industrial groups. They use working capital requirement as the explained variable and different economic and financial factors as explanatory variables. The factors included are leverage, level of economic activity, firm growth, operating cash flow, size of the firm, industry, tobin's q, operating cycle of the firm, and return on assets. The authors report through their research findings that leverage, return on assets, operating cycle, and tobin's q as

important internal factors that determine the working capital requirements significantly whereas the practices are differently pursued by different industrial groups.

Afza and Nazir (2007) show more or less the same results as reported by the authors in their conference readings and research publications. Salawu (2006) completes a study of fifteen diverse industrial groups of Nigeria over an extended period to establish a relationship between aggressive and conservative working capital practices. The results from the study show that industries have significantly different current asset management policies and there is a significant negative correlation between industry asset and liability policies. It further inserts that relatively aggressive working capital asset management seems balanced by relatively conservative working capital financial management. His study considers the variables of current liability, current assets and total assets for 42 companies in fifteen different industries/sectors quoted on Nigeria Stock Exchange between 1994 and 2003, the number of companies range from 1 to 8 in each industry/sector. The study reveals an interesting finding that when relatively aggressive working capital policies are followed they are balanced by relative conservative working capital policies and a firm deciding its working capital policies should consider the policies adopted in the industry in which it operates as working capital policies are industry specific and so differ from one industry to another. The study reports that a firm pursuing aggressive working capital investment policy should match it with a conservative working capital financing and deems it important to mitigate the risk being faced under aggressive working capital investment policies by safely involved under conservative working capital financing policy.

2.3.5 Seasonal Needs

WCM to a great degree is exposed to seasonal sales demand for different products. Seasonal fluctuations occur in sales and manufacturing firms have to be better planned in terms of inventory & production management. Working capital strategist have to consider the compelling reasons for keeping fixed or variable working capital in this regard. Gopal (2008) categorizes working capital as permanent or fluctuating in his own words as “Permanent or fixed working capital is that portion of working capital, which is necessarily required to carry on the business operations. This amount is permanent in the business, as fixed assets are. For example, a certain amount of inventory or receivables is permanent in the business, irrespective of the volume of sales. This level would remain constant during the peak as well as non-peak season. In other words, this level does not fluctuate, with the change in volume of business.” While the

fluctuating as “The extra working capital needed to support the changing production and sales is called the fluctuating or variable working capital.

The classical example is *Divali* period, when sales are normally high. To manufacture the increased inventory, more raw materials are needed and equally work-in-process would also be more, during the period of production. Once, the season is over, the increased inventory held for the season disappears. This picture appears in the seasonal business too. In seasonal industries, the inventory would be the highest during the peak season.

During the sugar cane crushing season, the inventory level would be the highest when the season is in progress. Once season is over and inventory is sold, the working capital level would be the lowest.” The author further goes on and presents the factors of WCM as business nature, scale of operations, the sales and demand for a product, production policy and existing technology, credit policy, credit availability, operating efficiency, seasonality of business, production competencies, business cycles, price level changes, and working capital cycle. The author mentions the liquidity profitability trade-off in the following paragraph.

“Both liquidity and profitability do not go together. Let us see the situation when the firm follows liberal credit policy. More credit sales require more working capital, as more funds would be tied up in receivables. So, when a firm follows liberal credit policy, it experiences liquidity crunch. However, it would have higher profits. When the firm switches to follow stringent credit policy, it would discontinue sales to those customers who have been taking longer time for payments or their creditworthiness has become doubtful. Lesser sales ease the problem on liquidity front. As a result, firm would not have liquidity problems. However, less sales result in lesser profits and profitability problem commences. So, profitability and liquidity are the two conflicting issues.”

Theoretically speaking, the life of working capital is limited and for many firms it does not exceed a year, however in practice some level of investment always remain permanent. This means that to keep business going in the long run some level of investment remains locked up in unfinished and finished stocks with some materials in process. Almost every business carries forward these components to the next year financial statements. A minimum level of current assets is permanent working capital while current assets needed to take care of fluctuations in business activities is variable working capital. Predicting the level is easy for permanent working capital while it is a tough challenge in case of variable working capital.

After critical reviews of literature in Section 2.2 & Section 2.3 that details a number of factors. This thesis inserts employees' capability of decision making in addition to liquidity proxy, debt employment, business performance, growth etc and formulates the following hypotheses for different sectors of manufacturing firms in Pakistan;

H₀₆: Policy induced internal micro level factors significantly affect the efficiency of WCM

2.4 Macro Level Factors – Internal to a sector

Macro level factors are those factors identified by researchers that affect both the societal and task environment of a business firm. The internal factors are identified as those factors affecting the task or sector environment for a business firm. They include the regulatory framework under which a business performs, social responsibility of the firms for society in general, sector specific competition, or the industries effects like demand supply forces that affect a specific industry.

Along with the set of internal sector specific factors there are external macroeconomic forces like the state of the economy in general. When economies are performing better a number of economic indicators show an upward trend like the Gross Domestic Product, Foreign Direct & Indirect Investment, Employment figures, Production Indices etc. Poor performing economies affect the cost of doing business and have implications on short term and long term financial management of business firms.

2.4.1 Industry Effects

An industry remains exposed to shocks like raw material scarcity, technological changes, regulatory changes etc. There may be sector specific concentration of investment, ease of discounts etc. Some authors have their findings on industry effects.

Talat (2008) believes that there exist significant differences in investment and financing policies of WCM in different industrial sectors of Pakistan. They find consistency in this practice after studying the relationship from a data ranging from 1998 to 2003 for 17 industrial units for firms listed on Karachi Stock Exchange.

Filbeck and Krueger (2005) conduct a study for firms that can lessen financing costs and can increase funds for expansions by investing lesser funds in current assets. They use CFO magazine's annual surveys on WCM and find that there are significant differences between WCM of firms across time. They also find that the measures for working capital do change

significantly across time within industries. This suggests that there is a considerable competitor effect on WCM from the perspective of firm's external micro level.

Chiou & Cheng (2006) study using a 19180 firm/quarter data to assess the determining factors of working capital for Taiwanese companies. They analyze and report on the basis of their literature review that industry effect, debt ratio, business indicator, company growth, performance and firm size may be important and significant determinants for WCM. They use net liquid balance as a proxy for WCM as it is supported by Shulman and Cox (1985) and Hawawini, Viallet and Vora (1986). Another measure supported by these researchers for measuring WCM of a firm is working capital requirements. Both these measures are favored by the authors than traditional approaches of measurements for WCM. The authors report after analysis towards their posed hypotheses that debt ratio along with operating cash flow are significant determinants whereas company growth, company performance, firm size, business cycles seem inconsistent towards determining WCM of Taiwanese firms.

2.4.2 Sectoral Differences

Different economic sectors perform differently. Scholars have come up with their findings in this regard but it is important to find the implications on WCM. Nazir and Afza (2009) work on the determining factors of WCM in Pakistan. This study considers 14 industrial groups and takes 132 manufacturing firms from Karachi Stock Exchange for the period 2004-07. The study takes a number of micro/macro level factors as determinants like operating cycle of the firm, firm's growth, level of economic activity, level of industry activity and deem them important factors determining WCM of a firm.

Kieschnick, LaPlante and Moussawi (2006) are of the view that there has been little importance dedicated in the past on researching the implications and consequences of working capital on value of the firm. Their research work targets the same. Using a panel dataset of US corporations from 1990 to 2004 they provide statistical evidence in conformity with other contemporary surveys on the topic that there is a significant inverse relationship between investment in working capital and value of the firms. This research finds that firm size, growth in sales, proportion of non-executive directors on corporate boards, chief executive's ownership of shares, and practices in the industry are important drivers of WCM for a firm.

2.4.3 Compelling Business Reasons for Firms

Corporations that work at international or national level have to devise a system of collection from customers in a variety of bank branches, lockboxes, and the concentration of collected cash to central accounts. Most companies prefer to put idle cash in money market securities. All sales are not in cash, firms have to make credit. Customer credit is equally significant as trade credit availed by the selling firm. The accrual based philosophy of selling makes it essential for business firms to adopt a sound credit policy. The terms of sale identifies that when goods are to be sold on cash and when on credit. There remains a chance or probability that customers may not pay their due bills, credit analysis can make companies aware of such chances. For clearance of due bills business firms also need to have a sound collection policy.

Economic order quantity is used in determining the optimal amount of credit a company should offer. For determining this point the carrying costs mean the cash flows that must be incurred when credit is granted. The opportunity costs (lost sales from refusing credit) have to be fairly estimated along with demand for credit sales. In a collection policy receivables have to be routinely monitored. Inventory is the biggest form of current asset a manufacturing firm manages in routine.

Inventory management influences the overall working capital policy of a firm and the effectiveness and efficiency of WCM heavily rests on it. Inventory is in different varieties in a manufacturing business, it may be in raw form, in semi-finished form or in finished form. Keeping too much inventory than required is again a costly affair for manufacturing concerns. It is necessary to assess the future demands for products and then to activate production processes accordingly. Companies that pay heed to managing their inventories efficiently reap better economic benefits. Keeping a low level of inventory can be very costly as stock-out costs are associated, there could also be lost sales or lost customers. Firms make shrewd decisions relating to the ordering or holding of inventories. Manufacturing firms reserve stores both for raw inventory and for finished products. This involves holding cost that adds to the final costing of a product. There may be efficiency scope in holding costs. Frequent ordering means more expenses. Business firms devise a most economic order quantity approach towards lowering the costs and by achieving business objectives. This could be achieved using the conventional Economic Order Quantity model.

2.5 Macro Level Factors – External to a sector

There is a general saying that macroeconomic conditions affect every body. Businesses decide according to prevailing macroeconomic conditions. When economies are not performing good businesses act and react differently to opportunities. Similarly a different approach is adopted by businesses when economies are booming. Very few scholars seem to have taken a note of this. It is important to know that how short term financial decisions are taken when macroeconomic indicators show a poor picture of the economy or vice versa.

Mills (1996) conducts a study for checking the effects of inflation on endorsement of capital budgeting and working capital decisions. The author inserts basing the experience of US economy that one major factor affecting the theory and practice of financial decisions has been the general rise in price levels. This work investigates the role of working capital as a non-depreciable asset of the business, and its impact on inflation affecting capital budgeting process. This work clearly mentions that inflation is one amongst many macroeconomic factors that links to working capital and its processes.

Lamberson (1995) studies the response in position of working capital that may be caused due to changes in level of economic activity. Using financial data for fifty small firms for the period 1980 to 1991 the author is of the view that there is a slight increase in liquidity position of these firms during economic expansion whereas during economic slowdowns there is no noticeable change observed. Inventory to total assets with current assets to total assets are used as proxies for measuring investment in working capital which are observed as stable during the study period. The author reports that the commonly held expectations are not justified on the basis of his findings.

Common expectations are that during economic expansion firms have a tendency to become less liquid whereas when there is an economic contraction they tend to be more liquid. Another conclusion that is contrary to the earlier research findings of Johnson, Campbell and Savoie (1983) reported by the author is that evidence was not found towards lowering inventory levels in fixing liquidity problems.

The broader macroeconomic picture of an economy reflects on every sphere of business activity and monetary and fiscal policies of the governments subject businesses to new challenges. Of all the indicators the most notable is the impact of inflation on business activities. For accounting conventions based on historical cost concept the hike in prices of goods and services produce

noteworthy challenges. For the same quantum of input when the prices are increasing for inventory, labor and other overheads and under conditions favorable for more profits, the whole pressure exerts on increasing the degree of operations. This should increase the demand of investing more in current assets.

With increasing operations and extensive cyclical flows of working capital the finance managers may add expensive financing solutions which may increase the weighted average cost of capital and thus slacken profits. There could be a speculative motive of investing more in working capital during times of inflation. Keeping higher levels of inventory may be a good idea in such circumstances. A major implication of inflation is visible on the financial statements of firms. When there is inflation, profits may give a twisted picture. Because of historical cost concept in accounting parlance the profits may look paranormal as the current prices are inclusive of inflation effect especially for inventories which is a major portion of any manufacturing concern. The resulting higher paranormal profits may have to be distributed in the form of dividends after paying more taxes.

The abatement of the funds available may put such firms to testing times in future for new projects. Lesser funds availability would exert higher pressure in future on finding financing solutions for cost of inputs, meeting production demands, and catering for the speculative needs of investing in inventory etc. Among some other implications comes the arrangement of financing for working capital when there is inflation in the economy. Usually central banks control inflation by a tight monetary policy in which funds in the economy dry up and finding credit from banks or other financial institutions becomes both expensive and rare.

2.5.1 Impact of Inflation on Inventory

Due to historical cost concept internal funds ebb too. When inflation is on the rising trend the trade credit may not be on normal conditions and usually suppliers choose a tightening policy. All these conditions produce friction in routine functioning of any business. Inflation affects the main components of working capital. Inventory may be subject to shortages, inappropriate valuation, speculative motives, upsetting control etc. due to inflation. The resultant inefficiency in managing inventories further exacerbates inflation. According to some authors inefficient materials management is the cause of inflation in economies. Conventional EOQ model fails to identify most economic order quantity when there is rise in prices over time for needed items.

2.5.2 Impact of Inflation on Receivables

In inflationary times more assets tied in receivables means more opportunity cost. It depends on the invested amount of account receivables. Higher the amount tied up means higher the cost for the firm with higher risks of losses. Trade credits may not involve interest in which case the supplier bears the cost. Not only of the interest on the receivable amount but also of the discounted value realizable after taking the effect of inflation percentage.

2.5.3 Impact of Inflation on Cash Balances

Finally the effect of inflation may affect the management of cash for business firms. Keeping higher levels of fixed deposits or cash at hand seems costly when its depreciation by inflation increases day by day or month by month. Under such circumstances it may be necessary to search for investment opportunities where the net effect may be mitigated by reaping some interest through employment of idle cash.

2.6 Summary of Reviewed Literature

In sum the above literature on linking profitability with WCM show a variety of approaches aimed at exploring the relationship. Cash conversion cycle has been a favorite explanatory variable for most of the research studies. Most researchers agree that cash conversion cycle is negatively related to profitability suggesting improving cash conversion cycle means improving profitability.

Some researchers do not agree and believe on the basis of their findings that higher cash conversion cycles are good for reaping higher profits. Even there are researchers who conclude that there is no relationship between cash conversion cycle and profitability and improvement in one does not bring any improvement in the other. Profitability is a tricky issue and there is no single measure for it. Different indicators of profitability are generally used including accounting and economic profit indicators.

The literature reviewed above implies the use of net operating profit, return on assets, gross operating profit, return on capital employed, operating profit margin, gross profit, and gross operating income as main indicators of profitability by contemporary researchers. The list of explanatory variables used by most research studies include average receivable (days), average payable (days), average inventory (days), average payable (days) as important internal micro level factors towards efficient management of WCM.

Researchers have relied upon a number of control variables in their research settings like fixed financial asset ratio, size of the firm, sales growth, leverage, debt used by a firm etc. There seems an agreement amongst research findings that speeding receivables, cash and inventory conversion increase profitability whereas delaying payables is more beneficial.

Some researchers do not agree with delaying payables by firms and are of the view that optimality should be achieved where business relationships with suppliers do not become a threat to the business. The reviewed literature do unfolds an interesting debate in the determining factors of working capital. The determining factors include both internal and external components.

Researchers have investigated numerous factors in this regard. Internal financing options, access to capital markets, operating cycle, leverage, operating cash flows, tobin's q, return on assets, proportion of non-executive boards, chief executive's ownership of shares, sales force participation, debt ratio, business indicators, performance, ratio of fixed to total assets, changeable operating conditions, credit & collection experience make a list of internal micro level factors.

The external micro/macro level factors for a firm that determine WCM includes cost of financing, level of economic activity, level of industry activity, firm growth, type of industry, industry practices, industry effects, seasonal implications on sales volume and supplies. There are some factors identified by literature that can be attributed both to internal and external categories. Like firm growth depends both on internal and external conditions and their interplay determines WCM. Likewise are higher market share of business, product image relevant to competition, and size of the firm.

The divergent views of the authors can be conveniently studied in the framework of following categories. Each category is supported by views of different researchers and scholars. The following categorization enables us to understand all those important factors which are identified by authors in different parts of the world which will have to be investigated especially in their relation to working capital management.

Micro Level Factors

Internal to a firm

Profitability

Credit Policy of a Firm

Inventory Management

Employees' Capability of Decision Making

Payables Management

Receivables Management

Liquidity Needs

Corporate Governance

External to a firm

Customer Needs

Supplier Covenants

Shareholder's Wealth

Financing Opportunities and Requirements

Seasonal Needs

Macro Level Factors

Internal to a sector

Industry Effects

Sectoral Differences

Regulatory Framework

Compelling Business Reasons

External to a sector

Inflation

Unemployment

Manufacturing Index

GDP

Social Responsibility

CHAPTER 3 METHODOLOGY

3.1 Chapter Overview

This chapter presents theoretical model which is developed sequentially. Contemporary theoretical discussions lead us in this chapter to arrive at theoretical models which forms the base for our empirical modeling of the thesis. The discussion would depend on economic, accounting and finance theory to understand the micro level internal factors for efficient management of WCM. Economic efficiency is the key to increasing profitability and optimizing production levels with the minimal cost of resources. Accounting theory paves the way for different accounting tools used in measuring different level of WCM. In finance, the management of current assets and current liabilities reserves considerable importance. Section 3.2 provides rationale of theoretical models, Section 3.3 provides the theoretical base for exploring efficiency, Section 3.4 discusses business performance in relation to WCM, Section 3.5 provides a theoretical base for determinants of WCM, Section 3.6 gives a stock of determinants of liquidity requirements of business firms, Section 3.7 helps in linking micro level factors with working capital efficiency, Section 3.8 maps the thesis pictorially in a novel way, Section 3.9 presents the research methodology.

3.2 Rationale of Theoretical Models

Decisions are taken by businesses for their interests. There can be a variety of objectives set by a business but invariably, for businesses, maximizing profitability and reducing costs of the business are main business objectives. Considering WCM, it becomes pertinent to start thinking about the same two key objectives. A good working capital strategy could increase the profitability and can work towards reducing the cost of keeping current assets and current liabilities. Profitability is the favorite term of a business but it is not measured uniformly and rather different proxies are used for its measurement. The previous chapter gives input to thinking that WCM cannot be exercised in isolation and there is myriads of inter-relationships of unique business aspects with it. The first concrete thinking that attracts research interest, in light of this discussion, is to explore the current status of WCM in Pakistan. Are firms in Pakistan managing their current assets and current liabilities wisely? Do they do the job efficiently?

3.3 The Efficiency Quest in Exploratory Sense

This research expedition starts with a notion of achieving efficiency in every kind of management which is aimed at achieving business objectives. Management theory asserts that the allied functions of management should be performed most efficiently. This suggests that economic resources have to be utilized optimally in achieving business objectives. Financial management stresses to make such business decisions which lower down the cost factor for achieving higher profitability. Even in Economics, we want to save resources to effectively utilize them in addressing multiple demands. Efficiency in WCM can be idealized through different dimensions of a business.

The question at hand is that how can we differentiate efficient firms from non-efficient firms? This would enable us in understanding framing a better working capital policy for a firm or a sector. Achieving efficiency in working capital is tricky in the sense as yet there is no uniformity of thinking for liquidity-profitability trade-offs of a firm. This leads to a debate that whether an optimal liquidity-profitability condition prescribes a most efficient WCM scenario or higher liquidity should be preferred for achieving greater efficiency or vice a versa.

Ratio analysis prescribes ratios for understanding liquidity and profitability in isolation. Further, future research could unfold the identification of a liquidity-profitability model towards achieving greater efficiency. Achieving greater efficiency in WCM includes performance metrics like sales. Improvement in sales can be attributed to WCM policy as only a fluent, flexible, well-thought working capital policy can contribute to appreciation in sales in future. The advantage of current assets is undeniable here and especially the availability of sufficient inventory. Not only stocks in stores but enough cash in hand or in bank should enable enough liquidity that businesses can pay their dues.

Businesses that have the ability to convert optimal current assets to generating more sales quickly and consequently sales to current assets faster can be easily considered more efficient as tying up investments in business for long is expensive. In light of this some metrics are suggested to model the efficiency of WCM. Utilizing current assets more effectively and converting current assets in revenues can lead us to efficiency standards. Once the working capital efficiency mechanism is devised, firms' efficiency can be easily compared. Another theoretical model that can be developed here is that how firms behave in comparison to their

respective sector. Do they improve efficiency in WCM by looking at other firms in the same sector?

3.3.1 Theoretical Model for Exploring Efficient Firms

Keeping in view the discussion given above the thesis proposes the following theoretical model to test the efficiency in working capital.

Business performance = f(sales, each individual unit of current assets)

Both for service and non-service business firms sales is a really important consideration in measuring business performance. The interplay of current assets also contributes heavily to business performance. The theoretical model suggested above can measure performance as a product of these two significant contributors.

Utilization of current assets = f(sales, each individual unit of current assets)

Business firms want to know that how current assets are utilized towards business performance. For this purpose the utilization model is suggested. Revenues are generated from increased sales and each individual unit of current assets say cash, inventory, receivables are contributing factors to higher revenues. If a business firm is efficiently utilizing its current assets, no doubt it is operationally fit to make bigger revenues.

Efficiency in working capital = f(business performance, utilization of current assets)

Linear regression is believed to identify those business firms who tend to improve their efficiency standards compared to their competitors in a sector. Using Ordinary Least Squares (OLS) it is possible to measure that how a firm pursues its working capital strategy compared to its respective economic sector. Business firms may become more or less efficient in managing working capital over time if compared with industry averages.

The thesis inserts that in a linear regression model $y = a + bx$, the coefficient b can be used for any such purpose.

3.4 Business Performance and Working Capital Management

As discussed in detail in the literature efficient WCM should result in more profits for a business. Business performance can have more than one indicator. Return on equity, return on assets, net profit margin, economic value added, operating profits etc are some common business performance indicators. The proxy for profits has to be appealing and sense making. Not only this, when putting the argument that business performance depends on something, many

explanatory factors come to mind. Identifying the key drivers of profits as independent variables is important as it would lead us to find the predictors of profits in future.

3.4.1 Theoretical Model for Linking Business Performance with Working Capital

Management

On the basis of this discussion given above the following model can be presented to monitor an economic effect of important internal micro level factors on business performance.

Business performance = f (micro level factors-internal to a firm, micro level factors-external to a firm, macro level factors-internal to a sector, macro level factors-external to a sector)

This model can be broken in four empirical models as follows;

Business performance = f (micro level factors-internal to a firm)

Business performance = f (micro level factors-external to a firm)

Business performance = f (macro level factors-internal to a sector)

Business performance = f (macro level factors-external to a sector)

This set of models can identify significant factors affecting business performance. Since this thesis is interested in identification and estimation of the role of internal micro level factors towards efficient working capital management; therefore, only the first model is endorsed for testing, in light of available data. There can be a variety of firm-specific internal micro level factors that can affect the business performance.

Since this thesis is interested in testing working capital management and its components as the main firm-specific internal micro level factors; therefore, payables management, receivables management, inventory management and cash conversion management are intuitively included in the model. Some control variables in this model are thought to include the debt ratio, size of the firm, and fixed asset turnover ratio.

3.5 Determinants of the Working Capital Requirements of a Firm

When we think of working capital requirements, the simple equation that comes to mind is the current assets minus current liabilities. To remain solvent businesses must ensure paying their dues in time. We need to find answers to the question that what determines the working capital requirements for a firm working in a sector. Since the working capital requirements of a firm cannot be determined endogenously, therefore the following theoretical model is presented to understand the key determinants of working capital requirements.

3.5.1 Theoretical Model for Identification of Determinants of Working Capital

Requirements

Depending on the earlier discussion the following model is suggested to check any important endogenous or exogenous determinants of working capital requirements.

$$\text{Working capital requirements} = f(\text{micro level factors}, \text{macro level factors})$$

In this case micro level factors could be internal or external to a firm, and macro level factors can be internal or external to a sector. This theoretical model is suggested as both the reviewed literature and common sense endorses the idea of using both micro and macro level factors. Micro level factors including the level of leverage, cash flows, firm's growth, size of the firm etc exert pressure on a firm in setting periodic targets of working capital.

Not only firms take internal business pressure but they are exposed to external environment like the cost of borrowing, opportunity cost of tied current assets, business cycles etc. In light of these pressing business and economic aspects, the effects on working capital requirements of a business can be multiple and severe. Testing these effects in light of real business data can unfold stories untold. For this purpose change in normalized working capital requirement is regressed on change in business cycle, change in leverage, change in normalized cash flow, change in growth of the firm, change in return on assets, change in size of the firm, change in real gross domestic product growth rate, change in labor force unemployment rate, and change in quantum manufacturing index.

As it is assumed earlier, industries differ from one another and there are little internal differences in firms over a time series, using a fixed effect model makes more sense as we will be having a balanced panel of sampled firms giving multivariate financial data. Variables like leverage, cash flows, growth, profitability, size of the firm can be lumped into a set termed as internal micro level factors. The other set would compose of business cycle, real GDP, labor force unemployment, quantum manufacturing index and we could label it as external to a firm macro factors.

3.6 Determinants of Liquidity Requirements of a Firm

Like the working capital requirements the liquidity needs reserve attention and demand an understanding. Liquidity needs of a firm can be looked at in the internal or external level factors which may be micro or macro. The liquidity needs make firms aware of their cash needs in the near future. Such needs can be looked at by making liquidity requirements a function of different

forces. There are multiple endogenous and exogenous reasons for a firm to meet the liquidity demands.

3.6.1 Theoretical Model for Identification of Determinants of Liquidity Requirements

We can put forward the following model for testing potential determinants of liquidity requirements.

$$\text{Liquidity Needs} = f(\text{micro level factors}, \text{macro level factors})$$

Micro level factors could be internal or external to a firm, and macro level factors can be internal or external to a sector. There is no exact theoretical model available on valuation of liquidity, yet the topic has considerable importance for a business. Studying the liquidity needs of a business is thought to have effects of both micro and macro level environment of a business. Liquidity depends on internal business forces but it is partially dictated by forces beyond business control. Cash outflows from a business can be controlled but inflows have their own dynamics. Business firms may be more willing to invest in times of prosperity to expand business further and may be willing to risk liquidity. Profitability, real GDP, leverage, business cycles are some other such factors that are deemed to have an effect on liquidity needs of business firms. Taking liquidity needs as a dependent variable the aforementioned micro and macro level factors can be taken as regressors and their effects on liquidity requirements can be monitored.

3.7 Linking Internal Micro Level Factors with Working Capital Efficiency

Business firms make decisions to achieve efficiency in every phase of business. Firms make decisions to attain efficiency in all kinds of management at its disposal. Management of working capital is no exception. The attainment of efficiency in working capital can only be possible when firms seriously consider taking decisions towards inventory management, receivables management, payables management, reducing cycle of cash, generation of profits, levels of liquidity etc. Therefore one can argue that the efficiency of working capital is dependent upon a number of micro and macro factors which may be internal or external to a firm or to a sector.

3.7.1 Theoretical Model for Checking the Effects of Internal Micro Level Factors on the Efficiency of Working Capital Management

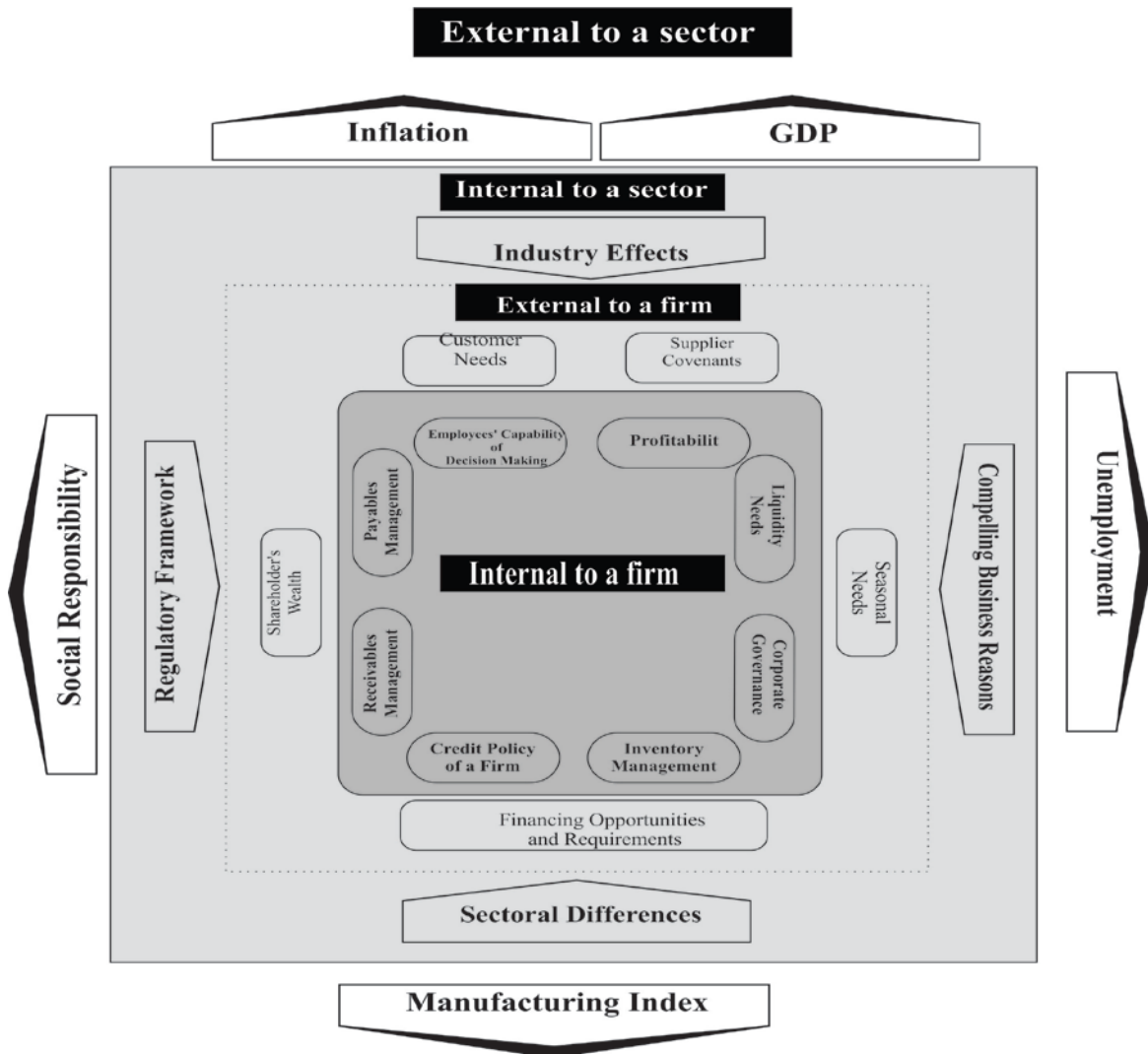
The following model is suggested to understand the effect of internal micro level factors on the efficiency of working capital management.

$$\text{Efficient Working Capital} = f(\text{Micro level factors}, \text{Macro level factors})$$

Business firms are believed to be more efficient in their working capital strategies if they have favorable firm-specific internal and industry-specific external suitable conditions. A good combination of such internal and external favorable conditions can result in the best and most efficient use of working capital. In the suggested model some proxy of working capital efficiency can be used with a list of micro and macro level factors to observe a more dominant effect on the working capital efficiency paradigm. This theoretical model is one major focus of this thesis and it can unfold considerable findings.

3.8 Pictorial Presentation of the Study

A novel theoretical model idealized by this thesis is as follows;



3.9 Research Methodology

Since most of the data used in this thesis is secondary in nature, this present research study takes advantage of the available data and uses hypothetico-deductive approach in addressing research gaps. The research methodology used is divided in the following sections.

3.9.1 Sampling Design

There is a variety of methods in choosing a sample which can be done on probability or non-probability basis. Our target population of firms is 436 in number and our unit of analysis is a single firm of manufacturing sector. Relying on a single firm as a unit of analysis provides many recorded business facts which are mainly secondary in nature. These firms are divided in thirteen economic sectors which provide us with ready stratification. Firm-specific or sector-specific data in Pakistan is either not available or not reliable. These aspects are considered while drawing an objective sample that looks into micro-level or macro level factors towards efficient working capital management. A number of assumptions are exercised in reaching an objective sample for the thesis.

3.9.2 Sampling methodology

According to the State Bank's published report titled "Balance Sheet Analysis of Joint Stock Companies in Pakistan" there are 436 listed companies at Karachi Stock Exchange in the year 2008, which are divided into 13 economic sectors. This study aims at drawing a scientific sample size, following standard statistical methodology which is discussed in the next section. There are 13 different homogenous strata where each strata contains similar businesses, a stratified sample using proportional allocation was deemed sense making. Once the sub-units are determined from each economic sector, most capital intensive business firms are sampled to collect relevant data. This can have some generalizations problem for a sector as there is both diversity and variation in each economic sector. However, this limitation of data availability for all firms in the population is not deemed very serious.

3.9.3 Determination of sample size

The sample size is to be determined on the basis of the following assumptions for a finite population of manufacturing firms.

- The confidence interval is 95%

- The pre-assigned error is plus-minus sigma divided by four i.e. the sample mean will not differ from the true population mean by more than 25% of the standard deviation of the population, with a probability of 0.95
- Since data on current assets is available from State Bank of Pakistan, therefore, standard deviation of current assets from each sector can be computed and can be used as a proxy for the deviation in practice of WCM
- Error is computed as standard deviation divided by four
- The following standard formulae would be used for sampling from the population of manufacturing firms

$$n = N (Z_{\alpha/2} \sigma)^2 / \{(N-1) e^2 + (Z_{\alpha/2} \sigma)^2\}$$

‘n’ is the sample size to be drawn conveniently, N is the size of listed manufacturing firms, $Z_{\alpha/2}$ is the standardized normal variable value at a 95% confidence interval, e is the pre-assigned error for the parameter to deviate from its actual value, σ is the standard deviation estimate of WCM in all the listed manufacturing firms.

Once the sample size is determined proportionally for each sector a sample of size ‘n_i’ is selected from the (k=13) sectors using the stratified sampling procedure for collection of data. The relevant variables for the panel of firms are extracted using annual reports, published materials, online resources. Karachi Stock Exchange, Bureau of Statistics, State Bank of Pakistan, and Government Ministries.

3.9.4 Inclusion Criteria for Firms

Data about business firms is included based on the following conditions; only manufacturing firms are considered, firms listed at Karachi Stock Exchange are included, data on all variables from the year 2000 to 2008 is included. The main reason for including the considered years is the availability of data as considering earlier years showed a serious shortcoming in terms of availability of all variables for the econometric modeling.

3.9.5 Exclusion Criteria for Firms

Since only listed manufacturing sector of Karachi Stock Exchange is targeted therefore service providers, financial firms, all firms other than manufacturing firms are excluded.

3.9.6 Statistical Modeling & Concerned Variables

3.9.6 .1 Modeling Efficiency of Firms Toward Working Capital Management

For testing the efficiency of WCM a simple methodology is adopted. Listed firms in Pakistan are the target population for which efficiency analysis of WCM is analyzed. Using an applied research methodology stance secondary data is retrieved from State Bank of Pakistan is used. Periodical publications of State Bank titled ‘Balance sheet analysis of joint stock companies listed on Karachi Stock Exchange’ are used to extract some important variables in addition to using annual reports of the companies. These reports provide most of the variables, however they do not provide all of them; therefore, based on the availability of annual reports capital intensive firms are included in the analysis.

Research critics argue the validity of information obtained from secondary sources, as it negatively affects research findings if found incorrect. However utilizing government and authentic sources are encouraged to be used. Following Shulman and Cox (1985), this study is going to use his proposed set of ratios for analyzing efficiency in managing working capital, both for a firm and its relative performance with the sectors’ performance. Benchmarking the method three indices are to be computed for each sector for a sample of firms drawn scientifically. These indices are defined as follows;

$$\text{Performance Index (wcm)} = ((\text{sales}_t/\text{sales}_{t-1})(\sum(W_{i(t-1)}/W_{it}))/N$$

$$\text{Utilization Index (wcm)} = (\text{current assets/sales})_{t-1}/(\text{current assets/sales})_t$$

$$\text{Efficiency Index (wcm)} = \text{Performance Index (wcm)} \times \text{Utilization Index (wcm)}$$

Where W_i is defined as the individual group of current assets, N is the number of current asset groups, wcm is working capital management

A simple decision rule is exercised to monitor performance in these core areas of WCM efficiency. An index greater than 1 reflects on higher efficiency whereas less than one suggests lower efficiency on part of a business firm or the industry as a whole in a given year. The work capitalizes on standard regression analyses towards model testing which are derived using the posed hypotheses.

The following general model of regression is used in analyses to identify efficient firms in context of WCM;

$$\hat{y} = \alpha + \beta X_i + e_i \quad \dots\dots\dots (i)$$

Where \hat{y} denotes $I_t - I_{t-1}$ and X_i denotes $IAI_t - I_{t-1}$, I stands for Index, t denotes time, IAI denotes industry average index. The coefficient of regression β measures how quickly a firm improves efficiency in comparison to industry benchmarks. A simple rule is illustrated here as follows;

If $\beta = 1$, this should suggest average efficiency stance by a firm in comparison to the practice in industry

If $\beta > 1$, this should suggest the firm is performing better than the industry in terms of achieving efficiency in WCM

If $\beta < 1$, this should suggest that the firm is becoming inefficient with the passage of time in comparison to industry practices.

Since the indices are three in number, therefore $I_t - I_{t-1}$ and $IAI_t - I_{t-1}$ would be computed for all the three indices. The model is used for each individual firm for the three indices namely performance, utilization, and efficiency in order to observe the speed of firms towards improving efficiency in WCM.

3.9.6 .2 Modeling Working Capital Management Toward Efficient Performance

A balanced panel model using Gujrati (2003) is as follows;

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \dots + u_{it} \dots\dots\dots (i)$$

In our case $i = 1, 2, 3, \dots, k$ and $t = 1, 2, 3, \dots, 9$

K is the number of sampled firms from each economic sector

Following Deloof (2003) and Padachi (2006) the thesis presents the following model to test the impact of firm level internal micro factors on business performance;

$$OP_{it} = \beta_1 + \beta_2 DAR_{2it} + \beta_3 DAP_{3it} + \beta_4 DINV_{4it} + \beta_5 DCCC_{5it} + \beta_6 FAT_{6it} + \beta_7 DR_{7it} + \beta_8 LS_{8it} + u_{it} \dots\dots\dots (ii)$$

The left-hand side of the equation shows the explained variable, in the present case it is the operating profits of a firm measuring the business performance. The right hand side shows the explanatory variables which are modeled to estimated operating profits. ' β_i ' are the regression coefficients. It is pertinent to mention here that OP denotes the operating profits before interest and taxes, DAR denotes normalized value of accounts receivables and is measured as account receivables/total assets, DAP denotes normalized accounts payables and is measured as accounts payable/total liabilities, DINV denotes normalized value of inventory and is measured as inventory/total assets, DCCC denotes cash conversion cycle in days where $DCCC = DINV + DAR - DAP$, FAT denotes fixed asset turnover taken as $FAT = \text{gross sales}/\text{fixed assets after deducting accumulated depreciation}$, DR denotes debt ratio taken as $DR = \text{total liabilities}/\text{total assets}$, LS denotes log of sales

This general model is broken down in four specific models to work towards testing the significance of individual components of working capital and to avoid multicollinearity. The working capital components to be tested are the average days of accounts receivable, the average payable days, the average days in inventory, and the cash conversion cycle. Fixed asset turnover, debt ratio, and size of the firm (log of sales) are taken as control variables.

$$OP_{it} = \beta_1 + \beta_2 DAR_{2it} + \beta_6 FAT_{6it} + \beta_7 DR_{7it} + \beta_8 LS_{8it} + u_{it} \dots\dots\dots(iii)$$

$$OP_{it} = \beta_1 + \beta_3 DAP_{3it} + \beta_6 FAT_{6it} + \beta_7 DR_{7it} + \beta_8 LS_{8it} + u_{it} \dots\dots\dots(iv)$$

$$OP_{it} = \beta_1 + \beta_4 DINV_{4it} + \beta_6 FAT_{6it} + \beta_7 DR_{7it} + \beta_8 LS_{8it} + u_{it} \dots\dots\dots(v)$$

$$OP_{it} = \beta_1 + \beta_5 DCCC_{5it} + \beta_6 FAT_{6it} + \beta_7 DR_{7it} + \beta_8 LS_{8it} + u_{it} \dots\dots\dots(vi)$$

Using the pooled OLS technique may be subject to the problems of heteroskedasticity, multicollinearity and autocorrelation. In addition Pooled OLS does not take into account the fixed effects of the different economic sectors. This necessitates the use of panel regression techniques. In such a case a fixed effect or a random effect model may be used. To control heteroskedasticity and autocorrelation in case of using a fixed effect model a Robust (HAC) standard errors model may be used.

If an assumption about time invariance of the intercepts of each sampled firm from a respective sector in the pooled regression model (i) is made, the following fixed effects model (FEM) may be used;

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + \dots + u_{it} \dots\dots\dots(vii)$$

The conventional modeling of a FEM is termed the least-squares dummy variable (LSDV) model as a number of dummy variables are incorporated in (i) to capture values of the cross-sectional unit 'i' in the panel set of time series 't'. Modern computer software on econometric modeling has made this job very easy.

In FEM as described in equation (vii) ' β_{1i} ' is assumed to be fixed, If this intercept is assumed to be random variable where $\beta_{1i} = \beta_1 + C_i$.

Equation (vii) is then presented as follows;

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \dots + w_{it} \dots\dots\dots(vii)$$

Equation (vii) is described as random effects model (REM) or error components model (ECM)

Where $w_{it} = C_i + u_{it}$

In this composite error term C_i is the individual-specific error component and u_{it} is the combined time series and cross-section error component. Researchers often face the problem of using a

FEM or REM model, as there are a number of assumptions surrounding the error components mentioned above. Hausman (1978) developed a specification test to help in choosing an appropriate model. It works on a simple idea that estimators from FEM or REM do not differ substantially.

If the null hypothesis of Hausman test is rejected, the conclusion is to use FEM and not the REM. Statistical software like gretl offers estimating estimates of FEM robust with respect to heteroskedasticity and/or autocorrelation and hence also robust standard errors. This ensures efficiency of estimates using FEM. For the same purpose White’s Heteroscedasticity-Consistent variances and standard errors also known as robust standard errors is performed in gretl software. Our set of testable models following (Deloof: 2003, Padachi:2006, Rehman 2007) in light of fixed effects can be written as follows;

$$OP_{it} = \beta_1 + \beta_2DAR_{2it} + \beta_3DAP_{3it} + \beta_4DINV_{4it} + \beta_5DCCC_{5it} + \beta_6FAT_{6it} + \beta_7DR_{7it} + \beta_8LS_{8it} + a_i + u_{it} \dots\dots\dots(viii)$$

$$OP_{it} = \beta_1 + \beta_2DAR_{2it} + \beta_6FAT_{6it} + \beta_7DR_{7it} + \beta_8LS_{8it} + a_i + u_{it} \dots\dots\dots(ix)$$

$$OP_{it} = \beta_1 + \beta_3DAP_{3it} + \beta_6FAT_{6it} + \beta_7DR_{7it} + \beta_8LS_{8it} + a_i + u_{it} \dots\dots\dots(x)$$

$$OP_{it} = \beta_1 + \beta_4DINV_{4it} + \beta_6FAT_{6it} + \beta_7DR_{7it} + \beta_8LS_{8it} + a_i + u_{it} \dots\dots\dots(xi)$$

$$OP_{it} = \beta_1 + \beta_5DCCC_{5it} + \beta_6FAT_{6it} + \beta_7DR_{7it} + \beta_8LS_{8it} + a_i + u_{it} \dots\dots\dots(xii)$$

3.9.6 .3 Modeling Determinants of Working Capital Requirements and Liquidity Needs of Firms in Different Sectors

Research literature on this topic shows a number of determining factors for WCM. They can be viewed in the summary of literature review. This study includes business cycles measured by manufacturing index which is usually published in a number of reports by Government of Pakistan. The impact of external economic environment is deemed to exert both pressure and influence on manufacturing firms which can impact management of working capital by concerned managers.

For this data is analyzed to check the significance of determining factors. For manufacturing firms one could easily assess internal and external determinants at the micro or business level and macro or economy level. This study chooses a few internal and some external factors in light of reviewed literature. Business cycles, firm growth, size of the firm, unemployment rate of labor force, and real GDP growth rates are taken as external macro level factors whereas leverage, return on assets, natural log of total assets, and cash flow ratio are taken as internal micro level

factors thought to have influence on liquidity and WCM. Net liquid assets are taken in a normalized form.

Net Liquid Assets = Liquid assets – current liabilities

Where Liquid assets = Cash in hand + cash in transit + current deposits + saving deposits + call deposits + fixed deposits + deposits held abroad + government and corporate securities + savings and unit trust certificates + debentures of local or foreign companies

Current liabilities = Sundry creditors + Payment due but outstanding + Loans, deposits & advances

Sundry creditors = income tax payable + for expenses + for other finance + bills payable + advances from customers

Payment due but outstanding = income tax payable + proposed, unpaid and unclaimed dividends + estimated liabilities in respect of outstanding claims whether due or intimated + gratuities becoming payable + provident fund becoming payable + current installment and interest payable on fixed liabilities + provision for taxation estimated on current profits + workers profit participation fund

Loans, deposits & advances = loans secured by stock or other current assets + bank overdrafts and other unsecured loans + short term loans acquired against the security of fixed assets + unsecured loans from directors, parent company, and subordinate loan + due to managing agents + advances by directors + guarantee and security deposits of customers and staff

Normalized Net liquid assets = Net Liquid Assets / Total Assets

The change in net liquid assets is taken as proxy for any changes in its level. Similarly change in working capital requirement is taken as a differential in working capital requirements normalized with total assets. It is measured as follows;

Working capital requirement = accounts receivables + inventories – accounts payables - other payables

The following two models originated by this thesis are used as per methodology discussed in the above section to check significance of micro level internal factors by controlling external macro level factors;

$$CDWCR_{it} = \beta_1 + \beta_2 CBC_{2it} + \beta_3 CLEV_{3it} + \beta_4 CDCF_{4it} + \beta_5 CGF_{5it} + \beta_6 CROA_{6it} + \beta_7 CSF_{7it} + \beta_8 CRGDPGR_{8it} + \beta_8 CLFUR_{8it} + \beta_9 CQMI_{9it} + u_{it} \dots \dots \dots (ix)$$

$$CDNLA_{it} = \beta_1 + \beta_2 CBC_{2it} + \beta_3 CLEV_{3it} + \beta_4 CDCF_{4it} + \beta_5 CGF_{5it} + \beta_6 CROA_{6it} + \beta_7 CSF_{7it} + \beta_8 CRGDPGR_{8it} + \beta_8 CLFUR_{8it} + \beta_9 CQMI_{9it} + u_{it} \dots \dots \dots (x)$$

Where CDWCR means change in normalized value of working capital requirement, CDNLA means change in normalized value of net liquid assets, CLEV means change in leverage, CDCF means change in normalized value of cash flows, CGF means change in growth of the firm, CROA means change in return on assets, CSF means change in size of the firm, CBC means the change in business cycle measured in terms of large scale manufacturing growth rate, CRGDPGR means change in real gross domestic product growth rate. CLFUR means change in labor force unemployment rate. Leverage indicates the debt ratio of a firm and is equal to the following ratio; Debt ratio = total liabilities / total assets

CQMI means change in quantum manufacturing index which monitors and reports the production activities in the economy of Pakistan over time.

Contingent upon the endorsement of a Hausman test, the fixed effect model in this case can be written as follows;

$$CDWCR_{it} = \beta_1 + \beta_2 CBC_{2it} + \beta_3 CLEV_{3it} + \beta_4 CDCF_{4it} + \beta_5 CGF_{5it} + \beta_6 CROA_{6it} + \beta_7 CSF_{7it} + \beta_8 CRGDPGR_{8it} + \beta_8 CLFUR_{8it} + \beta_9 CQMI_{9it} + a_i + u_{it} \dots \dots \dots (ix)$$

$$CDNLA_{it} = \beta_1 + \beta_2 CBC_{2it} + \beta_3 CLEV_{3it} + \beta_4 CDCF_{4it} + \beta_5 CGF_{5it} + \beta_6 CROA_{6it} + \beta_7 CSF_{7it} + \beta_8 CRGDPGR_{8it} + \beta_8 CLFUR_{8it} + \beta_9 CQMI_{9it} + a_i + u_{it} \dots \dots \dots (x)$$

3.9.6 .4 Factor Analysis

Factor analysis could help in identifying the more important significant factors that explain most of the variation in the efficiency of WCM of a firm. Factor Analysis is primarily used for data reduction or structure detection. The purpose of data reduction is to remove redundant (highly correlated) variables from the data file, perhaps replacing the entire data file with a smaller number of uncorrelated variables. The purpose of structure detection is to examine the underlying (or latent) relationships between the variables. The Factor Analysis procedure has several extraction methods for constructing a solution. The principal components method of extraction begins by finding a linear combination of variables (a component) that accounts for as much variation in the original variables as possible. It then finds another component that accounts for as much of the remaining variation as possible and is uncorrelated with the previous component, continuing this way until there are as many components as original variables. Usually, a few components will account for most of the variation, and these components can be

used to replace the original variables. This method is most often used to reduce the number of variables in the data file. Other Factor Analysis extraction methods go one step further by adding the assumption that some of the variability in the data cannot be explained by the components (usually called factors in other extraction methods).

As a result, the total variance explained by the solution is smaller; however, the addition of the structure to the factor model makes these methods ideal for examining relationships between the variables. The methodology involving factor analysis is designed in a way where it is assumed that there are two kinds of factors having an impact on the WCM of a manufacturing firm. Since a random sample of firms is drawn from the population of manufacturing firms listed on Karachi Stock Exchange, an investigation into the important internal micro level factors towards the efficiency of WCM of all firms makes a good statistical sense.

The observed variables on internal factors; therefore, are considered random variables. It can be inferred in the model that the efficiency of WCM is a linear combination of internal micro level factors. The efficiency score in terms of managing working capital is taken as the dependent variable along with a set of independent variables including of the internal micro level factors. In this context, some agreeable factor loadings (coefficients) have to be incorporated. Factor analysis is used to identify the dependent variable among a set of three variables namely a utilization score, performance score and efficiency score.

Firms having identical set of micro level factors may have different criteria of handling WCM, as we know that errors will creep in, due to differences in firm and industry practices.

3.9.6 .5 Modeling Internal Micro Level Factors on Working Capital Efficiency of Pooled Firms

The following model originated by this thesis is used to test the impact of internal factors on the efficiency of WCM in the whole sample.

$$X_S = \mu * V_{1 \times 207} + FL_{1,1}ECDM + FL_{1,2}IM + FL_{1,3}CP + FL_{1,4}PM + FL_{1,5}CCC + FL_{1,6}LogDWCR + FL_{1,7}DNLA + FL_{1,8}DR + FL_{1,9}SF + FL_{1,10}ROA + FL_{1,11}GF + \varepsilon_{1,1} \dots \dots \dots (xi)$$

S denotes the sampled firms from each manufacturing sector where s=1,2,3,.....207

X_S denotes ith firm's efficiency score for managing WCM

μ_k denotes the mean of firm's score for the k factors

V_{1x207} denotes the sample of manufacturing firms from 13 economic sectors in Pakistan

FL denotes the factor loadings for each firm

ECDM denotes the employees' capability of decision making, the proxy for this variable is the Altman's bankruptcy score for a firm, ECDM is estimated as follows;

$$ECDM = \{(Working\ Capital / Total\ Assets) \times 1.2 + (Retained\ Earnings / Total\ Assets) \times 1.4 + (EBIT / Total\ Assets) \times 3.3 + (Market\ Value\ of\ Equity / Total\ Liabilities) \times 0.6 + (Sales / Total\ Assets) \times 1\}$$

(A high score should reflect better capability of making decisions whereas a low score should reflect low capability of decision making)

IM denotes the inventory management, the proxy for this variable is Inventories/Average daily sales (A lower ratio denotes better inventory management)

CP denotes the credit policy of a firm, the proxy for this variable is days receivables

PM denotes the payables' management of a firm, the proxy for this variable is days payables

CCC denotes the cash conversion cycle of the firm

DWCR denotes the normalized working capital requirements where $DWCR = WCR/Total\ Assets$ and $WCR = Account\ receivables + Inventory - Creditors$

DNLA denotes the normalized value of net liquid assets

ROA denotes the return on assets and is taken as a proxy for profitability

DR denotes the debt ratio taken as total liabilities/total assets and is taken as a proxy for leverage (control variable)

SF denotes size of the firm and is measured as log of sales (control variable)

GF denotes the growth of a firm (control variable)

ϵ denotes the errors

The model for testing the impact of internal micro factors or external macro factors on the efficiency score of WCM in a fixed effect scenario can be written as follows, if endorsed by Hausman test;

$$X_S = \mu * V_{1x207} + FL_{1,1}ECDM + FL_{1,2}IM + FL_{1,3}CP + FL_{1,4}PM + FL_{1,5}CCC + FL_{1,6}LogDWCR + FL_{1,7}DNLA + FL_{1,8}DR + FL_{1,9}SF + FL_{1,10}ROA + FL_{1,11}GF + a_i + \epsilon_{1,i} \dots \dots \dots (xii)$$

$$X_S = \beta_1 + \beta_2ECDM + \beta_3IM + \beta_4CP + \beta_5PM + \beta_6CCC + \beta_7DWCR + \beta_8 DNLA + \beta_9DR + \beta_{10}SF + \beta_{11}ROA + \beta_{12}GF + a_i + \epsilon_{1,i} \dots \dots \dots (xiii)$$

This model is suggested to be used if (xi) shows a problem of multicollinearity. For checking the multicollinearity a correlation matrix can identify significant correlations between independent variables.

CHAPTER 4

RESULTS & DISCUSSIONS

4.1 Chapter Overview

This chapter provides findings and discussions to the posed research questions. Initially, the determination of sampled firms is presented and some important indicators are provided. This chapter is divided in two sections; In the first section a descriptive picture towards efficiency of the sampled firms from different sectors is presented. This involves a comprehension about the working capital practices of these firms. The indices discussed in the methodology section are computed and presented in tables sequentially. This includes a utilization index, a performance index, and an efficiency index for each sampled firm grouped in its corresponding sector. These tables clearly differentiate efficient firms from inefficient ones as far as efficiency of WCM is concerned.

In addition, a rate of change in efficiency with respect to time is measured through regression coefficients for each firm of respective industrial sector, which shows significant or insignificant change in efficiency with respect to time compared to industrial practices. The second section of the chapter summarizes findings towards the following models discussed in the methodology section.

- (i) Modeling internal micro level factors that significantly affect profitability of firms in different sectors
- (ii) Modeling significant determinants of working capital requirements and liquidity needs of firms and identifying the most significant internal micro and external macro determinants for all sectors
- (iii) Modeling significance of internal micro factors on the efficiency of WCM and identifying significant internal micro factors that determine efficiency for manufacturing sectors

This chapter proceeds as follows. Section 4.2 presents determining the sample size, Section 4.3 informs about exploratory findings of working capital efficiency in different economic sectors, Section 4.4 report results of internal micro level factors on business performance of firms of different sectors, Section 4.5 presents results on working capital requirements of firms of different sectors, Section 4.6 details results on liquidity needs of firms of different sectors,

Section 4.7 gives results on the effects of internal micro level factors on the working capital efficiency of firms of different sectors.

4.2 Sample size

Since the work adopts applied research stance, therefore, initially from all manufacturing sectors of Pakistani economy sample size is computed using important information pertaining to the management of working capital. Standard statistical procedures involve assumptions pertaining to such estimation processes. For estimation of sample sizes from each sector, variability in the practice of WCM is worked out using variation in the level of current assets.

Estimation of sample size in Table 4.2.1 is based on using 95% significance level. Error is idealized to be one fourth of the variability in the level of current assets. Table 4.2.1 demonstrates that 207 firms are sampled from 13 economic sectors. These firms are sampled using stratified sampling using proportional allocation procedure from respective sectors. Textile sector is an important economic sector of the country; this importance is reflected in more firms sampled from this sector.

| Table 4.2.1 | | | | | |
|---|---------------------------------|-----------------------------------|---------------------------|---------------------|-------------------------------------|
| Sample size determination | | | | | |
| $n = N (Z\alpha/2 \sigma)^2 / \{(N-1) e^2 + (Z\alpha/2 \sigma)^2\}$ | | | | | |
| S.No | Economic Sector | Capital Employed (Million Rupees) | No of listed firms (2008) | No of firms sampled | % of firms sampled from each sector |
| 1 | Cotton Textile | 210,425 | 161 | 45 | 28% |
| 2 | Other Textile | 31,678 | 21 | 14 | 67% |
| 3 | Chemicals | 149,922 | 35 | 23 | 66% |
| 4 | Engineering | 84,344 | 40 | 24 | 60% |
| 5 | Sugar and Allied Industries | 32,008 | 35 | 21 | 60% |
| 6 | Paper and Board | 40,919 | 10 | 7 | 70% |
| 7 | Cement | 186,979 | 21 | 14 | 67% |
| 8 | Fuel and Energy | 400,534 | 27 | 16 | 59% |
| 9 | Transport and Communications | 198,484 | 12 | 3 | 25% |
| 10 | Tobacco | 9,612 | 4 | 3 | 75% |
| 11 | Jute | 5,386 | 6 | 4 | 67% |
| 12 | Vanaspati and Allied Industries | 1,225 | 7 | 4 | 57% |
| 13 | Miscellaneous | 64,145 | 57 | 29 | 51% |
| | Total | 1,413,209 | 436 | 207 | 48% |

Proportional allocation seems to be handy as all economic sectors are represented in the sample. The later sections of data analysis would consider this aspect and sector analysis can educate us in identifying internal micro level factors towards efficient WCM. Table 4.2.2 demonstrates the importance of managing current assets by indigenous manufacturing sector. This table clearly mentions the significance of current assets for the concerned economic sectors of the country. Assets are economic resources at the disposal of business firms, the table emphasizes the need for efficiently and effectively using current assets in achieving business goals. The visible range of 28% to 76% shows that firms keep huge amount of capital in current asset form. Business decisions have to be aligned to safeguarding the business objectives from current assets, to minimize risks to them and to use them in increasing business performance.

| Percentage of Assets in Current Asset Form in each Sector | | | | |
|--|---------------------------------|---|---|------------------------------------|
| S.No | Economic Sector | Total assets (in million rupees) | Current assets (in million rupees) | % of assets in current form |
| 1 | Cotton Textile | 418,932 | 229,049.60 | 55% |
| 2 | Other Textile | 69,799 | 41,446.70 | 59% |
| 3 | Chemicals | 255,734 | 150,271.40 | 59% |
| 4 | Engineering | 166,109 | 115,580.30 | 70% |
| 5 | Sugar and Allied Industries | 82,804 | 37,533 | 45% |
| 6 | Paper and Board | 54,875 | 22,091.20 | 40% |
| 7 | Cement | 264,632 | 76,222 | 29% |
| 8 | Fuel and Energy | 992,309 | 636,607.30 | 64% |
| 9 | Transport and Communications | 375,450 | 103,298.10 | 28% |
| 10 | Tobacco | 19,928 | 10,988.40 | 55% |
| 11 | Jute | 7,923 | 6,033 | 76% |
| 12 | Vanaspati and Allied Industries | 2,467 | 1624.1 | 66% |
| 13 | Miscellaneous | 114,105 | 57565.1 | 50% |

4.3 Efficiency of Working Capital Management in Different Economic Sectors

Firms may be ranked on the basis of increased sales through employing more current assets, the level of current assets and their efficient advantage in terms of their proper utilization. An overall efficiency stance can show how firms have been managing their current assets in light of a panel set. Firms exist in an age of competition where they have to be competitive in their management philosophy towards acquisition and disposition of available resources. It is important how they

shape their future by adopting efficient business practices which they pursue in their present. Learning organizations learn from their environmental constraints and business competitors. It is important for firms to upgrade efficiency standards in managing their current resources. For a firm the benchmark to beat for better performances are the industry practices. A firm may be pursuing the efficiency agenda if it is performing better than its competition in the industry it is operating. According to Economic Survey 2009-10 by the Government of Pakistan, the native economy is the fourth largest producer of cotton and third largest consumer of cotton in the world. According to figures released by State Bank of Pakistan, in 2008 the entire textile sector showed Rs. 229049.6 million invested in current assets where the total assets employed were 418931.5. This means that 54.7% of the assets were in current form at the disposal of business managers.

Such huge sums invested in current assets form have to offer returns over and above the opportunity cost to compensate for the risk undertaken by business managers in this sector. It is deemed imperative to evaluate and monitor efficiency in management of these assets in the current form so that a fair understanding can be developed to commensurate risk with realized returns and identify gaps form improvement. Next, the responsiveness of a firm's efficiency in relation to its sector's efficiency is evaluated to observe the pace with which efficiency in working capital is achieved. There are few success stories in this respect. Discussion given above shows the relative importance of Cotton Textile sector, however the fact of using huge sums of current assets in other sectors cannot be denied. A sectoral exploratory analysis can portray a better picture. The same is attempted as follows.

4.3.1 Working Capital Efficiency for Cotton Textile Sector

While judging the descriptive nature of working capital efficiency some indices were developed in the previous chapter. These indices can describe how firms are managing their current assets, how effectively are using their current assets in achieving business goals and can be termed efficient or inefficient in their working capital practices. In addition to these indices, the business firms' working capital efficiency responsiveness to the industrial sectors average performance would help us understanding the fact that how efficiency standards of business firms change with the passage of time. Table 4.3.1 shows a summary of performance, utilization and efficiency indices for this important sector.

Table 4.3.1

| Working Capital Efficiency Indices for Sampled Textile Sector Firms | | | | |
|--|---------------------------------------|------------------------------------|------------------------------------|-----------------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Taj Textile Mills Ltd. | 0.83 | 0.88 | 0.70 |
| 2 | Sapphire Fibres Ltd. | 0.94 | 0.89 | 0.83 |
| 3 | Nishat Mills Ltd. | 0.99 | 0.91 | 0.89 |
| 4 | Fateh Textile Mills Ltd. | 0.97 | 0.94 | 0.91 |
| 5 | Gulistan Textile Mills Ltd. | 1.00 | 0.94 | 0.94 |
| 6 | Fazal Cloth Mills Ltd. | 1.04 | 0.93 | 0.95 |
| 7 | Gulshan Spinning Mills Ltd. | 1.04 | 0.95 | 0.96 |
| 8 | Kohinoor Industries Ltd. | 1.04 | 1.01 | 0.97 |
| 9 | Indus Dyeing & Manufacturing Co. Ltd. | 1.12 | 0.93 | 0.97 |
| 10 | Fatima Enterprises Ltd. | 1.10 | 0.93 | 1.02 |
| 11 | Faisal Spinning Mills Ltd. | 1.08 | 1.02 | 1.02 |
| 12 | Ayesha Textile Mills Ltd. | 1.09 | 0.98 | 1.03 |
| 13 | Kohinoor Textile Mills Ltd. | 1.06 | 1.02 | 1.05 |
| 14 | Colony Textile Mills Ltd. | 1.21 | 1.02 | 1.05 |
| 15 | Dewan Textile Mills Ltd. | 1.09 | 0.96 | 1.07 |
| 16 | Nishat(Chunian) Ltd. | 1.22 | 0.94 | 1.07 |
| 17 | Paramount Spinning Mills Ltd. | 1.16 | 0.95 | 1.09 |
| 18 | Sapphire Textile Mills Ltd. | 1.23 | 0.92 | 1.12 |
| 19 | Salfi Textile Mills Ltd. | 1.25 | 1.07 | 1.13 |
| 20 | Shahzad Textile Mills Ltd. | 1.17 | 1.04 | 1.14 |
| 21 | Towellers Ltd. | 1.15 | 1.02 | 1.18 |
| 22 | The Crescent Textile Mills | 1.15 | 1.01 | 1.18 |
| 23 | Bhanero Textile Mills Ltd. | 1.27 | 1.03 | 1.19 |
| 24 | Gadoon Textile Mills Ltd. | 1.39 | 0.98 | 1.24 |
| 25 | Nakshbandi Industries Ltd. | 1.11 | 1.05 | 1.26 |
| 26 | Nagina Cotton Mills Ltd. | 1.18 | 1.05 | 1.26 |
| 27 | Din Textile Mills Ltd. | 1.19 | 1.07 | 1.30 |
| 28 | Olympia Spinning & Weaving Mills Ltd. | 1.15 | 1.11 | 1.35 |
| 29 | Mohammad Farooq Textile Mills Ltd. | 1.76 | 0.95 | 1.55 |
| 30 | Gul Ahmed Textile Mills Ltd. | 1.48 | 1.06 | 1.55 |
| 31 | Dawood Cotton Mills Ltd. | 1.86 | 0.87 | 1.60 |
| 32 | Tata Textile Mills Ltd. | 1.68 | 1.00 | 1.61 |
| 33 | Fazal Textile Mills Ltd. | 1.76 | 0.96 | 1.62 |
| 34 | Suraj Cotton Mills Ltd. | 1.71 | 1.04 | 1.66 |
| 35 | Reliance Weaving Mills Ltd. | 1.49 | 1.06 | 1.68 |
| 36 | Quetta Textile Mills Ltd. | 1.83 | 0.94 | 1.69 |
| 37 | Nina Industries Ltd. | 2.01 | 0.95 | 1.89 |

| | | | | |
|---|----------------------------------|------|------|------|
| 38 | Ghazi Fabrics International Ltd. | 2.16 | 0.99 | 2.16 |
| 39 | Artistic Denim Mills Ltd. | 2.53 | 0.94 | 2.20 |
| 40 | Blessed Textiles Ltd. | 2.14 | 0.99 | 2.23 |
| 41 | Masood Textile Mills Ltd. | 2.44 | 0.97 | 2.37 |
| 42 | Saif Textile Mills Ltd. | 2.48 | 0.97 | 2.47 |
| 43 | Apollo Textile Mills Ltd. | 3.12 | 0.95 | 2.69 |
| 44 | Prosperity Weaving Mills Ltd. | 3.95 | 1.17 | 4.11 |
| 45 | Mahmood Textile Mills Ltd. | 2.24 | 2.01 | 4.33 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)</i> | | | | |

Table 4.3.1 presents descriptive findings for three main discussed indices for the sampled firms in this sector. The results for 45 sampled firms of this sector exhibit that 41 firms are above average efficient in showing using current assets to achieving better business performance. However, there are only 18 firms observed out of 45 which are most efficiently utilizing their current assets. The efficiency score is dominated by performance index for the sampled firms. Still there are 9 business firms observed as below average working capital efficiency standards. These findings portray a simple picture that most of the firms in this sector are performance oriented and give relatively less importance to efficient utilization of current assets.

It is observable from Table 4.3.1 that Taj Textile Mills Ltd., Sapphire Fibres Ltd., Nishat Mills Ltd., Fateh Textile Mills Ltd., Gulistan Textile Mills Ltd., Fazal Cloth Mills Ltd., Gulshan Spinning Mills Ltd., Kohinoor Industries Ltd., and Indus Dyeing & Manufacturing Company Ltd. are those firms who are poorly managing the costs associated with their working capital. Their efficiency standards in managing current assets are low that shows that current assets are not playing its role in business performance. If we want to understand the responsiveness of working capital efficiency of a business firm in comparison to its sector standards, we will have to refer to Table 4.3.2, which presents findings in this regard. Each firm in the table shows how responsive it is in meeting efficiency standards. Some of them significantly achieve their milestones by moving better than the industry average practice of handling WCM most efficiently. Five firms are observed to be showing significant results. Bhanero Textile Mills Limited & Olympia Spinning and Weaving Mills Limited are two of these five firms that are beating industry benchmarks in improving their efficiency levels. The simple reason for this observation is a more effective working policy of these firms as they far ahead of the industry

Table 4.3.2

Individual firm's working capital efficiency responsiveness to textile sector

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|------|----------------------------------|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | B | p-value | r^2 |
| 1 | Apollo Textile Mills Ltd. | -0.07 | 0.31 | 0.2 | 0.67 | 0.17 | 0.34 | -0.05 | 0.6 | 0.06 |
| 2 | Artistic Denim Mills Ltd. | -0.06 | 0.3 | 0.21 | -0.35 | 0.44 | 0.12 | -0.08 | 0.22 | 0.28 |
| 3 | Ayesha Textile Mills Ltd. | -0.34 | 0.61 | 0.06 | 1.35 | 0.12 | 0.42 | 0.62 | 0.42 | 0.13 |
| 4 | Bhanero Textile Mills Ltd. | 0.25 | 0.55 | 0.08 | 0.27 | 0.39 | 0.15 | 1.03 | **0.01 | 0.72 |
| 5 | Blessed Textiles Ltd. | -0.03 | 0.83 | 0.01 | 0.08 | 0.86 | 0.01 | -0.03 | 0.73 | 0.03 |
| 6 | Colony Textile Mills Ltd. | -0.05 | 0.91 | 0 | 0.34 | 0.22 | 0.28 | 0.42 | 0.41 | 0.14 |
| 7 | Dawood Cotton Mills Ltd. | 0.03 | 0.89 | 0 | 0.29 | 0.69 | 0.03 | 0.05 | 0.8 | 0.01 |
| 8 | Dewan Textile Mills Ltd. | 0.48 | 0.54 | 0.08 | 0.18 | 0.86 | 0.01 | 0.38 | 0.62 | 0.05 |
| 9 | Din Textile Mills Ltd. | 1.39 | 0.08 | 0.49 | 0.33 | 0.47 | 0.11 | 0.45 | 0.21 | 0.29 |
| 10 | Faisal Spinning Mills Ltd. | -0.49 | 0.39 | 0.15 | 0.02 | 0.96 | 0 | -0.36 | 0.59 | 0.06 |
| 11 | Fateh Textile Mills Ltd. | 0.96 | 0.5 | 0.09 | 1.57 | 0.11 | 0.44 | 2.04 | *0.02 | 0.69 |
| 12 | Fatima Enterprises Ltd. | -0.18 | 0.72 | 0.03 | 2.08 | 0.1 | 0.45 | 0.22 | 0.72 | 0.03 |
| 13 | Fazal Cloth Mills Ltd. | -0.11 | 0.83 | 0.01 | 1.73 | 0.04 | 0.59 | 0.53 | 0.38 | 0.16 |
| 14 | Fazal Textile Mills Ltd. | -0.06 | 0.72 | 0.03 | 1.19 | 0.06 | 0.53 | 0.13 | 0.53 | 0.08 |
| 15 | Gadoon Textile Mills Ltd. | 0.15 | 0.39 | 0.15 | 0.13 | 0.77 | 0.02 | 0.22 | 0.21 | 0.29 |
| 16 | Ghazi Fabrics International Ltd. | 0.11 | 0.6 | 0.06 | 0.69 | 0.47 | 0.11 | 0.11 | 0.52 | 0.09 |
| 17 | Gul Ahmed Textile Mills Ltd. | -0.23 | 0.33 | 0.19 | 1.55 | 0.06 | 0.54 | -0.14 | 0.61 | 0.06 |
| 18 | Gulistan Textile Mills Ltd. | -0.79 | 0.47 | 0.11 | 1.49 | 0.25 | 0.25 | 0.33 | 0.76 | 0.02 |
| 19 | Gulshan Spinning Mills Ltd. | 0.64 | 0.52 | 0.09 | 0.27 | 0.78 | 0.02 | 1.78 | 0.17 | 0.34 |
| 20 | Indus Dyeing & Man. Co. Ltd. | 0.33 | 0.38 | 0.15 | 0.02 | 0.98 | 0 | 0.98 | 0.11 | 0.43 |
| 21 | Kohinoor Industries Ltd. | 0.67 | 0.41 | 0.14 | 0.35 | 0.2 | 0.3 | 0.58 | *0.04 | 0.61 |
| 22 | Kohinoor Textile Mills Ltd. | 0.36 | 0.53 | 0.09 | -0.46 | 0.32 | 0.2 | -0.23 | 0.59 | 0.06 |
| 23 | Mahmood Textile Mills Ltd. | -0.05 | 0.57 | 0.07 | 0.03 | 0.59 | 0.06 | 0.01 | 0.72 | 0.03 |
| 24 | Masood Textile Mills Ltd. | 0.11 | 0.2 | 0.3 | 0.74 | 0.42 | 0.13 | 0.1 | 0.17 | 0.34 |

* Coefficient significant at either 5% or 1% level of significance

*** Coefficient significant at both 5% and 1% level of significance*

Individual firm's working capital efficiency responsiveness to textile sector

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|------|-------------------------------------|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | B | p-value | r^2 |
| 25 | Mohammad Farooq Textile Mills Ltd. | -0.14 | 0.2 | 0.3 | 2.31 | *0.00 | 0.9 | -0.16 | 0.32 | 0.2 |
| 26 | Nagina Cotton Mills Ltd. | 1.18 | *0.04 | 0.57 | 0.29 | 0.7 | 0.03 | 0.45 | 0.21 | 0.3 |
| 27 | Nakshbandi Industries Ltd. | 0.07 | 0.81 | 0.01 | 0.9 | 0.1 | 0.44 | 0.13 | 0.45 | 0.12 |
| 28 | Nina Industries Ltd. | 0.11 | 0.5 | 0.1 | 1.2 | 0.44 | 0.12 | 0.13 | 0.41 | 0.14 |
| 29 | Nishat Mills Ltd. | 0.04 | 0.94 | 0 | -0.67 | 0.5 | 0.1 | -0.26 | 0.75 | 0.02 |
| 30 | Nishat(Chunian) Ltd. | 0.1 | 0.68 | 0.04 | 0.62 | 0.46 | 0.11 | 0.33 | 0.31 | 0.2 |
| 31 | Olympia Spinning & Weav. Mills Ltd. | 0.75 | **0.01 | 0.73 | 0.63 | 0.39 | 0.15 | 0.67 | **0.00 | 0.88 |
| 32 | Paramount Spinning Mills Ltd. | -0.27 | 0.53 | 0.08 | 0.55 | 0.51 | 0.09 | -0.05 | 0.92 | 0 |
| 33 | Prosperity Weaving Mills Ltd. | 0.05 | 0.24 | 0.26 | 0.03 | 0.95 | 0 | 0.06 | 0.3 | 0.21 |
| 34 | Quetta Textile Mills Ltd. | -0.12 | 0.42 | 0.13 | 0.97 | 0.15 | 0.37 | -0.06 | 0.79 | 0.02 |
| 35 | Reliance Weaving Mills Ltd. | 0.09 | 0.78 | 0.02 | 0.35 | 0.44 | 0.12 | 0.09 | 0.61 | 0.06 |
| 36 | Saif Textile Mills Ltd. | -0.13 | 0.18 | 0.33 | -0.29 | 0.75 | 0.02 | -0.11 | 0.19 | 0.32 |
| 37 | Salfi Textile Mills Ltd. | -0.34 | 0.16 | 0.35 | 0.3 | 0.25 | 0.26 | 0.11 | 0.81 | 0.01 |
| 38 | Sapphire Fibres Ltd. | 0.21 | 0.8 | 0.01 | -0.32 | 0.76 | 0.02 | -0.15 | 0.91 | 0 |
| 39 | Sapphire Textile Mills Ltd. | -0.4 | 0.32 | 0.19 | 0.63 | 0.56 | 0.07 | -0.43 | 0.41 | 0.14 |
| 40 | Shahzad Textile Mills Ltd. | 0.11 | 0.69 | 0.04 | -0.21 | 0.84 | 0.01 | 0.17 | 0.61 | 0.06 |
| 41 | Suraj Cotton Mills Ltd. | 0.09 | 0.7 | 0.03 | 0.1 | 0.85 | 0.01 | 0.15 | 0.6 | 0.06 |
| 42 | Taj Textile Mills Ltd. | -0.15 | 0.84 | 0.01 | 0.84 | 0.09 | 0.48 | 1.12 | 0.06 | 0.55 |
| 43 | Tata Textile Mills Ltd. | 0.17 | 0.22 | 0.28 | 0.51 | 0.21 | 0.29 | 0.27 | *0.03 | 0.66 |
| 44 | The Crescent Textile Mills | 1.09 | 0.21 | 0.29 | -0.48 | 0.62 | 0.05 | 0.28 | 0.69 | 0.04 |
| 45 | Towellers Ltd. | 0.88 | 0.17 | 0.34 | 0.13 | 0.82 | 0.01 | 0.76 | 0.26 | 0.25 |

** Coefficient significant at either 5% or 1% level of significance*

*** Coefficient significant at both 5% and 1% level of significance*

practices in showing a significant and above average working capital performance. Three of the said five significant performers have slightly improved their practice in this regard.

4.3.2 Working Capital Efficiency for Other Textile Sector

After analyzing relevant data for this sector indices summary is prepared for performance, utilization and overall efficiency. For the sampled other textile firms' efficiency findings are summarized in Table 4.3.3. This table shows that 5 out of 14 business firms were less efficient in taking fuller advantage of their current assets, 7 business firms seem to be average performers whereas two are leading the sector. Table 4.3.3 again points towards an important finding that 12 out of 14 firms are showing above average performance in making use of their current assets. Utilization index is found to show poor utilization in terms of efficiency though. There are a number of business firms observed to be poor both in terms of performance and utilization of current assets.

A very low performance index for the use of current assets is observed for Indus Polyester Company Ltd. and Bannu Wollen Mills Ltd. Poor utilization of current assets is observed for most of the firms in this sector, namely these firms are; Indus Polyester Company Ltd., Dewan Salman Fibre Ltd., Gatron (Industries) Ltd., Ibrahim Fibres Ltd., Liberty Mills Ltd., Pakistan Synthetics Ltd., Moonlite (Pak) Ltd., and S.G. Fibres Ltd. Despite S.G. Fibres Ltd is marked with a low utilization index of current assets, its performance index in showing

| Working Capital Efficiency Indices for Other Textile Sector Firms | | | | |
|--|--|------------------------------------|------------------------------------|-----------------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Indus Polyester Company Ltd. | 0.87 | 0.71 | 0.51 |
| 2 | Dewan Salman Fibre Ltd. | 1.00 | 0.88 | 0.88 |
| 3 | Bannu Woollen Mills Ltd. | 0.99 | 1.07 | 0.94 |
| 4 | Gatron (Industries) Ltd. | 1.02 | 0.95 | 0.96 |
| 5 | Ibrahim Fibres Ltd. | 1.01 | 0.99 | 0.97 |
| 6 | Liberty Mills Ltd. | 1.08 | 0.97 | 1.05 |
| 7 | Pakistan Synthetics Ltd. | 1.15 | 0.92 | 1.05 |
| 8 | Moonlite (Pak) Ltd. | 1.12 | 0.97 | 1.08 |
| 9 | The National Silk and Rayon Mills Ltd. | 1.09 | 1.06 | 1.17 |
| 10 | Rupali Polyester Ltd. | 1.17 | 1.07 | 1.26 |
| 11 | Al-Abid Silk Mills Ltd. | 1.38 | 1.01 | 1.40 |

| | | | | |
|--|----------------------|------|------|------|
| 12 | Polyron Ltd. | 1.34 | 1.08 | 1.49 |
| 13 | Kashmir Polytex Ltd. | 2.20 | 1.21 | 2.67 |
| 14 | S.G. Fibres Ltd. | 3.68 | 0.88 | 3.14 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)</i> | | | | |

the leading figures in the sector which has resulted in the highest efficiency index of working capital. Some of the Other Textile Sector firms that need serious attention to working capital costs are namely Ibrahim Fibres Ltd., Gatron (Industries) Ltd., Bannu Woollen Mills Ltd., Dewan Salman Fiber Ltd., and Indus Polyester Company Ltd. Table 4.3.4 shows that three firms have significantly improved their performance in taking advantage of the current assets to higher sales and efficient utilization. Most of the fittings made do not exhibit good fitted models, this is because the panel comprised of only seven years. There are nine firms whose current asset performance in achieving business goals has decreased compared to sectoral benchmarks. Five firms show improvement in attaining good business performance from the use of current assets. Six firms are observed to have improved the cost of working capital and have achieved some level of efficiency.

Table 4.3.4

Individual firm's working capital efficiency responsiveness to other textile sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|--|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | B | p-value | r^2 |
| 1 | Al-Abid Silk Mills Ltd. | 0.01 | 0.90 | 0.00 | 0.15 | 0.50 | 0.10 | 0.03 | 0.71 | 0.03 |
| 2 | Bannu Woollen Mills Ltd. | -0.22 | 0.19 | 0.32 | 0.17 | *0.02 | 0.72 | 0.22 | 0.41 | 0.14 |
| 3 | Dewan Salman Fibre Ltd. | -0.39 | 0.19 | 0.31 | 0.26 | 0.80 | 0.01 | -0.48 | 0.22 | 0.28 |
| 4 | Gatron (Industries) Ltd. | -0.13 | 0.41 | 0.14 | -0.39 | 0.21 | 0.29 | -0.24 | 0.14 | 0.39 |
| 5 | Ibrahim Fibres Ltd. | -0.07 | 0.42 | 0.13 | 0.16 | 0.20 | 0.30 | -0.01 | 0.91 | 0.00 |
| 6 | Indus Polyester Company Ltd. | 0.00 | 1.00 | 0.00 | 0.17 | 0.21 | 0.29 | 0.28 | *0.03 | 0.64 |
| 7 | Kashmir Polytex Ltd. | -0.02 | 0.51 | 0.09 | 0.04 | 0.86 | 0.01 | -0.01 | 0.61 | 0.06 |
| 8 | Liberty Mills Ltd. | 0.09 | 0.59 | 0.06 | 0.75 | *0.04 | 0.60 | 0.18 | 0.23 | 0.27 |
| 9 | Moonlite (Pak) Ltd. | 0.12 | **0.01 | 0.82 | -0.02 | 0.94 | 0.00 | 0.13 | **0.01 | 0.76 |
| 10 | Pakistan Synthetics Ltd. | -0.27 | 0.24 | 0.26 | 0.11 | 0.83 | 0.01 | -0.33 | 0.26 | 0.24 |
| 11 | Polyron Ltd. | -0.03 | 0.52 | 0.09 | -0.08 | 0.33 | 0.19 | -0.02 | 0.40 | 0.15 |
| 12 | Rupali Polyester Ltd. | -0.04 | 0.72 | 0.03 | -0.14 | 0.62 | 0.05 | -0.04 | 0.64 | 0.05 |
| 13 | S.G. Fibres Ltd. | 0.00 | 1.00 | 0.78 | -0.16 | 0.56 | 0.07 | 0.04 | *0.02 | 0.72 |
| 14 | The National Silk and Rayon Mills Ltd. | -0.08 | 0.74 | 0.02 | 0.08 | 0.72 | 0.03 | -0.01 | 0.91 | 0.00 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.3 Working Capital Efficiency for Sugar Sector

Table 4.3.5 summarizes efficiency indices for the sampled sugar sector firms. The results demonstrate that most of the firms are meeting efficiency parameters and are managing current assets amicably. Three out of 21 firms are low on their efficiency standards while eight of them

| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
|------|---|-----------------------------|-----------------------------|----------------------------|
| 1 | Adam Sugar Mills Ltd. | 0.52 | 1.05 | 0.59 |
| 2 | Mirpurkhas Sugar Mills Ltd. | 0.60 | 1.13 | 0.64 |
| 3 | Khairpur Sugar Mills Ltd. | 0.89 | 0.93 | 0.86 |
| 4 | Habib - ADM Ltd.(Habib Arkady LTD.) | 1.03 | 1.10 | 1.12 |
| 5 | Habib Sugar Mills Ltd. | 1.33 | 1.04 | 1.27 |
| 6 | Crescent Sugar Mills And Distillery Ltd. | 1.24 | 1.01 | 1.28 |
| 7 | JDW Sugar Mills Ltd. | 1.51 | 1.00 | 1.56 |
| 8 | Al-Abbas Sugar Mills Ltd. | 1.49 | 1.01 | 1.60 |
| 9 | Noon Sugar Mills Ltd. | 1.43 | 1.14 | 1.62 |
| 10 | The Premier Sugar Mills & Distillery Co. Ltd. | 1.40 | 1.36 | 1.74 |
| 11 | Chashma Sugar Mills Ltd. | 1.62 | 1.61 | 1.93 |
| 12 | Shakarganj Mills Ltd. | 2.16 | 1.00 | 2.11 |
| 13 | Husein Sugar Mills Ltd. | 1.27 | 1.74 | 2.21 |
| 14 | Tandlianwala Sugar Mills Ltd. | 1.99 | 1.14 | 2.31 |
| 15 | Ansari Sugar Mills Ltd. | 2.27 | 1.07 | 2.42 |
| 16 | Shahtaj Sugar Mills Ltd. | 2.75 | 1.02 | 2.69 |
| 17 | Sakrand Sugar Mills Ltd. | 2.68 | 1.10 | 2.86 |
| 18 | Kohinoor Sugar Mills Ltd. | 2.59 | 1.09 | 2.96 |
| 19 | Al-Noor Sugar Mills Ltd. | 2.75 | 1.09 | 4.07 |
| 20 | Dewan Sugar Mills Ltd. | 3.94 | 1.32 | 4.39 |
| 21 | Shahmurad Sugar Mills Ltd. | 17.06 | 1.01 | 20.79 |

Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)

are on the average scale, most of the firms in the sector are observed to be above-average efficient in pursuing their working capital management practice.

Three firms namely Adam Sugar Mills Ltd., Mirpurkhas Sugar Mills Ltd. and Khairpur Sugar Mills Ltd are low performing mills in achieving better business performance by the use of current assets. All of the firms are observed to have achieved average indices in utilizing the

current assets. The above mentioned three firms are also observed to be achieving low levels of working capital efficiency. There are a number of firms like Shakarganj Mills Ltd., Husein Sugar Mills Ltd., Tandlianwala Sugar Mills Ltd., Ansari Sugar Mills Ltd., Shahtaj Sugar Mills Ltd., Sakrand Sugar Mills Ltd., Kohinoor Sugar Mills Ltd., Al-Noor Sugar Mills Ltd., Dewan Sugar Mills Ltd., and Shahmurad Sugar Mills Ltd. who are observed to be the star performers in light of most efficient working capital management.

An observation that can be made from Table 4.3.6 is that sugar sector does not seem to be fully aware of the advantages of using working capital to achieve business goals. It does not seem that this sector has been taking an optimal of current assets; however it is evident that it has utilized the current assets to its advantage and struggles to improve efficiency in WCM. With only a single firm visibly has significantly improved its working capital practice compared to the industry average performance, all firms can be seen as having positive or negative coefficients. Table 4.3.6 shows that Ansari Sugar Mills Ltd., Chashma Sugar Mills Ltd., Sakrand Sugar Mills Ltd., and Shahtaj Sugar Mills Ltd have moved in opposite direction, compared to the whole sector, in use of current assets in getting business results.

It is evident from the same table that Adam Sugar Mills Ltd., Al-Abbas Sugar Mills Ltd., Al-Noor Sugar Mills Ltd., Ansari Sugar Mills Ltd., Dewan Sugar Mills Ltd., Khairpur Sugar Mills Ltd., Mirpurkhas Sugar Mills Ltd., Sakrand Sugar Mills Ltd., Shahmurad Sugar Mills Ltd., and Shahtaj Sugar Mills Ltd have positively improved the use of current assets in their businesses. Only four firms are found with deteriorating working capital efficiency coefficients. The cost of working capital seems to be increasing for these firms.

Table 4.3.6

Individual firm's working capital efficiency responsiveness to sugar sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|------|--|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | B | p-value | r^2 |
| 1 | Adam Sugar Mills Ltd. | 4.28 | 0.08 | 0.50 | 1.31 | 0.58 | 0.07 | 2.30 | 0.19 | 0.32 |
| 2 | Al-Abbas Sugar Mills Ltd. | 0.08 | 0.94 | 0.00 | 2.64 | 0.16 | 0.36 | 0.36 | 0.53 | 0.09 |
| 3 | Al-Noor Sugar Mills Ltd. | 0.20 | 0.31 | 0.20 | 1.91 | 0.18 | 0.33 | 0.10 | 0.29 | 0.22 |
| 4 | Ansari Sugar Mills Ltd. | -0.52 | 0.10 | 0.45 | 1.13 | 0.54 | 0.08 | -0.38 | 0.22 | 0.28 |
| 5 | Chashma Sugar Mills Ltd. | -0.22 | 0.67 | 0.04 | -0.37 | 0.34 | 0.18 | -0.53 | 0.24 | 0.26 |
| 6 | Crescent Sugar Mills And Distillery Ltd. | 1.10 | 0.43 | 0.13 | -2.85 | 0.26 | 0.24 | 0.13 | 0.90 | 0.00 |
| 7 | Dewan Sugar Mills Ltd. | 0.15 | 0.42 | 0.13 | 0.74 | 0.36 | 0.17 | 0.30 | 0.04 | 0.59 |
| 8 | Habib - ADM Ltd.(Habib Arkady LTD.) | 1.24 | 0.71 | 0.03 | -1.36 | 0.65 | 0.04 | 0.06 | 0.99 | 0.00 |
| 9 | Habib Sugar Mills Ltd. | 1.29 | 0.22 | 0.28 | -2.02 | 0.12 | 0.42 | 0.52 | 0.68 | 0.04 |
| 10 | Husein Sugar Mills Ltd. | 2.09 | 0.13 | 0.40 | -0.48 | 0.42 | 0.14 | 0.10 | 0.85 | 0.01 |
| 11 | JDW Sugar Mills Ltd. | 0.40 | 0.82 | 0.01 | -0.53 | 0.68 | 0.04 | -0.03 | 0.95 | 0.00 |
| 12 | Khairpur Sugar Mills Ltd. | 1.81 | 0.74 | 0.02 | 1.72 | 0.24 | 0.26 | 1.03 | 0.40 | 0.15 |
| 13 | Kohinoor Sugar Mills Ltd. | 0.15 | 0.86 | 0.01 | -0.14 | 0.93 | 0.00 | 0.10 | 0.83 | 0.01 |
| 14 | Mirpurkhas Sugar Mills Ltd. | 0.03 | 0.99 | 0.00 | 2.46 | 0.12 | 0.41 | 4.84 | 0.07 | 0.51 |
| 15 | Noon Sugar Mills Ltd. | 1.60 | 0.12 | 0.41 | -2.25 | 0.18 | 0.33 | 1.09 | 0.35 | 0.17 |
| 16 | Sakrand Sugar Mills Ltd. | -0.25 | 0.18 | 0.32 | 0.60 | 0.64 | 0.05 | -0.18 | 0.32 | 0.19 |
| 17 | Shahmurad Sugar Mills Ltd. | 0.08 | *0.02 | 0.70 | 1.54 | 0.37 | 0.16 | 0.04 | 0.07 | 0.51 |
| 18 | Shahtaj Sugar Mills Ltd. | -0.53 | 0.44 | 0.13 | 0.72 | 0.74 | 0.02 | 0.12 | 0.91 | 0.00 |
| 19 | Shakarganj Mills Ltd. | 0.95 | 0.01 | 0.73 | -0.73 | 0.78 | 0.02 | 0.91 | *0.04 | 0.62 |
| 20 | Tandlianwala Sugar Mills Ltd. | 2.12 | 0.32 | 0.20 | -0.07 | 0.94 | 0.00 | 0.06 | 0.88 | 0.01 |
| 21 | The Premier Sugar Mills & Dist Co. Ltd. | 1.50 | 0.10 | 0.45 | -0.43 | 0.66 | 0.04 | 0.37 | 0.58 | 0.06 |

* Coefficient significant at either 5% or 1% level of significance

** Coefficient significant at both 5% and 1% level of significance

4.3.4 Working Capital Efficiency for Engineering Sector

Table 4.3.7 presents efficiency findings for the sampled engineering firms.

| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
|------|---|-----------------------------|-----------------------------|----------------------------|
| 1 | Millat Tractors Ltd. | 0.80 | 0.95 | 0.75 |
| 2 | Al-Ghazi Tractors Ltd. | 1.17 | 0.96 | 1.09 |
| 3 | Exide Pakistan Ltd. | 1.09 | 1.05 | 1.14 |
| 4 | Agriauto Industries Ltd. | 1.12 | 1.01 | 1.14 |
| 5 | Singer Pakistan Ltd. | 1.11 | 1.04 | 1.14 |
| 6 | Pak Elektron Ltd. | 1.21 | 1.02 | 1.22 |
| 7 | Atlas Battery Ltd. | 1.12 | 1.10 | 1.23 |
| 8 | Siemens (Pakistan) Engineering Co.Ltd. | 1.43 | 0.96 | 1.34 |
| 9 | KSB Pumps Company Ltd. | 1.28 | 1.06 | 1.37 |
| 10 | Baluchistan Wheels Ltd. | 1.25 | 1.11 | 1.38 |
| 11 | Dewan Farooque Motors Ltd. | 1.42 | 0.97 | 1.42 |
| 12 | Indus Motor Company Ltd. | 1.34 | 1.10 | 1.45 |
| 13 | Pakistan Cables Ltd. | 1.47 | 1.07 | 1.54 |
| 14 | Crescent Steel And Allied Products Ltd. | 1.49 | 1.12 | 1.55 |
| 15 | Bolan Castings Ltd. | 1.60 | 1.01 | 1.58 |
| 16 | Atlas Honda Ltd. | 1.24 | 1.30 | 1.60 |
| 17 | Huffaz Seamless Pipe Industries Ltd. | 1.39 | 1.20 | 1.66 |
| 18 | Pakistan Telephone Cables Ltd. | 1.77 | 0.97 | 1.90 |
| 19 | Hinopak Motors Ltd. | 2.10 | 1.11 | 2.15 |
| 20 | Pak Suzuki Motor Company Ltd. | 1.92 | 1.20 | 2.34 |
| 21 | Pakistan Engineering Company Ltd. | 2.94 | 1.31 | 3.49 |
| 22 | International Industries Ltd. | 7.41 | 0.98 | 7.24 |
| 23 | Ghandhara Nissan Ltd. | 8.65 | 1.25 | 9.88 |
| 24 | Metropolitan Steel Corporation Ltd. | 16.03 | 2.35 | 19.31 |

Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)

This sector shows that except for one firm the rest of the firms are considering managing and utilizing their current assets in most efficient form. Millat Tractors Limited is found to be the only firm from the sampled engineering sector firms that has a low efficiency index. There are number of firms observed to have poorly utilized their current assets, they include Millat Tractors Ltd., Al-Ghazi Tractors Ltd., Siemens (Pakistan) Engineering Company Ltd., Dewan

Farooque Motors Ltd., Pakistan Telephone Cables Ltd., and International Industries Ltd. Both the performance index and utilization index show average standards of achieving working capital efficiency.

Some firms have performed remarkably well and have achieved lowest possible costs in using current assets towards effective business goals. They include Hinopak Motors Ltd., Pak Suzuki Motor Company Ltd., Pakistan Engineering Company Ltd., International Industries Ltd., Ghandara Nissan Ltd., and Metropolitan Steel Corporation Ltd. Table 4.3.8 shows that only two firms namely Hinopak Motors Ltd. and Pak Suzuki Motors Company Ltd. does not seem to be able to maintain efficiency in working capital costs. Both these firms show increase in the costs of current assets compared to the whole sector. The rest of the sector shows diligent efforts towards lowering the costs of working capital as visible from the positive coefficients of performance.

There are firms visible from Table 4.3.8 that can be called worsening cases in poor utilization of current assets, they include Atlas Honda Ltd., Bolan Castings Ltd., Exide Pakistan Ltd., Ghandara Nissan Ltd., Hinopak Motors Ltd., International Industries Ltd., Metropolitan Steel Corporation Ltd., Millat Tractors Ltd., Pak Elektron Ltd., Pakistan Engineering Company Ltd., and Singer Pakistan Ltd. The working capital efficiency responsiveness of some firms is moving opposite to the sector's performance. It is visible from Table 4.3.8 firms like Atlas Honda Ltd., Hinopak Motors Ltd., Millat Tractors Ltd., and Pak Suzuki Motor Company Ltd. are on the route to higher working capital costs as their costs of working capital seem to be increasing compared to the whole sectors' costs. Most of the values for the coefficient of determination in the said table are small which suggest poor fit in most of the cases. There are some significant results visible though.

Table 4.3.8

Individual firm's working capital efficiency responsiveness to engineering sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|---|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | B | p-value | r^2 |
| 1 | Agriauto Industries Ltd. | 10.75 | 0.50 | 0.10 | 23.24 | **0.00 | 0.92 | 16.48 | **0.00 | 0.87 |
| 2 | Al-Ghazi Tractors Ltd. | 2.38 | 0.60 | 0.06 | 10.25 | 0.37 | 0.16 | 4.91 | 0.34 | 0.18 |
| 3 | Atlas Battery Ltd. | 6.49 | 0.44 | 0.12 | 5.58 | 0.72 | 0.03 | 6.30 | 0.37 | 0.16 |
| 4 | Atlas Honda Ltd. | 4.70 | 0.27 | 0.23 | -5.91 | *0.04 | 0.57 | -1.94 | 0.43 | 0.13 |
| 5 | Baluchistan Wheels Ltd. | 4.33 | 0.40 | 0.14 | 19.26 | 0.12 | 0.41 | 5.80 | 0.12 | 0.40 |
| 6 | Bolan Castings Ltd. | 2.44 | 0.40 | 0.15 | -12.60 | 0.41 | 0.14 | 2.68 | 0.38 | 0.16 |
| 7 | Crescent Steel And Allied Products Ltd. | 0.47 | 0.78 | 0.02 | 5.09 | 0.19 | 0.31 | 2.09 | 0.30 | 0.21 |
| 8 | Dewan Farooque Motors Ltd. | 3.70 | 0.33 | 0.19 | 20.75 | 0.07 | 0.52 | 3.84 | 0.22 | 0.28 |
| 9 | Exide Pakistan Ltd. | 8.59 | 0.17 | 0.33 | -5.79 | 0.72 | 0.03 | 7.58 | 0.26 | 0.25 |
| 10 | Ghandhara Nissan Ltd. | 0.00 | 1.00 | 0.11 | -1.99 | 0.61 | 0.06 | 0.27 | 0.21 | 0.29 |
| 11 | Hinopak Motors Ltd. | -0.18 | 0.91 | 0.00 | -6.75 | 0.27 | 0.23 | -1.95 | 0.34 | 0.18 |
| 12 | Huffaz Seamless Pipe Industries Ltd. | 1.74 | 0.86 | 0.01 | 13.28 | 0.22 | 0.28 | 4.14 | 0.41 | 0.14 |
| 13 | Indus Motor Company Ltd. | 6.47 | 0.47 | 0.11 | 3.85 | 0.67 | 0.04 | 11.90 | 0.11 | 0.43 |
| 14 | International Industries Ltd. | 0.09 | 0.72 | 0.03 | -2.68 | 0.79 | 0.02 | 0.05 | 0.84 | 0.01 |
| 15 | KSB Pumps Company Ltd. | 2.84 | 0.56 | 0.07 | 35.96 | *0.02 | 0.69 | 3.42 | 0.36 | 0.17 |
| 16 | Metropolitan Steel Corporation Ltd. | 0.06 | 0.42 | 0.13 | -0.82 | 0.08 | 0.48 | 0.02 | 0.72 | 0.03 |
| 17 | Millat Tractors Ltd. | 17.71 | 0.39 | 0.15 | -5.25 | 0.59 | 0.06 | -6.50 | 0.79 | 0.02 |
| 18 | Pak Elektron Ltd. | 11.57 | 0.18 | 0.32 | -10.48 | 0.47 | 0.11 | 6.44 | 0.45 | 0.12 |
| 19 | Pak Suzuki Motor Company Ltd. | -2.71 | 0.18 | 0.33 | 8.10 | 0.51 | 0.09 | -1.82 | 0.29 | 0.22 |
| 20 | Pakistan Cables Ltd. | 0.76 | 0.75 | 0.02 | 7.50 | 0.44 | 0.12 | 1.58 | 0.56 | 0.07 |
| 21 | Pakistan Engineering Company Ltd. | 0.84 | 0.35 | 0.18 | -2.59 | 0.40 | 0.14 | 0.76 | 0.28 | 0.22 |
| 22 | Pakistan Telephone Cables Ltd. | 1.33 | 0.51 | 0.09 | 1.79 | 0.81 | 0.01 | 0.49 | 0.71 | 0.03 |
| 23 | Siemens (Pakistan) Engineering Co.Ltd. | 2.27 | 0.58 | 0.07 | 8.07 | 0.75 | 0.02 | 5.10 | 0.32 | 0.19 |
| 23 | Singer Pakistan Ltd. | 7.07 | 0.38 | 0.16 | -9.42 | 0.67 | 0.04 | 8.92 | 0.37 | 0.16 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.5 Working Capital Efficiency for Vanaspati & Allied Sector

Table 4.3.9 summarizes indices for sampled vanaspati and allied firms in Pakistan. As there are fewer listed firms in the sector and since only four firms are sampled from the sector, not a clear picture of WCM efficiency emerges. There is one firm show a very poor performing index, namely it is Wazir Ali Industries Ltd. There is another firm namely S.S. Oil Mills Ltd. showing very poor utilization current assets in achieving business goals. Kakakhel Pakistan Ltd. is found to be the leading firm in the sector with the least cost of working capital. Wazir Ali Industries Ltd. is found to be a firm with the highest cost of working capital.

| Working Capital Efficiency Indices for Vanaspati & Allied Sector Firms | | | | |
|---|---------------------------|--|--|---------------------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Wazir Ali Industries Ltd. | 0.93 | 1.01 | 0.96 |
| 2 | S.S. Oil Mills Ltd. | 1.52 | 0.95 | 1.42 |
| 3 | Punjab Oil Mills Ltd. | 1.67 | 1.02 | 1.70 |
| 4 | Kakakhel Pakistan Ltd. | 9.64 | 1.26 | 11.87 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)</i> | | | | |

Two of the four firms have significantly improved their working capital management efficiency standards compared to the entire sector as is observable from Table 4.3.10. These two firms are namely Kakakhel Pakistan Ltd. and Punjab Oil Mills Ltd. These two firms have concentrated more on business performance through the optimal use of current assets. Some of the firms like S.S. Oil Mills Ltd seem to have taken a more costly route in using current assets. The cost of working capital seem to be rising for this firm as it is showing a negative coefficient compared to the working capital costs of the whole sector. Table 4.3.10 presents an interesting finding in the sense that the two significant results for performance and efficiency have very high values for coefficient of determination. This suggests high estimation power of the concerned models used.

Table 4.3.10

Individual firm's working capital efficiency responsiveness to Vanaspati & Allied sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|---------------------------|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | P-value | r^2 | β | P-value | r^2 | B | P-value | r^2 |
| 1 | Kakakhel Pakistan Ltd. | 0.35 | *0.02 | 0.68 | 0.74 | 0.65 | 0.05 | 0.27 | **0.00 | 0.92 |
| 2 | Punjab Oil Mills Ltd. | 1.83 | **0.01 | 0.81 | 2.68 | 0.47 | 0.11 | 1.42 | *0.02 | 0.72 |
| 3 | S.S. Oil Mills Ltd. | 0.01 | 0.99 | 0.00 | -1.77 | 0.56 | 0.07 | -0.04 | 0.95 | 0.00 |
| 4 | Wazir Ali Industries Ltd. | 1.04 | 0.72 | 0.03 | 1.20 | 0.68 | 0.04 | 0.84 | 0.65 | 0.04 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.6 Working Capital Efficiency for Miscellaneous Sector

Table 4.3.11 shows findings for the sampled miscellaneous sector firms and discards the idea that firms are not efficiently managing their current assets towards improved performance. Only a single firm namely Grays of Cambridge (Pakistan) Ltd. is found to be having a low business performance through the use of current assets. In Table 4.3.10 utilization index is found to be low for firms like Ismail Industries Ltd., Shifa International Hospitals Ltd., Pakistan Services Ltd., Mitchell's Fruit Farms Ltd., Shabbir Tiles and Ceramics Ltd., Shezan International Ltd., Treet Corporation Ltd., National Foods Ltd., and Baluchistan Glass Ltd. This means that the said firms could not achieve a better business advantage after deployment of current assets. Results in Table 4.3.12 shows that only two firms have improved their working capital efficiency standards

Table 4.3.11

Working Capital Efficiency Indices for Miscellaneous Sector Firms

| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
|------|------------------------------------|-----------------------------|-----------------------------|----------------------------|
| 1 | Ismail Industries Ltd. | 1.02 | 0.88 | 0.91 |
| 2 | Shifa International Hospitals Ltd. | 1.02 | 0.96 | 0.97 |
| 3 | Pakistan Services Ltd. | 1.05 | 0.93 | 0.99 |
| 4 | Grays Of Cambridge (Pakistan) Ltd. | 0.99 | 1.07 | 1.07 |
| 5 | Mitchell's Fruit Farms Ltd. | 1.18 | 0.92 | 1.08 |
| 6 | Shabbir Tiles And Ceramics Ltd. | 1.08 | 0.99 | 1.08 |
| 7 | Zulfeqar Industries Ltd. | 1.08 | 1.01 | 1.09 |
| 8 | Tariq Glass Industries Ltd. | 1.12 | 1.03 | 1.12 |
| 9 | Bata Pakistan Ltd. | 1.05 | 1.08 | 1.14 |
| 10 | Service Industries Ltd. | 1.07 | 1.06 | 1.15 |
| 11 | Emco Industries Ltd. | 1.11 | 1.05 | 1.15 |

| | | | | |
|---|---------------------------------|------|------|-------|
| 12 | Shezan International Ltd. | 1.18 | 0.98 | 1.16 |
| 13 | Treet Corporation Ltd. | 1.39 | 0.86 | 1.18 |
| 14 | Clover Pakistan Ltd. | 1.13 | 1.07 | 1.23 |
| 15 | National Foods Ltd. | 1.37 | 0.94 | 1.26 |
| 16 | Baluchistan Glass Ltd. | 1.32 | 0.96 | 1.31 |
| 17 | Unilever Pakistan Ltd. | 1.29 | 1.06 | 1.35 |
| 18 | Murree Brewery Company Ltd. | 1.32 | 1.10 | 1.43 |
| 19 | Noon Pakistan Ltd. | 1.37 | 1.09 | 1.48 |
| 20 | Karam Ceramics Ltd. | 1.32 | 1.13 | 1.49 |
| 21 | Tri-Pack Films Ltd. | 1.49 | 1.05 | 1.50 |
| 22 | Eco Pack Ltd.(Plastobag Ltd.) | 1.43 | 1.07 | 1.55 |
| 23 | Pakistan Hotels Developers Ltd. | 1.41 | 1.21 | 1.66 |
| 24 | Ghani Glass Ltd. | 1.81 | 1.09 | 1.96 |
| 25 | Rafhan Maize Products Co. Ltd. | 2.80 | 1.07 | 3.04 |
| 26 | Nestle Milkpak Ltd | 3.02 | 1.02 | 3.18 |
| 27 | Gillette Pakistan Ltd. | 4.52 | 1.16 | 4.82 |
| 28 | Diamond Industries Ltd. | 3.08 | 2.44 | 5.33 |
| 29 | Frontier Ceramics Ltd. | 3.87 | 2.75 | 11.95 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)</i> | | | | |

and are doing better than the entire sector. In terms of performance of current assets some firms are found to be working on reducing costs of working capital while others simply seem to be working against it. Table 4.3.12 demonstrates that Baluchistan Glass Ltd., Eco Pak Ltd.

(Plastobag Ltd.), Emco Industries Ltd., Gillette Pakistan Ltd., Ismail Industries Ltd., Karam Ceramics Ltd., Noon Pakistan Ltd., Pakistan Services Ltd., Shabbir Tiles and Ceramics Ltd., Treet Corporation Ltd., Tri-pack Films Ltd., and Unilever Pakistan Ltd. are firms on the route to increases in costs of working capital. If these firms could maintain the costs of current assets in enhancing sales, they can be further profitable.

Table 4.3.12 identifies Baluchistan Glass Ltd., Diamond Industries Ltd., Eco Pack Ltd., Emco Industries Ltd., Gillete Pakistan Ltd., Ismail Industries Ltd., Noon Pakistan Ltd., Pakistan Hotels Developers Ltd., Pakistan Services Ltd., Shabbir Tiles and Ceramics Ltd., Shezan International Ltd., Treet Corporation Ltd., Tri-pack Films Ltd., and Unilever Pakistan Ltd to be amongst that pool of firms which are working against lowering down the costs of working capital. These firms can concentrate more on reducing the said costs and can increase their profitability.

Table 4.3.12

Individual firm's working capital efficiency responsiveness to miscellaneous sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|------------------------------------|-------------|---------|----------------|-------------|---------|----------------|------------|---------|----------------|
| | | β | p-value | r ² | β | p-value | r ² | β | p-value | r ² |
| 1 | Baluchistan Glass Ltd. | -0.06 | 0.82 | 0.01 | -0.42 | 0.61 | 0.06 | -0.08 | 0.68 | 0.04 |
| 2 | Bata Pakistan Ltd. | 0.12 | 0.73 | 0.03 | -1.23 | 0.28 | 0.23 | 0.02 | 0.95 | 0.00 |
| 3 | Clover Pakistan Ltd. | 0.32 | 0.23 | 0.27 | 0.19 | 0.57 | 0.07 | 0.24 | 0.22 | 0.28 |
| 4 | Diamond Industries Ltd. | 0.00 | 1.00 | 0.43 | -0.03 | 0.27 | 0.24 | -0.01 | 0.78 | 0.02 |
| 5 | Eco Pack Ltd.(Plastobag Ltd.) | -0.32 | 0.40 | 0.14 | -0.11 | 0.76 | 0.02 | -0.10 | 0.55 | 0.08 |
| 6 | Emco Industries Ltd. | -1.13 | **0.01 | 0.82 | 0.78 | 0.11 | 0.42 | -0.23 | 0.68 | 0.04 |
| 7 | Frontier Ceramics Ltd. | 0.00 | 0.96 | 0.00 | 0.05 | 0.24 | 0.26 | 0.00 | 0.56 | 0.07 |
| 8 | Ghani Glass Ltd. | 0.14 | 0.17 | 0.34 | 0.10 | 0.88 | 0.00 | 0.13 | 0.13 | 0.39 |
| 9 | Gillette Pakistan Ltd. | -0.03 | 0.13 | 0.39 | 0.05 | 0.78 | 0.02 | -0.02 | 0.16 | 0.35 |
| 10 | Grays Of Cambridge (Pakistan) Ltd. | 0.55 | *0.02 | 0.70 | -0.40 | 0.40 | 0.15 | 0.48 | 0.09 | 0.47 |
| 11 | Ismail Industries Ltd. | -0.30 | 0.32 | 0.20 | -0.36 | 0.45 | 0.12 | -0.25 | 0.31 | 0.21 |
| 12 | Karam Ceramics Ltd. | -0.27 | 0.37 | 0.16 | 0.45 | 0.08 | 0.49 | 0.13 | 0.54 | 0.08 |
| 13 | Mitchell'S Fruit Farms Ltd. | 0.44 | *0.02 | 0.69 | -1.75 | 0.12 | 0.41 | 0.54 | *0.02 | 0.67 |
| 14 | Murree Brewery Company Ltd. | 0.69 | **0.01 | 0.77 | -0.23 | 0.77 | 0.02 | 0.42 | 0.07 | 0.52 |
| 15 | National Foods Ltd. | 0.03 | 0.86 | 0.01 | 0.67 | 0.42 | 0.13 | 0.11 | 0.67 | 0.04 |
| 16 | Nestle Milkpak Ltd | 0.02 | 0.41 | 0.14 | 0.49 | 0.36 | 0.17 | 0.02 | 0.39 | 0.15 |
| 17 | Noon Pakistan Ltd. | -0.19 | 0.16 | 0.35 | 0.25 | 0.15 | 0.36 | -0.09 | 0.47 | 0.11 |
| 18 | Pakistan Hotels Developers Ltd. | 0.08 | 0.31 | 0.20 | -0.18 | **0.00 | 0.84 | -0.08 | 0.23 | 0.27 |
| 19 | Pakistan Services Ltd. | -0.26 | 0.33 | 0.19 | 0.32 | 0.62 | 0.05 | -0.24 | 0.39 | 0.15 |
| 20 | Rafhan Maize Products Co. Ltd. | 0.00 | 0.91 | 0.00 | -0.29 | 0.72 | 0.03 | 0.00 | 0.92 | 0.00 |
| 21 | Service Industries Ltd. | 0.22 | 0.69 | 0.04 | 0.47 | 0.56 | 0.07 | 0.18 | 0.59 | 0.06 |
| 22 | Shabbir Tiles And Ceramics Ltd. | -0.37 | 0.32 | 0.20 | -1.20 | 0.13 | 0.40 | -0.36 | 0.14 | 0.38 |
| 23 | Shezan International Ltd. | -0.63 | *0.05 | 0.58 | 0.61 | 0.43 | 0.13 | -0.47 | 0.18 | 0.33 |
| 24 | Shifa International Hospitals Ltd. | 0.29 | 0.68 | 0.04 | -0.24 | 0.77 | 0.02 | 0.18 | 0.78 | 0.02 |
| 25 | Tariq Glass Industries Ltd. | 0.42 | *0.04 | 0.61 | -0.48 | 0.56 | 0.07 | 0.38 | *0.04 | 0.59 |
| 26 | Treet Corporation Ltd. | -0.07 | 0.47 | 0.11 | 0.33 | 0.56 | 0.07 | -0.10 | 0.37 | 0.16 |
| 27 | Tri-Pack Films Ltd. | -0.31 | **0.01 | 0.76 | 0.36 | 0.13 | 0.40 | -0.17 | 0.49 | 0.10 |
| 28 | Unilever Pakistan Ltd. | -0.22 | 0.60 | 0.06 | -0.94 | 0.42 | 0.14 | -0.50 | 0.27 | 0.24 |
| 29 | Zulfeqar Industries Ltd. | 0.02 | 0.92 | 0.00 | 0.49 | 0.49 | 0.10 | 0.05 | 0.81 | 0.01 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.7 Working Capital Efficiency for Transport & Communication Sector

Table 4.3.13 shows results for sampled transport and communication firms. All the three sample firms show above average performance in using current assets to their business advantage. The highest efficiency in term of working capital costs is achieved by Pakistan Telecommunication Company Ltd. The utilization of current assets to achieve business goals by these firms shows average scores which can be further increased to improve efficiency indices.

| Efficiency in Working Capital Management by Transport & Communication Firms | | | | |
|--|--|-----------------------------|-----------------------------|----------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Pakistan International Airlines Corporation Ltd. | 1.13 | 1.08 | 1.21 |
| 2 | Telecard Ltd. | 2.22 | 1.03 | 2.20 |
| 3 | Pakistan Telecommunication Company Ltd. | 2.68 | 1.03 | 2.69 |

Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)

Table 4.3.14 shows that a single firm has been more efficient in working capital practices than the industry practices. Telecard Ltd. is found to be moving against the whole sector in achieving business results from current assets. The working capital costs of Pakistan International Airlines Ltd. are increasing compared to the rest of the sector, it is joined by Pakistan Telecom Company Ltd. The table shows that Telecard Ltd. and Pakistan International Airlines Ltd are on the route to bigger costs related to working capital.

| Individual firm's working capital efficiency responsiveness to transportation & communication sector firms | | | | | | | | | | |
|---|--|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
| | | β | p-value | r^2 | β | p-value | r^2 | β | p-value | r^2 |
| 1 | Pakistan International Airlines Corporation Ltd. | 1.07 | 0.17 | 0.34 | -1.50 | *0.03 | 0.65 | -0.21 | 0.75 | 0.02 |
| 2 | Pakistan Telecom Company Ltd. | 0.16 | 0.05 | 0.58 | -0.33 | 0.72 | 0.03 | 0.17 | *0.03 | 0.63 |
| 3 | Telecard Ltd. | -0.15 | 0.27 | 0.24 | 0.48 | 0.31 | 0.21 | -0.05 | 0.68 | 0.04 |

* Coefficient significant at either 5% or 1% level of significance

** Coefficient significant at both 5% and 1% level of significance

4.3.8 Working Capital Efficiency for Paper & Board Sector

Table 4.3.15 exhibits efficiency findings for the sampled paper and board firms in Pakistan. This table shows that Packages Ltd. is the only firm marked with very low performance of current assets, remaining firms show average performance indices. A number of firms like Pakistan Paper Products Ltd., Merit Packaging Ltd., and Century Paper & Board Mills Ltd. show poor results in utilizing of current assets to attain business objectives. Indeed Packages Ltd. and Pakistan Paper Products Ltd. are found to be two such firms who are having high costs of working capital in their businesses. Table 4.3.16 shows a single firm performing better than the sector. It seems that all of the firms of this sector are concentrating on the performance on current assets in achieving higher sales and profitability.

| Efficiency in Working Capital Management by Paper & Board Sector Firms | | | | |
|--|----------------------------------|-----------------------------|-----------------------------|----------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Packages Ltd. | 0.97 | 0.93 | 0.91 |
| 2 | Pakistan Paper Products Ltd. | 1.03 | 0.96 | 0.98 |
| 3 | Cherat Papersack Ltd. | 1.05 | 1.01 | 1.07 |
| 4 | Merit Packaging Ltd. | 1.11 | 0.99 | 1.15 |
| 5 | Security Papers Ltd. | 1.11 | 1.04 | 1.19 |
| 6 | Century Paper & Board Mills Ltd. | 1.70 | 0.92 | 1.37 |
| 7 | Dadabhoy Sack Ltd. | 1.99 | 1.02 | 2.08 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)</i> | | | | |

This is visible from the positive performance coefficients. As far as utilization of current assets is concerned some firms like the Merit Packaging Ltd., and Pakistan Paper Products Ltd are found to working against the sectoral practices in lowering the working capital costs. But overall the efficiency coefficients suggest that all firms are trying to reduce costs related to working capital.

| Individual firm's working capital efficiency responsiveness to paper & board firms | | | | | | | | | | |
|---|----------------------------------|-------------|---------|----------------|-------------|---------|----------------|------------|---------|----------------|
| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
| | | β | P-value | r ² | β | P-value | r ² | β | P-value | r ² |
| 1 | Century Paper & Board Mills Ltd. | 0.05 | 0.73 | 0.03 | 0.10 | 0.90 | 0.00 | 0.36 | 0.28 | 0.22 |
| 2 | Cherat Papersack Ltd. | 0.82 | 0.10 | 0.46 | 0.68 | 0.49 | 0.10 | 0.88 | 0.07 | 0.52 |
| 3 | Dadabhoy Sack Ltd. | 0.00 | 1.00 | 0.56 | 0.72 | 0.13 | 0.39 | 0.16 | **0.01 | 0.75 |
| 4 | Merit Packaging Ltd. | 0.06 | 0.90 | 0.00 | -0.10 | 0.90 | 0.00 | 0.02 | 0.95 | 0.00 |
| 5 | Packages Ltd. | 1.82 | 0.15 | 0.36 | 1.23 | 0.11 | 0.43 | 0.96 | 0.10 | 0.45 |
| 6 | Pakistan Paper Products Ltd. | 0.59 | 0.48 | 0.10 | -1.92 | 0.31 | 0.21 | 0.51 | 0.64 | 0.05 |
| 7 | Security Papers Ltd. | 0.43 | 0.32 | 0.19 | 1.11 | 0.31 | 0.20 | 0.43 | 0.23 | 0.27 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.9 Working Capital Efficiency for Tobacco Sector

In Table 4.3.17 a summary of efficiency indices is reported for sampled tobacco sector firms. This table shows that Pakistan Tobacco Company Ltd. has a very low current asset performance in realizing business goals. There is a firm namely Lakson Tobacco Company Ltd. which shows a very poor utilization of working capital. There is one firm that exhibits the lowest cost of working capital, it is namely Lakson Tobacco Company Ltd. The poor performer in terms of higher costs of working capital is namely Pakistan Tobacco Company Ltd.

| Working Capital Efficiency Indices for Tobacco Sector Firms | | | | |
|--|----------------------------------|-----------------------------|-----------------------------|----------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Pakistan Tobacco Company Ltd. | 0.79 | 1.10 | 0.87 |
| 2 | Sarhad Cigarette Industries Ltd. | 1.35 | 1.06 | 1.57 |
| 3 | Lakson Tobacco Company Ltd. | 4.38 | 0.93 | 3.91 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)</i> | | | | |

Table 4.3.18 shows a summary of the degree of responsiveness of individual firm to all firms in the sector for measuring efficiency in WCM. Two firms namely Lakson Tobacco Company Ltd., and Sarhad Cigarette Industries Ltd. are working to improve performance of current in achieving

| Individual firm's working capital efficiency responsiveness to tobacco sector firms | | | | | | | | | | |
|--|----------------------------------|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
| | | β | p-value | r^2 | β | p-value | r^2 | β | p-value | r^2 |
| 1 | Lakson Tobacco Company Ltd. | 0.30 | **0.00 | 0.93 | -5.51 | 0.36 | 0.17 | 0.33 | **0.00 | 0.93 |
| 2 | Pakistan Tobacco Company Ltd. | -23.68 | 0.32 | 0.20 | 8.70 | 0.22 | 0.28 | 16.96 | 0.21 | 0.29 |
| 3 | Sarhad Cigarette Industries Ltd. | 1.10 | 0.29 | 0.22 | -1.39 | 0.67 | 0.04 | 0.33 | 0.58 | 0.07 |
| <i>* Coefficient significant at either 5% or 1% level of significance</i> | | | | | | | | | | |
| <i>** Coefficient significant at both 5% and 1% level of significance</i> | | | | | | | | | | |

business goals but are failing to utilize their current assets as other firms in the sector. Lakson Tobacco Company is found to have significantly improved its working capital costs compared to its sector.

4.3.10 Working Capital Efficiency for Jute Sector

Table 4.3.19 shows the said results for the sampled jute sector firms. A single firm is found to have a very poor utilization score for the use of current assets which is resulting in higher cost of

| Working Capital Efficiency Indices for Jute Sector Firms | | | | |
|--|-------------------------------------|-----------------------------|-----------------------------|----------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Amin Fabrics Ltd. | 1.02 | 1.04 | 0.96 |
| 2 | Thal Limited (Thal Jute Mills Ltd.) | 1.35 | 0.95 | 1.29 |
| 3 | Crescent Jute Products Ltd. | 2.12 | 1.19 | 2.53 |
| 4 | Suhail Jute Mills Ltd. | 2.79 | 1.04 | 2.78 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)</i> | | | | |

working capital for this firm, the firm is namely Amin Fabrics Ltd. The rest of the three firms are enjoying higher efficiency or low costs of working capital. Table 4.3.20 shows three firms namely Amin Fabrics Ltd., Crescent Jute Products Ltd., and Thal Jute Mills Ltd. who are poorly

Table 4.3.20

| Individual firm's working capital efficiency responsiveness to jute sector firms | | | | | | | | | | |
|---|--------------------------------------|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
| | | β | P-value | r^2 | B | P-value | r^2 | β | P-value | r^2 |
| 1 | Amin Fabrics Ltd. | -0.32 | 0.62 | 0.05 | 1.33 | 0.19 | 0.31 | 0.10 | 0.92 | 0.00 |
| 2 | Crescent Jute Products Ltd. | -0.11 | 0.94 | 0.00 | 1.44 | 0.00 | 0.84 | 0.38 | 0.02 | 0.71 |
| 3 | Suhail Jute Mills Ltd. | 0.30 | 0.08 | 0.49 | 0.73 | 0.35 | 0.18 | 0.34 | 0.02 | 0.68 |
| 4 | Thal Limited (Thal Jute Mills Ltd.) | -1.30 | 0.47 | 0.11 | 5.36 | 0.02 | 0.72 | 1.61 | 0.36 | 0.17 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

using their current assets compared to their use by the whole sector. All firms are working hard on effectively utilizing their working capital to increase profitability. The same is true for costs as all of the firms show positive efficiency coefficients.

4.3.11 Working Capital Efficiency for Fuel & Energy Sector

Table 4.3.21 informs about efficiency of working capital in sampled fuel and energy sector firms. This table shows that usage of current assets in increasing business performance is low for National Refinery Ltd., Pakistan State Oil Company Ltd., and Kohinoor Power Company Ltd. Low utilization of current assets is observed for Generteck Pakistan Ltd., Pakistan State Oil Company Ltd., Attock Refinery Ltd., and Pakistan Oilfields Ltd. Since current assets are not effectively and efficiently used by some of these firms therefore higher costs are visible for working capital which are being monitored through efficiency indices. Firms with a high cost of working capital are observed as Attock Refinery Ltd., Pakistan State Oil Company Ltd., National Refinery Ltd., and Generteck Pakistan Ltd. Table 4.3.22 shows a number of interesting results relating to performance, utilization and efficiency of working capital by firms of Fuel & Energy Sector. This table shows that Attock Refinery Ltd., and Sitara Energy Ltd. are having negative coefficients for performance of current assets in realizing business goals.

Since these coefficients show the responsiveness in a firms usage of current assets compared to its sectoral average, the said performance looks opposite to the sectoral practices. For three firms namely Pakistan Refinery Ltd., Sui Northern Gas Pipelines Ltd., and Sui Southern Gas Co Ltd. the coefficient of determination is more than 50% which show better fitted cases, however; coefficient for performance of current assets is statistically significant only for Sui Southern Gas Co. Ltd. There are three firms observed as significant performance in properly utilizing current

assets to their business advantage, they are namely National Refinery Ltd., Pakistan Refinery Ltd., and Pakistan State Oil Company Ltd.

| Working capital Efficiency Indices for Fuel & Energy Sector Firms | | | | |
|--|----------------------------------|-----------------------------|-----------------------------|----------------------------|
| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
| 1 | Generteck Pakistan Ltd. | 1.03 | 0.85 | 0.76 |
| 2 | National Refinery Ltd. | 0.68 | 1.13 | 0.78 |
| 3 | Pakistan State Oil Company Ltd. | 0.88 | 0.98 | 0.87 |
| 4 | Attock Refinery Ltd. | 1.03 | 0.89 | 0.91 |
| 5 | Pakistan Oilfields Ltd. | 1.10 | 0.96 | 1.07 |
| 6 | Sui Southern Gas Co. Ltd. | 1.12 | 1.02 | 1.13 |
| 7 | Sui Northern Gas Pipelines Ltd. | 1.10 | 1.08 | 1.19 |
| 8 | Kohinoor Power Company Ltd. | 0.83 | 1.84 | 1.40 |
| 9 | Ideal Energy Ltd. | 1.34 | 1.29 | 1.47 |
| 10 | Sitara Energy Ltd. | 1.51 | 1.04 | 1.58 |
| 11 | Southern Electric Power Co. Ltd. | 1.55 | 1.16 | 1.76 |
| 12 | Japan Power Generation Ltd. | 2.04 | 0.94 | 1.87 |
| 13 | Kohinoor Energy Ltd. | 1.72 | 1.20 | 2.04 |
| 14 | The Hub Power Company Ltd. | 2.02 | 1.18 | 2.14 |
| 15 | Pakistan Refinery Ltd. | 3.31 | 1.12 | 3.97 |
| 16 | Shell Gas Lpg (Pakistan) Ltd. | 3.48 | 1.21 | 4.17 |
| <i>Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)</i> | | | | |

The coefficient of determination is very high for the said three firms showing some good fitted regression cases. Some firms are working against the sectoral practices of achieving reduction in costs of working capital, they are namely Generteck Pakistan Ltd., Japan Power Generation Ltd., Sitara Energy Ltd., Sui Southern Gas Co. Ltd. Four firms are identified to have achieved optimal working capital costs in their businesses; they are namely Pakistan Refinery Ltd., Southern Electric Power Co. Ltd., Sui Northern Gas Pipelines Ltd., and Sui Southern Gas Co. Ltd. Only one firm namely Sitara Energy Ltd. is found to be on the route to increase in the cost of working capital as it shows a negative coefficient which shows moving against the positive practices of the sector towards reduction of costs. Table 4.3.22 demonstrate the fact that most of the firms in this sector are working hard to reduce the costs of using current assets and to increase business performance by wisely using the current assets at their disposal. Similarly it is evident from the table that firms of the whole sector are working towards most effective use of working capital.

Table 4.3.22

Individual firm's working capital efficiency responsiveness to fuel & energy firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|------|----------------------------------|-------------|---------|----------------|-------------|---------|----------------|------------|---------|----------------|
| | | B | p-value | r ² | B | p-value | r ² | β | p-value | r ² |
| 1 | Attock Refinery Ltd. | -0.45 | 0.77 | 0.02 | 3.81 | *0.04 | 0.62 | 1.16 | 0.49 | 0.10 |
| 2 | Generteck Pakistan Ltd. | 0.28 | 0.52 | 0.09 | -0.14 | 0.86 | 0.01 | 1.55 | 0.11 | 0.43 |
| 3 | Ideal Energy Ltd. | 0.24 | 0.38 | 0.15 | 0.03 | 0.86 | 0.01 | 0.21 | 0.41 | 0.14 |
| 4 | Japan Power Generation Ltd. | 0.16 | 0.24 | 0.27 | -0.97 | 0.58 | 0.06 | 0.16 | 0.27 | 0.23 |
| 5 | Kohinoor Energy Ltd. | 0.19 | 0.67 | 0.04 | 0.70 | 0.34 | 0.18 | 0.36 | 0.27 | 0.23 |
| 6 | Kohinoor Power Company Ltd. | 0.78 | 0.52 | 0.09 | 0.04 | 0.73 | 0.03 | 0.16 | 0.53 | 0.08 |
| 7 | National Refinery Ltd. | 1.08 | 0.52 | 0.09 | 2.95 | **0.00 | 0.90 | 1.98 | 0.08 | 0.50 |
| 8 | Pakistan Oilfields Ltd. | 0.32 | 0.63 | 0.05 | 4.14 | 0.08 | 0.49 | 0.48 | 0.47 | 0.11 |
| 9 | Pakistan Refinery Ltd. | 0.00 | 1.00 | 0.54 | 1.71 | **0.01 | 0.76 | 0.10 | *0.04 | 0.62 |
| 10 | Pakistan State Oil Company Ltd. | 0.34 | 0.84 | 0.01 | 3.59 | **0.00 | 0.90 | 1.78 | 0.13 | 0.39 |
| 11 | Shell Gas Lpg (Pakistan) Ltd. | 0.08 | 0.43 | 0.13 | 0.61 | 0.28 | 0.23 | 0.08 | 0.26 | 0.25 |
| 12 | Sitara Energy Ltd. | -0.71 | 0.22 | 0.29 | -0.97 | 0.41 | 0.14 | -0.40 | 0.25 | 0.25 |
| 13 | Southern Electric Power Co. Ltd. | 0.33 | 0.18 | 0.32 | 0.39 | 0.44 | 0.12 | 0.39 | *0.05 | 0.56 |
| 14 | Sui Northern Gas Pipelines Ltd. | 1.96 | 0.07 | 0.51 | 2.47 | 0.46 | 0.12 | 1.75 | *0.04 | 0.59 |
| 15 | Sui Southern Gas Co. Ltd. | 1.39 | *0.05 | 0.56 | -2.59 | 0.37 | 0.17 | 1.44 | *0.05 | 0.55 |
| 16 | The Hub Power Company Ltd. | 0.21 | 0.54 | 0.08 | 0.69 | 0.33 | 0.19 | 0.47 | 0.18 | 0.32 |

* Coefficient significant at either 5% or 1% level of significance

** Coefficient significant at both 5% and 1% level of significance

4.3.12 Working Capital Efficiency for Cement Sector

The summary of efficiency indices for sampled cement sector firms is provided in Table 4.3.23. This table shows that only Fauji Cement Company Ltd. is having a low performance index while the rest of the firms are showing above average indices.

| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
|------|---|-----------------------------|-----------------------------|----------------------------|
| 1 | Fauji Cement Company Ltd. | 0.99 | 0.80 | 0.83 |
| 2 | Kohat Cement Ltd. | 1.14 | 0.79 | 0.86 |
| 3 | Zeal Pak Cement Factory Ltd. | 1.19 | 0.90 | 1.05 |
| 4 | D.G. Khan Cement Company Ltd. | 1.19 | 0.92 | 1.09 |
| 5 | Dandot Cement Company Ltd. | 1.14 | 0.91 | 1.09 |
| 6 | Dadabhoy Cement Industries Ltd. | 1.19 | 0.96 | 1.16 |
| 7 | Pioneer Cement Ltd. | 1.31 | 1.13 | 1.51 |
| 8 | Maple Leaf Cement Factory Ltd. | 1.91 | 0.93 | 1.68 |
| 9 | Bestway Cement Ltd. | 1.72 | 0.97 | 1.71 |
| 10 | Fecto Cement Ltd. | 2.06 | 0.92 | 1.89 |
| 11 | Attock Cement Pakistan Ltd | 1.94 | 1.13 | 2.01 |
| 12 | Al-Abbas Cement Industries Ltd. | 2.12 | 1.02 | 2.61 |
| 13 | Dewan Cement Ltd. (Pakland Cement Ltd.) | 2.17 | 1.25 | 2.98 |
| 14 | Lucky Cement Ltd. | 3.50 | 1.15 | 3.94 |

Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index <1 denotes less efficient firm (in span of 9 years)

This suggests that most of the firms of this sector are taking a good business advantage of the deployment of current assets. Nine firms are found to be low in terms of utilization of current assets. Only Fauji Cement and Kohat Cement are marked with high working capital costs. Table 4.3.24 shows that three firms have significantly improved their working capital efficiency standards compared to its sectoral practices. Five firms are found to be practicing against the sectoral practices in reducing the costs of working capital and are on the opposite route.

Table 4.3.24

Individual firm's working capital efficiency responsiveness to cement sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|---|-------------|---------|-------|-------------|---------|-------|------------|---------|-------|
| | | β | p-value | r^2 | β | p-value | r^2 | β | p-value | r^2 |
| 1 | Al-Abbas Cement Industries Ltd. | 0.00 | 1.00 | 0.86 | 0.43 | 0.06 | 0.55 | 0.12 | *0.02 | 0.71 |
| 2 | Attock Cement Pakistan Ltd | -0.25 | 0.10 | 0.45 | 0.13 | 0.83 | 0.01 | -0.62 | *0.02 | 0.70 |
| 3 | Bestway Cement Ltd. | 0.01 | 0.99 | 0.00 | -0.25 | 0.68 | 0.04 | -0.10 | 0.73 | 0.03 |
| 4 | D.G. Khan Cement Company Ltd. | -0.08 | 0.84 | 0.01 | 0.85 | **0.01 | 0.74 | 0.61 | 0.13 | 0.40 |
| 5 | Dadabhoy Cement Industries Ltd. | 0.90 | 0.27 | 0.24 | -0.35 | 0.80 | 0.01 | 0.29 | 0.57 | 0.07 |
| 6 | Dandot Cement Company Ltd. | 0.44 | 0.11 | 0.43 | 0.33 | 0.76 | 0.02 | 0.33 | 0.19 | 0.32 |
| 7 | Dewan Cement Ltd. (Pakland Cement Ltd.) | 0.22 | **0.01 | 0.75 | 0.33 | 0.67 | 0.04 | 0.11 | 0.02 | 0.69 |
| 8 | Fauji Cement Company Ltd. | 0.52 | 0.48 | 0.10 | -0.78 | 0.36 | 0.17 | -0.09 | 0.84 | 0.01 |
| 9 | Fecto Cement Ltd. | -0.18 | 0.77 | 0.02 | -2.66 | 0.16 | 0.35 | -0.80 | 0.20 | 0.31 |
| 10 | Kohat Cement Ltd. | 1.55 | *0.02 | 0.72 | -0.70 | 0.30 | 0.21 | 0.00 | 1.00 | 0.00 |
| 11 | Lucky Cement Ltd. | 0.45 | 0.28 | 0.23 | 0.05 | 0.92 | 0.00 | 0.08 | 0.60 | 0.06 |
| 12 | Maple Leaf Cement Factory Ltd. | -0.28 | 0.10 | 0.45 | 1.48 | *0.02 | 0.72 | -0.25 | 0.32 | 0.20 |
| 13 | Pioneer Cement Ltd. | -0.08 | 0.83 | 0.01 | 0.69 | *0.02 | 0.70 | 0.27 | 0.31 | 0.20 |
| 14 | Zeal Pak Cement Factory Ltd. | 0.65 | *0.02 | 0.70 | 0.72 | 0.38 | 0.16 | 0.73 | **0.00 | 0.84 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

4.3.13 Working Capital Efficiency for Chemical Sector

Table 4.3.25 demonstrates findings for sampled chemical sector firms in Pakistan. This table shows that only 2 firms namely Colgate-Palmolive and Sitara Chemical Industries Ltd are not

| S.No | Name of the firm | Performance Index (average) | Utilization Index (average) | Efficiency Index (average) |
|------|-------------------------------------|-----------------------------|-----------------------------|----------------------------|
| 1 | Fauji Fertilizer Bin Qasim Ltd | 1.03 | 0.84 | 0.87 |
| 2 | Colgate-Palmolive (Pakistan) Ltd. | 0.95 | 0.99 | 0.94 |
| 3 | Ferozsons Laboratories Ltd. | 1.10 | 0.88 | 0.95 |
| 4 | Sitara Chemical Industries Ltd. | 1.05 | 0.96 | 0.96 |
| 5 | BOC Pakistan Ltd, | 0.99 | 1.02 | 0.99 |
| 6 | Abbott Laboratories (Pakistan) Ltd. | 1.00 | 1.01 | 1.01 |
| 7 | Clariant Pakistan Ltd. | 1.04 | 1.00 | 1.05 |
| 8 | Otsuka Pakistan Ltd. | 1.05 | 1.05 | 1.11 |
| 9 | Highnoon Laboratories Ltd. | 1.04 | 1.07 | 1.12 |
| 10 | Biafo Industries Ltd. | 1.10 | 1.01 | 1.14 |
| 11 | Engro Chemical Pakistan Ltd. | 1.13 | 1.02 | 1.15 |
| 12 | Wyeth Pakistan Ltd. | 1.17 | 1.02 | 1.21 |
| 13 | Searle Pakistan Ltd. | 1.14 | 1.07 | 1.21 |
| 14 | Berger Paints Pakistan Ltd. | 1.18 | 1.04 | 1.22 |
| 15 | ICI Pakistan Ltd. | 1.11 | 1.12 | 1.25 |
| 16 | Nimir Industrial Chemicals Ltd. | 1.24 | 1.10 | 1.36 |
| 17 | Wah Nobel Chemicals Ltd. | 1.32 | 1.04 | 1.39 |
| 18 | Dynea Pakistan Ltd. | 1.54 | 0.98 | 1.54 |
| 19 | Fauji Fertilizer Company Ltd. | 1.37 | 1.20 | 1.61 |
| 20 | Glaxosmithkline (Pakistan) Ltd. | 1.57 | 1.02 | 1.62 |
| 21 | Ittehad Chemicals Ltd. | 1.55 | 1.10 | 1.65 |
| 22 | Dawood Hercules Chemicals Ltd. | 2.04 | 0.95 | 1.79 |
| 23 | Pakistan PTA Ltd. | 2.54 | 1.14 | 2.96 |

Any index = 1 denotes average efficient firm, Any index > 1 denotes more efficient firm, Any index < 1 denotes less efficient firm (in span of 9 years)

taking the due advantage of current assets in achieving business goals. There are four firms found to be poorly utilizing their current assets towards effective business goals, they are namely Fauji Fertilizer Bin Qasim Ltd., Colgate-Palmolive (Pakistan) Ltd., Ferozsons Laboratories Ltd., and Sitara Chemical Industries Ltd. The same four firms in addition to BOC Pakistan Ltd. are

marked with high working capital costs and are on low efficiency scores. Table 4.3.26 shows a number of interesting results for the chemical sector.

The performance of current assets is realizing business goals compared to the sectoral use of current assets in this table demonstrate that Berger Paints Pakistan Ltd., Biafo Industries Ltd., BOC Pakistan Ltd., Dawood Hercules Chemicals Ltd., Glaxosmithkline (Pakistan) Ltd., Ittehad Chemicals Ltd., Sitara Chemical Industries Ltd., and Wah Nobel Chemicals Ltd. are working in opposition to the sectoral practices in improving the business performance of current assets.

There are firms like Berger Paints Pakistan Ltd., Biafo Industries Ltd., BOC Pakistan Ltd., Clariant Pakistan Ltd., Fauji Fertilizer Company Ltd., Otsuka Pakistan Ltd., and Searle Pakistan Ltd who are not improving their utilization of current assets thereby increasing their costs for the business. BOC Pakistan Ltd. and Highnoon Laboratories are identified as two significant performers where Highnoon Laboratories has significantly reduced its working capital costs whereas BOC Pakistan is observed to have significantly increased its working capital costs. In addition to BOC Pakistan there are a number of other firms like Berger Paints, Biafo Industries Ltd., Dawood Hercules Chemicals Ltd., Glaxosmithkline (Pakistan) Ltd., Ittehad Chemicals Ltd., Nimir Industrial Chemicals Ltd., and Wah Nobel Chemicals Ltd. who are on the route to increasing the costs of working capital. If the mentioned firms work seriously on reducing the costs of working capital, they would be able to increase their profitability.

Table 4.3.26

Individual firm's working capital efficiency responsiveness to chemical sector firms

| S.No | Name of the firm | Performance | | | Utilization | | | Efficiency | | |
|--|-------------------------------------|-------------|---------|----------------|-------------|---------|----------------|------------|---------|----------------|
| | | B | p-value | r ² | β | p-value | r ² | β | p-value | r ² |
| 1 | Abbott Laboratories (Pakistan) Ltd. | 0.22 | 0.76 | 0.02 | 1.94 | 0.23 | 0.27 | 0.76 | 0.32 | 0.20 |
| 2 | Berger Paints Pakistan Ltd. | -0.24 | 0.77 | 0.02 | -0.20 | 0.90 | 0.00 | -0.22 | 0.74 | 0.02 |
| 3 | Biafo Industries Ltd. | -0.20 | 0.84 | 0.01 | -1.53 | 0.10 | 0.45 | -0.50 | 0.37 | 0.16 |
| 4 | BOC Pakistan Ltd, | -0.58 | 0.52 | 0.09 | -0.81 | 0.24 | 0.26 | -1.31 | **0.01 | 0.76 |
| 5 | Clariant Pakistan Ltd. | 2.97 | *0.05 | 0.57 | -0.66 | 0.88 | 0.00 | 2.24 | 0.12 | 0.41 |
| 6 | Colgate-Palmolive (Pakistan) Ltd. | 1.03 | 0.46 | 0.11 | 2.32 | 0.22 | 0.28 | 1.35 | 0.23 | 0.27 |
| 7 | Dawood Hercules Chemicals Ltd. | -0.05 | 0.77 | 0.02 | 0.23 | 0.70 | 0.03 | -0.06 | 0.80 | 0.01 |
| 8 | Dynea Pakistan Ltd. | 0.23 | 0.17 | 0.34 | 1.42 | 0.50 | 0.09 | 0.21 | 0.17 | 0.34 |
| 9 | Engro Chemical Pakistan Ltd. | 0.62 | 0.34 | 0.18 | 0.97 | 0.50 | 0.10 | 0.46 | 0.35 | 0.17 |
| 10 | Fauji Fertilizer Bin Qasim Ltd | 0.67 | 0.06 | 0.55 | 8.48 | 0.20 | 0.30 | 0.74 | 0.06 | 0.55 |
| 11 | Fauji Fertilizer Company Ltd. | 0.52 | 0.19 | 0.31 | -0.79 | 0.32 | 0.19 | 0.39 | 0.42 | 0.13 |
| 12 | Ferozsons Laboratories Ltd. | 1.13 | 0.25 | 0.26 | 1.45 | 0.58 | 0.07 | 1.88 | 0.11 | 0.42 |
| 13 | Glaxosmithkline (Pakistan) Ltd. | -0.14 | 0.58 | 0.06 | 0.55 | 0.78 | 0.02 | -0.15 | 0.58 | 0.07 |
| 14 | Highnoon Laboratories Ltd. | 1.53 | 0.08 | 0.48 | 4.14 | 0.12 | 0.41 | 1.36 | *0.05 | 0.57 |
| 15 | ICI Pakistan Ltd. | 1.91 | 0.20 | 0.30 | 0.70 | 0.59 | 0.06 | 0.87 | 0.29 | 0.22 |
| 16 | Ittehad Chemicals Ltd. | -0.24 | 0.30 | 0.21 | 2.49 | 0.07 | 0.51 | -0.21 | 0.42 | 0.13 |
| 17 | Nimir Industrial Chemicals Ltd. | -0.31 | 0.59 | 0.06 | 0.43 | 0.41 | 0.14 | -0.01 | 0.99 | 0.00 |
| 18 | Otsuka Pakistan Ltd. | 0.21 | 0.80 | 0.01 | -0.60 | 0.85 | 0.01 | 0.08 | 0.91 | 0.00 |
| 19 | Pakistan PTA Ltd. | 0.08 | 0.44 | 0.12 | 0.79 | 0.52 | 0.09 | 0.07 | 0.38 | 0.16 |
| 20 | Searle Pakistan Ltd. | 1.14 | 0.24 | 0.26 | -0.44 | 0.84 | 0.01 | 0.58 | 0.46 | 0.11 |
| 21 | Sitara Chemical Industries Ltd. | -0.51 | 0.45 | 0.12 | 0.59 | 0.41 | 0.14 | 0.38 | 0.73 | 0.03 |
| 22 | Wah Nobel Chemicals Ltd. | -0.51 | 0.39 | 0.15 | 0.25 | 0.77 | 0.02 | -0.16 | 0.72 | 0.03 |
| 23 | Wyeth Pakistan Ltd. | 0.18 | 0.62 | 0.05 | 0.04 | 0.97 | 0.00 | 0.24 | 0.60 | 0.06 |
| * Coefficient significant at either 5% or 1% level of significance | | | | | | | | | | |
| ** Coefficient significant at both 5% and 1% level of significance | | | | | | | | | | |

A final summary of all sampled firms in each sector demonstrate that all sectors are managing their current assets most efficiently and none of the sector shows below average performance. Table 4.3.27 gives a summary of these indices for respective sectors. This finding gives credence to one of the posed hypotheses.

| Sectoral Comparison of Working Capital Efficiency | | | | |
|--|---------------------------|--------------------------|--------------------------|-------------------------|
| S.No | Name of the sector | Performance Index | Utilization Index | Efficiency Index |
| 1 | Textile | 1.79 | 1.10 | 1.83 |
| 2 | Cement | 1.68 | 0.99 | 1.74 |
| 3 | Chemical | 1.34 | 1.24 | 1.65 |
| 4 | Fuel & Energy | 1.55 | 1.12 | 1.69 |
| 5 | Jute | 1.82 | 1.06 | 1.89 |
| 6 | Tobacco | 2.17 | 1.03 | 2.12 |
| 7 | Paper & Board | 1.28 | 0.98 | 1.25 |
| 8 | Other textiles | 1.36 | 0.98 | 1.33 |
| 9 | Transport & communication | 2.01 | 1.05 | 2.03 |
| 10 | Vanaspati & allied | 3.44 | 1.06 | 3.99 |
| 11 | Engineering | 2.57 | 1.52 | 4.44 |
| 12 | Sugar | 3.83 | 1.28 | 4.08 |
| 13 | Miscellaneous | 1.74 | 1.23 | 2.30 |

Table 4.3.28 shows a comparative analysis of the indicators of the WCM. Tobacco sector stands out to be the most efficient in terms of paying its bills whereas the miscellaneous sector is the least efficient with the highest time of clearing its payables (in days). Fuel & energy sector takes the longest duration in collections of receivables whereas tobacco sector collects its receivables quicker than any other sector. Jute firms take the longest in converting its inventories to finished products whereas cement sector makes the fastest conversion of inventory. The cash conversion cycle is the most efficient for cement sector and is the least efficient for the jute sector. Findings from Table 4.3.28 gives us a summarized look into the working capital components of different manufacturing sectors in Pakistan.

Table 4.3.28

Working capital industry averages for different sectors

| Sector | Days payables | Days receivables | Days inventory | Cash conversion Cycle |
|---------------------------|----------------------|-------------------------|-----------------------|------------------------------|
| Fuel & Energy Firms | 37 | 106 | 28 | 99 |
| Sugar Firms | 20 | 13 | 97 | 90 |
| Engineering Firms | 24 | 44 | 165 | 185 |
| Chemical Firms | 26 | 35 | 85 | 94 |
| Vanaspati & Allied | 28 | 19 | 64 | 55 |
| Transport & Communication | 38 | 38 | 45 | 46 |
| Tobacco | 9 | 10 | 55 | 56 |
| Textile | 34 | 44 | 155 | 161 |
| Paper & Board | 27 | 40 | 97 | 110 |
| Other Textile | 33 | 36 | 141 | 145 |
| Jute | 32 | 26 | 243 | 236 |
| Cement | 27 | 15 | 24 | 12 |
| Miscellaneous | 71 | 48 | 130 | 103 |

4.4 Results on Modeling Internal Micro Level Factors Towards Profitability

To view preliminary results on searching for internal micro level factors that may significantly affect profitability. An initial analysis in the form of OLS with no restrictions is applied to sampled firms of different sectors. Appendix-I shows some results in this respect. A formal OLS is subject to the problems of multicollinearity, heteroskedasticity, and autocorrelation. The three aspects are controlled using standard econometric techniques. There are inter-industry differences, for example differences in the accounting procedures, employment policies, firms other operations etc. Therefore, using fixed effect model such differences can be controlled for. In order to have more efficient estimators, as discussed in the methodology, the robust (HAC) standard errors model of FEM is used.

Results are reported in Table 4.4.1. For Fuel & Energy sector inventory management seems to significantly affecting operating profits. There is some evidence that size of the firm also affects profits. In the Sugar sector both inventory management and cash conversion cycle along with size of the firm have significant impact on the profits on the concerned sector. The operating profits of the Engineering firms seem to

Table 4.4.1

Fixed effects model using robust (HAC) standard errors

| Dependent Variable: Operating Profit | | | | | | | |
|---|---------------------|------------------|---------------------|-----------------------|----------------------|----------------------|---------------------|
| Regression coefficients for different sectors (p-value) | | | | | | | |
| Sector | Days payables | Days receivables | Days inventory | Cash conversion Cycle | DR | SF | FAT |
| Fuel & Energy Firms | 7.13579 (0.2676) | | | | -24.5859 (0.98) | 751.556 (0.11) | -19.22 (0.67) |
| | | 1.509 (0.11) | | | -376.96 (0.77) | 949.024 (0.10) | -37.237 (0.48) |
| | | | 51.251 (0.02**) | | -1256.87 (0.44) | 1754.65 (0.03**) | -28.543 (.42) |
| | | | | 1.862 (.011) | -500.44 (0.69) | 1034.02 (0.09*) | -41.733 (0.44) |
| Sugar Firms | 0.907 (0.12) | | | | -113.88 (0.18) | 258.766 (0.00***) | 0.0056 (0.96) |
| | | -1.288 (0.23) | | | -96.072 (0.23) | 238.548 (0.00***) | 0.0025 (0.98) |
| | | | 0.435 (0.02**) | | -108.448 (0.21) | 272.255 (0.00***) | 0.01 (0.93) |
| | | | | 0.289 (0.01**) | -107.053 (0.21) | 255.433 (0.00***) | 0.007 (0.95) |
| Engineering Firms | 4.364 (0.02**) | | | | 778.142 (0.00***) | 507.102 (0.00***) | 18.444 (0.05*) |
| | | 1.452 (0.18) | | | 803.383 (0.00***) | 439.924 (0.00***) | 19.329 (0.04**) |
| | | | 0.291 (0.31) | | 765.478 (0.00***) | 479.585 (0.00***) | 19.4761 (0.04**) |
| | | | | 0.265 (0.34) | 771.307 (0.00***) | 472.225 (0.00***) | 19.515 (0.04**) |
| Chemical Firms | 7.388 (0.01**) | | | | -184.29 (0.93) | 1593.03 (0.00***) | 3.499 (0.96) |
| | | -9.503 (0.37) | | | -382.054 (0.85) | 1310.31 (0.00***) | -4.665 (0.95) |
| | | | -4.665 (0.00***) | | -546.797 (0.77) | 2310.01 (0.00***) | 11.144 (0.87) |
| | | | | 6.781 (0.10) | -859.375 (0.66) | 1670.94 (0.01**) | 3.648 (0.95) |
| Vanaspati & Allied | 0.325 (0.03**) | | | | -18.836 (0.04**) | 17.038 (0.38) | 2.559 (0.02**) |
| | | 0.094 (0.91) | | | -2.925 (0.84) | 10.632 (0.63) | 2.628 (0.39) |
| | | | 0.183 (0.52) | | -9.801 (0.59) | 19.006 (0.39) | 2.828 (0.34) |
| | | | | -0.111 (0.54) | -4.148 (0.78) | 10.884 (0.57) | 2.699 (0.36) |
| Transport & Communication | -66.307 (0.42) | | | | -14393.2 (0.40) | 7410.07 (0.60) | 18149.9 (0.02**) |

| | | | | | | |
|---------------|--|--------------------|----------------------|----------------------|----------------------|----------------------|
| | | 37.232 (0.06) | | -13221.2 (0.43) | 13649.3 (0.17) | 20173.6 (0.01**) |
| | | | 163.234 (0.00***) | -782.126 (0.94) | 6402.35 (0.37) | 10838.1 (0.05*) |
| | | | | 122.434 (0.00***) | -11854.1 (0.30) | 2255.11 (0.83) |
| Tobacco | | -5.761 (0.87) | | -237.482 (0.88) | 3282.51 (0.00***) | 16.809 (0.84) |
| | | | 14.675 (0.00***) | -775.992 (0.40) | 3421.56 (0.00***) | 29.231 (0.65) |
| | | | -9.927 (0.01**) | -282.841 (0.60) | 2903.35 (0.00***) | -11.799 (0.82) |
| | | | | 0.586 (0.95) | -356.732 (0.66) | 3344.11 (0.00***) |
| Textile | | 0.764 (0.03**) | | -391.408 (0.16) | 419.782 (0.00***) | 26.698 (0.43) |
| | | | -0.996 (0.35) | -321.423 (0.23) | 374.517 (0.00***) | 22.542 (0.51) |
| | | | 0.611 (0.00***) | -484.927 (0.03**) | 520.908 (0.00***) | 44.871 (0.17) |
| | | | | 0.357 (0.16) | -390.596 (.11) | 438.143 (0.00***) |
| Paper & Board | | 0.602 (0.20) | | -1319.76 (0.19) | 853.31 (0.19) | 14.501 (0.28) |
| | | | 0.254 (0.88) | -1267.55 (0.20) | 821.648 (0.20) | 12.82 (0.32) |
| | | | -2.059 (0.14) | -1103.26 (0.19) | 721.859 (0.20) | 18.318 (0.22) |
| | | | | -0.83 (0.18) | -1263.04 (0.18) | 815.99 (0.19) |
| Other Textile | | 0.035 (0.72) | | -134.417 (0.41) | 127.333 (0.21) | 0.417 (0.35) |
| | | | -5.548 (0.36) | -148.331 (0.39) | 118.657 (0.19) | 0.392 (0.38) |
| | | | -0.113 (0.67) | -140.6 (0.36) | 123.682 (0.22) | 0.425 (0.35) |
| | | | | -0.289 (0.37) | -167.796 (0.34) | 120.966 (0.20) |
| Jute | | 1.105 (0.00***) | | -5.303 (0.92) | 77.062 (0.43) | 42.914 (0.00***) |
| | | | 0.134 (0.88) | 30.936 (0.63) | 73.192 (0.44) | 43.477 (0.00***) |
| | | | 0.348 (0.06*) | 187.714 (0.09*) | 368.01 (0.05*) | 27.721 (0.00***) |
| | | | | 0.337 (0.07*) | 190.121 (0.09*) | 355.781 (0.07*) |
| Cement | | 6.238 (0.08*) | | 255.244 (0.37) | 837.142 (0.00***) | 116.443 (0.17) |
| | | | -0.212 (0.91) | 313.027 (0.31) | 712.841 (0.00***) | 72.215 (0.47) |

| | | | | | | |
|--|-------------------|--------------------|-------------------|--------------------|----------------------|---------------------|
| | | 1.535 (0.63) | | 312.263 (0.31) | 736.103 (0.00***) | 79.236 (0.40) |
| | | | -2.707 (0.12) | 285.02 (0.35) | 719.819 (0.00***) | 52.936 (0.60) |
| Miscellaneous | 0.182 (0.02**) | | | -51.0543 (0.72) | 193.926 (0.00***) | 0.316 (0.00***) |
| | | 0.175 (0.00***) | | -5.127 (0.97) | 198.309 (0.00***) | -0.336 (0.00***) |
| | | | 0.374 (0.02**) | -51.235 (0.71) | 228.006 (0.00***) | -0.354 (0.00***) |
| | | | 0.057 (0.34) | 14.04 (0.92) | 179.972 (0.01**) | -0.314 (0.00***) |
| * shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level | | | | | | |

have a significant impact of the payables management, leverage, size of the firm and fixed asset turnover. The profits of Chemical firms are significantly impacted by inventory management, and size of the firm. The Vanaspati and Allied sector firms show that their profits take a significant impact of payables management. In the Transport & Communication sector inventory management, cash conversion cycle, and fixed asset turnover significantly impact the operating profits.

The profits of Tobacco sector show that they take significant influence of receivables management, inventory management, and size of the firm. The biggest economic sector in Pakistan i.e. the Cotton Textile sector, its profits take significant impact of payables management and inventory management along with size of the firm. There are no significant factors identified towards the profits of Paper & Board sector along with the Other Textile sector.

The Jute sector shows that payables management, inventory management, cash conversion cycle, and fixed asset turnover significantly impact its profits. There is little evidence in favor of leverage and size of the firm towards such an impact as well. The Cement sector of Pakistan has shown the payables management and size of the firm as the main significant factors impacting operating profits. The profits of Miscellaneous sector are significantly impacted by payables management, receivables management, inventory management, size of the firm, and fixed asset turnover. Referring to the third hypotheses in the set of hypotheses there is no evidence of similar working capital determinants that significantly impact the business performance of the firms in each sector. Now we turn our attention to another important aspect of the analysis. Theoretically speaking, the signs of relationship between the dependent and independent variables should be as follows;

Observed Sign with the Dependent Variable (Operating

| Independent Variables | Profits) |
|------------------------------|-------------------|
| Days Payables | Positive/Negative |
| Days Receivables | Negative |
| Days Inventory | Negative |
| Cash Conversion Cycle | Negative |
| Leverage (Debt ratio) | Positive/Negative |
| Size of the firm | Positive |
| Fixed Asset Turnover | Positive |

Looking at Table 4.4.1 we get signs of regression coefficients for payables management in the different sectors. With some sectors, it is evident that profits and days payables move together while with some others we can see that it is the opposite. This suggests a dual understanding of firms towards more profits. Some are supportive of the fact that delaying bills payable is a profitable thing while there are others who seem to have the idea the making payments earlier is more profitable.

The signs of other regression coefficients like receivables management, inventory management, cash conversion cycle, leverage, and fixed assets turnover do not follow expectations uniformly as they keep on changing. The sign for size of the firm is positive for all sectors. For some sectors however, significance of regression coefficients with an expected or unexpected sign drives attention. An observed sign in such a case endorses contemporary theory but an unexpected sign proposes that firms of different sectors behave differently. Seven out of thirteen sectors show significance of payables management on profits. All of these seven sectors exhibit a positive sign for the regression coefficient of days payables. This should endorse the supposition that firms of different sectors believe that delaying payments of purchases availed is more profitable. Two out of thirteen considered economic sectors show significant coefficients for receivables management. Both of them show positive signs for the concerned coefficients. This looks deviated from theory as established finance theory believes that speedy recoveries of credit sales is more beneficial.

Seven sectors showed significant estimates of regression coefficients for inventory management affecting business performance where only two coefficients came with expected negative signs. For some sectors there were unexpected positive signs like Fuel & Energy firms for days inventory, it may be due to volatility of oil prices, as firms increase their profits by keeping more inventory in anticipation of higher future prices. Chemical & Tobacco sector seem to reap economic benefits of faster inventory conversion.

Three economic sectors exhibit significant coefficients of cash conversion cycle towards profits. They show unexpected positive signs for the regression coefficient of CCC. This includes the Sugar sector which has had several operational crises during recent years. We revert back to our earlier posed hypothesis and conclude that there is no evidence to accept that there are similar working capital determinants for business performance in all economic sectors.

4.5 Results on Modeling Working Capital Requirements of a Firm

Now, we discuss our results on the fourth hypotheses in the study. We wish to test that business level internal micro level factors impact the working capital requirements for business firms in different economic sectors. Therefore, using robust standard errors (HAC) modeling technique important results are extracted in Table 4.5.1 using gretl software. The said table shows that there is no problem of autocorrelation in the used methodology. As already mentioned the change in all the used variables is measured by the first difference of the concerned variables, therefore according to standard text like (Gujrati 2003) there cannot be a problem of multicollinearity. Except for Chemical sector the remaining economic sectors show considerable R-squared values which makes these models reasonable for estimation. However, the F-test favors the proposition of using a model for estimation by significant values which is possible in the case of Textile sector, Miscellaneous sector, Jute sector, and Cement sector. Working capital requirements can be estimated using the models of the named sectors.

The variables used in Table 4.5.1 can be broadly divided into two categories for analyzing their effects on the working capital requirements of firms in all sectors. It is easily observable from Table 4.5.1 that most of the significant coefficients for macro factors except for quantum manufacturing index show negative signs.

This suggests that the broader macroeconomic picture, which really looks grim over the study period 2000-2008 has a negative relationship with working capital requirements of firms of concerned sectors. This should suggest that working capital requirements increase when the economy is performing poorly. The state of negative macroeconomic picture exerts great deal of pressure on the working capital requirements of firms in different sectors, it may not be with the same intensity though and as visible may benefit some sectors or firms in those sectors. The quantum manufacturing index shows very small positive coefficients, this shows the state of low production and small improvements in production of the concerned sectors.

The table also shows that a number of internal micro and external macro factors have an impact on working capital requirements of different sectors. They are not uniform for all sectors. Most of the sectors show leverage, cash flows, firm growth, and size of the firm to be

significant contributors towards suggesting working capital requirements of firms in different sectors. Surprisingly return on assets does not impact the working capital requirements of firms in different manufacturing sectors.

Table 4.5.1

Fixed Effects Models using robust standard errors (HAC) methodology**Dependent Variable: Change in normalized working capital requirements (CDWCR)**

| Sectors | Regression coefficients (p-values) | | | | | | | | | | Model results | | |
|---------------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|--------------------|------------------|-----------|---------------|
| | Constant | CBC | CLEV | CDCF | CGF | CROA | CSF | CRGDPGR | CLFUR | CQMI | F-Test | R-squared | Durbin-Watson |
| Vanaspati & Allied | 0.001 (0.992) | -0.602 (0.045**) | 0.036 (0.092*) | 0.012 (0.1227) | -0.001 (0.031**) | -0.001 (0.1307) | 0.061 (0.0829*) | -0.006 (0.049**) | 2.595 (0.3073) | 0.002 (0.7634) | 0.632 (0.790) | 0.29 | 2.50 |
| Transport & Communication | 0.001 (0.9537) | -0.23 (0.0537*) | -0.181 (0.00***) | -0.171 (0.1971) | -0.000 (0.6713) | -0.000 (0.8209) | 0.111 (0.1107) | -0.002 (0.047**) | 0.379 (0.8503) | -0.000 (0.8771) | 2.12 (0.106) | 0.66 | 1.94 |
| Tobacco | -0.115 (0.0825*) | -0.325 (0.3244) | 1.102 (0.0510*) | -0.001 (0.882) | -0.002 (0.3716) | 0.004 (0.1959) | -0.762 (0.1064) | -0.006 (0.3084) | 5.611 (0.1019) | 0.013 (0.061*) | 1.246 (0.354) | 0.53 | 1.77 |
| Textile | -0.188 (0.000***) | -0.458 (0.00***) | -0.035 (0.8324) | 0.084 (0.1042) | -0.000 (0.00***) | -0.001 (0.1353) | 0.035 (0.0901*) | -0.012 (0.000***) | -0.058 (0.9562) | 0.008 (0.00***) | 3.68 (0.000) | 0.39 | 2.37 |
| Sugar | -0.048 (0.043**) | -0.593 (0.00***) | -0.151 (0.2568) | -0.015 (0.4084) | -0.000 (0.7202) | -0.000 (0.7202) | 0.001 (0.4359) | -0.006 (0.8943) | -0.009 (0.005***) | 0.343 (0.8778) | 1.392 (0.107) | 0.23 | 2.67 |
| Paper & Board | -0.028 (0.6723) | 0.384 (0.6144) | -1.25 (0.0775*) | 0.061 (0.043**) | -0.005 (0.00***) | -0.000 (0.9347) | 0.619 (0.005***) | -0.023 (0.001***) | -3.09 (0.3948) | -0.006 (0.3752) | 1.81 (0.07) | 0.40 | 2.29 |
| Other Textile | -0.033 (0.2506) | -0.231 (0.2099) | -0.205 (0.01***) | 0.003 (0.1537) | 0.000 (0.9675) | -0.000 (0.833) | 0.017 (0.3998) | -0.004 (0.088*) | 3.05 (0.0505*) | 0.002 (0.3975) | 1.285 (0.20) | 0.24 | 2.21 |
| Miscellaneous sector | -0.087 (0.000***) | -0.32 (0.01***) | -0.071 (0.6777) | 0.012 (0.055*) | 0.000 (0.0984*) | 0.002 (0.1395) | 0.012 (0.055*) | -0.012 (0.000***) | -2.92 (0.006***) | 0.002 (0.053*) | 2.26 (0.000) | 0.30 | 2.26 |
| Jute Sector | -0.133 (0.1954) | 0.104 (0.5921) | 0.192 (0.2344) | 0.004 (0.00***) | -0.000 (0.00***) | -0.003 (0.047**) | 0.003 (0.9302) | -0.01 (0.2865) | -3.25 (0.0867*) | 0.005 (0.4622) | 1.81 (0.005) | 0.26 | 1.91 |
| Fuel & Energy | -0.006 (0.8852) | 0.034 (0.8439) | 0.296 (0.038**) | -0.023 (0.5998) | -0.000 (0.039**) | -0.004 (0.2251) | 0.059 (0.0221**) | -0.003 (0.3311) | -1.13 (0.5085) | -0.000 (0.9188) | 1.55 (0.189) | 0.50 | 2.37 |
| Engineering Sector | -0.173 (0.000***) | -0.539 (0.014**) | -0.027 (0.7946) | -0.005 (0.000**) | 0.000 (0.8059) | -0.005 (0.1146) | -0.004 (0.8916) | -0.012 (0.000***) | -0.652 (0.7791) | 0.007 (0.01***) | 0.58 (0.874) | 0.16 | 1.99 |
| Cement | 0.007 (0.4334) | -0.04 (0.5037) | 0.04 (0.5751) | 0.003 (0.8739) | 0.000 (0.8253) | -0.000 (0.8990) | 0.010 (0.6744) | -0.001 (0.1108) | -0.244 (0.7942) | -0.001 (0.3601) | 2.39 (0.000) | 0.33 | 2.47 |
| Chemical Sector | -0.032 (0.0592*) | -0.163 (0.0792*) | -0.016 (0.8209) | -0.006 (0.034**) | 0.000 (0.5348) | 0.001 (0.1047) | -0.034 (0.4114) | -0.006 (0.005***) | -2.04 (0.016**) | 0.001 (0.7245) | 0.329 (0.997) | 0.08 | 2.92 |

* shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level

4.6 Results on Modeling Working Capital Needs of Firms in Different Sectors

Now we proceed to estimate working capital needs of firms in different sectors. This needs quantifying the liquidity aspect of the sampled firms. Table 4.6.1 presents some important findings in this respect. Change in normalized net liquid assets is measured by the first difference of net liquid assets as ratio of total assets. Only size of the firm has significant influence on net liquid assets of Vanaspati & Allied sector firms. For the Transport & Communication sector firms leverage and return on assets are internal micro factors influencing net liquid assets whereas it is significantly impacted by macroeconomic variables like quantum manufacturing index and real gross domestic product.

Tobacco sector shows leverage and growth of firm as significant internal determinants of liquidity. Business cycle does affect liquidity of Tobacco firms. Cotton textile sector has a number of internal micro and external macro factors affecting liquidity of these firms. Namely the internal micro factors are, leverage, cash flows, size of the firm along with business cycle, real gross domestic product, labor force unemployment, and quantum manufacturing index. The Sugar sector demonstrates leverage, cash flows, and return on assets as internal micro level factors having an impact on the liquidity management of firms. Real GDP is the only external macro level factor that influences the liquidity management of firms in the said sector. For Paper & Board sector only leverage and quantum manufacturing index are significant influences on the liquidity management. Other Textile sector only shows leverage as a significant determinant of liquidity. For Miscellaneous sector leverage, cash flows, return on assets are significant internal micro level factors impacting liquidity along with labor force unemployment and quantum manufacturing index are some of the external macro factors. Jute sector shows business cycle and production index to be the key external macro determinants of liquidity along with leverage, growth of firm, and return on assets as some internal macro level determinants.

Leverage is identified as the only significant determinant of liquidity management for Fuel & Energy sector. Liquidity management in the Engineering sector seems to be under the influence of leverage, cash flows, and growth of firm as they show statistical significance. Production index, labor force unemployment, and real GDP significantly affect liquidity management of the same sector.

The liquidity of Cement sector seems to be more influenced by internal micro level factors, namely they are, leverage and growth of the firm. Business cycle is yet another significant determinant of liquidity management for firms in the said sector. In the Chemical sector, leverage, cash flows, and size of the firm are the only significant determinants of liquidity.

This shows that the macroeconomic forces hardly dictate liquidity of chemical firms in Pakistan.

Table 4.6.1 shows that for most of the manufacturing sectors in Pakistan; leverage, cash flows, and firm growth bear credible importance as internal micro level factors affecting the liquidity management of firms. The importance of macroeconomic forces in liquidity management is evident from the fact that many sectors take their significant effect while they manage liquidity. This suggests that the performance of the economy exerts considerable pressure on business firms. The level of performance of the economy has a significant influence on the liquidity management of business firms.

With the exception of Vanaspati & Allied and Transport & Communication sectors, regression models used for the remaining sectors are capable of estimating net liquid assets as their corresponding F-tests are significant with fairly high R-squared values. Durbin-Watson results show no problem of autocorrelation. Since differencing of all concerned variables is used, therefore multicollinearity may not be a problem.

In the final analysis of the thesis, Table 4.6.2 exhibits correlations between efficiency score of WCM with internal micro and external micro level factors. This table shows some interesting correlations. Return on assets has a significant relationship with all of the used variables. Payables management is significantly correlated with inventory management and CCC. Receivables management has a significant correlation with CCC, liquidity and size of the firm. Inventory management has a significant correlation with CCC.

Leverage is significantly correlated with liquidity management, working capital requirements, growth of firms, size of firms and employees' capability of decision making. Working capital requirements are significantly correlated with employees' capability of decision making. To control multicollinearity and improve the estimation quality of regression coefficients, equation (xi) is not used and instead a modified model (xii) is used. It is deemed a better fit as the formal VIF test endorses it since it controls multicollinearity. Results of VIF are given in Appendix-II.

Table 4.6.1

Fixed Effects Models using robust standard errors (HAC) methodology

| Dependent Variable: Change in normalized net liquid assets (CDNLA) | | | | | | | | | | | | | |
|--|------------------------------------|----------------------|----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|----------------------|---------------------|------------------|-----------|---------------|
| Sectors | Regression coefficients (p-values) | | | | | | | | | | Model results | | |
| | Constant | CBC | CLEV | CDCF | CGF | CROA | CSF | CRGDPGR | CLFUR | CQMI | F-Test | R-squared | Durbin-Watson |
| Vanaspati & Allied | -0.046 (0.4901) | -0.030 (0.8732) | -0.06 (0.3580) | 0.007 (0.2328) | 0.000 (0.5336) | 0.000 (0.4954) | -0.138 (0.0109**) | 0.002 (0.6449) | 0.795 (0.9048) | 0.0014 (0.815) | 0.337 (0.971) | 0.18 | 1.59 |
| Transport & Communication | -0.143 (0.0690*) | 0.129 (0.8680) | -0.285 (0.000***) | -0.192 (0.6939) | -0.000 (0.9204) | 0.007 (0.0386**) | 0.001 (0.9984) | 0.0194 (0.0443**) | 8.7237 (0.2196) | 0.011 (0.000***) | 1.98 (0.127) | 0.65 | 1.31 |
| Tobacco | 0.034 (0.4275) | -0.510 (0.000***) | -0.992 (0.000***) | -0.008 (0.1356) | 0.003 (0.000***) | 0.003 (0.0178**) | 0.173858 (0.3212) | -0.000 (0.9892) | -1.62278 (0.6191) | -0.0043 (0.380) | 3.465 (0.021) | 0.76 | 1.97 |
| Textile | -0.033 (0.0145**) | -0.263 (0.008***) | -0.706 (0.000***) | -0.074 (0.011**) | 0.000 (0.7160) | -0.000 (0.5634) | 0.055 (0.038**) | 0.005 (0.001***) | 3.107 (0.0174**) | 0.003 (0.004***) | 3.15 (0.000) | 0.36 | 2.26 |
| Sugar | -0.022 (0.4237) | 0.101 (0.6033) | -0.685 (0.000***) | -0.036 (0.0819*) | 0.000 (0.9808) | 0.005 (0.000***) | 0.067 (0.2123) | 0.01 (0.000***) | -2.52 (0.2455) | 0.001 (0.621) | 7.119 (0.000) | 0.60 | 2.37 |
| Paper & Board | -0.051 (0.1966) | -0.025 (0.8835) | -0.706 (0.000***) | -0.011 (0.3514) | 0.001 (0.5095) | 0.002 (0.2137) | -0.096 (0.5732) | -0.0005 (0.8998) | 0.415 (0.8486) | 0.004 (0.043**) | 2.32 (0.017) | 0.47 | 1.92 |
| Other Textile | 0.015 (0.6539) | 0.124 (0.6412) | -0.690 (0.000***) | -0.006 (0.2160) | 0.000 (0.2547) | -0.000 (0.7920) | -0.03 (0.1756) | -0.001 (0.6879) | 0.217 (0.9298) | -0.002 (0.432) | 4.69 (0.000) | 0.54 | 2.05 |
| Miscellaneous sector | -0.025 (0.0530*) | -0.034 (0.7569) | -0.604 (0.000***) | -0.015 (0.005***) | 0.000 (0.7586) | -0.004 (0.0484**) | -0.028 (0.3542) | 0.001 (0.3484) | 2.9043 (0.0584*) | 0.003 (0.032**) | 1.81 (0.005) | 0.26 | 1.91 |
| Jute Sector | -0.117 (0.000***) | -0.272 (0.0842*) | -0.94 (0.000***) | -0.003 (0.3677) | 0.000 (0.000***) | 0.003 (0.0743*) | 0.003 (0.7809) | 0.003 (0.7662) | -1.744 (0.5545) | 0.007 (0.000***) | 12.46 (0.000) | 0.89 | 1.34 |
| Fuel & Energy | -0.015 (0.5493) | -0.033 (0.8431) | -0.81 (0.000***) | 0.084 (0.2781) | -0.000 (0.2087) | 0.001 (0.2533) | 0.041 (0.1006) | -0.001 (0.5174) | -2.46 (0.2042) | 0.000 (0.99) | 3.66 (0.000) | 0.48 | 2.05 |
| Engineering Sector | -0.006 (0.7187) | -0.203 (0.1658) | -0.636 (0.000***) | -0.002 (0.002***) | 0.000 (0.007***) | -0.002 (0.4594) | -0.069 (0.1940) | 0.01 (0.000***) | 2.850 (0.0461**) | 0.003 (0.021**) | 3.56 (0.000) | 0.42 | 2.18 |
| Cement | -0.019 (0.5354) | -0.357 (0.0716*) | -0.562 (0.000***) | 0.059 (0.2192) | 0.001 (0.004***) | -0.000 (0.9129) | -0.037 (0.3447) | 0.003 (0.1834) | 1.32 (0.4805) | 0.002 (0.333) | 3.84 (0.000) | 0.49 | 1.87 |
| Chemical Sector | 0.014 (0.2922) | -0.176 (0.1440) | -0.911 (0.000***) | -0.013 (0.000***) | 0.000 (0.1137) | 0.000 (0.4436) | -0.102 (0.015**) | 0.001 (0.3264) | 1.371 (0.2247) | 0.000 (0.757) | 3.180 (0.000) | 0.39 | 2.49 |

* shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level

4.7 Results on Modeling Internal Micro Level Factors Towards Working Capital

Efficiency

The final table in the analysis is aimed at finding internal micro level determinants that have a significant impact on the efficiency of WCM in Pakistan. As visible from Table 4.7.1, four regression models are used. As there were interrelationships between the main components of WCM namely receivables management, inventory management, and cash conversion cycle; therefore, for controlling this aspect four regression models are used.

Table 4.7.1 briefs some important findings in this regard. Payables management is identified as not a significant internal micro level factor that affects the efficiency of WCM. Its positive sign does show that it plays a positive role in improving the aforementioned efficiency. Receivables management, inventory management, and cash conversion cycle are identified as internal level micro level factors for the sampled firms of all sectors. The three factors show positive signs which emphasize their contribution to efficiency of working capital management. The findings lead to another important argument as well, payables management is not regarded as a significant contributor towards increasing efficiency of WCM whereas firms consider receivables management, inventory management and CCC to be significant in increasing the efficiency of WCM. This should mean that firms in Pakistan believe that delaying payables to purchases due does not harm more than delaying receivables. There is statistical evidence that suggests that better inventory management, receiving credit collections earlier and converting cash quickly increases efficiency of WCM. There is no statistical evidence in favor of finding a contribution of the business personnel capability of decision making towards achieving better efficiency of WCM. The same is true for return on assets, leverage, and size of the firm. There is little evidence that supports the argument that working capital requirements of a firm increases the efficiency of WCM. Growth of the firm also indicates that it significantly improves the efficiency of WCM. This makes sense as growing firms need to be efficient in handling working capital when they start off new business projects or cater to the liquidity of existing business projects. F-test is uniformly accepted for the used models, which endorses the use of these models for estimation purposes and rather than using mere guesswork in determining working capital efficiency. Durbin-Watson results show that there is no problem of autocorrelation in the used models. Table 4.7.2 summarizes significant micro level factors found to have an effect on profitability, working capital requirements, liquidity needs, and working capital efficiency. This table is a key finding of the thesis. It shows that for seven business sectors the profitability depends on the number of days the payments are made for the purchases done earlier.

Table 4.6.2

Pearson Correlation Matrix

| | ROA | PM | RM | IM | CCC | DR | DNLA | DWCR | GF | SF | ECDM | Xs |
|------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----|
| ROA | 1 | | | | | | | | | | | |
| PM | 0.104 (0.000) | 1 | | | | | | | | | | |
| RM | -0.085 (0.000) | 0.022 (0.345) | 1 | | | | | | | | | |
| IM | 0.112 (0.000) | 0.995 (0.000) | 0.014 (0.558) | 1 | | | | | | | | |
| CCC | 0.110 (0.000) | 0.983 (0.000) | 0.081 (0.000) | 0.99 (0.000) | 1 | | | | | | | |
| DR | -0.411 (0.000) | 0.0152 (0.513) | -0.004 (0.835) | 0.016 (0.481) | 0.0167 (0.474) | 1 | | | | | | |
| DNLA | 0.366 (0.000) | -0.019 (0.410) | -0.042 (0.070) | -0.025 (0.291) | -0.031 (0.182) | -0.681 (0.000) | 1 | | | | | |
| DWCR | 0.148 (0.000) | -0.011 (0.614) | 0.025 (0.283) | 0.023 (0.32) | 0.049 (0.036) | -0.080 (0.001) | -0.126 (0.000) | 1 | | | | |
| GF | 0.073 (0.002) | -0.007 (0.748) | -0.019 (0.402) | -0.004 (0.877) | -0.002 (0.93) | 0.085 (0.000) | -0.0184 (0.43) | 0.025 (0.277) | 1 | | | |
| SF | 0.224 (0.000) | -0.026 (0.272) | -0.232 (0.000) | -0.022 (0.339) | -0.037 (0.113) | -0.077 (0.000) | 0.074 (0.001) | -0.045 (0.050) | -0.009 (0.706) | 1 | | |
| ECDM | 0.641 (0.000) | 0.014 (0.534) | 0.018 (0.429) | 0.013 (0.573) | 0.014 (0.556) | -0.485 (0.000) | 0.399 (0.000) | 0.111 (0.000) | 0.030 (0.195) | 0.155 (0.000) | 1 | |
| Xs | -0.1 (0.000) | -0.004 (0.866) | 0.123 (0.000) | -0.003 (0.906) | 0.007 (0.769) | 0.152 (0.000) | -0.058 (0.012) | -0.023 (0.315) | 0.395 (0.000) | -0.081 (0.000) | -0.065 (0.005) | 1 |

* shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level

Now, we need to think what should be an optimal paying strategy of the firm? Should it pay its due by the time purchases are made or should it delay it unless the supplier strictly demands the payments? Since we know delaying payments for purchases allows firms to have inexpensive finance for other business operations but paying it early appreciates trust and confidence of the supplier. It looks more in benefit of firms to stretch payables optimally where

Table 4.7.1

Estimation Results of Panel Regression Models (FE)

Dependent Variable: Working Capital Management Efficiency Score

| Factors | First Model | Second Model | Third Model | Fourth Model |
|--|--------------------|---------------------|---------------------|---------------------|
| Constant | 4.68 (0.017**) | 4.6 (0.013**) | 4.22 (0.036**) | 4.10 (0.0278**) |
| Payables Management | 0.001 (0.146) | | | |
| Receivables Management | | 0.003 (0.001***) | | |
| Inventory Management | | | 0.001 (0.007***) | |
| Cash Conversion Cycle | | | | 0.002 (0.005***) |
| Employees Capability of Decision Making | -0.039 (0.351) | -0.037 (0.3704) | -0.036 (0.391) | -0.034 (0.408) |
| Return on Assets | -0.022 (0.1745) | -0.022 (0.179) | -0.022 (0.186) | -0.021 (0.200) |
| Normalized Net Liquid Assets | -0.828 (0.502) | -0.793 (0.519) | -0.778 (0.526) | -0.727 (0.548) |
| Normalized Working Capital Requirements | -0.522 (0.158) | -0.571 (0.115) | -0.669 (0.073*) | -0.78 (0.057*) |
| Leverage | -0.434 (0.668) | -0.37 (0.712) | -0.423 (0.675) | -0.367 (0.713) |
| Size of the Firm | -0.343 (0.18) | -0.343 (0.157) | -0.29 (0.267) | -0.284 (0.25) |
| Growth of the Firm | 0.007 (0.022**) | 0.007 (0.022**) | 0.007 (0.018**) | 0.007 (0.0173) |
| R-Squared | 0.29 | 0.29 | 0.29 | 0.29 |
| F-test (p-value) | 0 | 0 | 0 | 0 |
| Durbin-Watson | 2.15 | 2.15 | 2.14 | 2.14 |
| * shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level | | | | |
| The p-values for the regression coefficients are based on robust standard errors | | | | |

both the aforementioned conditions can be satisfied. There are business eight sectors as identified by Table 4.7.2 where the number of days in inventory is significantly determining the profits. Firms purchase inventory for conversion to sellable goods. If inventory spends more time in warehouses rather being converted to finished products, it will increase costs of the business.

For this reason, business firms must realize the importance of ordering, storing, and conversion of inventory. Frequent ordering and more storage of inventory would eat profits of the business. Conversion of inventory to finished products will have to be done most efficiently and at full capacity of the business concern, if the number of days in inventory is to be reduced. Another most important consideration for firms as reflected in Table 4.7.2 is the sales of the business, more sales means more profits. This is observed in seven business sectors. Debt ratio or level of leverage used by the firms is observed to be a major factor in determining the working capital requirements of a business firm. Since total liabilities include current liabilities, it would depend that what specific mix of these two would benefit a business firm in finding the needed capital.

One thing looks clearer from this finding that current liabilities have to be generated keeping in view business objectives. Interest bearing liabilities increase the risk factor but at the same time they are able to produce better returns. Firms with better sales in most of the sectors are found to have shaped their working capital requirements accordingly. With some sectors firm growth and cash flows have a significant influence in determining working capital requirements. Table 4.7.2 shows that with the exception of one sector, all other sectors are showing leverage to be a significant internal micro level factor determining the liquidity needs of the firm. Firms need to remain solvent and would have to seriously consider employing the amount of current liabilities while doing so. In addition to this, the cash flows and sales have to be planned in a manner that will not endanger the liquidity flow of the firms. Table 4.7.2 shows that working capital efficiency of all business sectors depends on receivables management, inventory management and cash conversion cycle. This suggests that an integrated effort has to be made to lower down costs of working capital by firms of all sectors.

Table 4.7.2 Significant internal micro level factors affecting business performance and working capital

| Sector | Profitability | Working Capital Requirements | Liquidity Needs | Working Capital Efficiency Receivables Management, Inventory Management, and Cash Conversion Cycle |
|--------------------------------------|---|---|---|--|
| Vanaspati & Allied | Days payables | Leverage, Firm's growth, Size of the firm | Size of the firm | |
| Transport & Communication | Days inventory, Cash Conversion Cycle | Leverage | Leverage, Return on assets | |
| Tobacco | Days receivables, Days inventory, Size of the firm | Leverage | Leverage, Firm's growth, Return on assets | |
| Textile | Days payables, Days inventory, size of the firm | Firm's growth, Size of the firm | Leverage, Cash flows, Size of the firm | |
| Sugar | Days inventory, Size of the firm | None | Leverage, Cash flows, Return on assets | |
| Paper & Board | None | Leverage, Cash flows, Firm's growth, Size of the firm | Leverage | |
| Other Textile | None | Leverage | Leverage | |
| Miscellaneous sector | Days payables, Days receivables, Days inventory, Size of the firm, Fixed asset turnover ratio | Cash flows, Firm's growth, Size of the firm | Leverage, Cash flows, Return on assets | |
| Jute Sector | Days payables, Days inventory, Cash conversion cycle, Fixed asset turnover ratio | Cash flows, Firm's growth, Return on assets | Leverage, Firm's growth, Return on assets | |
| Fuel & Energy | Days inventory | Leverage, Firm's growth, Size of the firm | Leverage | |
| Engineering Sector | Days payables, debt ratio, size of the firm, fixed asset turnover ratio | Cash flows | Leverage, Cash flows, Firm's growth | |
| Cement | Days payables, Size of the firm | None | Leverage, Firm's growth | |
| Chemical Sector | Days payables, Days inventory, size of the firm | Cash flows | Leverage, Cash flows, Size of the firm | |

CHAPTER 5

SUMMARY, CONCLUSION & RECOMMENDATIONS

5.1 Chapter Overview

This chapter summarizes the thesis and presents some of its most important findings. Additionally, it discusses policy implications for the benefit of stakeholders of corporate sector, researchers, and policy makers. This chapter will also inform the reader about some recommendations and input to policy making on the basis of findings. Since the research thesis is applied in nature, a number of interesting findings are concluded that need attention for making some recommendations. Later in this chapter a discussion is made on furthering the research agenda on the topic of WCM and its business implications.

Business organizations are a key part of the social and economic fabric of a country. They are obliged to play an important role in the economic decision making of individuals, be productive to the economy and have to play their positive role by being socially and environmentally responsible. This thesis has looked into one major aspect of business decision making. Working capital management is one form of management that can keep a business solvent, can keep it on a business track and can enable a business in lowering down its costs of resources. Businesses go bankrupt when they have no money to pay their outstanding bills. The very solvency of a business depends on WCM.

Decisions relating to WCM are not endogenous as they involve a number of exogenous factors like government policies, legal framework, market conditions, seasonality pressures etc.

Keeping in view the findings of the thesis the following recommendations are suggested that can further improve the efficiency of WCM in Pakistan. A discussion is generated from the viewpoint of giving input to policy and suggestions to the concerned sector. The recommendations are divided in sections for each sector that is being analyzed by this thesis.

As mentioned earlier in Chapter 4 the thesis sought some descriptive findings, including differentiation of firms of different sectors in terms of working capital efficiency and understanding the degree of efficiency responsiveness of firms with its sectoral averages.

In addition, this study was interested in identifying internal micro level factors that significantly affect business performance of firms in different sectors. Identification of Internal micro level determinants for working capital requirements and liquidity needs of firms in different sectors was another major question for which answers were sought. The final objective of the thesis was to identify significant internal micro level factors that determine efficient working capital management for a firm in a sector.

This chapter is going to present in detail the descriptive and inferential findings in detail for each sector included in the study. It helps us in identifying significant factors that can help in policy making for more efficient and effective management of working capital. Moreover, the key findings of the thesis are linked with existing finance literature in this chapter. Finally, the policy implications based on findings of the thesis are also formulated. Section 5.2 gives a summary of statistical procedures used in deriving findings, Section 5.3 to Section 5.15 details findings and recommendations for the thirteen manufacturing sectors, Section 5.16 gives findings on the pool of firms from all sectors, Section 5.17 discusses lead to future research.

5.2 Summary of statistical procedures

After setting some key objectives of the research and setting hypotheses an objective sample size of 207 firms was drawn from 13 economic sectors of Pakistan. Sample size is determined using standard statistical formula for finite populations. Variation in current assets is used as a proxy for measuring variability in the practice of working capital management. From every manufacturing sector only those firms are sampled which have the highest employed capital. The sampling units from each sector are selected using proportional sampling methodology. Those firms from each sector were included in the sample where maximum information about their modeled variables was available.

Three types of analysis are conducted for firms of each sector. Initially efficiency indices are computed for sampled firms of each sector to describe their state of efficiency with which they are managing their current assets and are taking their advantage in generating performance of the business. Next, the degree of efficiency achieved overtime is measured by the degree of responsiveness of each firm of a sector with its sectors efficiency benchmarks. This will show any improvement or deterioration in efficiency of WCM over time.

The second phase of the analysis measures the significance of internal micro level factors in the business performance of firms of different sectors. The third and final phase of the analysis determines the role of internal micro level or external macro level determinants towards how firms manage the working capital requirements and liquidity requirements in different sectors. In addition to the analysis above a pooled regression analysis is carried out in the end after determining efficiency index as the main dependent factor using factor analysis. A number of internal micro and external macro determinants are used as independent variables in framing an econometric model. Using standard statistical methodology, the drivers of working capital efficiency are inquired and are reported in the previous chapter.

5.3 Findings from the Cotton Textile Sector

The analysis started with an evaluation of the practices of different sectors as far as efficiency in WCM is concerned. Every sector was scrutinized using sampled firms with the application of some indices directed at monitoring the performance, utilization, and efficiency of WCM. Initially efficiency indices are computed for Cotton Textile sector of the economy to differentiate efficient firms from inefficient firms and next an attempt is made to explore any key determinants that determine efficiency in the efficient firms. The efficiency indices for the practice of WCM are computed for sampled textile firms. The Cotton Textile sector showed that most of firms are efficiently pursuing their working capital strategies. There is more emphasis on performance i.e. on increasing sales though there are indications of low utilization of current assets towards generating more sales. Around 80% of the sampled Cotton Textile firms showed efficient performance on their part towards managing working capital. This sector can be truly called the backbone of Pakistani economy, as it has been contributing to the GDP in the country, has been providing jobs, and employs a sizeable workforce. The assets employed in this sector, if are utilized efficiently can further provide room for growth and expansion of both the sector and economy. Only five firms in the Cotton Textile sector are observed to have improved efficiency of WCM. Reduction in costs of current assets is observed for Bhanero Textile Mills Ltd., Fateh Textile Mills Ltd., Kohinoor Industries Ltd., Olympia Spinning & Weaving Mills Ltd., & Tata Textile Mills Ltd. Overall, this sector has been performing satisfactorily in managing its current assets and current liabilities. One of the major reasons for low efficiency of WCM in this sector is a longer duration of conversion of cash, as more time is spent in converting inventories to sellable goods. The operating profits of this sector are found to be significantly impacted by the payables duration and inventory conversion. Results also suggest that size of the firm results in significant profits for this sector. Delaying purchases payables looks to be a profit making strategy used by indigenous Cotton Textile sector. These findings confirm to findings of the earlier studies (Deloof: 2003, Eljelly: 2004, Khan, Shah and Hijazi: 2006, Mathuva: 2009, Ramachandran and Jankiraman 2009, Gill, Biger and Mathur: 2010). This sector is found to be significantly influenced by a number of internal micro and external macro level factors when it comes to identifying the working capital requirements.

External macro level factors like business cycle, real GDP rate, and quantum manufacturing index impact such requirements adversely along with firm growth and size of the firm as internal micro level determinants. The liquidity requirements of the firms are found to be impacted by leverage, cash flows, and size of the firm which are deemed as internal firm level

factors. Production index, labor force unemployment rate, real GDP rate, quantum manufacturing index, and business cycle exert adverse pressure on maintenance of liquidity by the said firms.

5.3.1 Recommendations for the Textile Sector

In light of findings for this sector it is believed that firms have to work more on utilization of current assets for generating more sales. Most of the firms are found not to fully utilize their current assets. For this purpose, firms have to think about return on fixed assets and return on current assets in order to fully understand the cost and benefits of current assets. In addition to this, the sector has to raise standards of efficiency while utilizing current assets. The sector as whole has to think about lowering cash conversion cycle as the current modus operandi in place for production consumes more time for cash to be in cycle. Our exports and local consumption of textile are dependent upon production from firms of the sector. Inventory takes more time to be converted to sellable items. One obvious reason for this is the installment of obsolete machinery by a significant number of business concerns. Such firms have to find ways and means to arrange the capital cost for replacing outdated machinery. Government can announce some soft loans in this respect. Business firms have to realize that their profits are significantly affected by payables duration. Longer payables duration is a handicap for firms to have more funds for other business projects. Working capital requirements take a significant influence of some macro level factors. They should be looked at while devising working capital policies of the firm. Maintenance of cash flows and using leverage has to be done with care, as the firm liquidity depends on them. One lesson firms of this sector need to learn is that when economy is performing poorly and indicators are going low, they have to be more careful in handling working capital and liquidity requirements.

5.4 Findings for the Other Textile Sector

For this sector it was observed that most of the firms are efficiently managing their working capital. 64% of the firms of this sector were found to be efficient in managing their current assets. Interestingly, more firms performed better on the performance index while utilization of current assets towards improving sales was low like Cotton Textile sector.

Three of the firms from this sector have been found to have improved their working capital efficiency compared to its sectors' working capital efficiency standards. They include Indus Polyester Company Ltd., Moonlite (Pak) Limited., and S.G. Fibres Ltd. Very few firms of this sector seem to have improved their performance standards in terms of conversion of current assets to sales. Like Cotton Textile sector this sectors seems to be having problems in inventory conversion and having a larger cash conversion cycle. There are no significant

determinants identified for operating profits of this sector. The working capital requirements of this sector are significantly affected by leverage employed by firms. Macroeconomic variables like real gross domestic product rate and labour force unemployed rate exert influence on managing working capital requirements. Leverage is the only internal micro level determinant identified for firms in this sector having an impact on determining the liquidity policy.

5.4.1 Recommendations for the Other Textile Sector

Sample findings from this sector suggest that a reasonable number of firms are not efficiency in handling WCM. There seems a low utilization of current assets towards achieving more sales. The firms have a textile diversity like they produce polyester, silk, woollen, and fibres products. Very few firms are found to be improving their efficiency standards. Current asset and liability management has to be seriously taken by these firms if they want to increase both their profitability and business viability. Firms of this sector can improve efficiency standards by wisely planning the WCM. Ministry of Textiles and textile associations in the country can work towards increasing awareness about the costs and benefits in managing working capital. Textile exports face fierce competition from countries in the region like India and Bangladesh. Reducing the cost of output by efficient management of working capital will surely benefit the economy. Government would have to provide an enabling environment to this sector by providing enough energy. Energy shortages including that of electricity, gas, oil etc adversely affects the costs of working capital. This working capital requirement of this sector takes a significant impact of economic indicators. In such turbulent times the financial planners of this sector will have to think differently about managing working capital as the need for working capital will increase. Leverage is to be considered as a key factor in managing working capital and liquidity requirements of the said factor.

5.5 Findings from the Sugar Sector

From the sampled 21 top capital employed firms the efficiency analysis of WCM showed only three firms not meeting the standards. Utilization index for firms from this sector showed poor utilization of current assets in meeting business objectives. The performance index was managed satisfactorily well. The degree of efficiency responsiveness with the sector performance was not very convincing and most of the firms showed no improvement in achieving greater efficiency in managing working capital. Indeed only a single firm is found to have achieved reduction in costs of current assets, namely Shakarganj Mills Ltd. This may be due to the lethargic overall performance of Sugar sector.

Results do show that some firms achieved some improvement while others showed deterioration of performance in meeting efficiency standards. The degree of responsiveness in

achieving better performance and improved utilization of current assets towards enhanced sales seemed not changing with the industry benchmarks. These firms showed fast CCC with a lot of focus on early payments of purchases payables and fast recovery of receivables. The sampled firms showed fast conversion of raw materials into finished product form. The operating profits of Sugar sector in Pakistan seem to be significantly affected by inventory management and cash conversion cycle.

This confirms to the findings of Chiou and Cheng (2006). Size of the firm is identified to be another major factor that improves profitability of firms in the said sector. For this sector there are no internal micro level factors identified those affect the working capital requirements of firms; however, there is evidence that macroeconomic variables significantly affect the same. Business cycle and labour force unemployment rate are some factors identified in the same context. For maintaining the liquidity requirements a number of internal micro level factors are identified including leverage, cash flows, and returns on asset. In addition to internal micro level factors there is evidence found that external macro level factors also affect the liquidity management of firms in this sector. It is found that liquidity management is significantly affected by change in real gross domestic rate.

5.5.1 Recommendations for the Sugar Sector

This sector has been under tremendous pressure to meet indigenous demands. Limited supply of sugar is not enough to meet consumer demand. Sugar import is now a common phenomenon. Limited local production along with a significant level of import is deemed responsible for rapid inflation in the unit consumption. In view of critics, this sector is not performing efficiently and has to make more efficient business strategies. This thesis has looked into the efficiency of WCM and in light of findings the business firms of this sector has to find more profitable strategies that ensure utilizing the current assets more efficiently. Some firms are better than others in achieving the said efficiency but overall the sectoral standards are low. Owners of sugar mills through active associations, workshops, debates, and seminars should increase awareness about the risks and returns associated with working capital. The sector should work more on reducing the cash conversion cycle and the number of days in inventory. Reducing these two will have further economic dividends for firms of the sector. Sales and number of days in inventory have a significant impact on the profits of firms. Sugar firms should plan their working capital by managing inventory wisely as profitability could be further improved. The demand for sugar is inelastic yet in uneven macroeconomic conditions the sector is under immense pressure to remain efficient and achieve business goals by keeping business costs to the minimum. These firms should work toward strategizing working capital

and liquidity requirements. Liquidity needs should be planned in light of leverage levels, cash flows and profits made. Improving in production levels of this sector is vital for meeting local needs of sugar. This may be possible by lowering the costs of working capital. A profitable sector is in the interest of economy, consumers, government, and investors etc.

5.6 Findings from the Engineering Sector

Only one firm from this sector is found which is not efficiently managing its working capital. Almost all of the sampled firms from this sector seem to be performance driven and are taking comparatively better utilization of their employed current assets in generating more business for their firms. A reasonable number of firms are performing with greater efficiency in managing their current assets and current liabilities and are effectively managing their business goals aligned with working capital. Two firms are observed to have improved the utilization of current assets, they are namely Agriauto Industries Ltd., Atlas Honda Ltd., and KSB Pumps Company Ltd. Only Agriauto Industries Ltd. is observed to have reduced the costs associated with current assets.

This sector is a leading manufacturing sector in the country with the exemplary efficiency performance over the study period. The degree of efficiency responsiveness to industry benchmarks shows a little complacency in maintaining the same standards and over time it seems that efficiency of WCM is depreciating. There is room for improvement in reaping more benefits though. The cash conversion cycle and inventory management of this sector may be further improved which can yield bigger economic dividends. The business performance of the firms is significantly impacted by payables management, leverage employed, size of the firm and fixed assets turnover. The working capital requirements take a significant influence of macroeconomic situation in the country. Business cycle, change in real gross domestic product rates, and change in quantum manufacturing index are some important external macro level factors that impact the working capital needs of firms in this sector. Cash flow is identified as the only internal micro level factor that affects such needs. As far as liquidity management is concerned, again a number of factors are evident. Level of leverage employed, the state of cash flows, and change in growth are some internal micro level evident determinants of managing liquidity requirements. Change in production index, level of labour unemployment and change in real gross domestic product are macroeconomic forces that compel firms of this sector to manage its liquidity requirements.

5.6.1 Recommendations for the Engineering Sector

This sector is performing better than the other sectors in terms of working capital efficiency. The efficiency standards can be further raised though. Firms of this sector can further work on

utilizing their current assets towards effective business performance. Sectoral competition is low as far as improving working capital efficiency is concerned. This shows a herd behavior of firms of this sector. Inventory conversion takes a longer period which may be reduced. The length of cash conversion can be decreased by more effective working capital policies. Payables management affects the profits of these firms, therefore care must be exercised and the cost of paying early or late should be ascertained in order to use payables as an inexpensive financing strategy for meeting the day to day operations of the business. The sector need to seriously consider the use of debt-ratio as profitability depends on it. Achieving higher sales and quicker fixed asset turnover are other considerations for achieving higher profitability. There is a widening demand-supply gap assessed for this sector. Achieving greater efficiency in working capital can benefit the firms in improving production levels which can cater to the increasing demands. The sector takes a significant influence of macroeconomic conditions which suggests sound policy making for managing current assets and current liabilities by the business thinkers of this sector. Cash flows demand special attention while economy is slowing down. Liquidity needs should be planned in light of employed leverage, state of cash flows, and growth of firms. Engineering firms would be better placed in meeting liquidity requirements if the stated factors are managed in uneven macroeconomic conditions.

5.7 Findings from the Vanaspati & Allied Sector

Out of the four sampled firms from this sector one firm showed very low efficiency in managing working capital. Performance index was dominating compared to the utilization index which shows that firms are performance driven in use of their current assets. Two firms out of the four firms showed improvements in achieving greater efficiency in making use of their working capital. They are namely Kakakhel Pakistan Ltd. and Punjab Oil Mills Ltd. Working capital descriptive statistics indicate satisfactory image of the state of WCM by the firms of the said sector.

Payables management is identified as having a significant impact on the business performance of firms of this sector. Firms of this sector seem to take influence of the macroeconomic picture of the economy and their working capital requirements are affected by any such changes. Some internal factors like leverage and firm growth are firm-specific factors that influence working capital requirements by the said firms. Only size of the firm is identified as the main factor having an impact on the liquidity management of firms in this sector. This confirms to the findings of Zainudin (2008).

5.7.1 Recommendations for the Vanspati & Allied Sector

For improving the working capital efficiency firms of this sector will have to consider the utilization of current asset for achieving business goals. The firms are using current assets amicably but the economic use of current assets needs further improvement. The Vanaspati sector should consider devising industry benchmarks in setting business goals from the use of working capital. Firms of this sector have to concentrate more on payables management as it is found deeply linked with business profits. While planning the working capital requirements these firms must consider the firm's growth and the level of leverage employed. Cooking oil is in high demand with rising population and more health awareness. Proper management of raw material for production is not only important for enhancing production but also in lowering down production costs. Enhancing sales through higher production and providing more supply is in favor of these firms. Firms should work towards increasing sales as it would meet their liquidity needs. The sector's working capital is affected by poor macroeconomic conditions. In such a case firms of this sector need to concentrate on employing the right proportion of leverage and lowering the cost of working capital components.

5.8 Findings from the Miscellaneous Sector

The descriptive indices mentioning the efficiency performance in working capital portrays an encouraging picture. Utilization of current assets in generating more sales looks meager though. 89% of the firms showed efficient performance in terms of managing working capital. Most of the sampled firms are finding it difficult to maintain such efficiency standards and it is evident in the analysis that such efficiency norms are deteriorating compared to industry benchmarks. There is evidence that some firms improved efficiency in management of working capital and have worked to reduce costs associated with current assets and current liabilities. These firms include Emco Industries, Grays of Cambridge (Pakistan) Ltd., Mitchell's Fruit Farms Ltd., Muree Brewery Company Ltd., Shezan International Ltd., Tariq Glass Industries Ltd., Tri-Pack Films Ltd., Pakistan Hotels Developers Ltd. These firms can further think of reducing the costs of working capital by paying their bills earlier to their creditors and by reducing their cash conversion cycle. Inventory management can be further improved to enhance business performance.

The operating profits of this sector seem to take a significant impact of payables management, receivables management, inventory management, size of the firm, and fixed assets turnover ratio. These findings are in agreement with the earlier findings of Raheman and Nasr (2007). The management of working capital requirements of this sector seems to be influenced by macroeconomic forces as it is evident that a number of macroeconomic variables adversely affect such needs. Return on assets, cash flows, size of the firm, cash flows and leverage are

internal micro level factors dictating the working capital requirements. The liquidity management of this sector takes similar micro and macro influences and is dictated both by macroeconomic situation in the country and some firm-specific influences. Cash flows, leverage, and return on assets are some firm-specific internal micro level influences.

5.8.1 Recommendations for the Miscellaneous Sector

This sector is maintaining good efficiency standards in managing working capital. The firm should consider and think about the costs associated with the current assets. Utilization of current assets needs improvement in realizing business goals. On a timeline there is evidence of a worsening working capital performance by firms of this sector. Industrial practices in managing working capital are deteriorating with the passage of time. With rising costs few firms are found to take a challenge of improving working capital efficiency standards. The firms may pay their bills early to keep businesses smooth and reduce the working capital costs associated with inventory management. Firms of this sector will have to make working capital policies that may reduce the cash conversion cycle as the current practices are found to be costly. Firms can realize more profits if attempts are made to optimize the payables policies, receivables policies and inventory management policies. In addition to this, increasing sales and optimizing fixed asset turnover ratio is in the benefit of the said sector. Special consideration is needed to lower down costs of working capital while in turbulent macroeconomic conditions. The firms should work more towards maintaining or increasing profitability, improving cash flows, enhancing sales, and employing leverage when macroeconomic conditions are adverse. The liquidity requirements are also under stress in such conditions and these firms should work on optimizing cash flows and on employing optimal leverage in business.

5.9 Findings from Transport & Communication Sector

Firms from this sector showed efficiency in managing working capital. Only one firm namely Pakistan Telecom Company Ltd. showed acceleration towards improving its efficiency standards, the remaining two showed depreciation in their approach towards efficient management practices. Working capital components were found satisfactory and business performance in terms of operating profits was found to be significantly impacted by inventory management and cash conversion cycle. Level of leverage used was found to be the only internal micro level factor determining the working capital requirements of firms in this sector and there was statistical evidence of business cycle and change in real gross domestic rates affecting such decisions. Liquidity needs were observed to be significantly influenced by change in leverage, returns on assets. These results confirm to earlier findings of Chiou and

Cheng (2006). There were some macroeconomic variables observed as significantly influencing liquidity requirements of firms in this sector.

5.9.1 Recommendations for the Transport & Communication Sector

On the basis of findings this sector can further add value to the economy if the efficiency levels of working capital are further improved. Current assets are not utilized properly in generating higher sales. The sector averages can be further improved only if the current assets management is worked upon. Since inventory management and cash conversion cycle directly affects the profits of this sector, therefore firms of this sector should consider ways and means through which optimality is achieved in keeping required inventory levels and in ensuring smooth and fast conversion of cash, not only to remain liquid and solvent but to increase profits gradually. Working capital requirements should be strategized in light of leverage used by firms of the said sector. Using the level of leverage should be based on the state of macroeconomic conditions. Business cycles exert pressure on working capital requirements where firms of this sector should be considerate of the fact and should wisely manage their working capital under depressing business conditions. Liquidity requirements by firms of this sector should be shaped in light of profitability, leverage, and firm's growth.

5.10 Findings from the Paper & Board Sector

71% of the firms from this sector are found to be efficient in managing their current assets. There is more concentration on performance metrics than on utilization of current assets to improve sales. Most of the sampled firms showed that they are working to improve their working capital efficiency overtime and their efficiency responsiveness in comparison to industry's efficiency standards showed improvements. Only one firm namely Dadabhoy Sack Ltd. seems to have worked on lowering the costs of working capital. This sector showed higher cash conversion cycle which means there is a room for improvement in the same. Inventory management is found to have a significant impact on the operating profits of this sector. There is evidence that internal micro level factors seem to have a bigger impact on determining the working capital requirements of firms in the said sector.

Leverage, cash flows, firm's growth, and size of the firm are some of such internal micro level factors. Change in real gross domestic product rate is identified as having a significant impact on working capital requirements. Level of leverage kept by a firm seems to have a significant influence on determining the liquidity levels by firms in this sector. This finding is in conformity with earlier studies on the topic like Kim, Mauer and Sherman (1998). Not only this, a variation in the production index in the country also explains significant variation in maintaining the liquidity levels.

5.10.1 Recommendations for the Paper & Board Sector

This sector needs to work further on utilizing its current assets. There is a need to improve the efficiency levels of working capital. Firms of this sector need to awareness about the costs and benefits of working capital. These firms need to initiate a healthy competition of lowering the costs of current assets and current liabilities. The sector will have to find ways to lower down the cash conversion cycle as it ties up the assets for too long. The working capital needs of the firms need to be framed in light of firm's growth, higher level of sales, cash flows and level of leverage employed. The firms need to make proper business strategies while designing working capital under poor economic conditions. In turbulent economic times these firms may face higher costs due to higher cost of borrowing funds, low sales and shrinking profits. Leverage is the key to designing a more effective liquidity needs strategy.

5.11 Findings from the Tobacco Sector

From the sampled three top capital employed firms of this sector only one is found not maintaining working capital efficiency standards. Only Lakson Tobacco Company Ltd is found to have lowered down costs of working capital. The same firm looks to be realizing the fact and is pushing hard to improve the same efficiency. Working capital components exhibit normal practices as far as payables management, receivable management, inventory management or cash conversion cycle are concerned. The operating profits take a significant influence of receivables management and inventory management. Size of the firm also explains significant profits earned by firms of this sector.

In meeting their working capital requirements, it is observed that firms in this sector take a significant impact of leverage employed by firms. Variability in quantum manufacturing index is associated with significant changes in maintaining working capital requirements. Liquidity needs are shaped in light of leverage kept, firm's growth, and return on assets. In addition to the mentioned internal micro level factors there is some evidence that business cycles do impact maintaining liquidity needs. Some of the findings in this sector confirm to the earlier findings by Nazir and Afza (2008).

5.11.1 Recommendations for the Tobacco Sector

This sector needs to increase awareness about the use of current assets. Performance of business by efficient use of current assets needs to be further improved. Though the efficiency levels of working capital are better than some other sectors, still the costs of working capital can be further reduced to increase profitability. Firms of this sector should concentrate more on payables management and inventory management as their profitability is found to depend upon them. These firms will have to look into the costs of inventory conversion. In addition to this,

there are costs associated with payables management which need to be optimized. Working capital requirements of this sector should be framed in light of leverage employed by these firms. Liquidity needs of these firms should be worked out using profitability and firm's growth. Leverage is another consideration for devising working capital needs. Management of liquidity of these firms will need a special consideration of the state of business cycles.

5.12 Findings from the Jute Sector

All of the sampled firms in this sector are found to be efficient in managing their working capital. Utilization indices are low compared to performance indices which suggest that low attention is paid by firms of this sector in properly utilizing the current assets in generation of more sales. Most of the firms are observed to be pushing hard to achieve greater efficiency in managing working capital. Working capital industry averages suggest that this sector needs to focus more on reducing days in inventory. Cash conversion cycle also needs improvement. By addressing these two core management areas the sector can further improve profits and can achieve greater efficiency. This argument makes more sense as there is statistical evidence that operating profits of this sector take a significant influence of payables management, inventory management and cash conversion cycle management.

The findings confirm earlier findings of (Khan, Shah and Hijazi: 2006, Zariyawati, et al: 2009, Gill, Biger and Mathur: 2010). Fixed asset turnover also explains significant variation in the profits. This sector is found to take significant influence of internal micro level factors like cash flows, firm's growth, and return on assets towards managing its working capital requirements. Liquidity requirements; however, are affected both by internal micro level and external macro level factors. Some significant factors in this respect are leverage, firm's growth, return on assets, change in business cycle, and change in production index.

5.12.1 Recommendations for the Jute Sector

This sector should further improve its utilization of current assets in generating more sales. Firms are not found to be realizing the fact of achieving greater efficiency in managing its current assets. Firms of this sector will have to find ways to reduce the time of inventory conversion, and cash conversion cycle. This can be done by installing advanced technology in production processes and in breaking the culture of long durations in paying bills or realizing receivables. The current practices of handling working capital are found to be the weakest compared to any other sector of the economy. Important drivers of profitability in terms of working capital are the payables management policies, inventory conversion methods, and cash conversion cycle. These factors should be seriously considered as they have a significant impact on the profits of these firms. Firms of this sector should concentrate more on improving

cash flows, the growth aspects, and profitability in shaping their working capital requirements. The level of leverage employed, profits realized and the firm growth can also determine the liquidity needs of these firms.

5.13 Findings from Fuel & Energy Sector

From the sampled firms it was found that 75% of the firms are managing their working capital efficiently. For this sector, it was observed that performance and utilization indices show similar results. 25% of the sampled firms seem to working towards improving their efficiency standards as their degree of efficiency responsiveness is significantly improving. Firms like Attock Refinery Ltd., National Refinery Ltd., Pakistan Refinery Ltd., Pakistan State Oil Company Ltd, Southern Electric Power Co. Ltd., Sui Northern Gas Pipeline Ltd., Sui Southern Gas Co. Ltd seem to have worked on lowering the costs of working capital and have achieved better efficiency.

There is only one working capital indicator that requires attention for this sector i.e. the receivables management. Improvement in receivables can further enhance economic dividends for the said sector and for concerned stakeholders. The operating performance of this sector is significantly influenced by inventory management. There is no evidence in favor of the impact of external macroeconomic factors on the determining levels of working capital requirements. Leverage, size of the firm and firm's growth are internal micro level factors determining working capital requirements. Liquidity requirements for firms in this sector are significantly impacted by level of leverage kept by the firms. These findings are similar to earlier findings like that of (Shin and Soenen: 1998, Deloof: 2003, Dong and Su: 2010)

5.13.1 Recommendations for the Fuel & Energy Sector

This sector is an important segment of the economy and affects many other economic sectors. Their performance and business strategies have a direct effect on common consumers and other businesses. Low utilization of current assets should subject these firms to devise strategies where performance of current assets can be further enhanced. Overall the efficiency of working capital is found to be satisfactory but there is room for improvement in realizing business goals through lowering the cost of working capital. There are firms like the National Refinery Ltd., Pakistan Refinery Ltd., and Pakistan State Oil Company Ltd. who have improved utilization of current assets in achieving business goals. Some firms, like the Pakistan Refinery Ltd., Southern Electric Power Company Ltd., Sui Northern Gas Pipeline Ltd., and Sui Southern Gas Co. Ltd, have reduced their costs associated with working capital and have achieved greater efficiency standards. Firms of this sector should find ways to quickly collect their bills due from debtors. Inventory management should be done with a lot of business vision as it affects

the profits of firms of this sector. It is also suggested that policies regarding working capital requirements by these firms should be devised using level of leverage employed, firm's growth, and sales levels. Leverage is found to be important determinant in determining the liquidity needs of these firms. This would suggest that firms should consider leverage to be a key factor when liquidity levels are set by firms of this sector.

5.14 Findings from the Cement Sector

Most of the firms in this sector are found to manage their working capital efficiently. It can be easily observed that firms emphasize more on improving performance indices while there seems a low utilization of current assets towards improving sales of the firm. There are mixed findings that show that some firms are improving their efficiency standards while some others are losing their standards in the same respect.

Some firms are identified as working hard to improve their efficiency in managing working capital. These firms include Al-Abbas Cement Industries Ltd., Attock Cement Pakistan Ltd., D.G. Khan Cement Company Ltd., Dewan Cement Ltd., Kohat Cement Ltd., Maple Leaf Cement Factory Ltd., Pioneer Cement Ltd., and Zeal Pak Cement Factory Ltd. Some firms do show significant improvements in making proper utilization of employed current assets. There is evidence that compared to industry benchmarks some firms have improved their performance while there are others who have improved their utilization of using current assets in achieving business goals.

This sector is having respectable working capital industry averages and the cash conversion cycle is found best compared to any other sector in the country. Payables management is found to have a significant impact on operating profits along with size of the firm. This finding confirms to the findings of an earlier study by Raheman and Nasr (2007). Cement firms are found not to have any significant internal micro or external macro factors those determine working capital requirements. There is little evidence in favor of business cycle though. There are internal micro level factors that does impact the liquidity requirements of firms, some of such factors include leverage employed and firm's growth.

5.14.1 Recommendations for the Cement Sector

This sector enjoys high consumer demand and will have to work further in realizing the true economic benefits by further improving utilization of current assets in achieving business goals. Efficiency levels relating to costs of working capital need improvement. There are cement companies who have improved performance of current assets in generating more sales, they include Dewan Cement Ltd., Kohat Cement Ltd., and Zeal Pak Cement Factory Ltd. Some other firms have been working on improving the utilization of current assets towards business

performance like D.G. Khan Cement Company Ltd., Maple Leaf Cement Factory Ltd., and Pioneer Cement Ltd. These are examples for other firms to realize the fact that costs associated with working capital should be decreased through effective management. The examples of Al-Abbas Cement Industries Ltd., Attock Cement Pakistan Ltd., and Zeal Pak Cement Factory Ltd., in lowering down working capital costs should be followed by other firms of the sector. Amongst all components of working capital, firms of this sector should seriously consider the effects of payables management on profitability. Firm's growth and leverage are important considerations for shaping the working capital needs of these firms.

5.15 Findings from the Chemical Sector

From the sampled firms it is evident that most of the firms are efficiently managing their working capital. Utilization index is dominated by performance index recorded for firms of this sector. This clearly mentions that firms are more interested in the use of current assets and their performance and there is little emphasis on their utilization towards improving sales. Some firms are trying to improve their efficiency norms compared to industry benchmarks while others show a depreciating performance in the same respect. They include BOC Pakistan Ltd., and Highnoon Laboratories Ltd.

The operating performance of this sector is significantly impacted by payables management and inventory management. Size of the firm does determine significant profits. This sector seems to take more influence of changing macroeconomic picture of the country and main macroeconomic variables seem to exert considerable pressure while designing the working capital requirement strategies. Cash flow is identified as the only internal micro level factor identified as having a significant impact on the aforementioned strategy. Liquidity requirements in this sector are influenced by internal micro level factors only. Leverage, cash flows, and size of the firm are some factors in this regard. This finding is in conformity with the earlier findings of Nazir and Afza (2009).

5.15.1 Recommendations for the Chemical Sector

The findings for this sector suggests that firms of this sector need to consider working capital a key business area and need to reduce its associated costs. There is a visible low utilization of current assets which resultantly shows low efficiency standards of managing working capital. Firms can work towards increasing corporate awareness in keeping optimal levels of working capital which eventually can decrease working capital costs. This would need proper training of inventory managers, production managers, and finance managers. The marketing managers would have to be taken on board in order to achieve optimal sales objectives. Working capital as an area cannot be restricted to decisions taken by finance managers alone. Following the

example of Clariant Pakistan Ltd. firms of this sector should think about improving performance of current assets. BOC Pakistan Ltd. and Highnoon Laboratories have consistently improved efficiency of working capital compared to the whole sector. Other firms need to follow them, this can help in achieving higher sales at lower costs and resultantly more profits can be expected. In order to further improve profitability these firms should seriously consider the way they manage their payables and inventories. The working capital requirements should be determined in light of cash flows of the firms. Under depressing business and economic conditions these firms should work on framing effective business strategies involving working capital. Level of sales and leverage along with cash flows should be considered while designing liquidity needs of these firms.

5.16 Findings from the Pooled Firms

In the final phase of the analysis the impact of important internal micro level factors on the working capital efficiency of firms is checked using standard econometric methodology. Four pooled models are fitted to monitor the impact of micro level internal factors on the working capital efficiency of sampled firms. It is evident that receivables management, inventory management, cash conversions cycle management, and growth of the firm have a significant impact on the efficiency of working capital management. There is some evidence in favor of working capital requirements influencing working capital efficiency. These findings are in conformity with earlier conducted studies of (Kieschnick, LaPlante and Moussawi: 2006, Chiou and Cheng: 2006, Zainudin: 2008)

5.17 Conclusions & Future Research

This thesis worked on exploring efficiency of working capital management for different manufacturing sectors of Pakistan. A number of internal micro level factors are identified having their influence on the working capital policies of firms in different sectors. Future research can work appreciate the findings in light on an intensive primary data which can be gathered from different stakeholders. This can ensure an understanding of the environmental, business, and operational constraints that exert influence on shaping the WCM strategies. Different sectors or even business firms in each sector can Identify a liquidity-profitability trade-off model which can suggest an optimal working capital strategy for better business performance and business stability which minimum solvency. Business firms should be informed through research about the required skill set, qualification, temperament, cultural background, and emotional makeup of people who are responsible for working capital decisions. Not only this, the organizational structure and role of the corporate boards needs to be explored to identify that enabling environment where working capital costs can be

significantly reduced. Further research is needed for manufacturing firms in Pakistan to identify the costs and benefits that result from leverage for firms of different sectors. Liquidity is an important concern, this thesis has identified some significant determinants for liquidity needs, however; firms need to know the value of liquidity, for which further research is needed. Financing choices by firms in financing working capital play a very important role in determining the cost of working capital and in achieving any derived benefits. Islamic financing options need to be explored in financing working capital of firms for which research can provide some insights. Firms may be ranked on the basis of most efficient working capital performance for which research can suggest some scorecard mechanism which can differentiate firms with most effective working capital policies. Organizational behavior of the firms may be a hindrance when it comes to efficient and effective working capital policy making, researchers can find some logical answers which can be helpful in policy making. The role of government can be explored by researchers which could provide an enabling environment where firms can most effectively use their economic resources.

After a detailed analysis of the data, there is no credible evidence that could support the argument that the working capital efficiency of business firms in different manufacturing sectors is improving with the passage of time. Firms of some sectors were found better than others but by and large there is no finding that a significant majority of firms are consistently responsive to its concerned business sectors' efficiency benchmarks. Therefore, reason is not enough to accept H_{01} . This result conforms to the studies of (Ramachandran and Jankiraman: 2009, Ghosh and Maji: 2004). Towards the second hypothesis in the study, most of the business firms are found efficient in managing their working capital as reflected by their set of performance, utilization, and efficiency indices. This provides enough evidence that business firms in each business sector are efficiently managing their working capital. Therefore, there is enough evidence to accept H_{02} . The third hypothesis stands rejected as the study is unable to identify similar firm-specific internal micro level factor of working capital that significantly determine profitability in all manufacturing sectors. There is evidence that suggests that significant internal micro level working capital factors as determinants of business performance vary from sector to sector. This finding is in conformity with (Chiou and Cheng: 2006, G. Michalski: 2007). In regard to the fourth hypotheses, there is reasonable evidence that business level internal micro level factors impact the working capital requirements of most of the business sectors in Pakistan, though these determinants are not uniform across all sectors. Similarly there is statistical reason to believe that business level internal micro level factors have a significant impact on the liquidity needs of firms in different business sectors.

The sixth hypothesis in the list is also accepted as there is evidence that policy induced internal micro level factors affect the working capital efficiency of firms. Not only this, there is a reasonable support to the argument that working capital decisions of firms are affected by broader macroeconomic conditions in the country.

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Appendix-I: OLS With no restrictions

Dependent Variable: Operating Profit

Regression coefficients for different sectors (p-value)

| Sector | Days payables | Days receivables | Days inventory | Cash conversion Cycle | DR | SF | FAT |
|---------------------|-------------------|--------------------|-------------------|-----------------------|--------------------|-------------------|--------------------|
| Fuel & Energy Firms | -6.660 (0.176) | | | | -209.01 (0.856) | 99.96 (0.433) | 36.97 (0.02) |
| | | -1.129 (0.241) | | | -254.26 (0.826) | 29.27 (0.838) | 35.35 (0.03) |
| | | | -28.73 (0.002) | | -44.87 (0.967) | 26.4 (0.834) | 45.99 (0.004) |
| | | | | -1.32 (0.199) | -257.11 (0.823) | 14.24 (0.922) | 35.54 (0.03) |
| Sugar Firms | -0.862 (0.136) | | | | -80.97 (0.07) | 203.99 (0.000) | 0.0027 (0.93) |
| | | -0.1379 (0.841) | | | -103.66 (0.02) | 203.70 (0.000) | 0.000 (0.99) |
| | | | 0.0343 (0.821) | | -101.101 (0.02) | 204.60 (0.000) | 0.000 (0.99) |
| | | | | 0.085 (0.57) | -96.60 (0.03) | 205.54 (0.000) | 0.000 (0.98) |
| Engineering Firms | -0.355 (0.794) | | | | 321.99 (0.02) | 401.16 (0.000) | 16.162 (0.000) |
| | | -0.217 (0.784) | | | 317.39 (0.01) | 401.31 (0.000) | 16.10 (0.000) |
| | | | 0.270 (0.162) | | 269.5 (0.04) | 416.84 (0.000) | 16.43 (0.000) |
| | | | | 0.296 (0.149) | 267.41 (0.04) | 418.9 (0.000) | 16.541 (0.000) |
| Chemical Firms | 2.57 (0.52) | | | | -1829.43 (0.02) | 957.93 (0.000) | -41.84 (0.28) |
| | | 0.849 (0.875) | | | -1798.79 (0.03) | 953.06 (0.000) | -45.5 (0.257) |
| | | | -2.955 (0.22) | | -1845.93 (0.01) | 895.8 (0.000) | -35.324 (0.367) |
| | | | | -3.401 (0.138) | -1742.48 (0.02) | 869.21 (0.000) | -24.53 (0.546) |
| Vanaspati & Allied | 0.38 (.117) | | | | -25.03 (0.192) | 17.3 (0.07) | -2.297 (0.17) |
| | | 0.322 (0.630) | | | -5.69 (0.712) | 14.14 (0.145) | -1.9 (0.27) |
| | | | 0.279 (0.221) | | -17.90 (0.317) | 13.66 (0.15) | -0.91 (0.64) |
| | | | | -0.007 (0.97) | -6.33 (0.68) | 14.67 (0.14) | -2.2188 (0.26) |

| | | | | | | |
|---------------------------|---------------------|-------------------|--------------------|----------------------|---------------------|---------------------|
| Transport & Communication | -119 (0.31) | | | -52850.17 (0.000) | -1233.6 (0.68) | -905.93 (0.89) |
| | | 140.5 (0.23) | | -39949. (0.00) | 793.08 (0.59) | -1397.72 (0.824) |
| | | | 228.728 (0.000) | -209 (0.0330) | -227.62 (0.8430) | -5893.11 (0.212) |
| | | | | 179.861 (0.000) | ;-30642. (0.000) | -5072.0 (0.01) |
| Tobacco | -102.627 (0.059) | | | 849.86 (0.542) | | -121.56 (0.12) |
| | | 11.3017 (0.42) | | -1218.202 (0.288) | 359.83 (0.000) | -22.62 (0.701) |
| | | | -27.75 (0.001) | -1125.10 (0.21) | 342.97 (0.000) | -60.77 (0.218) |
| | | | | -21.382 (0.028) | -1059.692 (0.29) | 257.193 (0.001) |
| Textile | 0.367 (0.092) | | | -362.13 (0.003) | 345.82 (0.000) | -18.86 (0.204) |
| | | 0.170 (0.752) | | -324.71 (0.008) | 327.405 (0.000) | -22.57 (0.130) |
| | | | 0.419 (0.000) | -317.63 (0.006) | 376.72 (0.000) | -21.30 (0.131) |
| | | | | 0.253 (0.002) | -294.68 (0.01) | 344.04 (0.000) |
| Paper & Board | 1.143 (0.40) | | | -937.15 (0.19) | 437.030 (0.000) | -25.83 (0.30) |
| | | 4.929 (0.322) | | -674.4 (0.36) | 428.49 (0.000) | -30.06 (0.221) |
| | | | -1.643 (0.462) | -995.20 (0.173) | 423.03 (0.000) | -19.39 (0.487) |
| | | | | -0.943 (0.40) | -1031.57 (0.161) | 436.43 (0.000) |
| Other Textile | -0.300 (0.60) | | | -57.49 (0.612) | 140.59 (0.000) | 1.1296 (0.003) |
| | | -2.564 (0.05) | | -122.26 (0.27) | 130.97 (0.000) | 0.977 (0.01) |
| | | | -0.1879 (0.60) | -72.160 (0.511) | 142.03 (0.000) | 1.1362 (0.003) |
| | | | | -0.1933 (0.522) | -85.549 (0.443) | 142.23 (0.000) |
| Jute | -0.227 (0.850) | | | -26.01 (0.734) | 68.128 (0.115) | 22.92 (0.004) |
| | | 0.267 (0.883) | | -39.018 (0.531) | 70.15 (0.083) | 22.51 (0.003) |
| | | | 0.091 (0.11) | -37.53 (0.500) | 112.2 (0.02) | 16.82 (0.03) |

| | | | | | | |
|--|-------------------|------------------|------------------|---------------------|--------------------|--------------------|
| | | | 0.088 (0.114) | -34.85 (0.53) | 109.18 (0.02) | 17.22 (0.03) |
| Cement | 1.038 (0.452) | | | 49.757 (0.79) | 716.63 (0.000) | 44.17 (0.463) |
| | | -0.46 (0.746) | | 56.519 (0.763) | 692.22 (0.000) | 29.4 (0.61) |
| | | | 4.912 (0.09) | 125.11 (0.50) | 763.32 (0.000) | 41.59 (0.47) |
| | | | | -0.171 (0.858) | 56.7 (0.765) | 697.46 (0.000) |
| Miscellaneous | 0.4513 (0.000) | | | -143.188 (0.214) | 304.51 (0.000) | -0.5528 (0.364) |
| | | 0.41 (0.000) | | -181.823 (0.122) | 293.47 (0.000) | -0.609 (0.325) |
| | | | 0.483 (0.002) | -227.469 (0.062) | 291.46 (0.000) | -0.565 (0.367) |
| | | | | 0.0106 (0.851) | -136.43 (0.262) | 262.4 (0.000) |
| * shows significance at 10% level, ** shows significance at 5% and 10% level, *** shows significance at 1%, 5% and 10% level | | | | | | |

Appendix-II

Variance Inflation Factors

Minimum possible value = 1.0

Values > 10.0 may indicate a collinearity problem

ROA 1.888

PM 1.024

DR 2.189

DNLA 2.051

DWCR 1.112

GF 1.024

SF 1.065

ECDM 1.894

$VIF(j) = 1/(1 - R(j)^2)$, where $R(j)$ is the multiple correlation coefficient between variable j and the other independent variables

Properties of matrix $X'X$:

1-norm = 3.9228676e+009

Determinant = 2.1126515e+039

Reciprocal condition number = 7.8188534e-009

Appendix-III List of sampled firms from industrial sectors included in the study

| Cotton Textile Sector | | 23 | <i>Bhanero Textile Mills Ltd.</i> | Other Textile Sector | | 67 | <i>Al-Abbas Sugar Mills Ltd.</i> |
|------------------------------|--|----|--|-----------------------------|---|---------------------------|--|
| 1 | <i>Taj Textile Mills Ltd.</i> | 24 | <i>Gadoon Textile Mills Ltd.</i> | 46 | <i>Indus Polyester Company Ltd.</i> | 68 | <i>Noon Sugar Mills Ltd.</i> |
| 2 | <i>Sapphire Fibres Ltd.</i> | 25 | <i>Nakshbandi Industries Ltd.</i> | 47 | <i>Dewan Salman Fibre Ltd.</i> | 69 | <i>The Premier Sugar Mills & Distillery Co. Ltd.</i> |
| 3 | <i>Nishat Mills Ltd.</i> | 26 | <i>Nagina Cotton Mills Ltd.</i> | 48 | <i>Bannu Woollen Mills Ltd.</i> | 70 | <i>Chashma Sugar Mills Ltd.</i> |
| 4 | <i>Fateh Textile Mills Ltd.</i> | 27 | <i>Din Textile Mills Ltd.</i> | 49 | <i>Gatron (Industries) Ltd.</i> | 71 | <i>Shakarganj Mills Ltd.</i> |
| 5 | <i>Gulistan Textile Mills Ltd.</i> | 28 | <i>Olympia Spinning & Weaving Mills Ltd.</i> | 50 | <i>Ibrahim Fibres Ltd.</i> | 72 | <i>Husein Sugar Mills Ltd.</i> |
| 6 | <i>Fazal Cloth Mills Ltd.</i> | 29 | <i>Mohammad Farooq Textile Mills Ltd.</i> | 51 | <i>Liberty Mills Ltd.</i> | 73 | <i>Tandianwala Sugar Mills Ltd.</i> |
| 7 | <i>Gulshan Spinning Mills Ltd.</i> | 30 | <i>Gul Ahmed Textile Mills Ltd.</i> | 52 | <i>Pakistan Synthetics Ltd.</i> | 74 | <i>Ansari Sugar Mills Ltd.</i> |
| 8 | <i>Kohinoor Industries Ltd.</i> | 31 | <i>Dawood Cotton Mills Ltd.</i> | 53 | <i>Moonlite (Pak) Ltd.</i> | 75 | <i>Shahtaj Sugar Mills Ltd.</i> |
| 9 | <i>Indus Dyeing & Manufacturing Co. Ltd.</i> | 32 | <i>Tata Textile Mills Ltd.</i> | 54 | <i>The National Silk and Rayon Mills Ltd.</i> | 76 | <i>Sakrand Sugar Mills Ltd.</i> |
| 10 | <i>Fatima Enterprises Ltd.</i> | 33 | <i>Fazal Textile Mills Ltd.</i> | 55 | <i>Rupali Polyester Ltd.</i> | 77 | <i>Kohinoor Sugar Mills Ltd.</i> |
| 11 | <i>Faisal Spinning Mills Ltd.</i> | 34 | <i>Suraj Cotton Mills Ltd.</i> | 56 | <i>Al-Abid Silk Mills Ltd.</i> | 78 | <i>Al-Noor Sugar Mills Ltd.</i> |
| 12 | <i>Ayesha Textile Mills Ltd.</i> | 35 | <i>Reliance Weaving Mills Ltd.</i> | 57 | <i>Polyron Ltd.</i> | 79 | <i>Dewan Sugar Mills Ltd.</i> |
| 13 | <i>Kohinoor Textile Mills Ltd.</i> | 36 | <i>Quetta Textile Mills Ltd.</i> | 58 | <i>Kashmir Polytex Ltd.</i> | 80 | <i>Shahmurad Sugar Mills Ltd.</i> |
| 14 | <i>Colony Textile Mills Ltd.</i> | 37 | <i>Nina Industries Ltd.</i> | 59 | <i>S.G. Fibres Ltd.</i> | Engineering Sector | |
| 15 | <i>Dewan Textile Mills Ltd.</i> | 38 | <i>Ghazi Fabrics International Ltd.</i> | Sugar Sector | | 81 | <i>Millat Tractors Ltd.</i> |
| 16 | <i>Nishat(Chumian) Ltd.</i> | 39 | <i>Artistic Denim Mills Ltd.</i> | 60 | <i>Adam Sugar Mills Ltd.</i> | 82 | <i>Al-Ghazi Tractors Ltd.</i> |
| 17 | <i>Paramount Spinning Mills Ltd.</i> | 40 | <i>Blessed Textiles Ltd.</i> | 61 | <i>Mirpurkhas Sugar Mills Ltd.</i> | 83 | <i>Exide Pakistan Ltd.</i> |
| 18 | <i>Sapphire Textile Mills Ltd.</i> | 41 | <i>Masood Textile Mills Ltd.</i> | 62 | <i>Khairpur Sugar Mills Ltd.</i> | 84 | <i>Agriauto Industries Ltd.</i> |
| 19 | <i>Salfi Textile Mills Ltd.</i> | 42 | <i>Saif Textile Mills Ltd.</i> | 63 | <i>Habib - ADM Ltd.(Habib Arkady LTD.)</i> | 85 | <i>Singer Pakistan Ltd.</i> |
| 20 | <i>Shahzad Textile Mills Ltd.</i> | 43 | <i>Apollo Textile Mills Ltd.</i> | 64 | <i>Habib Sugar Mills Ltd.</i> | 86 | <i>Pak Elektron Ltd.</i> |
| 21 | <i>Towellars Ltd.</i> | 44 | <i>Prosperity Weaving Mills Ltd.</i> | 65 | <i>Crescent Sugar Mills And Distillery Ltd.</i> | 87 | <i>Atlas Battery Ltd.</i> |
| 22 | <i>The Crescent Textile Mills</i> | 45 | <i>Mahmood Textile Mills Ltd.</i> | 66 | <i>JDW Sugar Mills Ltd.</i> | 88 | <i>Siemens (Pakistan) Engineering Co.Ltd.</i> |

Appendix-III List of sampled firms from industrial sectors included in the study

| | | | | | | | |
|--------------------------------------|--|-----|---|---|---|---------------------------------|--|
| 89 | <i>KSB Pumps Company Ltd.</i> | 110 | <i>Shifa International Hospitals Ltd.</i> | 133 | <i>Rafhan Maize Products Co. Ltd.</i> | 152 | <i>Thal Limited (Thal Jute Mills Ltd.)</i> |
| 90 | <i>Baluchistan Wheels Ltd.</i> | 111 | <i>Pakistan Services Ltd.</i> | 134 | <i>Nestle Milkpak Ltd</i> | 153 | <i>Crescent Jute Products Ltd.</i> |
| 91 | <i>Dewan Farooque Motors Ltd.</i> | 112 | <i>Grays Of Cambridge (Pakistan) Ltd.</i> | 135 | <i>Gillette Pakistan Ltd.</i> | 154 | <i>Suhail Jute Mills Ltd.</i> |
| 92 | <i>Indus Motor Company Ltd.</i> | 113 | <i>Mitchell'S Fruit Farms Ltd.</i> | 136 | <i>Diamond Industries Ltd.</i> | Fuel & Energy Sector | |
| 93 | <i>Pakistan Cables Ltd.</i> | 114 | <i>Shabbir Tiles And Ceramics Ltd.</i> | 137 | <i>Frontier Ceramics Ltd.</i> | 155 | <i>Generteck Pakistan Ltd.</i> |
| 94 | <i>Crescent Steel And Allied Products Ltd.</i> | 115 | <i>Zulfeqar Industries Ltd.</i> | Transport & Communication Sector | | 156 | <i>National Refinery Ltd.</i> |
| 95 | <i>Bolan Castings Ltd.</i> | 116 | <i>Tariq Glass Industries Ltd.</i> | 138 | <i>Pakistan International Airlines Corporation Ltd.</i> | 157 | <i>Pakistan State Oil Company Ltd.</i> |
| 96 | <i>Atlas Honda Ltd.</i> | 117 | <i>Bata Pakistan Ltd.</i> | 139 | <i>Telecard Ltd.</i> | 158 | <i>Attock Refinery Ltd.</i> |
| 97 | <i>Huffaz Seamless Pipe Industries Ltd.</i> | 118 | <i>Service Industries Ltd.</i> | 140 | <i>Pakistan Telecommunication Company Ltd.</i> | 159 | <i>Pakistan Oilfields Ltd.</i> |
| 98 | <i>Pakistan Telephone Cables Ltd.</i> | 119 | <i>Emco Industries Ltd.</i> | Paper & Board Sector | | 160 | <i>Sui Southern Gas Co. Ltd.</i> |
| 99 | <i>Hinopak Motors Ltd.</i> | 120 | <i>Shezan International Ltd.</i> | 141 | <i>Packages Ltd.</i> | 161 | <i>Sui Northern Gas Pipelines Ltd.</i> |
| 100 | <i>Pak Suzuki Motor Company Ltd.</i> | 121 | <i>Treet Corporation Ltd.</i> | 142 | <i>Pakistan Paper Products Ltd.</i> | 162 | <i>Kohinoor Power Company Ltd.</i> |
| 101 | <i>Pakistan Engineering Company Ltd.</i> | 122 | <i>Clover Pakistan Ltd.</i> | 143 | <i>Cherat Papersack Ltd.</i> | 163 | <i>Ideal Energy Ltd.</i> |
| 102 | <i>International Industries Ltd.</i> | 123 | <i>National Foods Ltd.</i> | 144 | <i>Merit Packaging Ltd.</i> | 164 | <i>Sitara Energy Ltd.</i> |
| 103 | <i>Ghandhara Nissan Ltd.</i> | 124 | <i>Baluchistan Glass Ltd.</i> | 145 | <i>Security Papers Ltd.</i> | 165 | <i>Southern Electric Power Co. Ltd.</i> |
| 104 | <i>Metropolitan Steel Corporation Ltd.</i> | 125 | <i>Unilever Pakistan Ltd.</i> | 146 | <i>Century Paper & Board Mills Ltd.</i> | 166 | <i>Japan Power Generation Ltd.</i> |
| Vanaspati & Allied Sector | | 126 | <i>Murree Brewery Company Ltd.</i> | 147 | <i>Dadabhoy Sack Ltd.</i> | 167 | <i>Kohinoor Energy Ltd.</i> |
| 105 | <i>Wazir Ali Industries Ltd.</i> | 127 | <i>Noon Pakistan Ltd.</i> | Tobacco Sector | | 168 | <i>The Hub Power Company Ltd.</i> |
| 106 | <i>S.S. Oil Mills Ltd.</i> | 128 | <i>Karam Ceramics Ltd.</i> | 148 | <i>Pakistan Tobacco Company Ltd.</i> | 169 | <i>Pakistan Refinery Ltd.</i> |
| 107 | <i>Punjab Oil Mills Ltd.</i> | 129 | <i>Tri-Pack Films Ltd.</i> | 149 | <i>Sarhad Cigarette Industries Ltd.</i> | 170 | <i>Shell Gas Lpg (Pakistan) Ltd.</i> |
| 108 | <i>Kakakhel Pakistan Ltd.</i> | 130 | <i>Eco Pack Ltd.(Plastobag Ltd.)</i> | 150 | <i>Lakson Tobacco Company Ltd.</i> | Cement Sector | |
| Miscellaneous Sector | | 131 | <i>Pakistan Hotels Developers Ltd.</i> | Jute Sector | | 171 | <i>Fauji Cement Company Ltd.</i> |
| 109 | <i>Ismail Industries Ltd.</i> | 132 | <i>Ghami Glass Ltd.</i> | 151 | <i>Amin Fabrics Ltd.</i> | 172 | <i>Kohat Cement Ltd.</i> |

Appendix-III List of sampled firms from industrial sectors included in the study

| | | | |
|------------------------|--|-----|--|
| 173 | <i>Zeal Pak Cement Factory Ltd.</i> | 195 | <i>Engro Chemical Pakistan Ltd.</i> |
| 174 | <i>D.G. Khan Cement Company Ltd.</i> | 196 | <i>Wyeth Pakistan Ltd.</i> |
| 175 | <i>Dandot Cement Company Ltd.</i> | 197 | <i>Searle Pakistan Ltd.</i> |
| 176 | <i>Dadabhoy Cement Industries Ltd.</i> | 198 | <i>Berger Paints Pakistan Ltd.</i> |
| 177 | <i>Pioneer Cement Ltd.</i> | 199 | <i>ICI Pakistan Ltd.</i> |
| 178 | <i>Maple Leaf Cement Factory Ltd.</i> | 200 | <i>Nimir Industrial Chemicals Ltd.</i> |
| 179 | <i>Bestway Cement Ltd.</i> | 201 | <i>Wah Nobel Chemicals Ltd.</i> |
| 180 | <i>Fecto Cement Ltd.</i> | 202 | <i>Dynea Pakistan Ltd.</i> |
| 181 | <i>Attock Cement Pakistan Ltd</i> | 203 | <i>Fauji Fertilizer Company Ltd.</i> |
| 182 | <i>Al-Abbas Cement Industries Ltd.</i> | 204 | <i>Glaxosmithkline (Pakistan) Ltd.</i> |
| 183 | <i>Dewan Cement Ltd. (Pakland Cement Ltd.)</i> | 205 | <i>Ittehad Chemicals Ltd.</i> |
| 184 | <i>Lucky Cement Ltd.</i> | 206 | <i>Dawood Hercules Chemicals Ltd.</i> |
| Chemical Sector | | 207 | <i>Pakistan PTA Ltd.</i> |
| 185 | <i>Fauji Fertilizer Bin Qasim Ltd</i> | | |
| 186 | <i>Colgate-Palmolive (Pakistan) Ltd.</i> | | |
| 187 | <i>Ferozsons Laboratories Ltd.</i> | | |
| 188 | <i>Sitara Chemical Industries Ltd.</i> | | |
| 189 | <i>BOC Pakistan Ltd,</i> | | |
| 190 | <i>Abbott Laboratories (Pakistan) Ltd.</i> | | |
| 191 | <i>Clariant Pakistan Ltd.</i> | | |
| 192 | <i>Otsuka Pakistan Ltd.</i> | | |
| 193 | <i>Highnoon Laboratories Ltd.</i> | | |
| 194 | <i>Biafo Industries Ltd.</i> | | |