IMPACT OF INNOVATION ON FIRM PERFORMANCE: A CASE OF SMALL AND MEDIUM ENTERPRISES (SMES) IN PAKISTAN

By

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A thesis presented to the Bahria University, Islamabad, in partial fulfillment of the requirement for the degree of Doctorate of Philosophy

Department of Management Sciences, Bahria University, Islamabad Campus, Islamabad, Pakistan

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I, Qazi Abdul Subhan, certify that the research work presented in this thesis is, to the best of my knowledge, my own. All the sources used and any help received in the preparation of this dissertation have been acknowledged. I hereby declare that I have not submitted this material, either in the whole or in a part, for any other degree at this or any other institution.

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DEDICATION

To My Beloved Parents and Teachers
Impact of Innovation on Firm Performance: A Case of Small and Medium Enterprises (SMEs) in Pakistan

ABSTRACT

The Small and Medium Enterprises (SMEs) play a pivotal role for the promotion of an economy in terms of poverty reduction, employment generation and social integration. In least developing economies like Pakistan, the promotion of SME sector may require the application of innovation in their process and products. Despite having potential natural and human resources, the contribution of SMEs sector is not up to the mark because of persistent negligence by the public sector. It has been observed from empirical evidences that the use of modern technology and innovative methods, particularly in SME sector around the globe, have drastic impact on the economic growth of the country. The innovative firms are more inclined to using new technologies and modern methods to improve their processes and products to gain competitive edge in the market.

The key objective of the present study is to analyze the impact of process innovation on firm performance, in terms of operative financial and competitive, of small and medium enterprises, listed on Karachi Stock Exchange, Pakistan. The data, collected from secondary sources, comprises of 69 small and medium enterprises for the period of 1999 to 2009.

Based on the discovery and support of the argument, a conceptual framework has been developed to draw testable hypotheses to answer the central research questions. Three key hypotheses have been formulated to achieve the objectives of the study. The present study has
used balanced panel data collected from secondary source. The model was estimated through Fixed Effect Method (FEM) estimation technique with the help of *E. Views 6.1 (Software)*.

The findings of the present study have shown positive impact of process innovation on the performance of small and medium enterprises. In the present study, innovative activities of the firms were measured through number of patent statistics (PAT) which are granted annually to the firms by the patent office, Karachi, Pakistan. One of the significant results of the present study was positive and significant impact of size of the firm, which has been measured through natural log of total assets (NLTA), on all three types of performance of small and medium enterprises in Pakistan.

The findings of the present study have also indicated a significant relationship between time consistent risk and operating performance of SME firms. Another interesting finding of the present study has shown a significant relationship between cash flow ratio (CFR) and financial performance of small and medium enterprises. In the present study, the competitive performance has been measured through net profit margin (NPM) of the enterprises. Based on these findings, it could be inferred that there is positive relationship between innovation and performance of SMEs. The Pakistani government must concentrate on the significance of innovation in SMEs to promote economic growth in the country. The present study has highlighted a number of potential areas (impact of innovation on sectoral performances like agriculture sector, industrial sector) that might be explored in future studies in the same context.
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<td>AGTA</td>
<td>Annual growth in total assets</td>
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<td>PAT</td>
<td>Number of patents granted</td>
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<td>WCR</td>
<td>Working capital ratio</td>
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<td>NLTA</td>
<td>Natural log of total assets</td>
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<td>SPTA</td>
<td>Sales as percentage of total assets</td>
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<td>RISK1</td>
<td>Time consistent risk</td>
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<td>ROA</td>
<td>Returns on assets</td>
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<td>NLTS</td>
<td>Natural log of total sales</td>
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Preface

The present study is an attempt to determine the relationship between innovation and operative, financial and competitive firm performance of small and medium enterprises, listed in Karachi Stock Exchange, Pakistan. It is an admitted fact that small and medium enterprises play an important role in achieving the economic strengths in developed as well as developing countries. If the innovation has been applied on the small and medium enterprises, then it is expected that performances of the enterprises may amplify. To test this proposition, certain financial variables have been selected to achieve the set objectives.

The definition of small and medium enterprises, in the context of present study, is based on the sales volume of up to or less than 300 million, as it is explained by SME bank, Pakistan. The current thesis comprises of six chapters. Chapter 1 highlights key issue of innovation in different empirical studies and its significance in small and medium enterprises, followed by the objective and significance of the study. Chapter 2 explains review of the literature which emphasizes previous studies regarding innovation and its impact on SME’s operative, financial and competitive performance. In chapter 3, theoretical framework has been developed which results in hypothesis development of the present study. Chapter 4 presents methodology, which highlights research design, unit of analysis, operationalization of variables, estimation techniques and data collection methods. Chapter 5 describes main results of the present research along with detailed discussion about the subject matters. In the last chapter, conclusion of the study has been drawn. Based on the findings, the present study infers that there is positive impact of innovation on performance of small and medium enterprises in Pakistan.
Chapter 1

Introduction

This chapter provides the background of present study on the relationship between process innovation and performance of Small and Medium Enterprises (SMEs) in the context of Pakistan economy. Further, it explains the growing interest of innovation, intellectual context of the study, problem statement, research objectives and significance of the study. It also provides an overview of theories and models which are relevant to process innovation in SMEs’ context. Finally, it discusses the role of process innovation in SME sector in general and its subsequent impact on the performance of SMEs, specifically those listed on Karachi Stock Exchange (KSE).

1.1. Growing Interest in Innovation

Pakistan is a land of natural resources and an agrarian country with 3.6 percent Gross Domestic Product (GDP) growth in 2012-13 (Economic Survey of Pakistan [ESP], 201213). The large scale manufacturing sector grew by 2.8 percent against the target of 2.5 percent during 2012-13. Similarly, the agriculture sector grew by an estimated 3.3 percent against a target of 4.0 percent in the same period. It is described in economic survey of Pakistan that manufacturing sector contributed to GDP by 13.2 percent in 201213, with the assistance of Large Scale Manufacturing (LSM) by 13.3 percent and with the involvement of SME sector by 7.6 percent. The services sector captured 57.7% share in GDP during 2012-13, with 3.7 percent growth rate as compared to 1.6 percent in 2008-09.

Pakistan’s total labor force is about 57.24 million out of which an estimated 3.4 million laborers were unemployed in 2012-13. The agriculture sector remains the predominant source of employment
catering for approximately 45.1 percent of the total employment in Pakistan. The manufacturing sector employs 13.7 percent, trade 16.2 percent and services 10.8 percent in total employment respectively (ESP, 2012-13).

To improve the economic and social situation in Pakistan, it is pivotal to introduce modern techniques through which the performance of different sectors that are not contributing in the national economy up to the mark, such as agriculture sector and industrial sector, can be improved (Islam, 1995). In this regard, the present study intends to analyze global experiences and to synthesize how these countries developed their structure for economic and social development from scratch.

For instance, the economies of Pakistan, Malaysia, Korea and Thailand were approximately at the same stage in terms of social and economic indicators in the 1960’s, but in 2011-12, the difference regarding economic and social strengths of the three countries far outmatched that of Pakistan. The growth of these economies was almost twice that of Pakistani economy in 2011-12, despite the severe global financial crisis (SME Annual Report, 2009-10). Similarly, other countries such as India, Bangladesh, Taiwan, Korea and Thailand have transformed their infrastructures to boost their economic growth.

Therefore, it is essential to explore the underlying factors that have led to these drastic transformations of the other Asian economies. An extensive review of literature revealed that these emerging economies like those of Malaysia, Taiwan, Korea and China have automated their infrastructures by using modern technologies to improve their product and the process of innovation (Brouwers, 2010; OECD, 1996; Roper, 1997 & Bhalla, 1987).
Before commencing the role of innovation in small and medium enterprises of the country, it is worth defining innovation and its measurement. Generally, the term “Innovation” is defined by Sullivan and Dooley (2009) as follows:

“Innovation is the process of making changes, large and small, radical and incremental, to products, processes and services that results in the introduction of something new for the organization that adds value to customers and contributes to the knowledge store of the organization” (pp:05).

The above definition of innovation may seem comprehensive in the context of SME because it covers main aspects of the product and process of innovation. It indicates the different dimensions of innovation like radical innovation, incremental innovation, product innovation and process innovation. Basic objective behind promoting any type of innovation is to make value addition to the customers and make contribution to the knowledge expansion of the organization to develop those methods which may be helpful in achieving the economic objectives of the organization like profit maximization, production maximization and cost minimization, specifically in the context of SME (Salvatore, 2009).

There are some other perspectives which define the innovation as an invention that has not been exploited (Bacon & Butler, 1998). These views indicate that a firm produces unique product or service, which has never been launched in the market and can be exploited with the creative abilities of the firm. Based on these views, it might be inferred that innovation is a combination of invention and exploitation. More simply, in dynamic firms, the exploration and exploitation of the product and services move hand in hand. Generally, invention can be interchanged with the creative abilities of the firm that is more applicable to the organizations. In a nutshell, innovation is the summation of...
creative abilities of the firm and its exploitation which may make value addition in the lives of consumers.

Sullivan and Dooley (2009) have argued that there are six types of innovation; product innovation, process innovation, services innovation, disruptive innovation, radical innovation and incremental innovation. The product innovation is concerned with changes to the physical products in term of improvement or it is related to new product development which is beneficial for the firm and its customers. The degree of change may include incremental improvement, addition to the product groups or new core products. The product innovation may be possible for the new entrepreneurs as well as for those enterprises which have established their brands in the presence of other stakeholders in the market. They may deviate from long run equilibrium through product innovation to have a competitive edge. In Pakistan, most of the businesses are running under sole proprietorships which have less capacity to explore new avenues for product and service innovation (SMEDA, 2007).

The service innovation, defined by Sullivan and Dooley (2009), is to make changes in the products which are intangible like innovation in services, banking sector, insurance companies, hospitals and universities. In this type of innovation, there is a high degree of customer interaction. The radical innovation means making changes in any established practices within the firm. The term radical refers to the level of contribution made to the efficiency or revenue of the firm, particularly in the context of SME. An incremental innovation consists of smaller actions taken by the firm to promote the product with smaller resources that might be easily managed with less risk. The disruptive innovation may occur because of new technology which has positive impact on existing potentials. As Sullivan
and Dooley (2009) have demonstrated, the research laboratories are the key source of disruptive technologies.

The process innovation, highlighted by Sullivan and Dooley (2009) and Gualt (2010), is defined as the introduction of new and improved methods of production, which makes value addition of the firm. They emphasize that process innovation involves all operational activities including manufacturing of the products, after sales services and logistics facilities. An ultimate objective of process innovation may reduce the cost of production and get competitive edge in the industry like the Japanese SME manufacturing sector had adopted in 1980’s and got domination in electronic products on the globe. The results of process innovation might be gauged through number of patents granted to an organization in either manufacturing or services sectors. The present study examined and analyzed the impact of process innovation on the firm performance of the small and medium enterprises in Pakistan. The other types of the innovations, identified by Sullivan and Dooley (2009) are beyond the scope of this study.

Lewicka and Misterek (2013) have described the features of an innovative firm in the opinion of entrepreneurs and business institutions in selected EU region. They explained that key feature of innovativeness of a firm is an ability to quickly adapt the market changes by modifying the existing products and processes. The present study emphasizes on the type of process innovation in SME sector in Pakistan because a number of studies like Khawaja (2006) in local context show that cottage and small scale industries are very less innovative in their process of product and services. These studies have identified the key reasons for this missing link which is private ownership and lack of awareness of the dynamic environment. Further, less support and encouragement from the
government to SME owners is a big hurdle in the way of innovativeness of small and medium
terprises in Pakistan (Khawaja, 2006). An extensive literature review indicates that process
innovation is quite suitable for SME sector because of three unique reasons; SME requires 1) limited
resource base, 2) distinguishing managerial culture which creates strong links between owners and
management and 3) Lower ability to shape the external environment. These characteristics are main
roots for the informal character of management and innovation practices in SME sector (Jin, 2006,
Nauwelaers, & Wintjes, 2005).

To make the environment conducive for process innovation in small and medium enterprises, there
are some prerequisites for economic developments like political stability, development in human
capital, consistency in developmental policies, transparent monitoring and evaluation system, and
better infrastructure (Khawaja, 2006). Pakistan is far behind in this capacity than other developing
economies and is gradually becoming fragile in terms of agriculture as well as industrial outputs due
to lack of innovativeness, which is only possible through mass literacy programs, better quality of
human resources, and investment friendly government policies and regulations (Todero & Smith,
2007).

There is an immense need to restructure the industrial sector of Pakistan which is broadly decomposed
into large and small scale manufacturing sectors with the assistance of innovation. The small scale
manufacturing sector is a dominating contributor in Pakistan economy but unfortunately, since the
incarnation of Pakistan, no consistent efforts have been made for the development of small scale
industries. Actually, SME sector is a key to economic development as it has been depicted from the
following discussions.
The Small and Medium Enterprises (SMEs) are the driving force for the promotion of an economy (Khan, 2004). Due to its significance, all of the developed or developing countries are focusing on the development of SME sector. It is an admitted fact that encouraging entrepreneurship is the key to improving competitiveness, boosting trade volume, fostering economic activities and creating job opportunities (Jeppesen, 2005). The Small and medium enterprises are considered to be the main drivers for poverty reduction, employment generation, and social integration. This argument has also been advocated by Beck, et. al (2005). A number of studies indicate that small and medium enterprises are helpful in eradication of poverty because SMEs are more productive and labor intensive than large firms (Jeppesen, 2005).

The Small and Medium Enterprises Development Authority (SMEDA) highlighted that SME sector contributes around 87 percent in the economy of Pakistan. The contribution of SME’s sector is not up to the mark due to continuous negligence of public sector in Pakistan (Khan, 2004). Keeping in view the significance of SME sector, the application of innovation is direly required in small medium enterprises. The findings of the previous studies show that the applications of innovation in several East Asian countries like Malaysia, Thailand and Korea contribute in their economic growth. Pakistan may incorporate innovative methodologies in its small enterprises to improve their performance that ultimately impact the economy at large (Ohashi, 2007).

In Pakistan, a vast majority of the population (65%) belongs to rural areas and they are engaged in small enterprises like fishing, primary education, fruit production, crops cultivation, garments, knitting and handmade embroideries, cotton production, sugar cane, dates production, ginning, wood and many other areas which are the basic startups for many people. The process innovation might be required in these sectors to improve their productivity and profitability. A fast growing SME requires
innovative financing coupled with technical assistance to keep pace at national and international level. The government must join hands with these entrepreneurs to guide them about new and innovative methodologies which are experienced in other emerging economies. The SMEs are considered as engine of economic growth through which a country can mobilize its resources and encourages the investors for taking the initiatives at a gross root level. Through domestic resource mobilization, the government may reduce its dependency on donor agencies.

1.2. Intellectual Context of the Study

The small and medium enterprises may be considered a backbone for domestic resource mobilization (Beck et al, 2005). There are several studies, which are in favor of domestic resource mobilization in the present scenario through either product innovation or process innovation to restore the economic strengths of the country (Ohashi, 2007, Soraino & Doborn, 2009). It is described that with the help of new technology and innovative ideas, an entrepreneur may achieve economies of scale by the expansion of their businesses. The effects of innovative technologies might be seen on all aliened economic activities like demand expansion, business promotion, effective marketing, massive investment, employment generation and high consumption levels.

Kharbanda (2001) demonstrated on cluster development for the promotion of SME sector through innovation. In the prior research, small and medium enterprise sector constitutes approximately 80% of industrial enterprises in India. It has nearly three million SMEs, which account for almost 50 per cent of industrial output and 42 per cent of India’s total exports. Apart from SMEs’ significance, the study has shed light on main problems and their impediments with the help of innovation (Kharbanda, 2001). Kharbanda (2001) has suggested conducive policy environment like investment policies, liberalization policies, and introduction of modern technologies, to strengthen economic condition of
the country because adoption of modern technology leads the country towards self-reliance and economic stability. To promote SME sector, sourcing of new technology, innovation and effective transfer strategies, in the presence of SMEs cluster, are essential. It will result in indigenous industrialization and self-reliance of the country (Bhalla, 1987).

Hall, Lotti and Mairessi (2009), have analyzed the impact of innovation on the productivity of SMEs through structural model in Italy. They demonstrate that there is a massive need to investigate when and how innovation may take place in any sector rather than indulging in any painstaking requirement for deep study about the size of business, public policies, effect of research and development (R&D) on productivity and productivity levels in different sectors. They further explain that there are two types of innovation: product innovation and process innovation. The study of Hall, Lotti and Mairessi (2009) is based on primary date source covering the period from 1995 to 2003. Cobb Douglas Model (CDM) has been used to determine the impact of innovation on the economy. The findings of their study are in favor of positive impact of R&D decisions on innovation in SMEs and variability in R&D innovation productivity relationship is much greater for Italy than for other countries as well. Another finding of their study describes that size of a firm is negatively associated with the intensity of R&D. In other words, this study has found dual nature of R&D. The R&D investment contributes to develop the firm’s ability to identify and exploit the information from other private and public research organizations. The result of the past study shows that product innovation has positive impact on firm’s labor productivity. They have emphasized on innovation due to its higher impact on productivity level in Italy. Moreover, larger and older firms are less productive than innovative and modern small firms.
Gault (2010) has explained that there are global challenges of climate change, limited supply of energy, food and water. It is explained that world consumption of water has increased and that sources are gradually vanishing due to industrial and human pollution. This study explains that positive effect of these challenges is that it may be used as principal motivator for better innovation leading to sustainable productivity growth. The financial problem led to the reduction of economic growth and contributed to other challenges faced by humanity in 2009 (Gault, 2010). It is stated that there are drastic changes in new products, processes and practices that markets emerged due to globalization and that have been innovations in response to the global opportunities provided by the change. Keeping in view the above changes in the world, particularly, innovation in products, processes and practices, it is high time to avail those opportunities of innovations in our SME sectors to improve the productivity with least cost combinations of inputs (Kharbanda, 2001).

Motohashi (2001) has used innovation to uplift the performance of traditional SMEs and recommended a pro-competition policy to induce entrepreneurships and innovation in SMEs. The government has made an amendment in SME basic law on supporting business innovations. The plant level pattern on industrial dynamics suggests that both policies for new business start-ups and innovation creation in the existing firms are important. There are positive effects on sale growth due to the program of Creative Activity Laws.

Kalantaridis and Pheby (1999) have analyzed innovativeness in SME sector in two ways. First, success cases of local innovation systems at the expense of less successful areas, which are thus in greater need of policy intervention. The study aspires to address the gap in the literature by focusing
on the experience of an area (Bedfordshire) characterized by low levels of innovative activity. Second, the search for the factors that accommodate innovation concentrated heavily at the macro-level. Consequently, any policy recommendations failed to distinguish between SMEs according to the extent and nature of their previous involvement in innovation.

They have further developed a typology of SMEs based upon the extent and timing of innovation; the underlined aim is to undertake a comparative analysis of causes, processes and obstacles to innovative activity. They have argued that: (1) there are some relationships between the size of an enterprise and the extent of its involvement in innovation within the SME sector; (2) there are fundamental differences in the characteristics, processes and obstacles to innovation between the four elements of the typology; and (3) at the micro-level innovative activity does not appear to be positively related to job creation. Thus, increasing the innovative propensity of SMEs will not necessarily reduce unemployment rates.

Sternberg (1990) has focused on the formulation of innovation centers within small and medium enterprises. According to the study, these centers have been established in Germany since 1983 in small and medium-sized enterprises, namely, the new technology-based firms. The previous studies further investigate up to what extent innovation centers could have a positive influence on the development of technology-based small firms. The empirical basis of the analysis consists of data collected in 31 innovation centers and 177 of the enterprises located there. These centers are providing training to tenants and advisory services to farmers and especially to the center managers. These centers are not homogeneous but differ considerably with regard to personnel and
The author has further argued that accessibility of innovation centers is the most important factor which determines the decision for macro-location of new technology based firms in Germany. The findings of his study show that Innovation Centers (IC) managers are playing very important role in disseminating the information to the tenants. In brief, majority of innovation centers have been assessed to be good by the majority of the founders. The findings of the study are in favor of positive impact of Innovation Centers (IC) on new technology based firms (Sternberg, 1990).

Keeping in view the above studies like Motohashi (2001) and Kharbanda, (2001) it is an admitted fact that innovations play a positive and significant role in promotion of manufacturing sectors of the country. There are different points of views about getting the benefits from innovation in SME sector like formation of SME cluster, formation of innovation centers or though the adoption of structural model in the organization. These structural changes may be in processes of production (innovative processes) and operational activities which may be helpful in generating more competitive environment for the organizations. In present study, the impact of process innovation has been analyzed in the context of SME sector which may have positive impact on economic growth of the country. The next section, 1.2.1, highlights interrelationship between SMEs and economic growth in Pakistan.

1.2.1. SME Development and Economic Growth
It is generally presumed that SME development has positive impact on economic growth of a country through employment generation. It is stated that with the development of SMEs, particularly through process innovation, allocative as well as distributive efficiencies would be amplified. The production capacity of industrial units may increase due to process innovation which helps in expansion of the businesses. Through employment generation, income availability would increase and may assist in boosting the social standard of the society. Ultimately, consumption would increase which has positive impact on national income as it can be explained through national income identity equation; (Y=C+I+G+X-M), (Branson, 2000). But it is just one side of the coin; the other side indicates that there is no impact of SMEs development on the economic growth as highlighted in the study of Cravo, (2010).

Cravo (2010) has demonstrated the impact of SME sector on economic growth of Brazilian economy. In his study, he examines the relationship between the small and medium enterprises (SMEs) sector and economic growth for a panel of 508 Brazilian micro-regions for the period 1980–2004. The findings of his study show the significance of SME sector with respect to two main aspects “the share of the SME employment in total employment, and the level of human capital in the SME sector”. Moreover, he has also examined how these two aspects of SMEs influence the economic growth in regions with different level of development. Further the findings of his study have shown that Brazilian SME sector has no significant correlation with economic growth.

It is evident that these findings may not be generalized in all situations as a number of studies in other countries (e.g. Bangladesh, Malaysia, Thailand and China) indicate that there is a positive correlation
between SME sector and economic growth. For instance, Garcia (2005) has highlighted positive correlation between SME sector and economic development in China. He has argued that improvements during the last few decades in China are due to concentration on SME sector by the government. However, the optimal potential of the sector has not been exploited due to bottlenecks of financial availability to small businessmen and still there is a lot of room for improvement in this sector. A number of previous studies have indicated the financial problems for SMEs and their remedial measures with world experiences like Japan and Korea (Garcia, 2005, OECD, 1996 & Hall, 2000).

A study, conducted by the team of Institute of Cost & Management Accountants of Pakistan (ICMAP) and Federation of Pakistan Chambers of Commerce & Industry (FPCCI) in 2000 has identified that SMEs are the starting point for the development of those countries which are in transition and struggling for industrialization. SMEs are one of the potential sources of employment generation, investment and aliened economic activities. In the present study, the relationship between innovation and small and medium enterprises has been analyzed to examine its impact on the economic growth of the country.

The study of FPCCI further identifies that management of SMEs is easier than large scale industries due to the following reasons. First, less capital and less labor is required for starting small scale businesses. The significant point is that if the strategic planning for SME development were made successful, then middle class entrepreneur may play a pivotal role for the development of the country (ICMAP, 2000). Furthermore, this study concluded that SMEs have positive correlation with economic growth in Pakistan. In case of Pakistan, most of the entrepreneurs are concerned with SME
sector and the application of process innovation may amplify their productivity level which would be beneficial for the country.

Leegwater and Shaw (2008) have analyzed the impact of small and medium enterprises on economic growth. In their study, the analysis was carried out at three levels: (i) at macro level, using secondary aggregate static data from 60 countries, to examine causal effects of micro, small medium enterprises on economic growth; (ii) at mesa level, using secondary panel data from small and large industries in Canada, OECD and developing countries, to identify characteristics of dynamic industries and how they map into small and large industries and cause economic growth; and (iii) at micro level, using primary cross-sectional data gathered for the study from larger firms and micro enterprises in Bangladesh and Peru, to examine if forward linkages facilitate micro enterprises contributions to economic growth. The results show that there is positive impact of SMEs development on economic growth.

Beck, Kunt, and Levine (2002) have attempted to make a cross country analysis of small and medium enterprises, economic growth and their impact on poverty reduction. By using a sample of 62 countries, they found a strong association between SMEs and GDP per capita growth. Commonly, a large SME sector is a feature of successful economies but the results of their study do not confidently support the conclusion that SMEs exert a causal impact on economic growth (Beck et al, 2002). In their study, Beck et al (2002) have found no evidence that SMEs alleviate poverty or decrease income inequality. Finally, the study shows clear evidence that overall business environment has sound property rights and that contract enforcement influences economic growth (Beck et al, 2002).
It is evident from the previous studies that there is a positive correlation between innovation and SMEs. For instance, Leger (2005) has focused on innovation in small firms which are supposed to be highly competitive and they are in better position to exploit it fully. Similarly, Hicks and Buchanan (2003) have explained several innovation theories for SMEs and linked them with economic growth. Small firms have been shown to be more proficient in the use of factors of production like capital and labor resources (Zoltan & Audretsch, 1991).

Adetunmbi et al. (2005) have focused on SMEs development as a source of improving economic growth for Nigeria’s economy and six main findings have emerged from the survey. First, a wide range of financing is currently used by MSMEs (Micro and Small Medium Enterprises). Second, MSME demands for financial services and nearly 80 percent of enterprises maintain their business accounts with commercial banks. Third, the level of MSME satisfaction with commercial banks depends upon the type of industry in which the entrepreneur has engaged. Fourth, it is observed that MSME are reluctant to utilize commercial bank financing due to excessive collateral requirements. The banks are unable to provide medium to longer term financing which is one of the important constraints. Fifth, commercial banks have also observed constraints in supplying financing to MSME. Many banks have witnessed that MSME do not have necessary credit culture. The results show that SMEs are lacking behind in their expertise. Finally, banks also admit to a lack of sufficient knowledge and information about the MSME sector.
Nauwelaers and Wintjes (2005) have described that innovation in SME sector is a key element to boost economic development. There is huge potential in SME sector in developed as well as developing countries with regards to its promotion. Nauwelaers and Wintjes (2005) have used innovation policy as an instrument for SMEs at regional level. The studies of Cooke (1996) and Nauwelaers & Wintjes, 2005, conclude that there was actually paradigm shift in the key elements of economic development due to innovation in SME sector. Due to regional disparity in business activities, the targets, in terms of profitability, marketing and sales of the products may differ.

Roper (1997) has analyzed the impact of product innovation on the performance of small and medium enterprises in Ireland, Germany and UK. Main objective of this study was to find out the relationship between product innovation and growth in small firms in Ireland, Germany and UK. The findings of the study show that the output of innovative small firms has grown significantly faster than that of non-innovative firms in each country. In Germany, output growth was achieved by a product innovation strategy which sharply increased productivity but reduced employment. In U.K. and Ireland small firms adopted a more balanced approach, which increased both in employment and productivity. Overall, there was a positive link between product innovation and performance of small firms.

Terziovski (2009) has discussed innovation practices and its subsequent effects on the performance of small firms in Australian context. He has identified innovation drivers and their performance implications in manufacturing based SMEs. He has gathered data from a sample of 600 Australian SMEs and found that SMEs are similar to large firms with respect to method of adoption of modern
technology. The innovation strategy and formal structure of the firms are key drivers of their performance, but do not appear to utilize innovation culture in a strategic and structured manner. He has concluded that SMEs’ performance is likely to improve with respect to formal strategy and innovative structure of the firms. Terziovski (2009) has argued that innovative culture and strategy are closely aligned throughout the innovation process and have positive impact on the performance of the firms in Australia.

As far as the Pakistan economy is concerned, it is obvious that SMEs are not showing rising impact on economic growth which can be evaluated from their contribution to gross domestic product (GDP). The share of SMEs in GDP is approximately stagnant at 8.5 percent for the past 10 years. Besides social, economic, political, and external reasons, there are four basic causes of ineffectiveness of SMEs development. First, there is no comprehensive or consistent policy formulation for SME sector in Pakistan because of political instability, uncertainty and lack of futuristic plans. Second, policy implementation agencies like Ministry of Industries & Production and its subsidiary organizations such as Engineering Development Board, National Productivity organization are showing lethargic attitude towards policy implementation. Third, there is no revolutionary planning for future, which may worsen the picture of livings in Pakistan than Somalia and Chad (Islam, 1995). Fourth, the government has no transparent foreign policy to ensure domestic resource mobilization optimally, controlling law and order situation, for the promotion of SME sector in Pakistan.
The present study is intending to investigate remedial measures to overcome the above reasoning by focusing on innovation in SMEs as it has been experienced in East Asian countries like Thailand, Korea and Malaysia. Giger (1997) has highlighted the path of development of Malaysia through innovation and adoption of modern technology. He further explains that drastic improvement in the Malaysian economy is the result of a multiplicity of factors and especially the adoption of modern technology. He has provided the historical review of the industrial policies of Malaysia and the imports substitution polices has been given due attention since 1960s. The import substitution policy is the policy through which the importable items are produced with domestic resources which substitute the foreign goods. In other words, imports of such items may decrease because they are locally manufactured. This policy has resolved the deficit balance of payment problem of Malaysia. The Malaysian government has transformed the trade oriented industrialization policies with the adoption of modern technology.

Milbergs (2005) argues that there may be positive correlation between innovation and economic growth. Innovation may be measured through (R&D) expenditure, number of patents granted, number of publications, technology intensity and high tech exports in total manufacturing exports. Generally, SMEs development has positive impact on the economic strength of the country in the shape of an increase in GDP per capita, increase in real GNP due to increase in business activities, Human Development Index and social sector development.

The other basic factors like policy formulation and its implementation, planning for the future and aligning with the foreign policy for the development of SMEs are beyond the scope of present study. Moreover, the relationship between SME growth and economic development may also be dependent
on its positive effects on economic development as it has been derived from literature and different context. (Gault, 2010; Motohashi, 2001, & Khan, 2004).

1.3. Problem Statement

Keeping in view the above discussion, the key proposition of the present study is to determine how SMEs consistent policy formulation with its implementation, planning for future, aligned with foreign policy, leads to innovation and SME performance. However, the scope of present study is to find the relationship between process innovation in SMEs at individual and organizational levels and their respective operative, financial and competitive performances. Based on this discussion, the specific problem statement of the present study is as follows.

“To identify the extent of application of innovative activities in small and medium enterprises in Pakistan and to analyze the impact of process innovation on the performances of small and medium enterprises (SMEs) at individual and organizational levels and its impact on their operative, financial and competitive performances”

1.4. Research Objectives

The specific objectives of the present study are:
• to identify the role of innovation in promoting the performance of Small and Medium Enterprises in Pakistan
• to develop a framework that emphasizes the need of process innovation to improve the overall productivity of SME firms in Pakistan.
• to investigate that how process innovation has an impact on three types of performance of SMEs in terms of operative, financial and competitive performance in Pakistan.

1.5. Research Questions

To achieve the above mentioned research objectives, this study will answer the following questions:
• How to identify the role of process innovation in promoting the small businesses in Pakistan?
• How to develop a framework that highlights the need of process innovation to improve the overall productivity of SMEs in Pakistan.
• How to investigate the impact of process innovation on three types of performance of SMEs in terms of operative, financial and competitive performance in Pakistan.

1.6. Justification of the Present Research

Pakistan is the land of potential human and natural resources but because of mismanagement of these resources, it may remain one of the low income countries in the world. To boost economic activities in the country, one of the possible ways out is the adoption of new technologies and innovative processes in SME sector. The composition of Pakistan economy constitutes agricultural sector,
industrial sector and services sector. The contribution of agricultural sector in GDP during 2010-2011 is approximately 20.9% but there is a lot of potential to groom through process innovation, the share of agricultural sector can be amplified with the value addition in agricultural products (Economic Survey of Pakistan, 2010-11).

The significance of agricultural sector is broad due to its absorption of human capital, provision of basic food items, provision of raw materials for the industrial sector and employment generation. The agricultural sector and the industrial sector are interdependent and if there is any change in adoption of new production methods in agriculture sector, it will definitely have positive impact on industrial production. With an increase in industrial production, overall economic activities in the economy may amplify.

The share of SMEs in total industrial sector is around 87% in Pakistan (SMEDA report, 2006). It is inevitable to make changes in the processes of production methods in small and medium enterprises to increase overall productivity in the country. It is a complex issue to introduce process innovation in SMEs due to the diversity of SMEs in terms of their size, management structure, product lines and growth requirements. The mediumsized units have their distinct characteristics. The degree of diversity of SMEs might be evaluated from the fact that they simultaneously operate in agricultural, manufacturing, and services sectors at different production levels. The main areas which have been concentrated by SMEs are furniture, agro-based, sports goods, metal works, food products, catering, fisheries and poultry in Pakistan (Khawaja, 2006).
There are a number of studies which are providing fundamental guidelines to incorporate modern methods of production in conventional small and medium scale industrial sector (Bhalla 1987, Freel, 2005, Hall, Lotti & Mairesse, 2009). The details of these modern methods and practices have been discussed in the forthcoming chapters.

A study on innovation measurement, conducted by Advisory Committee, USA, under the supervision of a research team headed by Schramm, et al., (2008) has inferred that innovation measurement is at its initial stage. The committee has suggested three areas of future research:

- First, the identification and assessment of innovation outcome measures,
- Second, identification of gap in innovation data and its solution and
- Third, the analysis of relationship between innovation activities, innovation performances, and firm performances.

Based on the recommendation of the USA Advisory Committee, the areas for further research are quite interesting and may need to be explored in the fields of innovation measurement of the firm. The present study contends that these three areas of innovation measurements might be applied in the SME sector of the developed as well as in developing economies.

Based on Advisory Committee suggestions, it is intended to explore the third areas of innovation measurement in the context of Pakistani SME sector to find the impact of innovation in the operating, financial and competitive performances of the firms. The first two areas of proposed research are beyond the scope of present study because of time constraints and non-availability of data for such study in the developing countries like Pakistan.
The present study may be helpful for the future researchers because it is an opening avenue for proposed researches at sectoral level innovation in SMEs sector. Two other areas of research, identified by the team of Advisory Committee (2008) are still not being explored so the grooming scholars can use their potentials to contribute in the body of knowledge. The present study may provide a startup for the novice researchers in exploring the performance of small and medium enterprises in the presence of other types of innovation in the developing countries. A new debate might be developed on comparative analysis for innovative SMEs and non-innovative SMEs at sectoral level.

The present study may also be useful for the policy makers to realize the importance of SME’s sector in the economic growth of Pakistan. It is a country of potential resources and main tasks of the policy makers are to manage and amplify the given resources for optimum utilization. The present study is providing a guideline to restructure SMEs policy to obtain economic strengths which is one of the most important objectives of macro economy. Keeping in view the present study, the policy makers must focus on changing the processing methodologies to those which have been used in the Southeast Asian countries. All the emerging economies like Malaysia, Thailand, Korea and China are fostering their economic growth with the help of process innovation and particularly in SME’s sector.

The main contribution of this study in the body of knowledge might be summarized in two ways. First, the significance of process innovation has been highlighted and widely discussed particularly in the context of SME sector, supported with international experiences. Second, the effectiveness of process innovation on operative, financial, competitive performances, of small and medium enterprises is discussed in the context of Pakistani industrial sector.
1.7. Summary of the Study

This study is an attempt to analyze the impact of process innovation on three types of performances; operating, financial and competitive performances of small and medium enterprises, listed on Karachi Stock Exchange in Pakistan. To achieve the set of objectives, certain variables like number of patents granted (PAT) which is a proxy for measuring innovation, working capital ratio (WCR), natural log of total assets (NLTA) which measures the size of the firm, sales as percentage of total assets (SPTA), which is an indicator of asset efficiency and time-consistent risk based on return on assets (Risk1) are included in the study to capture the effects of process innovation on the performance of the SME’s.

In this chapter, the central research question, main objectives and justification of the present study have been presented to highlight the issue of subject matter.

From the above discussion, it is evident that SME sector is a driving force for economic development especially for developing countries like Pakistan. The policy makers in the developing countries have not yet started to comprehend the effects of modern and innovative methodologies which are increasing the gap between the developing and the developed world.

The political instability in Pakistan, especially during the 1990s, is creating a terrible mess and uncertainty in formulating and implementing economic development policies, especially, in the presence of law and order situation. During the 1990s, nine regimes, including caretaker governments, have been changed. In this political scenario, there is no question of policy consistency and stability in the economy. Due to political disturbances, there was a deceleration in all fronts of the economy.
on either internal or external levels during the fiscal year 1997-98. There was deterioration in fiscal and current account deficits and persistence of double digit inflation (Islam, 1995).

On the other hand, during fiscal year 1997-98, the large scale manufacturing sector has recorded growth rate of 6.2% as compared to negative growth of 2.3% in the previous fiscal year (Economic Survey of Pakistan 1997-98). It is worth mentioning that small scale manufacturers maintained its historical growth path at 8.4%. It was just because the government moved home grown program of economic reforms to restore macroeconomic stability due to nuclear sanctions imposition (ESP, 1999-00). It reflects that if home grown economic reforms are introduced, there is possibility of industrial progress. At the same time, rest of the world was busy in adopting modern technologies and excelling in their development and becoming emerging economies like Malaysia, Taiwan, Korea, China and India. Industry led growth hypothesis was implemented in those countries which had boosted the industrial growth. The developed countries are moving into a world of neno-technology where the decisions are implemented monitored and revised on the basis of feedback of instant actions (Khan, 2004). The developed as well as emerging economies might be taken full benefits of industrial revolution rather than developing countries which lack sense of direction and are busy in unnecessary political and ethnic debates.

To unleash the concealed potentials of industrial and agriculture sectors in Pakistan, it is indispensable to adopt modern methods of production. The present study emphasizes on the application of process innovation in SMEs which constitutes 87% of industrial sector (SMEDA, 2007). In the next chapter, different points of view of prominent scholars around the globe about the tactics of using process
innovation in SMEs sector has been discussed to restore the economic growth of their respective economies. On the basis of global experiences, the present study has proposed a theoretical framework, which might be applicable in the SME sector of Pakistan.

1.8. Scheme of Study

The rest of study has been organized in the following manner. In chapter 2, review of the literature is presented. Chapter 3 consists of theoretical framework of the present study. In chapter 4, construction of data and methodology of the present research has been discussed. In chapter 5, empirical analysis of the data is presented. In the last chapter, conclusion has been drawn in the light of empirical results. At the end, references have been mentioned.
Chapter 2

Review of Literature

This chapter comprises of four main sections. The first part provides the introduction and overview of the chapter. In the second part, substantive views about the process innovation in SME sector have been discussed. These views provide a glance of previous empirical studies and practical examples from developed and emerging economies of the world, which have used the innovative activities within their small and medium enterprises. These countries have used process innovation as an incremental tool for their economic growth. This part of the chapter finishes with the experiences of South Asian countries regarding process innovation in SMEs and its effects on the performances of small and medium enterprises, including those of Pakistan. The third part of the chapter presents the conceptual framework of the present study and discusses the landmark studies about process innovation in SME sector and its effects on economic growth. The fourth and final part of the chapter consists of methodological views about the process innovation issues and how these controversies have resolved by developed and developing economies, along with brief summary of the chapter.

This chapter also provides concrete remedial measures to those impediments which are coming in the way for the application of process innovation in SME sector of Pakistan in light of practical and empirical studies around the world. A significant role of SMEs has been recognized to play in achieving economic strengths and economic development of middle income, debt burdened LDCs (Least Developed Countries) (Oltra, et al. 1990). The small and medium enterprises are gaining more attention around the globe because of their contribution in their respective economies. With the advent of modern technology, it is imperative not to keep our industrial and agricultural sectors of the economy away from the benefits of modern processes and inventions which are amplifying the production capacities of respective sectors (Tambunan, 2008, Gualts, 2010, Leegwater & Shaw, 2008).

Moreover, it is a general perception that there is a positive relationship between small and medium enterprises and economic growth. This positive relation is channelized through the development of SME sector which is one of the potential sources of employment generation. It is presumed that with an increase in employment, the priorities of the people about the consumer baskets and their composition drastically improve which triggers the production volume. The economic growth might be depicted through Gross Domestic Product (GDP) which is the money value of goods and services produced within the boundary of a country. In other words, an increase in domestic production of goods and services is the identification of an increase in economic growth.
2.1. Substantive Views on Innovation in SMEs and Economic Growth

In this section, the issue of innovation in SME sector has been discussed in the light of dominant perspective at large. It also explains how innovation helps in achieving the goal of economic growth of the country. This section is segmented into the experiences of developed, emerging economies and South Asian experiences respectively. Kalantaridis and Pheby (1999) have explained the experience of innovation among manufacturing SMEs sector in Bedfordshire, UK. This study focuses on the exploration of main causes, impediments and their solutions regarding implementation of innovative measures in SMEs sector. Further, it explains that in early post world war, large firms were the main sources of innovative activities but in 1980’s a number of empirical studies have concentrated on the argument that small and medium enterprises are also one of the contributors to innovation process and improvement of firm performance. Kalantaridis and Pheby (1999) have further argued that SMEs with a low dedication to formal Research & Development activities provide a significant proportion of innovative output like number of patents.

Kalantaridis and Pheby (1999) have further demonstrated that there are two parameters of innovation in SMEs; 1) interactive logic, which means cooperation between economic agents with a view to innovate the processes in the organization and 2) collective learning dynamics; the ability of participants to alter their behavior in response to changes in the external environment. He focuses on networking and coordination among the SME sector to be more creative and innovative. In Pakistan, there is deficiency in coordination among the stakeholders in sharing the knowledge about modern techniques of production. There is no common forum which may play a binding role for all the firms related to one industry except SMEDA. There are several examples in the globe which are in favor of strong networking among the SMEs to create an innovative environment (Clifton, et al. 2010).

Kalantaridis and Pheby (1999) have emphasized on the importance of universities in transmitting the knowledge of innovation to the local small and medium enterprises. They further explain that universities may contribute in economic growth in three ways; generating the knowledge through applied research, training of group of scientists, engineers and technicians and through direct involvement in the establishment of networks of innovative SMEs (Castells & Hall, 1994).

Massa and Testa (2008) have argued that small and medium enterprises might bring radical change due to their innovativeness. They have conducted their research through an interview based survey about innovativeness of a sample of Italian Small and Medium Enterprises (SMEs). Their study is
based on social construction of innovation perspective and is based on interviews of three main innovation stakeholders identified as entrepreneurs, academics and policy makers. The main objective of the research, conducted by Massa and Testa (2008) is to investigate the different perspectives on innovation held by the considered stakeholders. The results of the study show that there is misalignment between the published data and self-reported data conducted by the authors.

In their research, Massa and Testa (2008) have identified some basic problems of implementation of innovation processes in SMEs such as those in certification processes and testing laboratories. Furthermore, they condemned the difficulties in communicating with science laboratories, universities, and the EU because of the perceived cultural gap. Their study finds that intermediary institutions could play an elementary role in supporting SMEs from these points of view. It might be worth arguing that the role of supporting the link between business and social science has been included in many intermediary institutions’ mission statements but it is totally ineffective. Massa and Testa (2008) have concentrated more on the role of public sector policies for innovation in SMEs sector in the country. The authors have emphasized on the identification of real impediments of SMEs sector by the government, either structural or financial deficiencies. They suggest that government should focus on formulation of conducive and consistent policies for the promotion of SMEs sector with the adoption of modern technologies.

On the basis of their research findings, they have recommended some suggestions to promote the innovation in SMEs sector. These are as follows:

1) There might be an immense need for a regional innovation policy which seems to be a common goal for all the policy makers.

2) The universities might be asked to contribute more in entrepreneurial activities especially in small and medium enterprises and to do applied research in the fields of innovation and SMEs sectors.

Massa and Testa (2008) have proposed future areas of research for the grooming of researchers like innovation management and segmentation of entrepreneurs by industry or geographic location. Moreover, they have suggested that innovation management might be included in order to refine the analysis which includes managing the innovation; its dissemination, improvement and its sustainability within the organization. They have further suggested that the inclusion of engineering companies, consulting companies and banks can amplify the innovation processes in SMEs sector. All these parameters like innovation management and innovation policies are concerned with the
promotion of innovation at individual, process, managerial and organizational levels which may be considered an important element for research.

Isaksen and Smith (1997) have given a detailed deliberation about the role of SMEs sector in Norwegian economy. They have also analyzed the role of SME oriented innovation policies in the economy of Norway. In Norway, there are SMEs clusters in the field of timber, mechanical engineering, food processing sectors and in the parts of chemical sector. To seek the importance of SMEs sector in contributing economic growth and provided the comparative analysis of large scale as well as small scale industries in Norway by selecting social and economic parameters. These parameters consist of marketing strategies, management issues, internal communications systems, availability of qualified technical manpower, financial matters, growth pattern and economies of scale.

They have focused on the importance of SMEs sector as a main source of employment generation, production and output growth. This study finds that there is an increase in skilled employees among SMEs but there is substantial disparity in growth rate of employment between different sectors and regions in Norway. Due to this increase in employment, total output has increased. With an increase in output, economic growth also amplifies (Branson, 2000). Isaksen and Smith (1997) also concentrate on public policies aimed at innovation support, in which SMEs participate significantly. These public policies are not only covering the research and development support but also the technology transfer, financing and consulting advice. They argue that there is an immense need for greater co-ordination and flexibility among the services offered to SMEs to improve their performances.

The coordination and flexibility among the SMEs are two main distinct features which can improve the productivity, sales and profitability for this sector. Kraemer et al. (2006) have demonstrated the impact of coordination and flexibility in policy formation on Taiwan computer industries. They have explained that the computer industry has flourished on the principal of emphasizing close supplier relationships with multinational computer companies all over the world. This level of coordination has positively affected the Taiwan computer industry in the shape of promotion of exports, employment generation and market expansion.

One of the important things is that the government of Taiwan is probably Asia’s best positioned country for continued success in the global computer industry.
The authors have further addressed the fact that innovation processes in SMEs are multifaceted at firm-level resources. They have explained that small firms may face problems of marketing strategies, financial aspects and business strategy and the innovation processes in SMEs is no easy task. They have focused on two main problems in the way of development of small and medium enterprises; lack of infrastructure in transmitting the knowledge of technology to SMEs Sector and lack of coordination in support services to SMEs. These two problems are two of the main bottlenecks in the way of development of SMEs sector in Norway. If the infrastructure is developed, the SME sector may emerge as technology intensive and knowledge intensive sector. With an improvement in infrastructure within the SMEs sector, it may be possible to improve the performance of these clusters by targeting their collective technology development needs.

As discussed by Isaksen and Smith (1997), that there are two main indicators for the improvement of SME sector in any country in general, which specifically might be considered for Pakistan. These two indicators are flexibility and coordination which are indispensible even in the present age for the improvement of innovation in SME sector. The flexibility means that the production process might be more elastic and can meet the desires of the consumers according to their requirements while, the term coordination is concerned with other stake holders producing homogeneous goods. All the producers may coordinate each other in terms of production processes and in innovative methods.

It is observed that these two indicators; flexibility and coordination are key variables which may be the leading causes of low innovativeness of SME sector in Pakistan. There are certain reasons behind these deficiencies. One of the most significant reasons is lack of government support to SME sector in Pakistan and secondly lack of awareness among the stakeholders in this sector. As far as Pakistani government is concerned, it has to face crucial law and order problems of the last twelve years. Mostly, the government spending is allocated to rectify the law and order situation in the country. In this regards, there is less amount allocated for developmental projects like supporting SME sector. There are certain studies like Martíneza et al (2010) who have emphasized the support of the SME sector through regional blocks like EU. Pakistan may also contact to those regional blocks, in which Pakistan is an active member, like SAARC, OIC and ASEAN, to attain the support for its SME sector.

Martíneza et al (2010) have analyzed sources of European Union (EU) funding for Spanish SMEs sector along with its empirical analysis about the use of EU funding to innovate in SMEs sector in Spain. There are two main objectives of this study; first, to describe the different European funding
programs aimed at SMEs and second to present an empirical study of Spanish SMEs which have used European funding to innovate the SMEs sector.

They explain that EU provides support to SMEs in different ways like providing grants, loans and guarantees. They have examined the impact of EU funding on SMEs in two main sections. In the first section, they explain that assistance schemes for SMEs are divided into four categories: thematic funding opportunities, structural funds, financial instruments, and support for SME internationalization. In the later section, the authors have analyzed the effects of EU funding on innovation activities in particularly SMEs sector in Spain.

They have further explained in their study about several funding opportunities like European Regional Development Fund (ERDF) and European Social Fund (ESF), which are considered as largest funding institutions for the promotion of SMEs sector in Spain. The main objectives of these organizations were to reduce income disparity across the regions and to facilitate the small and medium sector to innovate their processes of production. In regards to innovation, Research and Development are contained in the Seventh Framework Programme for Research and Technological Development (2007–2013) in Spain. The competitiveness and Innovation Framework Programme (CIP) have been developed which is particularly focusing on SMEs sector to improve their operative, financial and competitive performances.

The study of Martíneza et al (2010) explains that for the promotion of innovation in SMEs sector in Spain, there are three financing mechanism sponsored by European Investment Fund (EIF). First, High Growth and Innovative SME Facility (GIF) which is aiming to increase the supply of equity for innovative SMEs and to share risk and reward with private equity investors. Second, the SME Guarantee Facility which provides additional guarantees to increase the supply of debt finance to SMEs, and third the Capacity Building Scheme (CBS) which supports the capacity of financial intermediaries in some member states. In light of these financial mechanisms, established in developed economies, Pakistan may also follow these financial schemes to innovate the production processes of small and medium enterprises.

The authors have addressed the second objective of their research which is concerned with the determination of effects of EU funding in Spanish SMEs, to implement product, process, and organizational innovation. To determine the effect of EU funding on SME sector first, a descriptive analysis is given to establish whether there is difference between the profile of SMEs using EU funding and the profile of those which do not. Second, an explanatory analysis is performed to determine the probability that a firm will finance its activities with EU funds. Last, a new explanatory
analysis is carried out to investigate the importance of this source of funding for innovation implementation in Spanish SMEs.

The findings of Martíneza et al (2010)’s study show that there is a drastic improvement in SME performance due to process innovation, supported by European Union funding. They conclude that due to increase in process innovation in SME sector, the overall productivity of the firms have increased but that there are very few companies which are using the EU funding due to its accessibility and limited understanding of various financing options. Only 3.48% of Spanish service companies and 4.82% of Spanish manufacturing companies use EU funding. The results also conclude that in some instances, the funding was not accessible and inadequate for the needs of the company.

Clifton et al (2010) have emphasized on the importance of innovation networks in SME, which is one part of coordination. They explained that process innovation arises through highly iterative and network based processes. They highlight the contribution of SME sector as main source of achieving economic development in UK. They also analyze main factors which are affecting small and medium sector in UK and identify the mechanisms required to operationalize a framework which can be helpful in dissemination of knowledge and creation of innovation. The primary data set has derived from the survey responses of over 450 SMEs in UK.

The key findings of their study are that in modern economy, innovation plays a significant role in achieving the economic growth in the country. In this regard, role of universities is inevitable in creating innovative tools, used to enhance the performance of SMEs sector. Simultaneously, the promotion of SME sector amplifies the economic activities and economic growth of the country. Clifton et al (2010) conclude that the innovative firms are more productive than the non innovative firms. This result is not only true for UK but it can be generalized for Ireland and Germany also. They explain that there are positive linkages between innovation and economic growth of the country.

Paskaleva and Shapira (2006) have analyzed Asian experiences regarding innovation in SME sector. They have shared their experiences of Japan, Taiwan and South Korea respectively about innovation policy in enhancing the performance of SME sector, in terms of operative, individual and firm levels and its effects on economic growth. They highlight that these countries have increased their focus on SMEs sector and due to their concentration; they have improved economic growth in the world. For instance, South Korea and Japan are highly ranked by UNDP human development indices. Taiwan is ranked 3rd in the World Economic Forum’s country technology index.
They have further, described that restructuring in the industrial policies are contributing significantly to promote the performance of SME sector. Due to these industrial policies, economies of these three countries have shown a drastic improvement in their economic strengths. The economies of these three countries (South Korea, Taiwan and Japan) have transformed their large scale mass-production manufacturing sectors to flexible, knowledge based, entrepreneurial, creative, networked and customized form of manufacturing. The performance of Japanese SMEs sector has shown a flourishing trend in creating industrial entrepreneurship which has provided a concrete foundation for Japanese post-war economic development. These are major determinants which have transformed these three economies (South Korea, Taiwan and Japan).

Based on the study of Paskaleva and Shapira (2006), these restructuring for small and medium enterprises may also be applicable in Pakistan. There may be an immense need for creating linkages between the small and medium enterprises and large scale industrial sector in Pakistan to fill the gap of innovative production techniques, knowledge based and creative form of manufacturing. The coordination between small and large industrial sector may amplify the production level which might be beneficial for the individuals, manufacturers as well as for the country. Due to this harmonization between the firms, output level may amplify and along with it, employment of labor, sales of the products, exports of goods and profitability for the firms to improve. Moreover, international best practices in the field of small and medium enterprises may provide a guideline for the existing enterprises in Pakistan.

The authors have concluded that in spite of significant cultural, political and industrial structural differences, all these three countries, Japan, Korea, and Taiwan are adopting “global best practices” in fostering SME development. All the neighboring countries are also making the adoption of these best practices. They highlight the significance of bilateral economic relationship among the countries. For instance, these three countries have strong relationships with China, which is one of the strongest emerging economies of the world. The bilateral economic relationships among these countries have added an element of uncertainty for development of SME sector and its operative, financial and competitive performances.

The East Asian economies have also followed the structural changes and transformed their respective SME sectors into knowledge based innovative systems. Monroe (2006) has highlighted national innovation systems of Malaysia and Singapore which have achieved tremendous growth in SME sectors due to their national innovation systems. The national innovation system means transforming
the existing manufacturing units into innovative and creative enterprises. He further explains that technical development is one of the significant constituents of economic development of Singapore and Malaysia. Both countries have taken the initiative of innovative transformation, which means introducing process innovation by attracting the foreign direct investment into high-tech exports manufacturing sectors. These transformations have stimulated economic growth and knowledge based SMEs sector. In Malaysia and Singapore, the public policy has concentrated on developing the infrastructure and human capital, which was essential to prop up domestic innovative competence.

Both countries, Malaysia and Singapore, have put their potential resources for the improvement of social and economic sectors like education, entrepreneurial activities at all scales and knowledge flows, which are one of the major determinants for innovative activities in the countries. In this regard, the role of research institutes and universities are indispensible. The local policy makers and academia have established institutional linkages among the firms, universities and research institutions at local, regional and international levels which have provided greater network of transmitting the tacit knowledge.

An empirical study conducted by Monroe (2006) has highlighted the secrets of Singapore development which is implicit in dependence on Multi-National Companies (MNC’s) with the focus on indigenous technological innovation capabilities. Due to indigenous innovative capabilities, local small firms have adopted the technologies and have shown a drastic improvement in their industrial production. During 1990’s, Singapore government commenced locally targeted plan with the innovation program to develop a wide base of indigenous creative capabilities within Singapore. The government of Singapore has established public–private partnerships to promote entrepreneurial activities in the country which has shown positive impact on economic strengths of the country.

Keeping in view the study of Monroe, 2006, the government of Pakistan may commence public private partnership to develop innovative and creative SMEs through domestic resource mobilization to enhance the overall performance of the sector. All the MNCs which are working in Pakistan are big sources for technology transfer for local firms. It may be beneficial to make joint ventures with these multinational companies to develop a plan with innovation programs. To train the manpower, exchange of manpower between different countries may be commenced.

Other Asian countries like China have also adopted innovative technologies in SMEs sector to enhance their operative, financial and comparative performance. There is 100% contribution of small scale industries in total GDP of China (China Industrial Yearbook, 1996-2002). Chinese companies have adopted labor intensive technologies for the production process and are successfully making
advancement in all sectors of the economy. The secret of development of the Chinese economy is concerned more with the use of knowledge intensive technologies in SME sector. Due to application of modern technology, the output in SME sector has drastically increased. SME sector is providing around 83% of total employment, 56% of total tax collection and 100% in total industrial sector.

India is one of the emerging economies of the world in which the role of SME is also vital. It has nearly three million small and medium enterprises, which comprise more than 80% of the total number of industrial enterprises in the country. They contribute approximately 35 percent in direct export and 45 percent in overall export from the country. SMEs are one of the biggest employment provider sectors in India which is providing around over 30 million jobs. The Economic and Social Survey of Asia & Pacific 2008 has shown the economy of India appears to have moved on to a new phase of high growth, with an average growth rate of 8.8% over the last five years as investment in the economy has risen sharply. India’s 9.6% GDP growth rate for 2006 reflected double-digit growth in the industrial and services sectors (Economic Survey of India, 2006-07).

2.2. Theoretical Views of Innovation in SME Sector and its Subsequent Effects on Economic Growth

This section comprises of discussions, concerned with theoretical aspects of process innovation in SME’s operative, financial and competitive performances and its effect on economic growth of Pakistan. There are two aspects under consideration; firstly, the basis for process innovation in SME performance and secondly, role of innovative SMEs in achieving economic growth of Pakistan. There are many theoretical and empirical studies which are in favor of positive correlation between innovation and SME performances. For instance, Brouwers (2010) has focused on corporate sustainability with the help of innovation in SME sectors and its overall performance. He further explains that it is inevitable for the development of a country to concentrate on innovative SME sector due to its contribution to economic growth.

There are a number of studies which have used the innovation as an independent variable and SME performance as dependent variable, like Vrande et al. (2008), Cravo (2010), Massa and Testa (2008), but none of these authors have integrated these two aspects at a firm level; process innovation and SMEs performance, as presented in the present study. Though the significance of the process innovation is well defined by many studies like Motohashi (2001), and Freel (2000), they have not discussed its impact on SMEs operative, financial and competitive performance in the non financial institutions, as discussed in the present study.
The studies of Motohashi (2001), Roper (1997), and Freel (2000) highlight the significance of process innovation as an independent variable, in the development of SMEs sector.

Motohashi (2001) has focused on the impact of process innovation in the development of small and medium enterprises in Japan. He further explains that innovation has promoted small and medium enterprises performance in Japan and the firms are using their potentials to excel on the basis of performance. Based on these studies, the theoretical framework for the present study has been developed.

Theoretically, there are many drivers of innovation which requires continuous innovation and learning so that the process of production and innovation can be repeated time and again. These drivers are emerging technologies, competitor’s actions, human capital, technological knowledge and capital availability. Out of these drivers, three basic elements may be considered as prerequisites for innovation; capital availability, human capital and emerging technologies. The first foundation of innovation is capital availability. The capital is one of the most important factors of production as well as principal motivator for innovation. It is evident from simple production function \( Q = f(K, L) \), (Branson, 2000). It determines the size of the business, either at small scale, at medium scale or at large scale. The capital is also required for promotional activities of the business.

There are several studies like Howitt and Aghion (1998), which have emphasized on the significance of capital accumulation for innovation. They explain that innovation and capital accumulation are two main determinants for short term as well as long run economic growth. It is a general presumption that capital accumulation is inevitable for long term economic growth. They have proved in their study that endogenous growth models are also in favor of the results that capital accumulation and innovation are complementary components for long term growth of the country.

Second basis of innovation is human capacity which is one of the potential dimensions of innovation. Any type of innovation, like process innovation or product innovation, cannot exist without skilled and technical manpower. The different studies like Berglund (2007), Leavitt and Blumen (1995) have focused on the importance of human capacity for analyzing the effects of process innovation in SME sector. Berglund (2007) has demonstrated that the optimal utilization of human capacity is implicit in better management of human capital. He further emphasizes that when human capital will be managed in an organized manner, people can stimulate creativity and innovation. Leavitt and Blumen (1995) have emphasized that betterment of an organization is concealed in the utilization of capabilities of available manpower. They further explain that innovation and creativity is in big interest of the organizations which is only possible by managing the human resources. They recommended organizations to commence those programs which may amplify the performances of the
people.

Third base of innovation is emerging technologies, which is quite essential for the promotion of innovation. There are many studies like Sullivan and Dooley (2009) and Bagchi (2010), which have focused on emerging technologies and technical knowledge as basis for innovation. The previous studies have described that for improving the performances of SME through competitiveness, technical knowledge and emerging technologies are used as an instrument for innovation. Through the innovation, firms are getting competitiveness among the stakeholders in the market and their performances may increase (Wiggins & Ruefli, 2002).

In the context of present study, process innovation is measured through a number of patents granted to any firm. The number of patents granted statistics is frequently used as a benchmark of innovation activities in small and medium enterprises in the existing literature like Ornaghi and Correa (2012), Oltra, et al. (2008), Connelly (2007), and Hagedoorn and Cloodt (2003), who have used a number of patent granted statistics, in their studies, for the measurement of innovation in small and medium enterprises. The innovation activities are those activities through which the organizations are making pursuance of new and innovative methods of production with least cost combinations which results in granting of patents.

There are ample studies like Ahuja and Katila (2001), Roper (1997), Sternberg (1990) and Freel (2000) which show the impact of innovation on SME performances. For instance, Freel (2000) has compared the performances of innovative and non innovative firms using the data of 228 manufacturing units and concluded that innovative firms are more productive as compared to non innovative firms. In the present study, a comprehensive analysis of impact of process innovation on SME performances has been conducted. Based, on the study of Wright, et al. (2001), which describes three types of SME performances; operating performance, financial performance and competitive performance, the present study has intended to analyze the impact of process innovation on all three types of performances.

All the types of performances are interrelated. Actually, it is a sequence of getting competitiveness of firms among the stakeholders. In other words, the firms, first of all, have to achieve operating performance which is only possible through achieving efficiency in the processing of transformation of inputs like manpower, machines, information, and capital to outputs (Stevenson, 2007). The advent
of modern technologies, the processing of transformation of inputs to the output has gotten positive
effects, as experienced in the developed (Motohashi, (2001), Sternberg (1990)) and emerging
economies (Giger, 1997). The reflection of changes in developed and emerging economies, regarding
transformation of inputs to the output may be seen in the developing countries but to perceive the
operating performance, developing countries like Pakistan are lacking behind basic infrastructure.
Just a little effort with dedication and sincerity is required to achieve operating performances. The
provision of basic infrastructure, law and order situation and management of resources are key secrets
to attaining operating performances in Pakistani context.

The financial performance is the second type of firm’s performance which is only possible when
operating performance has been achieved. In other words, operating performance of small and
medium enterprises shapes financial performances. The financial statements are one of the diagnostic
tools to know about the financial performances of SMEs. There are two main measures of evaluating
the financial performance of the firm; firstly, Return on Equity (ROE) and Return on Assets (ROA).
The most popular way of measuring financial performance of SMEs is ROA because it gives the
summary of income statement and both sides of balance sheets.

The competitive performance is the third dimension of SMEs performance, which might be achieved
after achieving operating and financial performance. Competitive performance means getting
competitive advantages among the stakeholders, existing in the markets. The competitiveness is a
complex economic term which can be achieved after the recognition of 12 main pillars (The Global
Competitiveness Reports, 2009-2010). The most prominent pillars of competitiveness are institutions,
infrastructure, higher education and training; macroeconomic stability and goods market efficiency.
The competitiveness of SMEs is based on market share, profitability and cost of production (Seyoum,
2007).

It is generally presumed that due to improvement in SME performances, overall impact on the
economy seems to be positive in terms of accelerated economic growth, employment opportunities,
Improved external sector, price stability, and increase in industrial share in GDP. All of these changes
are interlinked with each other. For instance, if the small and medium enterprises are promoted
through innovation, then employment opportunities would increase. When employment increases, it
has two impacts on the individuals; first, economic transformation and second, social revolution from
basic necessities to more elastic goods baskets.

On the other hand, when employment increases, it means that labor demand increases and when labor
demand increases then output amplifies by following the production function \(Q= f (K, L)\). The
national income of the country is measured by taking monetary value of the output produced in the
country. When the output increases, national income of the country would definitely increase. An
increase in GDP growth is one of the strongest indicators of economic strengths of the country. Therefore, by ensuring economic stability, Pakistan may improve its economic positioning and social standards across the neighboring countries.

Brouwers (2010) has argued that innovation strengthens the competitiveness for countries as well as for sectors and individual companies. It contributes to the profitability and long-term continuity of the firm. It also leads to quality improvement, increasing variation and diversification in products, increased productiveness and a positive influence on turnover, profitability and employment (Guinet & Pilat, 1999, Porter, 1985). Another advantage is protection or extension of market shares, improved operational efficiency, improved reputation and cost reduction (Abernathy & Clark, 1985, Cooke, 1996). There are also noneconomical arguments for innovation, which focus on a better social and environmental corporate performance bringing an improved market position within reach (Elkington, 1997, Larson, 2000).

Brouwers (2010) has emphasized on the role of managers in innovation processes of SME sector and its performances. Further, he argues that at process level, SMEs are likely to be more development oriented than research minded in large companies. By participating in innovation networks, small and medium firms are able to gain access to more sophisticated technology and technological expertise, whose direct employment is not allowed by internal resource limitations. He further highlights that limitations in resource poverty in terms of capital, knowledge and skilled labor severely limits the sustainable innovation capacity of SMEs. Another reason for cooperation is reducing uncertainty by sharing risks and costs, gaining additional market knowledge, serving international markets and developing industry standards. He further explains that in the beginning of innovation in SME sector, it can be seen as incremental innovations (Bhasrakan, 2006), but the sustainable innovation are usually radical and transformational by nature.

Brouwers (2010) has analyzed 26 companies related to Rubber and Plastic industries (PRI) in the context of process innovations in SME sectors and corporate sustainability in Netherlands. These companies were asked about their innovation activities. The findings of this study demonstrate that medium scale industries show more succession in innovative processes than small scale industries. It has been observed in the findings that leadership style of the smaller and more sustainability oriented companies has been described as informal, committed, creative, and entrepreneurial. Some participating medium scale companies have amplified their manpower strengths through training, conferences and workshops and have focused on two aspects of innovation in SME sector: product development and process enhancement through the introduction of new technologies. From this study,
it has been observed that medium scale industries may have more potential to adopt innovativeness and contribute in economic activities of these countries.

Bendis et al. (2008) have highlighted the importance of innovation intermediaries to achieve technology based economic development in USA. They claimed that it is a new direction to achieve economic strengths of a country which might be possible through regional connectivity, government support, visionary leadership and innovation intermediaries. Innovation intermediaries are those organizations which are situated at the centre of a region’s efforts to align local technologies, assets and resources to work together on innovation. They have given historical view about the emergence of technology based economic development programs, initiated by US government. The governors of different states have continued to collaborate as founding board members of State Science and Technology Institute (SSTI) in 1996.

The SSTI has focused on public private partnership and promoted technology based economic development entities that encourage economic growth through the application of science and technology. The consistent improvement of technology based economic development concepts and best practices in different states of USA has led to reinvention and new formation of other entities in 1990’s and 2000s like New York State Office of Science, Technology (2000), Texas Regional Centers for Innovation and Commercialization (2005), etc. Government has also played an active role in promotion of innovation centers and provided funds for qualifying firms and industries to increase the competitiveness in USA.
They have further concluded that innovation intermediaries may amplify the pace of economic development of any country but that there are some prerequisites which should be accomplished. To achieve the economic development through innovation and adoption of modern technology is possible if there is regional connectivity, public private partnerships, visionary leadership and merit based decision. They have also focused on the access to investment capital, accountability, long term commitment and sustainability. In a nutshell, if these requisites are arranged in the country then innovation based economic development may have new emergence in the traditional development theories.

The study of Bendis et al. (2008) has highlighted one of the significant aspects of innovation for the promotion of economic growth of a country. They have emphasized on the connectivity among the firms at regional level, networking, public private partnership and establishment of innovation centers at regional level. These are significant steps towards technology led development hypothesis. In Pakistan most of the SMEs are not documented (SMEDA, 2007) because of non availability of funds. At the first step, at regional level, they may be documented along with their potential capacities and existing technologies. Then those innovation centers should guide them in their respective fields of production. For instance, Gujranwala division which consists of three districts; Sialkot, Gujrat and Gujranwala are famous for sports, electrical & furniture, light engineering and cutlery sectors respectively. The innovation centers may facilitate their processes of production, in light of best practices used in the world. It is worth mentioning that at innovation centers, the manpower should be expert and may be well aware of prevailing best practices of production processes in the globe.
Subrahmanya, et al. (2010) have focused on the importance of innovation for the promotion of SME growth in India. They highlight main drivers of innovation, dimensions, achievements, and outcomes of technological innovations carried out by SMEs in auto components, electronics, and machine tool sectors of Bangalore in India. They also analyze the growth rates of innovative SMEs and non-innovative SMEs in terms of sales turnover, employment and investment. They have estimated a correlation between innovation, sales growth and calculating innovation sales for high, medium, and low growth innovative SMEs.

The authors have further argued that there is a positive correlation between innovative SMEs and economic growth by using extensive literature review. The results of their study are based on semi-structured interviews. They have collected data on sales, employment and investment from the SMEs of auto, electronics, and machine tool sectors for a period of five years from 2001-02 to 2005-06. The findings of their study indicate that a large proportion of SMEs are innovative in all three manufacturing sectors. The principal motivators for SMEs to innovate are technological capability, technical qualification, knowledge, innovative ideas of entrepreneurs, customer requirements and market equipments. They further explain that innovative SMEs are more productive than non-innovative SMEs not only in terms of sales turnovers but employment and investment in all three sectors; auto components, electronics, and machine tool. They emphasize on the adoption of new and innovative processes to attain economic strengths and international competitiveness. This study emphasizes the significance of process innovation and its impact on economic growth. Pakistan may also follow the same track to foster economic growth through innovativeness of its SME sector.
The OECD\(^1\) (1996) has conducted a workshop on SME; Employment, Innovation and Economic Growth in Washington with the cooperation of U.S.A. Small Business Administration (SBA), Multilateral Investment Guarantee Agency (MIGA) of the World Bank Group and United Nation Development Program (UNDP). Many aspects have been discussed regarding SMEs, innovation and economic growth in Europe and Asia. The main conclusions of the workshops were that SMEs are playing a distinctive role in economic development and that the majority of new innovative small firms are providing new jobs to the society at large. This study further, explains that small firms appear to play a significant role in the development of innovation but small firms have a disadvantage in accessing new technology. One of the major results are that the gap between small firms and large firms regarding provision of quality jobs is shrinking which means that the SMEs are also able to provide quality jobs with the advent of innovation.

Çakar and Ertürk (2010) have examined the effects of organizational culture on the capacity of innovation in SME. The objective of the study is to bridge the gap between culture, perceptions of empowerment, and innovation capability. They have highlighted that innovation capability is developed by specific cultural dimensions and empowerment in SMEs. To examine the role of organizational culture, empowerment is considered as a foundation for innovation capability and also as a consequence of organizational culture. The authors have collected the information from 743 employees of SMEs located in Turkey. The results of the study indicate positive linkages between empowerment and innovation capability for SMEs at an individual as well as a firm level. Further,

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\(^1\) Organization for Economic Co-Operation and Development (OECD)
they also reveal and recommend for the promotion of innovative capabilities that the managers should focus on participative practices in the firm. The participative practices means empowerment of the employees and involvement of employees in promotion of new and innovative ideas.

Massa and Testa (2008) have examined the role of innovation in SME sector. They contended that there are three main innovation stakeholders: entrepreneurs, academics and policy makers. The aim of their study has been to investigate different perspectives on innovation held by the considered stakeholders, highlighting the points of major contrast together with similarities in order to provide new insights into the problem. The results of Massa and Testa (2008) indicate that there are different perspectives related to innovation, starting from its definition, effective policies for the promotion of innovation, and regarding to the role of intermediary institutions. The results also explain misalignment between the survey’s output and institutional data.

On the basis of the above literature, it has been observed that innovation in small and medium sector is not an easy task. Though, there is a positive correlation between innovative SME and productivity level which has positive impact on economic growth of respective countries (Subrahmany, et al. (2010), Brouwers (2010)), there are certain impediments in the way of introducing innovation in SME sector, which have been discussed in the next section 2.4, Methodological Perspective of Innovation in SME Sector.

2.3. Methodological Views of Innovation in SME Sector and its Subsequent Effects on Economic Growth

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In this section, the introduction of innovation and its impediments in SME sector, along with their solutions have been discussed. The main objective of the present study is to assess the impact of process innovation on operative, financial and comparative performances of SMEs in Pakistan. In a developing country like Pakistan, there are many impediments to introduce new innovation in SMEs sector like basic infrastructure, lack of skilled human capital and deficiency of capital. These main barriers in the way of introducing process innovation are addressed in this section, in light of the existing literature.

For instance, Tiwari and Buse (2007) have discussed the main barriers in introduction of the innovation in SME sector in Germany. They have highlighted the significance of small and medium enterprises as one of the largest contributing business blocks in the economies of the world as well as one of the largest employment providers in the respective countries. This study explains that due to globalization, ample opportunities have opened for the developed economies to introduce new innovations in the developing countries. The emerging economies like Malaysia and Korea, according to their existing resources of human and capital, have tried their best to promote their innovative capabilities in their respective countries.

They further explain that there are three phases of simplified innovation process. First is the conception which means idea generation. The second phase is the implementation of the ideas into tangible products and third is marketing or production of items. The study has explained that there are certain internal and external barriers in the way of implementation of innovation SME sector in Germany. For instance, accessibility of finance to the SME enterprisers, high innovation costs, high
economic risks, shortages of qualified personnel, lack of project management know how, missing market linkages and bureaucratic hurdles are major problems, in using innovation in SME sector in Germany. In Pakistan, almost same problems like bureaucratic hurdles, missing market linkages in more intense form along with the addition of deficiency of capital, lack of capital access and poor institutional framework; legal and administrative, are main problems in the way of process innovation in SMEs sector.

They have conducted an in depth study, based on online questionnaires which were used in their studies to explore main barriers of introduction of innovation in SME sector. The results show that primary barriers faced by the small and medium enterprises are concerned with financial constraints, finding qualified personnel, finding cooperation partners with knowledge resources, marketing of innovative products and development of innovative products. This study further explains that the majority of innovation projects have cancelled due to lack of financial availabilities at the final stage. These results explain that there is serious shortage of qualified personnel due to low birth rate in Germany. The most important results are that bureaucracy is also creating hurdles in the way of innovation in SME through regulations.

The findings of study of Tiwari and Buse (2007), further explain that restrictive labor laws are preventing hiring of human resource and creating bottlenecks for innovation in SME sector. Based on their findings, they suggested that global innovation has opened new avenues for the firms, particularly, for SMEs to support their innovation capabilities to increase competitiveness in the world. Further, they suggest that internationalization of research and development of SME sector is
one of the useful instruments to diminish the effects of barriers to innovation, faced by SME sector in Germany.

Śledzik (2013) has explained the Schumpeter’s view on innovation and entrepreneurship. The author has explained that economic development follows historical process of structural changes, geared by innovation which may be divided into five types; first, to launch a new product or a new species of already known product, second, to make an application of new methods of production or sales of a product which has not proven in the industry), third, opening of new market for which a branch of the industry was not introduced; forth, acquiring of new sources of supply of raw material or semi-finished goods and fifth is to develop new industry structure like the creation or destruction of a monopoly position (Schumpeter, 1934).

The Schumpeter emphasizes on the promotion of entrepreneurship because entrepreneur is main focal point of innovation. According to Schumpeter, innovation is a "process of industrial mutation, which incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one". The Schumpeter has focused on the promotion of innovation as a main driver for economic development. The author has further described that innovation process is subdivided into four different dimensions; invention, innovation, diffusion and imitation. These dimensions lead the country towards economic progress (Schumpeter, 1912)

Rammer and Schmiele (2007) have also discussed main drivers and effects of internationalizing innovation by Small and Medium Enterprises in Germany. In their findings, they have explained in detail all aspects regarding strengthening innovative capabilities and internationalizing their business.
activities in abroad. Internationalizing means shift of innovative resources from home country to abroad. The main benefit of internationalizing is that SMEs may gain access to new knowledge sources and sales potentials which may have positive effects on economic growth of the country. They guide other economies that to promote innovation in their respective countries and they may contact to developed economies for shifting their resources in the developing countries like Pakistan. They have used two econometric models to explain the effects of innovativeness in SME sector and its impact on the economic strengths of Germany. The period of analysis was 2004 to 2007. Main variables are decision to engage in international innovation activities, internal resources, competitive environment and attractiveness of domestic location for conducting innovation activities. They demonstrate that international experience of SMEs through exports and global innovation cooperation instigates the decision to internationalize innovation activities.

They have further contended that SMEs with higher internal financial resources are more likely to internationalize innovation activities. They explain that domestic competitive market is one of the potential factors to determine the internationalization of innovation activities. They assumed that a high degree of competition push the firms to undertake innovation activities abroad. Similarly, the study argues that SMEs with technological advantages are more likely to expand their innovation activities abroad. One of the most important arguments, given by the authors, is that those SMEs which are suffering from innovation-related location disadvantages in their home country are more likely to internationalize their innovation activities to get benefit from the location advantages of their host country. It means that if there are problems in launching the innovative activities in home country
due to lack of infrastructure, lack of technical personnel and lack of industrial setup, then the local firm must internationalize innovative activities abroad.

Main findings of the study of Rammer and Schmiele (2007) are in favor of innovative SMEs which might be achieved through globalization. The analysis addresses a basic policy question: whether shifting of innovative resources is beneficial for domestic firms or harmful. They conclude that it may be possible that government may provide the subsidies to prevent local companies from shifting the resources abroad and to intensify the SMEs for their internationalization activities through exports and international collaborations. They have found that the internationalizing innovative activities are signs of strength and not the weaknesses of the firms which is possible through the promotion of internal R&D activities.

They have concluded that innovative SMEs should be encouraged to make more use of internationalization opportunities, including establishment of R&D activities abroad. Pakistan may also develop the linkages with other innovative SMEs centers for getting benefits of their research in the field of SME. In this regards, SMEDA may join hands with those centers for innovation to promote innovativeness in Pakistani SME sector.

Möller, et al. (2007) have focused on fostering the innovation in SME sector through networking among the innovators. Their study has concentrated on the importance of networking among innovators in the context of SME sectors because of resources scarcity. They explain that with the help of networking among the stakeholders, the firms can reduce the cost of production and can create novelty in the products more rapidly. For networking, the relationship between the innovators is very important. They have recommended that innovators should not only rely on networking but also develop the relationships with the suppliers, customers, subcontractors, researchers in the universities and service providers. They have proposed further area of research to explore the effects of different types of innovation like product innovation, incremental innovation and radical innovation on SME sector.
Crepon, et al. (1998) have explained the relationship between innovation and productivity through a survey conducted in EU firms. They have explained that patent statistics is a good indicator of innovative activity across the different firms. They described that propensity to patent differ across the industries. They explained that small firms significantly receive higher number of patents per R&D dollar. The study concludes that R&D share increases along with size of the firm which amplify its market share and diversification with demand pull and technology push indicators.

Janz, et al. (2003) have analyzed the relationship between firm level innovation and productivity in German and Swedish knowledge intensive firms. They have used pooled sample of 1049 firms with 10-999 employees. The results show that intensity of both innovation input and innovation output decreases with firm size in Germany. It is also a worth mentioning that research and development subsidiary system for lager firm is more conducive as compared to Swedish firms. Another result is that German firms are relative more innovative as compared to Swedish firms.

Griliches (1990) has addressed the issue of patent and patent statistics as one of the sources of economic growth and technological advancement. The author has given historical background about input variable; research and development and output variable; patent statistics. The author has conducted a survey of US firms. The author has repeatedly examined the interrelationship between patents and research and development (R&D) activities to validate that patent are an economic indicator. The results of his study show that there is strong relationship between number of patents and R&D activities at cross sectional level, across firms and industries. Another result of the present study is that there is strong evidence about those firms who have changed their R&D expenditure; a parallel change has been seen in getting number of patents.
The author has further focused on the significance of patent statistic as an important resource for the process of technical change. The author has provided different dimensions to use the number of patent statistic for empirical analysis. The patents can be used to analyze the effects of R&D on firm level productivity across different firms and industries in USA. The author has further advised to use the current patent data to study inter firm differences in the levels of inventive activities.

A landmark study conducted by Schramm, et al. (2008) along with his colleagues presented a report to advisory committee on measuring innovation in the 21st century. He has pointed out different issues, concerned with the significance of innovation in SME sector and the importance of networking among SMEs and measurement of innovation in USA. He has focused on the involvement of government intervention in creating networks among the SMEs and the measurement of innovation through different methods. Schramm, et al. (2008) has explained that the role of community is very vital and productive in response to innovation.

Based on Schramm’s findings, three new avenues of research are identified which may need to be explored.

• *First*, the identification and assessment of innovation outcome measures are the area of research which should be explored.

• *Second* area of research is the identification of gaps in innovation data and its solution which should be explored by the grooming researchers.

• *Third* area of research is to analyze the impact of innovation activities on firm performances.
The innovation activities mean those activities which lead the organization towards innovativeness like the pursuance of patent rights, filing for trademarks, and obtaining copyrights. As mentioned earlier, Schramm et al. (2008) has conducted this study in USA particularly in the context of small and medium enterprises and their operative, financial and competitive performance.

Based on the above discussion, present study explores the impact of process innovation on operative, financial and competitive performances of small and medium enterprises.

Schramm et al. (2008) has highlighted that this area needs to be addressed in the context of SME. The present study, based on previous studies which are conducted in different part of the globe, contended that SME may play a significant role in the economy of Pakistan.

The present study addresses third proposed area of research, conducted by Schramm et al. (2008) in the context of Pakistani SME Sector. In the next chapter, theoretical framework is presented to examine the impact of innovation on the performance of SME sector in Pakistan and its subsequent effects on economic growth of Pakistan.

2.4. Summary

The small and medium enterprises are one of the potential sources for social and economic development in the country (Khawaja, 2006). It may also be considered as an engine for economic growth. They promote employment opportunities, increase in per capita, standard of living and quality of life (Bari, et al. 2005). It is also generator of primary or secondary sources of income for many households for low income or poor households in rural areas (Tambunan, 2008). Most of the developed as well as developing countries are focusing more on the development of small and medium enterprises (Beck, Kunt & Levine, 2005). The main rationale behind their development is
concentration on small and medium enterprises. There are many international experiences, especially in developed economies like France, Italy, Canada, Japan and Australia, in which small and medium enterprises are critically contributing in strengthening economic parameters such as GDP. Following table 2.1 explains the contribution of SMEs in the GDP of their respective economies.

Table 2.1 Contribution of SMEs in Gross Domestic Product

<table>
<thead>
<tr>
<th>Country</th>
<th>SME's Contribution in GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>61.80</td>
</tr>
<tr>
<td>Italy</td>
<td>58.50</td>
</tr>
<tr>
<td>Canada</td>
<td>57.23</td>
</tr>
<tr>
<td>Hungary</td>
<td>56.8</td>
</tr>
<tr>
<td>Japan</td>
<td>56.42</td>
</tr>
<tr>
<td>Argentina</td>
<td>53.65</td>
</tr>
<tr>
<td>Australia</td>
<td>23.00</td>
</tr>
</tbody>
</table>

Source: Bolotinsky and Jiang (2008)

As far as Pakistani economy is concerned, small and medium enterprises are also playing an important role in the country but there is still slackness in utilizing the given natural, human and capital potential resources. According to SMEDA (Small and Medium Enterprises Development Authority) estimates, there were approximately 3.2 million business enterprises in Pakistan in 2006. Enterprises employing up to 99 persons constitute over 90% of all private enterprises in the industrial sector and employ nearly 78% of the non-agriculture labor force. They contribute over 30% to the GDP and account for 25% of exports of manufactured goods besides sharing 35% in manufacturing value added. Due to its
significance, promotion of SMEs is vital for economic revival, poverty alleviation and employment generation (SMEDA, 2007).

Bari, et al. (2005) have argued that there are approximately five constraints in the development of small and medium enterprises in Pakistan. First, credit rationing in Pakistan’s formal sector credit market is considered as one of the major constraints for growth in SME sector. They have argued with the collaboration of Asian Development Bank that there is high cost of leasing and credit rationing specifically in the SMEs sector. These problems appear more binding with small manufacturing units as compared to medium size manufacturing units in Pakistan. The main financial problems are lack of access to finance, collateral requirement of banks, financial institutions, lack of connections with the banks and delay of loan processes and corruption in obtaining finance.

Second, main constraint to SME growth is that cost of firm growth is increasing due to fiscal and non-fiscal regulations. In these public institutions, there are non-transparent and complex rules which are increasing the compliance cost and amplifying the corruption burden on small and medium enterprises manufacturers. A third major constraint in the way of development of SMEs in Pakistan is poor infrastructure of the country, especially in the provision of utilities like electricity, gas, water, poor quality of services corruption in supplies and failure in SOE (State Owned Enterprises) service providers. Along with it, political involvement in determination of tariff rates is also increasing the compliance cost of production.

Fourth, there is a lack of education, training and skill among the workers and management of the firm which is also one of the important constraints of firm growth. Poor quality of the research, education especially in vocational training, ill designed education policies and government regulated education
framework are providing low quality of the workers who have low efficiency and productivity. Poor education of the owners is increasing the cost of firm’s growth. It is because of low investment in human capital by the firms which results in low returns by the workers and the management. Last, market failure in adopting new innovation and modern technology is one of the constraints in the way of more dynamic SME growth path. Keeping in view the existing potentials of Pakistan’s resources, there is significant scope of development and learning gains through SMEs development (Bari, et al. 2005).

Now the question is how to provide remedial measures to the above constraints? The solution to these constraints is hidden in adoption of modern innovative technologies in the largest contributor in GDP, the SME sector. How does innovation work in a SME sector and how it will promote the productivity of SME sector which would amplify the national income of the economy? These questions would be addressed in the next chapter; which is the theoretical framework of the present study.

Next chapter provides theoretical framework to examine the impact of process innovation on SME performances and its subsequent effects on economic growth in Pakistan. It has also been observed that there is significant impact of SME development on economic development in the country. There are many international experiences like Hall, Lotti and Mairesse (2009), Freel (2000), Roper (1997) and Bhalla (1987), in which the middle income and poor economies have developed their economic and social strengths with the help of innovation in their respective SME sectors. In light of international experiences, we can also develop a theoretical framework for the progress of SME sector in Pakistan. It is an admitted fact that SME sector has positive impact on economic growth of the country (Tambunan, 2008, Giger, 1997, Thurasamy, Mohamad, Omar & Marimuthu, 2009). Next
Chapter 3
Theoretical Framework

Introduction

This chapter comprises of three sections. The first section provides a brief description of the theoretical framework. The second part describes the linkages between the dependent and independent variables of the phenomena under investigation. The third and last section of this chapter provides a brief summary which consists of an overview of the proposed theoretical framework of the present study.

To draw an existing knowledge and relevant factors into sharp focus, a conceptual framework for examining the impact of innovation on the performance of SME sector of Pakistan is developed in Figure 3.1. This model aids in the formulation and empirical analysis of innovation in SME sector and its subsequent effects on economic growth of Pakistan. The main objective is to establish a viable predictive framework which will be a guiding benchmark for the comprehensive study of conceptually, pertinent factors in the empirical phase of the present study. The proposed conceptual framework especially focuses on the role of process innovation (independent variable) in small and medium enterprise’s performance (dependent variable). In the following section, description of the theoretical framework has been discussed. 3.1. Description of Theoretical Framework
Based on extensive review of the previous studies, the theoretical framework of present study is developed (Figure 3.1) which shows the impact of process innovation on SME’s operative, financial and competitive performance. As discussed previously, that SME performance has three dimensions; operating performance, financial performance and competitive performance.

On the basis of their respective relationships, certain hypotheses have been drawn in the following sections. Figure 3.1 explains the theoretical framework of the present study.

**Figure 3.1. The Proposed Theoretical Framework of the Study**
3.2. Linkages between Innovation and Performance of Small and Medium Enterprises

The conceptual framework is a manageable expression of a broader and more general explanation of the phenomena. The theoretical framework of the present study highlights the articulation of main variables, depicting innovation as an independent variable and SME performances as dependent variable. There are numerous studies like Nakamura and Ohashi (2007) and Hall, Lotti and Mairese (2009), which support positive correlation between innovation and firm’s productivity. Because of innovation, the performances of the SMEs amplify.

The different approaches have been used to measure the performances of the small and medium enterprises due to change in the process innovation, like the generation of employment and sales growth of the enterprises. If these two indicators; employment generation and sales growth, are consistently improving, it depicts that process innovation may have positive impact on SME performances (Sawan, Unsworth & Sorbello, 2006). As, it is discussed in previous chapter, that there are three types of the performances; operating, financial and competitive performance. The operating performance is a fundamental step to achieve financial performance and competitive performance respectively. In other words, due to the adoption of modern and innovative methods of production, the firm may achieve financial performance as well as competitive performance.

Keeping in view the dimensions of innovation and SME performances, following linkages have been developed in section 3.2.1, 3.2.2 and 3.2.3 respectively to unpack the theoretical model through analyzing one to one relationship between dimensions of innovation and dimensions of SME performances respectively. In other words, to explore the cause and effect relationship between dimensions of innovation and dimensions of SME performances, one to one relationship has been explained in the following paragraphs. The main objective of this exercise is to explore the articulation between the dimensions of innovation with SME performances. Generally, the performance of an organization is based on the technology which has been used for the production of certain level of output. If there is any change in innovative process or any new innovative method has been implemented, then the operating performance may be affected.

Figure 3.1 explains that there are three main bases which emerge into innovation. There are a few studies which are available for the measurement of Innovation. INSEAD (2010), has developed its second report on Global Innovation Index (GII) in response to a study conducted by Schramm, et
al. (2008) for innovation measurement in US economy, in which, he along with his team has emphasized the introduction of any national or international benchmark for innovation measurement. The organization has used input and output pillars to measure innovativeness in a country. The input pillars include institutions, human capacity, general and Information Technology infrastructure, market sophistications and business sophistications respectively. The output pillars consist of knowledge, competitiveness and wealth.

In other words, for innovation in an organization, these three elements; capital availability, human capital and emerging technologies are indispensible (Khawaja, 2006, Sullivan, 2008 & Bagchi, 2010). These three elements help the organizations in transformation of inputs variables into output variable of innovation which is widely known as patents. There are several studies which have used patents as a measure of innovative activities in small and medium enterprises such as Ornaghi and Correa (2012), Oltra, et.al (2008), Connelly (2007), and Hagedoorn & Cloodt (2003). In the following sections, linkages between innovation and respective dimensions of firm performances have been discussed separately to grasp their interrelationships in detail.

3.2.1 Linkages between Innovation and Operating Performance

As, it is discussed in section 3.2, that emerging technologies and technological knowhow are essential for promotion of innovation in SME sector particularly in Pakistan. It is admitted fact that technological knowledge is providing basis for emerging technologies which are indispensible for the promotion of SME performance (Stevenson, 2007). In other words, technological information is helpful in promoting the operating performance of the enterprises through emerging technologies. The operating performance of an enterprise might be measured through productivity of the employees, quality of the product and customer satisfaction. It might be appropriate to argue that technological knowledge assists the employees of the enterprises to promote productivity through creating awareness about latest techniques of production. In this regards, emerging technologies are playing very significant role in the promotion of innovation of SMEs. It also promotes the efficiency of the labor which amplifies the overall production of the enterprises.

The selection of operation process is based on three basic factors.

- Variety of the products or services,
Degree of equipment flexibility

Expected volume of outputs

These three aspects are addressed in the selection of process of production of outputs (Stevenson, 2007). These three basic elements may rely on emerging technologies, which may be used as methods of production. The emerging technologies are having capacity to produce a variety of products along with potential of producing the goods in large quantity. In other words, volume of the products depends upon existing technology and technological information. The degree of flexibility means the potential capacity of existing technology which might be changed with the technological information, which is called process innovation. The ultimate objective of the whole efforts of innovativeness of the firm is to achieve high operative performance from prevailing resources.

After achieving operating performance, the scale of production of the enterprise may change from small to medium scale, which is a courageous thing for large scale producers in the country. Due to changes in scale of production, overall output of the firm increases which might be helpful for the enterprises to achieve financial performance as well as competitive performance. As it is mentioned earlier that selection of operation process is based on a variety of products and services, degree of equipment flexibility and expected volume of outputs. Actually, all these three things are interrelated to each other. In the current era, the firms which are producing variety of the products are getting a more competitive edge as compared to stereo production. There are many existing examples like Gillette, ICI (Products), Mobilink and Telenor (Services) in Pakistan which are getting competitive edge on other competitors based on the production of variety of goods. The main reason behind this competitiveness is to get a better market share of one or two products due to their unique characteristics in the market.

It is generally recognized that emerging technologies have positive impact on the operating performances of the firm. Due to the adoption of modern technology, potential capacity of the manufacturing unit can be used at maximum level. Due to technological innovation, per unit cost of the product would come down because of continuous decrease in average fixed cost. It means that when the products have been produced at a large scale then per unit cost (Marginal Cost) of the product will come down and the difference between average cost and average variable cost would be squeezing due to continuous decline in average fixed cost. On the basis of above discussion, a testable hypothesis can be formulated to find out that either relationship between innovation and operating performance of the firm is positive.
**H01: There is positive relationship between Process Innovation and Operating Performance of SME Sector in Pakistan**

If positive correlation between process innovation and operating performance has been accepted in the study then it means that innovation through emerging technologies would be one of the significant factors for the promotion of small and medium enterprises in Pakistan.

### 3.2.2 Linkages between Innovation and Financial Performance

The financial performance of the enterprises might be achieved through skilled manpower, which is one of the drivers of process innovation. The skilled human capitals are well aware of using modern technology and innovative techniques for the production of certain outputs. Theoretically, human capital is one of the important factors of production as it is depicted in simple production function; \( Q = f(K, L) \). Where \( Q \) represents output level, \( K \) shows the units of capital consumed in production process and \( L \) explains labor or human capital (Nicolson, 2004). In other words, human capital is inevitable for the production of certain level of output. The performance of the company depends upon the quality of human capital. If the labor is skilled and experienced, the performance of the enterprises may amplify with greater magnitude. The operating performance actually shapes the financial performance of the organization. If the firm is showing operating performance in the shape of least cost combination of the inputs and generating profits then the firm might be considered to be financially sound (Capon, et al., 1990). Least cost combination is only possible when the human capital is efficient and productive to achieve the goals of firm like improvement in financial performances.

There are many studies which are shedding lights on the significance of human capital with regards to financial performance. For instance, Capon, et al. (1990) has focused on the determinants of financial performance of firms, based on 320 published studies. They explain main determinants of financial performances with the help of Meta analysis. To find the financial performance of the firms, they have selected the following variables; industry concentration, growth in assets and sales, market share, size of the firm, capital investment and advertising intensity. They have used ANCOVA (Analysis of Coefficients of Variance) to identify the effects of independent variables on dependent variables. Main results are in favor of significance of industry concentration, growth in assets and sales, market share, R&D expenses for training of human capital and capital investment. These variables have positive impact on financial performance of the organizations. In other words, human capital can contribute significantly in achieving the financial performance of small and medium enterprises.
It is generally presumed that quality of the human capital determine the financial performance of the firm because they are experts in using modern technology. In other words, better quality of human capital (skilled and unskilled) may amplify the financial performance of the firm by utilizing their potentials. There are many international experiences in which the countries have accelerated their economic growth on the basis of human capital along with the adoption of modern technology. For instance, all the emerging economies like China, Malaysia and Taiwan have developed their economic models by putting the concentration on adoption of modern technology and investment on human capital.

Ginger (1997) has discussed in detail about the industrial revolution in Malaysia. He explains that Malaysian economy has adopted three basic policies;

• Import substitution Policy
• Export oriented industrialization
• Look East Policy

He further argued that there are certain prerequisites for improving the performances of industrial units, irrespective of their size. These prerequisites include technological capabilities, human resources with IT knowledge, high quality infrastructure and legal framework. In other words, skilled human resources are inevitable for improving the performances of the manufacturing units. Based on this discussion, the following testable hypothesis is formulated to examine the interrelationship between process innovation and financial performance in the present study as follows:

H02: There is positive relationship between process innovation and financial performance of SME sector in Pakistan

In the present study, if the positive correlation between process innovation and operating performance has been accepted then it means that the drivers of process innovation; human capital would be one of the momentous factors for achieving financial performances of small and medium enterprises.
3.2.3 Linkages between innovation and Competitive Performance

For achieving competitive performances, it is quite evitable to have sufficient capital, which is one of the drivers of process innovation. In the present study, competitive performance of SMEs has been measured through net profit margin (NPM) as used by Reddy et al. (2012). The capital is one of the important factors of production for every enterprise. According to Alfred Marshall, Capital is defined as follows,

”Capital consists of all kinds of wealth, other than free gifts of nature, which yield income” (pp: 149).

This definition of capital explains that all types of wealth like capital goods, machines, cash, bonds, shares, instruments and capital tools are included in the definition of capital. There are many functions of capital where the involvement of capital is playing an important role, especially for promotional activities in the business. For instance, for the expansion of any business, for achieving competitiveness among the stakeholders and for amplifying the business and economic activities, the role of capital is indispensible. The generation of capital can only be possible through reinvestment of the capital or through adoption of modern technologies and innovations (Nicolson, 2004).

The scale of production and volume of business highly depend upon capital availability. If more capital is available, more volume of business deems to have flourished. Through the business expansion with innovative ideas, an enterprise can attain competitive performance. There are many empirical studies which favor positive link between capital availability and competitive performance of the company. For instance, Oliver (1997) has addressed the issue of competitive performance of the firms and interlinked the performance with the institutional and resource based context. He explains that sustainable competitive advantage depends on the ability to manage the given capital resources.

Oliver (1997) has conducted the analysis by using Resource Based View (RBV) model which examines the resources and capabilities of Small and medium enterprises. Further, he has argued that the current resources and capabilities enable the firms to generate above normal profits and that the firms are getting competitive advantages through regeneration of capital. The author has further demonstrated that RBV model consists of internal and external strategic factors. The internal factors are steered by motives of efficiency and profitability while external influences are like buying and supplier power, product market structure and intensity of competition. These factors influence the resources and lead the firms to perform competitively.
Another study conducted by Kettingham, et al. (1994), focuses on sustainability of competitive advantages and firm’s performance. In their study, they have discussed the performance measurements of 30 firms, which have used modern innovative technologies. They have explained that there are two main prerequisites for attaining substantial competitive advantage; establishment of technological base and availability of considerable capital. They have further highlighted the significance of capital availability in achieving the competitive advantages attained by the firms. Through the adoption of modern technology, firms may get the ability to maintain the initial business gain which has positive impact on efficiency and productivity of the firms. To sustain the competitive advantage of the firms, there is an immense need for capital availability.

The competitive performance of an enterprise might be measured through market share and competitors strategies. Generally, market share can be measured through the sale of one business as a percentage of total sales in the market. It is an admitted fact that there is a positive correlation between profitability and market share of the company. In other words, if the firm is becoming successful in attaining greater market share, it implies that firm has a competitive edge among the stake holders. There are certain motives which indicate that the firm has a competitive advantage like low cost production, product diversification and product innovation. All these objectives may only be achieved when there is availability of sufficient capital. On the basis of these discussions about the relationship between competitive performance and innovation, the following testable hypothesis is formulated.

**H03: There is a positive relationship between process innovation and competitive performance in SME sector of Pakistan**

After conducting the empirical analysis, when the positive relationship between innovation and competitive performance would be proved, it means that provision of innovation is quite essential for achieving competitive performance of small and medium enterprises. After achieving the competitive performances, a firm can be in a better position among other competitors, existing in the market due to economies of scale.
3.3 Linkages between Innovation, SME Performance and Economic Growth in Pakistan

Pakistan economy is composed of two main sectors; services sector and commodity sectors. The major contribution to GDP provided by services sector of 57.7 percent [ESP, 2012-13]. As far as commodity sector is concerned, it is further segregated in two to main sectors industrial sector and agricultural sector. An agricultural sector is contributing around 21.4 percent of GDP but industrial contribution to GDP is approximately 20.9 during 2012-2013. In industrial sector, small and medium enterprises are dominating in terms of its contribution to exports, employment generation and economic activities [ESP, 2012-13]. In the present study, SMEs are considered as a focal point for transformation and changes through the adoption of modern technology.

In Pakistan, a vast majority of population belongs to country areas and they are engaged in small enterprises like fishing, primary education, fruit production, crops cultivation, garments, knitting and handmade embroideries, cotton production, sugar cane, dates production, ginning, wood and many other areas which are the basic startups for many people (SMEDA, 2007). The present study also discusses the potentials of some sectors like external sectors, agricultural sector, and industrial sectors and provides their link with overall growth performance and economic development of the Pakistan.

The development in SMEs sector improves external sector which is another strong sign of growth of economy. Due to development in SMEs, it is expected that exports amplifies which may improve the trade balances. The share of exports increases with the expansion of demand of local products in international markets. A lot of foreign exchange can be earned by making the exports of finished commodities. Increase in foreign exchange reserves is one of the significant indicators of the healthy economic condition of the country. There are many international economies which have improved their economic strengths through the promotion of exports. Though Exports Led Growth (ELG) hypothesis is a conventional axiom but it still works for least developing economies like Pakistan. Along with it, with the advent of modern technology, there is an immense need for transformation of traditional goods producing sectors like the agriculture sector, to meet the market demand.

Agricultural sector is the biggest contributor in GDP of Pakistan [ESP, 2012-13]. For the development of agricultural sector, there are three stages as explained by Todero (2007).
• First, subsistence levels in which there are only two active forces are activating; labor and piece of land. Those peasants who are engaging with subsistence farming, merely able to produce the agriculture products which are quite sufficient for them to survive. This type of farming has been practiced in African countries and mostly in Latin American Countries. If they want to transform this farming then next stage is diversification of products which requires the availability of credit, fertilizer, awareness about the crops and marketing facilities.

• In second stage, the inhabitants of the country are doing family based farming in which they are not only self-sufficient in meeting the basic agric-crop requirements but they are also in a position to sell the products in the market.

• Third and last stage of agricultural development is specialization of the products which requires development in the industrial sector through innovation along with the provision of development in the aligned sectors. For the promotion of agricultural sector, there is immense need for introducing new techniques of production of goods along with diversification of products.

In present study, process innovation is treated as an independent variable while SME performance is dependent variable. Theoretically, there may be positive correlation between innovation and the performance of SME’s. This relationship is supported by a number of studies such as Sternberg (1990), Freel (2000), and Hall, Lotti and Mairesse (2009), which are in favor of positive correlation between innovation and performance of small and medium enterprises, on the basis of two foundations;

• One is that capital requirement for innovation for SME’s is relatively lower as compared to large scale industries.

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Second, there would be an abrupt response of innovation on the performance of SME’s because a large proportion of industrial sector is contributed by SME’s in Pakistan.

It is evident from the world experiences that due to its significance, most of countries have promoted their SME’s sector in an organized manner. For instance, all the advanced countries like Italy, Germany, France and Asia Pacific countries are concentrating more on the development of SME’s. Separate forums have been formulated for the development and promotion of SME’s sector with the assistance of research & development expenditures and innovation.

The relationship between SME performance and economic growth may be positive in Pakistani context but this relationship is beyond the scope of this study. There are many studies which indicate positive correlation between these two variables (Braunerhjelm, 2010 & Khawaja, 2006). For instance, in 2004, OECD has conducted a research for the promotion of SMEs sector in OECD member countries. The main theme of second ministerial conference, held in Istanbul, Turkey was, “Enhancing the role of SMEs in Economic development”. This study concludes that if a country is ambitious in obtaining strengths in economic growth with the help of innovative SMEs then there are certain prerequisites for the government to prioritize their concentration in the formation of new policies for the development of SME sector.

The positive relationship between SME performance and economic growth might be rationalized through economic and social indicators of the country which gets positive effects due to improvement in small and medium enterprises. The economic growth might be defined in the context of present study as an improvement in social and economic parameters like employment generation, increase in per capita and GDP growth rate. This positive link has been proved from the existing literature like Braunerhjelm (2010), Khawaja (2006) and Audretsch and Klepper (2000). Khawaja (2006) has argued that small and medium enterprises are one of the potential sources of income generation, employment generation and poverty reduction. With an increase in employment opportunities, income of the people increases and overall consumption in the economy also amplifies. Following national income identity (Y=C+I+G+X-M), as consumption in the country increases, national income of the country also increases (Branson, 2007).

It is one aspect of the subject matter. Another dimension of national income identity is positive link between investment and national income. Due to increase in SME performance, overall investment in the country amplifies. With an increase in investment, gross national income of the country also increases which is one of the indicators of economic development. Similarly, an increase in investment improves social indicators like infrastructure, health facilities, education and communication facilities in the country which transforms the state of economy of the
This chapter is an attempt to develop the relationship among the study’s variable for the development of theoretical framework and the formulation of testable hypothesis. Small and medium enterprises are considered as driving force for generation of employment and output in the country. Tambunan (2008) has highlighted in his study that:

- SMEs may progress for the short term as well as for long term because they create niche market for themselves.
- Second, the SMEs are the last resort for the poor people of developing countries like Pakistan.
- Third, they can grow along with large scale enterprises.
- Fourth, SMEs are providing intermediate goods for large scale industries and also one source of using wastage of large scale manufacturing industries.

It is admitted fact that process innovation may have positive correlation with SMEs performances in terms of operative, financial and competitive performance. It is validated from the existing literature like Freel (2000), Roper (1997), and Hall, Lotti and Mairesse (2009) that innovative SMEs are more prone to increase output level as compared to non innovative SMEs. In the above sections, interrelationships between drivers of innovation and SMEs performance have been discussed. The existing studies like Oliver (1997), Stevenson (2007) Ginger (1997) and Capon, et al. (1990) are in favor of positive relations between technological innovation and performance of the SMEs. To explore the relationships between the dimension of innovation and SMEs performance in the present study, three hypotheses have been developed. In the next chapter, methodology of the present study is discussed.
Chapter 4

Methodology

This chapter presents the study methodology, unit of analysis, operationalization of variables and the process of data collection, needed in order to empirically test the hypotheses, as formulated in the previous chapter. At the end of this chapter, analytical technique and a brief summary of the whole chapter is discussed. To achieve the set of objectives of the present study, mentioned in chapter 1, it is clear that an appropriate research methodology and a substantial body of information are essential. This study investigates the relationship between innovation and performance of small and medium enterprises, particularly in Pakistani context. To achieve these goals, balanced panel data method has been developed. Before discussing the research design and methodology, next section presents a brief overview of the research objectives, which have already been discussed in chapter 1.

4.1. Overview of the Research Objectives

The principal purpose of the present study is to contribute to a greater understanding of the relationship between process innovation and the performances (operating, financial and competitive) of small and medium enterprises. As discussed in chapter 2, most of the studies in the relevant literature have concentrated on the significance of innovation in small medium enterprises and have discussed the impact of innovation on the performance of the enterprises.

Following the study of Reddy et al. (2012), to achieve these objectives, certain variables like annual growth in total assets, number of patents granted, working capital ratio, natural log of total assets,
sales as percentage of total assets, time consistent risk, returns on assets, natural log of total sales, net profit margin and annual growth in total sales have been selected which are discussed in the following sections.

4.2. Research Design

Kerlinger (1986) has argued that the term research design refers to “the plan and structure of investigation so conceived as to obtain answers to research questions” (pp. 279).

The term research design has both a general and specific meaning. The general meaning of the research design refers to the presentation of the plan of the study’s methodology. The specific meaning of the research design refers to the type of study (Sullivan & Dooley, 2009)

The present study is specifically concerned with establishing the role of innovation in small and medium enterprises’ performances. For this purpose, we now address a number of critical issues like the unit of analysis, time frame of investigation, the purpose of study, anticipated challenges to the research and finally, the method of data collection. The following sub-sections discuss the critical components that comprise the design of the present study.

4.2.1 Unit of Analysis

In the context of social and management sciences, the unit of analysis might be individuals, firms, service organizations, communities or towns. Engel and Schutt (2009) have defined the unit of analysis in the following words,

\[ \text{The scattered plots of the variables are displayed in the Appendixes} \]
“Unit of Analysis refers to the level of social life on which the research question is focused, such as individuals, families, households, groups, communities, or towns.” (pp: 162).

A number of studies may vary by the unit of analysis. Both the personality theorist and the learning theorist use the same unit of analysis which is the individual (Engel & Schutt, 2009). In contrast to that, in the social sciences, the unit of analysis deals with groups as well as individuals like families, firms and cities (Engel & Schutt, 2009). Monette et al. (1998) has explained that there are four categories of units of analysis in the context of dual studies: a word, a theme, a major character or a sentence and paragraph. They explained that one of the most appropriate and convenient unit of analysis is a single word. The coding of certain words might be completed easily with high degree of reliability and it is also helpful in using the context unit. The amount of context needed to explain the use of a given word is the variable. They further explained that the theme as a unit of analysis refers to the major subject matter. In which the whole document can be characterized as having a primary theme. The use of major character or a sentence, normally based on more than one idea, as a unit of analysis creates more difficulties in formulating the classification in the presence of mutually exclusive categories (Monette et.al, 1998). In the present study, a single word is used as a unit of analysis which is small and medium enterprises (SMEs)

The present study is a positivist piece of social research in which the unit of analysis comprises of small and medium enterprises (SMEs: a group of firms) which are the combination of service as well as manufacturing production organizations. Conceptually, a service organization is an organization, which is engaged in the delivery of one or more than one offerings, which are not simply or
predominantly, tangible products while the manufacturing organizations are engaged in the production of the products in physical forms. In the present study, 69 small and medium nonfinancial organizations listed in Karachi Stock Exchange (KSE) are selected. Main rationale behind the selection of 69 SMEs is based on the definition of small and medium enterprises. Out of 411, only 69 companies are having net sales up to Rs. 300 Million or less than Rs. 300 Million. The Small and Medium Enterprises (SMEs) are defined, in the context of present study as those enterprises which have net sales up to Rs. 300 million as it has been mentioned by SME Bank\(^3\), State Bank of Pakistan and World Bank Resident Mission, Pakistan. In Table 4.1, the definition of SMEs has been mentioned as per Prudential Regulation (PRs) for SME, given by State Bank of Pakistan, which varies from institution to institution.

**Table: 4.1. Definition of Small and Medium Enterprises**

<table>
<thead>
<tr>
<th>No. of Employees up to</th>
<th>Trading</th>
<th>Manufacturing</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Employees up to</td>
<td>50</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Total Assets at cost up to</td>
<td>Rs.50 M</td>
<td>Rs.100 M</td>
<td>Rs. 50 M</td>
</tr>
<tr>
<td>Total Sales Turnover up to</td>
<td>Rs.300 M</td>
<td>Rs.300 M</td>
<td>Rs. 300 M</td>
</tr>
</tbody>
</table>

*Source: State Bank of Pakistan Annual Report, 2012*

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\(^3\) For further detail see [http://smebank.org/faqs](http://smebank.org/faqs), visited on 12-12-2012
Main enterprises are categorized as textile, food, chemicals, chemical products, pharmaceuticals, non-metallic mineral products, motor vehicles, auto parts, paper and paperboard products, information, communication and transport services, electrical machinery and apparatus. The present study addresses the issue of impact of innovation on three types of the performances of small and medium enterprises; operating performances, financial performances and competitive performances. Main reason behind the selection of these types of performances is that these are three scales of measuring the performance of an enterprise (Wright et al., 2001).

4.2.2. Time-Frame of the Study

The second issue is the time frame of the study. The optimum results would be achieved from following longitudinal study involving detailed information over the period of 11 years (1999-2009). The latest publication about the performance of non-financial organization by the State Bank of Pakistan in 2010 that was consulted for the research and the data was available for the period of 11 years (1999-2009). At any given point in time, some enterprises will be in preparation and planning stages of applying innovation in their organizations while others might have made substantial progress towards, or have completed the application of innovation policies in their respective enterprises. The approach adopted aims at maximizing the informative power of the data gathered and to gain insights about the organizations through secondary data spread over a number of years for several firms.
4.2.3. Research Purpose

Main purpose of the study is to provide detailed deliberation about the impact of process innovation on the operative, financial and competitive performance of SME firms (NonFinancial Institutions), listed on Karachi Stock Exchange, Pakistan.

4.2.4. Anticipated Challenges to the Research

Though the theoretical foundations of innovation in small and medium enterprises have been established since long time in the literature (Milbergs, 2000) but its practical application in small and medium enterprises in the developing countries like Pakistan is still at its initial stages. As a consequence, because of the nature of the innovation process, being largely unobservable and confidential, it is challenging to even identify the organizations which have been involved in innovative processes. Consequently, it is not an easy task to gain access to the field to collect the information about innovative activities of enterprises.

4.3. Operationalization of Variables

This section provides the detail of operationalization of dependent and independent variables of the present study.

The term “operationalization refers to that translation: the operations or indicators, we will use to determine the quantity or attribute we observe about a particular variable.” (Rubin & Babbie, 2008, pp: 156).
In other words, operationalization of variables means to translate dependent and independent variables into functional form which can be measured empirically. To achieve the specific objectives, a set of regression equations have been developed to analyze the impact of innovation on the operative, financial and competitive performance of small and medium enterprises of Pakistan. There are three types of performances, which are considered in the present research. To know the impact of innovation on performance of SMEs, there are three corresponding equations. In the following discussion, the construction of regression equations has been performed to determine the impact of innovation on each type of performance of the small and medium enterprises.

4.3.1. Determination of Operating Performances of SMEs

Following Reddy et al. (2012), the measurement of operating performance has been done through productivity of the enterprises which resulted with an increase in total assets of the company. In the present study, annual growth in total assets (AGTA) is considered as a proxy variable for operating performance of the enterprises. The operating performance depends upon the following independent variables; patent granted (PAT), working capital ratio (WCR), natural log of total assets (NLTA) which measures the size of the firm, sales as percentage of total assets (SPTA), which is an indicator of asset efficiency and time-consistent risk based on return on assets (Risk1). Following Ohashi (2007), in the present study, productivity is selected for assessing operating performance due to its significance for an entrepreneur. The equation 4.1 describes the regression model to analyze the impact of innovation on operating performances of the small and medium enterprises.

\[
AGTA_t = \alpha_0 + \alpha_1 PAT_t + \alpha_2 WCR_t + \alpha_3 NLTA_t + \alpha_4 SPTA_t + \alpha_5 Risk_1_t + \varepsilon_t
\] (4.1)
Where $i = 1, 2, 3 \ldots 69$. And $t = 1, 2 \ldots 11$

AGTA is annual growth in total assets

PAT is number of patents granted

WCR depicts working capital ratio

NLTA represents natural log of total assets

SPTA is sales as percentage of total assets

RISK1 is the risk based on return on assets

$\epsilon$ represents an error term

4.3.2. Determination of Financial Performance of SMEs

Following Delery and Doty (1996) and Reddy et al. (2012), financial performance of the company has been measured through return on assets (ROA) of the enterprises. In the present study, ROA has been considered as a dependent variable as well as proxy variable for financial performance. The financial performance depends upon size of the firm; natural log of total sales (NLTS), patent (PAT) cash flow ratio (CFR), sales as percentage of total assets (SPTA), working capital ratio (WCR) and debt equity ratio (DERA). In the present study, we may identify the impact of innovation on profitability of the company because all the tactics of the company converge towards the objective of profit maximization. Equation 4.2 describes the effect of independent variables including innovation on the financial performances of the enterprises

\[
ROA_{it} = \beta_1 PAT_{it} + \beta_2 WCR_{it} + \beta_3 NLTS_{it} + \beta_4 SPTA_{it} + \epsilon
\]

(4.2)

$\epsilon$ represents an error term
Where $i = 1, 2, 3 \ldots 69$. And $t = 1, 2 \ldots 11$

ROA is return on assets

PAT is number of patents granted

WCR depicts working capital ratio

NLTS represents natural log of total sales

SPTA is sales as percentage of total assets

DERA is debt-equity ratio

$\epsilon$ represents an error term

4.3.3. Determination of Competitive Performances of SMEs

Following Wright, et al. (2001), competitive performance can be measured through market share of the company or from net profit margin (NPM). In the current research, net profit margin is considered as a proxy for competitive performance. To see the impact of innovation on the competitive performance of the small and medium enterprises, following independent variables have been selected; size of the enterprises, measured by natural log of total assets (NLTA) patent granted (PAT), sales as percentage of total assets (SPTA) and annual growth in total sales. Generally, it is presumed that size of the firm has a positive correlation with competitive performances of the enterprises because large firms can easily enjoy the economies of scale and have more access to credits. The large size of the firm can help the enterprises to gain more competitive advantages. The equation 4.3 illustrates the effect of innovation on the competitive performances of the enterprises.
Where $i = 1, 2, 3 \ldots 69$. And $t = 1, 2 \ldots \ldots 11$

NPM is net profit margin

NLTA represents natural log of total assets

PAT is number of patents granted

AGTS is annual growth in total sales

SPTA is sales as percentage of total assets

$\text{\Box}$ represents an error term

Before proceeding to formal analysis, it is useful to specify the variables to be studied in more precise terms. In the present study, innovation is considered as an independent variable which has an effect on all three types of performances; operative, financial and competitive, respectively. To measure the innovation, two types of the variables have been identified from the literature (Schramm, et al. 2008, Milbergs, 2000, Westlake, 2009). One is input variable like research and development expenditure to GDP ratio, or research and development inputs in the firms and second, output variables like number of patent count, patent application filed, patent granted and patent citations, which are normally used as a proxy for measurement of innovation.

The present study uses number of patents granted statistics as a proxy for innovation activities in the enterprises. In other words, if more number of patents has been granted to any enterprise, it depicts
that the firm is promoting its innovative activities which may have positive impact on all three types of performance of the enterprise. There are many researches that support this positive correlation between innovation and firm’s performance (Roper, 1997, Freel, 2000 & Nooteboom, 1994). Though the number of patent granted is not giving comprehensive picture of the innovation activities but it is relatively better indicators as it has been widely used in the previous researches like Oltra et al. (2008), Connelly (2007), Hagedoorn and Clooet (2003), and Ornaghi and Correa (2012) who have used number of patent granted statistics, in their studies, for the measurement of innovation in small and medium enterprises.

The literature indicates that research and development (R&D) expenditure (which is an input variable) is not an appropriate measure for the gauging the innovation activities at the firm level because this variable does not depicts the results of R&D expenditure. The statistics of R&D expenditure portray that research and development is being conducted in the firm but it does not explain whether R&D expenditure has resulted with any positive change in the performance of enterprises or not. In the present study, number of patent granted in the respective years to the firm is taken as proxy for innovation measurement. Pakistan is a developing country and the innovative activities are at its initial stage. Therefore, comprehensive measurement yardsticks for innovative activities are not matured. In this scenario, number of patent granted is considered as a reasonable acceptable measure of innovative activities in the firm as it has been observed in the previous studies for example (Connelly, 2007, Ornaghi & Correa, 2012).

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For further study see www.innovationecosystems.com, cited on 28th Feb 2013
Following Wright, et al. (2001) and Huselid and Becker (2000), there are three scales for enterprise’s performance measurement: 1) operating performance (productivity and sales), 2) financial performance (profitability, stock prices) and 3) competitive performance like market share and competitor strategies. In the present research, all three types of performances; operating performance, financial performance and competitive performance are used to find out the effects of innovation on the performance of Small and Medium Enterprises (SMEs). The operational definitions of the types of performances have been discussed in the following paragraphs.

Based on the study of Wright et al. (2001), the operating performance is judged through productivity and sales. It means that when the firms are operating at the least cost combination of inputs or they are sustaining their productivity with positively consistent trend, it depicts that the firms are achieving the operating performance. Similarly, if the firms are successfully maintaining their sales which ultimately converge to increase in total assets, it depicts that the enterprises are achieving their operating performances. In the present study, annual growth in total assets (AGTA) is considered as an indicator of productivity. In other words, annual growth in total assets is a proxy for measuring the operating performances of the enterprises.

Based on the study of Reddy et al. (2012), the financial performance of SME’s is measured through four different techniques, as mentioned below:

1) Growth of the firm
2) Profitability of the firm
3) Risk faced by the firm
4) Profitability components

They have measured the growth of the firm through annual growth rate of total sales (AGTS) and annual growth rate of total assets (AGTA). It is generally presumed that the progress of an enterprise can be judged by analyzing the annual growth rate of total sales of the firm. If there is an improvement in sales growth, it depicts that progress of the firm is consistent. Second technique which has been used by Reddy et al. (2012) for measuring the financial performance of an enterprise is through profitability of the firm. In other words, if the profitability of the firm has indicated a positive and healthy sign, it means that the firm’s financial performance is up to the mark.

They have used two most common measures; return on Assets (ROA) and Cash Flow Ratio (CFR) for the measurement of profitability of the enterprise. Similarly, in the present study, the financial performance of an enterprise has been measured through these two common measures; return on Assets (ROA) and Cash Flow Ratio (CFR). The Cash Flow Ratio (CFR) is calculated by adding depreciation to net profits of the group and using it as numerator over total assets of the group. ROA is defined as \( \frac{\text{net income} + \text{interest} \times (1 - \text{tax rate})}{\text{total assets}} \). In the present study, ROA is taken as a dependent variable to measure the financial performance of small and medium enterprises.

Based on the study of Reddy et al. (2012), for measuring time consistent risk, coefficient of variance in cash flow ratio (Risk1) and coefficient of variance of Return on Assets (Risk 2) are considered in the present study as independent variables. If the coefficient of variance in cash flow ratio or of ROA is high, it means that the earnings of the firms are highly volatile which shows poor financial performance of the respective firms. Similarly, strong financial performing firms have low coefficient.
of variances. Both types of risks (Risk1, Risk 2) are considered as independent variables. To a larger extent, these may be considered as a good measure of firm’s risk.

The authors have used fourth technique to measure the financial performance through profitability components. There are two elements of profitability components; returns on sale and sales turnover ratio. The Gross Profit (GRPR) is used to measure return on sales, while sales turnover ratio is calculated by sales as percentage of total assets (SPTA). If the profitability components are showing consistently positive growth in terms of sales turnover ratio and returns on sales, it means that the firms have sustained its financial performance which is indispensible for the enterprises to protract their existence in the business. In the present study, both elements of profitability components; Gross Profit (GRPR) and sales as percentage of total assets (SPTA) are used to measure the financial performance of the enterprises as independent variables.

Based on the study of Reddy et al. (2012), the net profit margin (NPM) is used as a proxy for competitive performances of enterprises. The net profit margin (NPM) can be calculated as profit after tax to total sales ratio. It is observed that higher sales turnover ratio implies better utilization of natural, physical and human resources which transforms into higher efficiency of inputs and higher profit margins. The higher profit margin depicts that the firm is enjoying significant market share and market power. The competitive performance of the enterprises can be inferred from the market share of the enterprises which is correlated with the net profit margin. In the nutshell, in the present study, NPM is used as an indicator of competitive performances of the small and medium enterprises.
To know the ability of a firm to pay long term debts and liabilities, working capital ratio (WCR) may be considered as the best indicator as it has been frequently used in the previous studies like Buildersee (1974) and Reddy et al. (2012). The working capital ratio is measured as \( \frac{\text{Current Assets} - \text{Current Liabilities}}{\text{Total Sales}} \). The current assets consist of cash and bank balances, inventories and trade debts, short term investments and other current assets.

The current liabilities are all those liabilities which are indispensable to be discharged with in one year. These liabilities cover all those obligations whose liquidation is expected to be made out of current assets. Current liabilities consists of short term secured loans and other current liabilities. Total sales mean overall production of the company. If the working capital ratio is high, it means that there is efficient utilization of working capital. In other words, working capital ratio is a significant indicator which tells that either the firm is able to sustain its business in the presence of its current liabilities.

To capture the impact of firm size on the performance of small and medium enterprises, two accounting based measures of size are used in the current study; first is the natural log of total assets and second is natural log of total sales. The present literature exhibits that large size of the firm helps in attaining higher performances because they can exploit economies of scale and have more access to credit attainment (Majumdar, 1997).
4.4. Estimation Techniques

This section provides the estimation techniques of regression models that have been constructed in the above section. The present study has used balanced panel data, collected from secondary sources. The reason of choosing balance panel data is considered the most appropriate way to handle large number of sequence of observations that are based on different time periods and several cross sections. The technique of using balance panel is consistent with previous studies, conducted in the same kind. For example, Greene (2005) has argued that panel data provides a rich environment for the development of estimation techniques and theoretical results.

The panel data estimation is one of the most efficient analytical methods because it permits the inclusion of data for cross sections as well as time periods. The panel data matrix set consists of a time series for each cross sectional member in the data set which gives more informative data, less co-linearity among the variables, more degree of freedom and more efficiency. Another benefit of the panel data estimation is that these overcome the econometric errors of time series analysis as well as cross sectional data analysis (Asteriou & Hall, 2011).

In the present study, data about non-financial enterprises, the small and medium enterprises, listed on Karachi Stock Exchange (KSE) are available for eleven years thus to get optimal results, the data are pooled about all the firms. It is observed that panel data can better detect and measure the effects of independent variables on the dependent variable, which cannot be observed in pure cross section or in pure time series data because the panel data can minimize the biases due to large aggregate sample (Gujarati & Sangeetha 2008). The basic framework for panel data estimation commences, in the context of present study, from the regression model of the form

\[ y_{it} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki} + u_{it}, \]

where

- \( y_{it} \) is the dependent variable for firm \( i \) at time \( t \),
- \( x_{1i}, x_{2i}, \ldots, x_{ki} \) are the independent variables,
- \( \beta_0, \beta_1, \beta_2, \ldots, \beta_k \) are the coefficients to be estimated,
- \( u_{it} \) is the error term.

The error term \( u_{it} \) is assumed to be a disturbance term with mean zero and constant variance. The panel data estimation technique allows for the estimation of coefficients that are allowed to vary across firms (panels).
\[ Y_{it} = \beta_1 X_{it,1} + \beta_2 X_{it,2} + \ldots + \beta_k X_{it,k} + \epsilon_{it} \quad (4.4) \]

Where \( i = 1, 2, 3, \ldots \) N (69). And \( t = 1, 2, \ldots \) T (11)

The sample data are represented by the observation, N cross sectional units over T periods of time, with K regressors in \( x_{it} \). The number of observations in the context of pooled cross section and time series data has two main dimensions N and T. All the asymptotic properties of estimators are derived under the presumption that \( N \to \infty \) and \( T \to \infty \). In this type of data, N (the number of cross-sectional units) is large but normally T (Time period) is small (Asteriou and Hall, 2011). In the present study, the numbers of cross-sectional units (N) are 69 and the number of time periods (T) is 11 years (1999-2009). There are altogether \( n = N \times T \) observations which are 759 in the present research. All the \( \beta \)'s are the coefficients of explanatory variables or independent variables that are expected to affect the dependent variables. The explanatory variables and the regression disturbances are presumed to satisfy the assumptions of generalized linear regression model. In matrix notation the regression equation can be written as:

\[ y = X \beta + \epsilon \quad (4.5) \]

In 4.5 expression \( y \) represents the dependent variable in all time periods, specified in the present study. For instance, \( y_{11} \) means dependent variable of first firm in first time period (1999) which prolongs up to \( Y_{1T} \). In the current study T goes to 11. In other words, time period is 11 years. Similarly this process goes up to \( N \times T \) (N, the number of firms, T, the number of time periods). Similarly, X matrices
explain all the explanatory variables which have been used in the present study with \( N \) cross sectional units over \( T \) periods of time and with \( K \) regressors in \( x_{it} \).

The vector \( \beta \) represents the coefficients of all the explanatory variables. The \( \varepsilon \) term represents the error of the regression model. This specification provides a general framework for discussion of panel data estimation.

In the present research, Fixed Effect Method (FEM) has been used to see the impact of innovation on SMEs performance to make the analysis more convenient, we assume that each individual firm’s intercepts vary over time but the slope coefficients are assumed to be common across all the firms. In this case, Fixed Effects Method (FEM) would be considered as an appropriate econometric technique. Since Hausman test supports the fixed effects method.

Generally, linear panel data model can be estimated by using three different methods; 1) common constant method, 2) allowing for fixed effects and 3) allowing for random effects. In the first method, the model estimates a common constant for all the cross sections. The common parameters method implies that there are no differences between the estimated parameters across the cross sections. The second method is fixed effect model, in which the intercept is treated as group-section specific, meaning that the method allows for different intercepts for each group of firm. The fixed effects estimators are also known as the least squares with dummy variables (LSDV) estimator because the model can be specified by a dummy variable for each group. The third method is the random effects model. In this method, the intercept for all the cross-section is common but the differences are considered as random variable. For the random effects model, there is a need to formulate specific assumptions about the distribution of the random component. It is examined that if unobserved group
specific effects are correlated with the explanatory variables then the estimates will be biased and inconsistent (Asteriou & Hall, 2011).

In the present research, Fixed Effect Method (FEM) has been used to see the impact of innovation on SMEs performance due to the following reasons:

- *One* of the important reasons is that in the present study, it is assumed that $\epsilon_i$ (error terms) and X’s (explanatory variables) are correlated. Main rationale behind this assumption is that all the enterprises under consideration are small and medium enterprises and all the enterprises belong to non-financial enterprises which mean that their respective explanatory variables may be correlated with their respective error components (Asteriou & Hall, 2011).

- *Secondly*, to make the analysis more convenient, we assume that each individual firm’s intercepts vary over time but the slope coefficients are assumed to be common across all the firms. In this case, Fixed Effects Method (FEM) would be considered as an appropriate econometric technique.

- *Thirdly*, it is also observed that if the individual error component and one or more regressors are correlated then Random Effects Method (REM) does not give unbiased estimators while with the help of FEM, these estimators can be obtained as unbiased (Gujarati & Porter, 2010).

### 4.4.1 Fixed Effects Model

As mentioned in the previous section, the intercept is allowed to vary across the cross-sections in the fixed effect model (Kmenta, 1986). The fixed effects estimators are also known as Least Squares with
Dummy Variables (LSDV) estimators. The following model depicts the detailed deliberation of the Fixed Effects Model.

\[ Y_{it} = \beta_0 + \beta_1 x_{1it} + \beta_2 x_{2it} + \ldots + \beta_k x_{kit} + \epsilon_{it} \]  

(4.8)

Where Y and X have both i and t subscripts for i = 1, 2, 3, -----69 sections and t = 1, 2, 3 -----11, time periods. The term \( \epsilon_{it} \) represents the residuals of 69 cross sections for the period of 11 years. The equation shows that the intercepts are different for different individual firms but the slope coefficients are assumed to be common across all individual enterprises. In other words, all the behavioral differences between the individual small and medium enterprises, referred to as individual heterogeneity, are assumed to be captured by the intercepts. The individual intercepts are included to control for individual specific but time invariant characteristics. In the model, the intercepts are called fixed effects. In the matrix notation, the regression equation (4.8) can be written as:
Let \( Y \) and \( X \) be the \( T \) observations for the \( i \)th unit and let \( \epsilon \) be associated \( T^*1 \) vector of disturbances. Here all \( Y \)'s are dependent variables like operating performance, financial performance or competitive performance of the enterprises. To measure the fixed effects, dummies have been used. The dummy variable is the one, which allows us to take different group specific estimates, for each of the constants for each different firm. In expression 4.10, the dummy variable is indicating the \( i \)th unit. Let the \( NT^*k \) matrix

\[
D = \begin{bmatrix}
\mathbf{d}_1 & \mathbf{d}_2 & \cdots & \mathbf{d}_N \\
\end{bmatrix}
\]

(4.10)

and

\[
\mathbf{X} = \begin{bmatrix}
\mathbf{x}_{11} & \mathbf{x}_{12} & \cdots & \mathbf{x}_{1T} \\
\mathbf{x}_{21} & \mathbf{x}_{22} & \cdots & \mathbf{x}_{2T} \\
\vdots & \vdots & \ddots & \vdots \\
\mathbf{x}_{N1} & \mathbf{x}_{N2} & \cdots & \mathbf{x}_{NT} \\
\end{bmatrix}
\]

(4.11)

Then, assembling all \( N^*T \) rows gives
This means least squares dummy variable estimators and fixed effects estimators are identical (Asteriou & Hall, 2011). The $X$ indicates the matrices of explanatory variables and all $\beta$ are the coefficients of explanatory variables.

This completes the theoretical foundation of Fixed Effects Model (FEM) to estimate the impact of innovation on the performances of small and medium enterprises.

4.5. Data Collection Techniques

The following section provides data collection techniques and sources of information, from where the data has been collected. In the present study, quantitative data techniques have been used to find the impact of innovation on the performances of small and medium enterprises in Pakistan.

The selection of quantitative technique is more appropriate to achieve the set of objectives of the study under investigation because it has more advantages over the ethnographical approaches. In the present study, the scales have been used to measure the performances of the enterprises due to change in innovation activities which are rarely used in qualitative data estimation techniques rather than in quantitative techniques, it is frequently used to make the analysis (Rubin & Babbie, 2008). Quantitative technique is that method in which the researchers convert the information into numerical form and subject it to statistical analysis (Rubin & Babbie, 2008).

Broadly speaking, there are four levels of measurement scales of the variables in the quantitative data techniques: nominal measures, ordinal measures, interval measures and ratio measures (Rubin &
Babbie, 2008). The variables with only discrete or categorical attributes are called nominal measures like color, race and different places. The ordinal measures are concerned with those measures whose attributes may be logically rank ordered like age, satisfaction levels and social classes of the society. There are some variables which can be measured in ranges or interval like temperatures and heights. These measures of variables are coming under the interval measures. The last level of measurement of the variables is ratio measures. The ratio measures are concerned with social scientific variables like number of children, number of firms and number of antisocial behaviors. In the present study, ratio measures have been used due to nature of the data (Rubin & Babbie, 2008).

The quantitative methodology is also useful for hypothesis testing about the relationships among the variables and generalization of the results (Rubin & Babbie, 2008). Most of the positivists use the quantitative approach because it is easy to replicate and have the provision of generalization. Engel and Schutt (2009) have explained the use of quantitative methods. According to them; quantitative methods are used when the objectives of the research are concerned with explanation, description or evaluation. While, when the objective of research is concerned with the exploration, then normally, qualitative methods are used in the research. In the present study, the objectives of the research are evaluation, explanation and generalization of the impact of innovation on the performances of the small and medium enterprises. In this context, the quantitative methods are more appropriate and convenient to achieve the research objectives.

The quantitative methodology provides a precise measurement of variables. In the present study, quantitative research method has been selected due to following reasons:
• *First*, the researcher believed that the quantitative approach would be more appropriate to understand in detail the nature of relationships among major variables and provide a rich contextual basis for interpreting and validating the results (Cook & Reichardt, 1979, Rubin & Babbie, 2008).

• Second, quantitative research approach which consists of techniques, methodologies and activities which permits the observation, description and/or classification of organizational phenomena in such a way that the relationship among major variables can be identified and empirically documented.

• Third, the quantitative research relates to the capacity of the quantitative approach to introduce both testability and context to the research. Collecting large amounts of data from the secondary sources will provide a wide coverage that may result in the real picture of the entities and phenomena under study.

• The *fourth reason* relates to the fact that quantitative approach involves an examination of phenomena in a wide variety of naturalistic setting.

The quantitative research method in this study not only allows an in depth study into the organizational process but may also clarify the elements that are likely to be particular to the use of innovation in the small and medium enterprises.
There are various sources of data that provide the information about the variables used in the present study. The primary source of data is the publication of State Bank of Pakistan, in which financial statement analysis of non-financial institutions, listed in Karachi Stock Exchange has been conducted. The data about performance variables of SMEs are available on yearly basis.

The panel data have been constructed for all the SMEs for the period of 1999 to 2009 to get better results. There are certain variables which are available in gross form in State Bank Report and have been directly used in the analysis of the present study. For instance, the variables like return on assets (ROA), net profit margin (NPM) and debt equity ratio (DERA) are directly used in the present study.

The data about annual growth of total assets (AGTA) are obtained by using the growth formula

\[
\left( \frac{\text{C} - \text{P}}{\text{P}} \right) \times 100
\]

the total assets are available in the publication of State Bank of Pakistan. Similarly, data about number of patents granted are present in the publication of patent office, Karachi. The data for number of patents granted for each firm are placed on yearly basis. The working capital ratio (WCR) has been calculated with the help of available information about current assets, current liabilities and total assets of SMEs. The WCR are calculated by taking the difference between current assets and current liabilities over total sales.

The sales as percentage of total assets (SPTA) are calculated after taking the share of total sales as percentage of total assets which is one of the measures of assets efficiency utilization. In other words,
sales of the products of enterprises would increase if assets are utilized efficiently. To measure the size of the firms, natural log of total assets (NLTA) has been used as proxy variables. The information about total assets is available in the State Bank of Pakistan Report and by simply taking its natural log, this variable has been constructed. Similarly, natural log of total sales (NLTS) have been constructed by taking natural log of total sales of the enterprises in their respective years.

To measure the time consistent risk based on cash flow ratio (Risk1), the coefficient of variation in cash flow ratio has been calculated through the formula of coefficient of variation \(V=(\sigma/\mu)\times100\) (where \(V\) is coefficient of variation, \(\sigma\) is standard deviation, \(\mu\) is mean value). This variable measures the effects of risk on operative performance of enterprises. In other words, if the coefficient of variation is low it means that the firms are performing stronger than other firms because the coefficient of variation can be used to compare the variability of two or more than two sets of data even the observations are expressed in different units of measurement.

The main sources of the data are State Bank Reports, Economic Survey of Pakistan, published by Ministry of Finance, Government of Pakistan, Federal Bureau of Statistics (FBS), Intellectual Property Organization (IPO), Government of Pakistan, Patent office, Karachi, World Intellectual Property Organization (WIPO), Geneva, SME Bank, Security Exchange Commission of Pakistan (SECP), Government of Pakistan and World Bank publications. The information about the small and medium definition has been collected from SME Bank, SMEDA (Small and Medium Enterprises Development Authority), Government of Pakistan and World Bank Reports 2012. The data about the performances of the small and medium enterprises has been gathered from various issues of State

4.6. Summary

This chapter has formulated the framework for the conduct of this study by stating the research methodology and unit of analysis and by presenting various tools of gathering the data along with analytical techniques to reach the destination. Research methodology portrays a road map which provides the guideline for the researcher to achieve his or her research objectives and ensure the best possible outcomes. The next chapter presents the results, obtained from the data analysis of the present study have been discussed and an attempt has made to answer the central research question.
Chapter 5

Findings

This chapter provides an overview of the data structure; the description and data analysis with major findings of the present study. This chapter particularly focuses on the discussion of how our findings support key hypotheses that were formulated in the previous section (See Chapter 3). At the end of this chapter, a brief summary of the whole chapter is given.

The main objective of the present chapter is to examine the relationship between dependent and independent variables quantitatively which has been inferred from using panel data. The present study is a piece of positivist epistemology and is a longitudinal study due to its kind and nature of data about small and medium enterprises. In the present study, 69 firms are investigated for 11 years (1999-2009) regarding their innovative activities and their respective operative, financial and competitive performances.

This chapter comprises of five sections. The first section, 5.1, explains the structures of data in which the sources of information about the selected variables have been explained. Section 5.2 consists of description of data which explains how the data have been organized. This section also focuses on the data collection and its analysis with appropriate econometric techniques. The section 5.3 discusses major findings of the present study under three subheadings, consisting of impact of innovation on the three types of performance of small and medium enterprises. Section
5.4 describes articulation of the results of present study with key research questions.

5.1. **Data Structure**

Based on the previous studies like Ornaghi and Correa (2012), Oltra, et al. (2008), Connelly (2007), and Hagedoorn and Clooit (2003), the number of patents granted in a year, is used as a proxy variable for innovative activities. The information about patents is collected from three sources; patent office, Karachi, Intellectual Property Organization (IPO), Islamabad and World Intellectual Property Organization (WIPO) publications\(^5\), Geneva, Switzerland. The patent office, Karachi has time series data about the number of patents which have been granted to domestic as well as international firms. On a yearly basis, the data is collected about the innovative activities in small and medium enterprises for the period of 1999 to 2009.

The data about all types of operative, financial, and competitive performances as indicators of the small and medium enterprises like working capital ratio, total assets, sales as percentage of total Assets (SPTA), annual growth in total assets (AGTA), total sales, cash flow ratio (CFR), time consistent risk (Risk1), returns on assets (ROA), net profit margin (NPM) and debt equity ratio (DERA) are collected from financial statement analysis of non financial institutions, listed in Karachi Stock Exchange, published by State Bank of Pakistan. In the State bank report, the financial statements of 411 companies are given and out of these non-financial companies 69 enterprises are selected on the basis of their annual sales not exceeding Rs. 300 millions. In the

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\(^5\) All the member countries of WIPO have unified procedure for patent granting, based on the law of territoriality, under PCT (Patent Cooperation Treaty). (www.wipo.int)
present study, all those enterprises are considered as small and medium enterprises which are having their sales up to or less than 300 millions.

**5.2 Description of Data**

This section focuses on the data organization and its description. As mentioned in section 5.1, the data of innovative activities of the firms in terms of number of patents granted are collected from patent office, Karachi, IPO and WIPO. The primary source of data, about the performances indicators like total sales, total assets and financial ratios of each firm, is State bank report on financial analysis of non financial institutions, published by State Bank of Pakistan. The data has been arranged for each firm (69) for 11 years (1999 to 2009) against each cross section. There are some missing values which have been manipulated through the average method. The present study is a longitudinal in nature due to type of data. A panel of data has been developed to get efficient results because panel data is considered one of the most efficient methods to tackle econometric data (Asteriou & Hall, 2011).

To estimate the data, the structural form of the model has been estimated through Fixed Effect Method (FEM) estimation technique. The main reason behind the selection of this estimation technique is the significant value of Hausman Test which is one of the indicators for the selection of Fixed Effect Method (FEM). Secondly, Fixed Effect Method (FEM) is more appropriate as it is mentioned in the following part by Asteriou and Hall, (2011)
“The advantage of the use of the Fixed Effect estimator is that it is consistent even when the estimators are correlated with the individual effect. In other words, given a panel data model, fixed effects would be appropriate.” (pp: 421)

5.3. Empirical Evidence on the Impact of Innovation on Operating Performance of SMEs

In this section, the empirical results of estimation equations 4.1, 4.2, and 4.3 are presented. The impact of innovation on operating performance of small and medium enterprises has been presented in Table 5.1. The estimation has been done with the help of software; EVIEWS 6.1, which is frequently used for econometric analysis especially for time series and panel data estimation. For secondary data analysis, EViews is more conducive and researcher friendly as compared to the other software packages like SPSS, Minitab or Stata. Though they have their own characteristics, which are quite beneficial in the analysis according to the nature of data like SPSS is frequently used in primary data research and qualitative data analysis, yet for quantitative research, EViews is more appropriate.

Table 5.1 Impact of Process Innovation on Operating Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT</td>
<td>Number of Patents granted</td>
<td>4.223</td>
<td>7.988</td>
<td>0.000</td>
</tr>
<tr>
<td>WCR</td>
<td>Working capital ratio</td>
<td>0.026</td>
<td>0.574</td>
<td>0.566</td>
</tr>
<tr>
<td>NLTA</td>
<td>Natural log of total assets</td>
<td>20.815</td>
<td>10.536</td>
<td>0.000</td>
</tr>
</tbody>
</table>

CXV
The operating performance, in the context of present study, of the small and medium enterprises has been measured through annual growth rate in total assets (AGTA) which is a dependent variable in present study. Based on the study of Reddy et al. (2012) and Terzirovski, (2010), as discussed in equation 4.1 in the previous section (see in Chapter 4), the independent variables are number of patent granted (PAT), working capital ratio (WCR), size of the firm measured through natural log of total assets (NLTA), sales as percent of total assets (SPTA) depicts the measure of asset efficiency and time consistent risk based on cash flow ratio (Risk1). In the present study, the inclusion of independent variables is based on hit and trial method besides the lead taken from Reddy, et al. (2012)

The results in Table 5.1 show that number of patents granted (PAT), which is a proxy for innovation activities in the enterprises as used in previous studies like Hagedoorn and Cloodt (2003), Connelly (2007), Oltra et al (2008), and Ornaghi and Correa (2012), has significant effect on the operating performance of small and medium enterprises. The positive and significant correlation between innovation and operating performances of the enterprises, as resulted from present study, are consistent with Oltra, et al. and Kemp’ findings. The t-statistic of the estimated slope coefficient of the variable patent (PAT) is 7.98, which is highly significant. It means that in the survival of
enterprises in the developing countries like Pakistan, innovative activities are playing pivotal role in enhancing the operating performances of the enterprises. The innovation activities are effective in producing the outputs with least cost combination due to economies of scale (Kharbanda, 2001, Nooteboom, 1994).

The results, presented in Table 5.1, about the impact of patent (PAT) highlights the significance of innovation in the developing countries like Pakistan. Pakistan is at the initial stage of its development and has a huge potential to amplify the expected production with the help of innovation (Khawaja, 2006, Khan, 2004). There are many international experiences which have started their economic as well as social development from scratch. With the improvement in economic infrastructure of the country with the help of modern technology, those economies might be strengthened their status from low middle income to middle income countries. The examples are Malaysia, China and India.

The second important result, mentioned in Table 5.1, which comes out of the present research, is that size of the firm plays an important positive impact on operating performances of the enterprises. The Table 5.1 has shown that T-statistics of the estimated slope coefficient of the variable, the size of the firm (NLTA) is highly significant (at 1% level) which indicates that as the size of the firm grows it become more efficient in its functioning and efficient utilization of available resources. Due to economies of scale, the size of firm has positive and significant impact on the performance of enterprises. The same results have been supported by the studies of Majumdar (1997) and Lee (2009). For instance, Lee (2009) has found that size of the firm has
positive impact on productivity. He has examined this relationship between size of the firm and firm’s performance after collecting the data of over 7000 US public firms. He further explains that profits of the firms are positively correlated with firm size in non linear manner, holding an array of firms and industry-specific characteristics constant. These results are also supported by the study of Majumdar (1997) in which he has explained that the large size of the firms have positive impact on the firm performance because as the firm size grows, it becomes more easy to sustain impressive operating and financial performances due to its easy access to credit availability and economies of scale. In other words, as the size of the firm grows, their impacts become positive on the operating performance of enterprises.

The strengths of small and medium enterprises are their flexibility, quick response and willingness to take small orders (Khan, 2004). Flexibility of small and medium enterprises means that they can be easily manipulated according to the requirements of demand for the products in the market. They might be easily managed by the owners due to their particular features like balanced ownership structures, provision of a smooth transition to higher levels of technology and facilitating services sector. Another feature of small and medium enterprises is that they are giving quick response to small orders of output from the market. The small sizes of the firms have this distinctive feature over the large size of the firms (Khan, 2004). The present study also favors this concept that size of small and medium enterprises has positive and significant impact on the operating performance.

Another considerable result of the present study, mentioned in Table 5.1, is concerned with positive and significant correlation between time consistent risk and operating performances of the small and medium enterprises. It is a general presumption that there is a positive relationship between...
risk and expected returns of the enterprises. Normally, high returns can only be earned by assuming high risk (McGuigan & Moyer, 1993). The present study also depicts the same results that there is positive and significant impact of risk factor on the operating performances of the enterprises. In other words, for those firms which are taking more risk, their total assets are inclined to increase over a period of time.

It is obvious from the Table 5.1 that the t-statistic for Risk factor (Risk1) is 2.60 which is significant. This result supports positive relation between time consistent risk and operating performances, which means that for the firms that are taking more risk, their operating performances are better as compared to the risk-averter firms. As discussed in chapter 4, the time consistent risk has been measured through coefficient of variance in cash flow ratio or coefficient of Standard deviation (CV= S.D./Mean) (Reddy, et al.2012). The poor performing firms have high coefficient of variance because their earnings are highly volatile and uncertain, while those firms that have strong operating performances, they have low coefficient of variances.

Another important result shown, in Table 5.1, is related to the impact of working capital ratio (WCR) on the operating performances of the enterprises. The working capital ratio is an indicator of ability of a firm to pay the debts. The long term solvency position of a firm can be judged through working capital ratio. In the present study, it has been analyzed that what is the impact of working capital ratio on the operating performances of small and medium enterprises. Actually, the working capital ratio has strong influence on the performance of the enterprises because the ability of a firm to pay its debts only comes when the firm is financially strong and its operating performance is up to the mark. In other words, working capital ratio has positive impact on the operating performance of small and medium enterprises.
In the present study, the results show that there is a positive correlation between working capital ratio and operating performance of the enterprises but it is insignificant. The main reason behind this insignificant value for working capital ratio is that in Pakistan; most of the enterprises are running through cash economy in which most of the entrepreneurs do not take the loans from financial institutions due to high rate of interest. When most of the enterprises are not using the borrowed money for their production processes then its impact on the operating performance would be insignificant.

As it is discussed in the previous section (see chapter 4), that asset efficiency of the enterprises has been measured through sales as percentage of total assets (SPTA) which shows the efficient utilization of assets. Theoretically, there is a positive correlation between asset efficiency and operating performances because efficiency means least cost combination of inputs but interestingly in the present study, the results in Table 5.1 shows that SPTA has negative and insignificant relationship with operating performances of the enterprises. Main reason behind this negative relation is deficiency of capital in the developing countries like Pakistan. Because of deficiency of capital, the entrepreneurs are unable to utilize the assets efficiently. As shown in Table 5.1, the value of t-statistic for SPTA is (-0.76) which shows insignificant effect on operating performance.

In the present study, the goodness of fit of the model, is concerned, the value of $R^2$ (0.33) is reasonably good. In econometric literature, there is a continuous debate about the interpretation of $R^2$ which is thought as a measure of linear association between the residual sum of square (RSS), explained sum of square (ESS), and total sum of square (TSS) (Judge et al., 1988). The interpretation of $R^2$ in other than usual linear model has serious repercussion. For instance in the
longitudinal studies, the significance of value of R$^2$ becomes minimal as quoted by Goldberger (1990)

"From our perspective, R$^2$ has a very modest role in regression analysis, being a measure of the goodness of fit of a sample least square linear regression in a body of data. Nothing in the Classical Regression Model requires that R$^2$ be high. Hence a high R$^2$ is not evidence in favor of the model and a low R$^2$ is not evidence against it” (pp:177-178).

In other words, panel data, in which other than simple linear regression model estimation technique is used to measure, the value of R$^2$ has minimal significance. In general, the matter of R$^2$ has also been discussed by Asteriu and Hall (2011). They have argued that low R$^2$ does not mean the wrong choice of explanatory variables, included in the model. Low value of R$^2$ is not necessarily the result of using wrong explanatory variables (Asteriu & Hall, 2011). In place of R$^2$, F-statistic has been given due weight because F-Statistics is used to test the overall significance of the sample regression.

In the present study, the value of F-Statistic is 4.78 along with its probability has been shown in Table 5.1 which indicates that the model is statistically significant. F-distribution is normally used to analyze overall significance of the model, under consideration. The Durbin Watson (D.W) statistic is an indicator of presence of autocorrelation in the model, states that there is no autocorrelation in the model. The main principle of assessment of autocorrelation is that if the value of D.W. Statistic is equal to 2, then it means that there is no autocorrelation. The results of the present study indicate that there is no autocorrelation in the model. In the present study, as
presented in Table 5.1, the value of D.W. is 2.07, which indicates that there is no autocorrelation in the model.

Based on the empirical evidences presented in Table 5.1, it has been inferred that the present study accepts the null hypothesis which indicates positive impact of process innovation on the operating performance of SMEs in Pakistan. It is discussed in the previous section (chapter 4) that innovative activities are measured through the number of patents granted (PAT) to the firm and the operative performance of enterprises are measured through annual growth in total assets (AGTA). The t-statistic for PAT is 7.988, which is highly significant and has a positive impact on operating performance of enterprises.

5.3.1 Empirical Evidences on the Impact of Innovation on Financial Performance of SMEs

In this section, the empirical results of impact of innovation on financial performance of small and medium enterprises have been discussed in the following Table 5.2. It has been stated in the previous chapter 4, that the financial performance of the enterprises has been measured through return on assets (ROA). The regression equation 4.3, also mentioned in previous section (See Chapter 4), ROA is a dependent variable while size of the firm (NLTS), number of patents granted (PAT), cash flow ratio (CFR), sales as percentage of total assets (SPTA), working capital ratio (WCR) and debt equity ratio (DERA) are independent variables in the present study. The results of impact of innovation on financial performances of SMEs have been presented in the following Table 5.2.
Table 5.2. Impact of Innovation on Financial Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLTS</td>
<td>Natural log of total sales</td>
<td>0.824010</td>
<td>2.182814</td>
<td>0.0294</td>
</tr>
<tr>
<td>PAT</td>
<td>Number of patents granted</td>
<td>0.823241</td>
<td>3.811285</td>
<td>0.0002</td>
</tr>
<tr>
<td>CFR</td>
<td>Cash flow ratio</td>
<td>0.004828</td>
<td>8.777198</td>
<td>0.0000</td>
</tr>
<tr>
<td>SPTA</td>
<td>Sales as percentage of total assets</td>
<td>0.032580</td>
<td>5.503413</td>
<td>0.0000</td>
</tr>
<tr>
<td>WCR</td>
<td>Working capital ratio</td>
<td>0.005263</td>
<td>0.247838</td>
<td>0.8043</td>
</tr>
<tr>
<td>DERA</td>
<td>Debt equity ratio</td>
<td>6.31E-05</td>
<td>0.289949</td>
<td>0.7719</td>
</tr>
<tr>
<td>C</td>
<td>Intercept</td>
<td>-7.259412</td>
<td>-0.663300</td>
<td>0.5074</td>
</tr>
</tbody>
</table>

R-squared 0.583  Durbin-Watson stat 1.556
F-statistic 11.935 Prob (F-statistic) 0.000

In the present study, financial performance has been measured through ROA (Return on Assets) as it has been used in the previous studies like Reddy et al. (2012), Preston and Bennon (1997) and Delery & Doty (1996). The panel data has been used to get the results. One of the significant results, mentioned in Table 5.2, is in favor of cash flow ratio (CFR). CFR has significantly positive impact on financial performance of the small and medium enterprises. Though there is no single agreed definition of cash flow ratio but the general definition of the cash flow ratio is the firm’s earnings after tax plus noncash charges or depreciation. In other words, if there is improvement in
the firm’s earnings after tax, it means that the financial performance of the enterprises would also increase.

The Table 5.2 shows that the t-statistic of cash flow ratio (CFR) is 8.77 which indicate significant impact on the financial performances of the enterprises. This positive relationship has also been supported by the previous studies like Ryu and Jang (2004) and Jooste (2006). Net income and cash flow ratio are interchangeably used in the analysis of performances of the enterprises but more importance has been given to cash flow ratio analysis rather than net income because cash flow ratio is providing clearer picture about the earnings of the enterprises after tax. The cash flow ratio is an integral part of financial performances and has significant independent variable that has a positive impact on the financial performances. Because of globalization and expansion in international trade, the significance of the cash flow ratio has become more vital. It is also considered as lifeblood of the enterprises. The information about the cash flow ratio is quite useful in evaluating the financial performances of the enterprises.

The second important result, mentioned in Table 5.2, is positive and significant relationship between sales as a percentage of total assets (SPTA) which is a proxy for efficient utilization of assets, and financial performance of the small and medium enterprises. The t-statistic of the estimated slope coefficient of the variable SPTA is 5.50 which show high significant impact of SPTA on the financial performance. It has been discussed earlier in section 5.1; the SPTA is an indicator of efficient uses of assets. It is understandable that when the assets are utilized efficiently then the financial performance of the enterprises would amplify more consistently. Basic rationale behind this positive relationship between SPTA and ROA is that in Pakistan, most of the small and
medium enterprises have limited capital availability. The entrepreneurs are using this limited capital efficiently.

Another reason of positive relationship between sales as percentage of total assets (SPTA) and return on assets (ROA) is that in Pakistan; most of the businesses are running under sole proprietorship. The SMEDA (Small and Medium Enterprises Development Authority) has reported that approximately 53 percent of small businesses are engaged with retail trade who has low volume of capital. They are utilizing the capital without taking the risk of wastage. The small and medium enterprises are using the existing capital after doing detailed planning and conducting feasibility studies. Briefly, they are using the existing assets with great caution, responsibility and efficiency. Due to efficient utilization of resources, it has positive and significant impact on return on assets.

The findings in Table 5.2 explains that number of patents granted (PAT) which are a proxy for innovation activities in SMEs, have a significant impact on the financial performances of the enterprises. The t-statistic of the estimated slope coefficient of the variable PAT is 3.81 which indicate positive and significant impact on the financial performance of small and medium enterprises, listed in Karachi Stock Exchange, Pakistan. The present study strongly favors second hypothesis which indicates positive impact of innovative activities on financial performance of small and medium enterprises. In Table 5.2, though the t-value is not indicating high significance level because in Pakistan, the innovation activities are at their initial stages but the secret of survival of developing nations like Pakistan is implicit in adoption of modern technology and innovation activities (Khan, 2004).
The findings in Table 5.2 explain that size of the firm has significant impact on the financial performance of enterprises. In the present study, the size of the firm is measured as natural log of total sales (NLTS). The t-value for NLTS is 2.1 which are significant. This positive relationship between size of the firm and financial performance has also been supported by the studies of Majumdar (1997) and Lee (2009). Both studies have emphasized that as the size of the firm expands its impact on the performance of SMEs become positive and significant due to efficient utilization of resources. However, there is another view about the size of the firm that when the size of the firms are becoming large due to its expansion of the businesses and due to scale of production, it become difficult for the firms to maintain their sustainable financial positions due to two main reasons 1) market structures and 2) competitive environments (Kurshev & Strebulaev, 1995, Dunne & Hughes, 1994).

Market structures mean those frameworks through which the firms are producing the goods or services in country like perfect market structures or imperfect market structure like monopoly, duopoly and monopolistic competition. If size of the firms is expanding due to scale of production then the management of its operational activities becomes complex which has negative impact on the financial performances of the enterprises. Second main reason of low financial performance of the enterprises is competitive environment. Those firms which are active and well aware about modern methods of production, they introduce and adopt modern and innovative methods of production to make least cost combination. But not all the firms have such capacity to transform their production techniques due to technological barriers, sociological barriers and economies of scales.
Those enterprises that are unable to continue their innovative activities due to lack of information, lack of coordination with other stakeholders and due to deficiency of capital become weaker and weaker in their financial performances and ultimately they become out of streams of competition from the market. In Pakistan, the failure ratio of the firms is very high due to inconsistency of the policies and poor financial returns. The proper planning in managerial decisions about price and output determination plays a very pivotal role in the expansion of the business activities in the country.

Table 5.2 presents another important result of the phenomena under investigation, which is positive relationship between working capital ratios (WCR) and financial performance. In the previous section, it has been discussed that working capital ratio is an indicator of an ability of a firm to pay short term financial liabilities and debts. This ratio provides the financial strengths in terms of liquidity of the firms. In Table 5.2, it is obvious that the statistic of the estimated slope coefficient of the variable of WCR (0.24) is positive but insignificant which points out an important outcome of the present study. In Pakistan, most of the small businesses are running with cash economy due to lack of access to capital from the financial institutions like commercial banks. The banking sector in Pakistan is not so developed to disperse the loans to small businessmen. In other words, if the firms are not taking the loans from the financial institutions then the impact of working capital ratio on financial performance would be insignificant.

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6 The correlation coefficient stat reveals that there is no multi co linearity between WCR and DERA.
The results, mentioned in Table 5.2, are consistent with earlier studies of Niazi, et al. (2011), Azam and Haider (2011) and Garcia (2005). In the above mentioned studies, the results show that there is a positive relationship between working capital ratio and financial performance of the enterprises because the working capital is useful in creating the value of the firm in the market in terms of symbol of quality. If the quality is the core competency of the firm, then the confidence of the customers improves over a period of time which amplifies the sale of the products of respective firm. When the sales of a firm improve, it promotes the financial strengths of the firm in terms of its performance. Briefly, there is positive relationship between working capital ratio and financial performances of the enterprises.

In Table 5.2, it is mentioned that there is a positive but insignificant relationship between debt to equity ratio (DERA) and financial performances of the small and medium enterprises. As discussed in the previous section, 5.2, the financial performance of the enterprises has been measured through return on assets (ROA). The debt to equity ratio is an indicator of financial leverage of the firm which is calculated by dividing its total liabilities by stockholders' equity. It indicates that what proportion of equity and debt the company is using to finance its assets. In the present study, the results show that t value of the estimated slope coefficient of the variable. DERA is 0.28 which indicated that there is a positive relationship between DERA and financial performances of the enterprises but insignificant.

There are two points of views about the relationship between debt to equity ratio and financial performances. Some researchers are in favor of positive correlation between debt to equity ratio...
and financial performances of the enterprises if the firms are small or medium. They justified this point of view by stating that SMEs have a small amount of capital and that they are unable to cope up the cost of inputs with limited amount of capital so that their initial investment can be based on the debts from the financial institutions which can boost their capacity of production. With an increase in the production capacity, sale of the firm is presumed to be increased. In other words, due to increase in sales, overall performance of the enterprises improves.

Other view is that there is a negative relationship between debt to equity ratio and financial performances. High debt to equity ratio means that the firm is relying more on outside financing than their own resources which increase the cost of financing in terms of interest. The existing literature is in favor of self financing for economic activities of the firms and explains that those firms which are doing their investment activities through self financing, they are doing more profitable business as compared to those of borrowed capital. If the debt to equity ratio is high, it means that the firm is bearing additional cost of operation in terms of interest which may reduce the profitability of the firm if the expected returns are less than cost of financing (Eriotis et al. 2002).

In Pakistan, the cost of doing business is very high due to high prices of the inputs. Due to the failure of policy managers in making structural reforms, Pakistan has lost its ranking by three points from 104 to 107 in doing business ranking in the world (World Bank’s Ease of Doing Business Report, 2013). It is a developing country where there is deficiency of capital and most particularly, financial crisis in 2007 has intensified the situation regarding the rate of interest. In most of the commercial banks, the rate of interest varies from 12 percent to 37 percent, which is
highest in South Asia. In this situation, high debt to equity ratio is not a symbol of high financial performance due to high cost of capital. The price of capital is paid from the profits earned by the enterprises. Because of inflationary pressure in Pakistan, the buying power of the people has drastically decreased and aggregate demand for the products in the country has come down. So from production perspective, the cost of doing business is very high while on the other hand the demand for the product is very low due to inflationary pressure. Due to the above reasons, the relationship between debt to equity ratio and financial performance is insignificant.

The goodness of fit of the model is measured through $R^2$ (Gujarati & Porter, 2010). In the present study, the value of $R^2$ is 0.58, which, as mentioned in Table 5.2, is reasonably good. The model is best fitted which means that the gap between observed values and expected values are minimal. As, it is discussed in earlier discussion that the significance of $R^2$ becomes relatively minimal in the longitudinal studies or in panel data studies rather than in cross sectional or time series studies because it can mislead the results of the estimation. The overall significance level of the model is evaluated through the value of F-statistic. In Table 5.2, the value of F-statistic is 11.90 which show that the model is significant. The value of D. Watson statistic is an indicator of testing the autocorrelation in the model. In the present study, as mentioned in Table 5.2, the results show that there is almost no autocorrelation in the model because of its value (1.55) which is closer to 2.

### 5.3.2 Empirical Evidences on Impact of Innovation on Competitive Performance of SMEs

The competitive performance of an enterprise means to produce the goods at least cost combination. It is an admitted fact that adoption of innovative technology is an important
determinant to transform the industrial structure in creating value addition of the products (Porter, 1985). The use of innovative methods for the production process creates economies of scale for the firms and enhances the competitive performances of the enterprises. The existing literature also supports these positive linkages between innovation and performance of the enterprises like Freel (2000), Kharbanda (2001), and Hall, Lotti and Mairesse (2009). There are certain changes which have been occurred in the structure of the enterprises due to the adoption of innovative technologies. For instance, the technological change reduces the cost of production due to continuous decline in average fixed cost with an increase in output in bulk. The technological change shifts the cost in favor of firms due to least cost combination and improves competitive performances of the enterprises.

Porter, (1985), has claimed the significance of technological change for competitive advantages in this way;

” Technological change is not important for its own sake, but is important for if it affects competitive advantages and industry structure” (pp: 165).

In the present study, the competitive performance has been measured through net profit margin (NPM) of the enterprises based on the study of Reddy et al. (2012) and Gattis (2009). According to Gattis (2009), the net profit margin can be computed by dividing the net profits over revenues of the firm. The net profit margin might be said as the returns on sales, which refers to how much profit is retained by the firm after paying all the bills. In the present study, as mentioned in equation CXXXI
4.3 (see chapter 4), net profit margin (NPM) is a dependent variable whereas size of the firm, which is measured through natural log of total assets (NLTA), number of patent granted (PAT) which is a proxy parameter for innovation, sales as percentage of total assets (SPTA) and growth of the firms which are measured through annual growth in total sales (AGTS), are independent variables. The results of panel data analysis are presented in Table 5.3.

Table 5.3  Impact of Innovation on Competitive Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NLTA</td>
<td>Natural log of total assets</td>
<td>7.213417</td>
<td>2.735027</td>
<td>2.637421</td>
<td>0.0085</td>
</tr>
<tr>
<td>PAT</td>
<td>Number of patents</td>
<td>2.949525</td>
<td>1.137517</td>
<td>2.592951</td>
<td>0.0097</td>
</tr>
<tr>
<td>SPTA</td>
<td>Sales as percentage of total assets</td>
<td>0.269136</td>
<td>0.033806</td>
<td>7.961202</td>
<td>0.0000</td>
</tr>
<tr>
<td>AGTS</td>
<td>Annual growth in total sales</td>
<td>0.050833</td>
<td>0.019056</td>
<td>2.667520</td>
<td>0.0078</td>
</tr>
<tr>
<td>C</td>
<td>Intercept</td>
<td>-119.6683</td>
<td>15.81796</td>
<td>-7.565342</td>
<td>0.0000</td>
</tr>
<tr>
<td>R-squared</td>
<td></td>
<td>0.4476</td>
<td></td>
<td></td>
<td>1.661</td>
</tr>
<tr>
<td>F-statistic</td>
<td></td>
<td>7.7212</td>
<td></td>
<td></td>
<td>0.000</td>
</tr>
</tbody>
</table>

The Table 5.3 shows that one of the important results is a positive and significant relationship between efficient use of asset utilization and competitive performances. In the present study, the efficient asset utilization in the enterprises is measured through SPTA (sales as percentage of total assets) which has a positive effect on competitive performances of the companies. The t statistics
of the estimated slope coefficient of the variable SPTA is (7.96) which show highly significant impact on the competitive performance.

It is a general phenomenon that if the enterprises are utilizing their assets efficiently, they may attain economies of scale due to least cost combination. This positive relation has been supported with the existing literature as in the study of Ibbotson and Kaplan (2000) who have explained that efficient allocation of assets can bring better competitive performance. The efficient allocation of assets means to allocate the existing resources in such a way that the firm can produce the output at its optimal level which create a competitive edge for the firm among the stakeholders in the market.

Another key result of the present study, mentioned in Table 5.3, is concerned with positive and significant effects of innovation on the competitive performance of small and medium enterprises. The innovative activities are measured through the number of patent granted (PAT) which were widely used in the previous studies like Ornaghi and Correa (2012), Oltra, et al. (2008), Connelly (2007) and Hagedoorn and Cloodt (2003). This positive and significant relationship between innovative activities and competitive performance of SMEs has been supported with existing literature like Nelson et al. (1993), Lall and Albaladejo (2003) and Ornaghi and Correa (2012). For instance, Nelson et al. (1993) have focused on firm level competitiveness with the interaction of knowledge creation and innovation. According to their study, innovation helps in getting competitive position for the firms through alliances and cooperative agreements. They further explained that the firm can also get competitive edge through exchanging new and innovative methodologies of production and can attain steady growth through technology based alliances.
One of the significant results of the present study, mentioned in Table 5.3, is related to positive and significant relationship between size of the firm and competitive performance of the enterprises. In the present study, it has been observed that the size of the firm is one of the significant variables which have an impact on performance of the enterprises. Moen (1999) has explained that firm size has a strongly positive impact on the competitive performance of the enterprises, especially in SMEs. Moen (1999) has investigated this relationship between size of 335 Norwegian SMEs and competitive advantages of the firms and resulted that small firms tend to have strong competitive advantages with regards to products and innovation. While they are weaker with regards to marketing of their respective products.

In the present study, the size of the firms has been measured through natural log of total assets (NLTA) as measured in the study of Reddy et al. (2012). In Table 5.3, the value of t statistic for NLTA is 2.83 which shows a positive and significant impact on competitive performance. These results are consistent with the prior studies like Dunne and Hughes (1994) that have supported the proposition that small size of the firms grew faster than larger companies. Another study conducted by Kurshev and Strebulaev (1995) have supported this positive relationship between size of the firm and firm’s performances. They do favor for small firms which are enjoying high leverages but in cases of financing their expenses from loaning then fixed costs of financing contribute to the explanation of stylized size leverage relationship.

The Table 5.3 indicates that there is a positive and significant relationship between growth of firms and competitive performances of small and medium enterprises in Pakistan. As discussed in previous section (see Chapter 3), that growth of the firms has been measured through annual growth in total sales (AGTS). Theoretically, growth in sales is an outcome of consistent efforts
done by the management of the firms with the existing firm infrastructure, human resource
development, technology development and procurement of raw material (Porter, 1985). All other
aliened strategies like marketing strategies, demand expansion strategies and cost minimizing
strategies are simultaneously important to sustain growth in sales of the firm. Growth in sales is an
important indicator of achieving competitive performance. The sale of the firms actually triggers
existing resources of the firm towards their efficient utilization for getting competitive advantages
among the existing stakeholders in the market. In short, there is a positive relationship between
growth of the firms and competitive performance of the enterprises.

The goodness of fit of the fitted regression line to the given set of data actually measures that how
well the sample regression line fits the data (Gujarati & Sangeetha, 2007). In Table 5.3, the value
of $R^2$ is 0.44 is estimated which is reasonably good. As discussed in earlier section 5.2, that the
importance of $R^2$ becomes relatively nominal in the panel studies rather than in time series or cross
sectional studies because it can mislead the results of the estimation (Gujarati & Sangeetha,
2007). The overall significance level of the model is evaluated through the value of F-statistics.
In Table 5.3, the value of F-statistic is 7.72 which show that the model is significant. The Durbin
Watson (D.W) statistics is an indicator of measuring the autocorrelation in the model. In Table
5.3, the results show that there is no presence of autocorrelation in the model because of its value
(1.66).

5.4. Discussion

The present study has followed positivist paradigm in which the impact of innovative activities on
the operative, financial, and competitive performance of small and medium enterprises has been
evaluated with the help of financial and economic indicators. There are three scales of performance measurement; operating performance, financial performance and competitive performance, developed by Wright et al. (2001). In the previous section, the detail of performance measurement of SME sector has been elaborated. One of the major findings of the present study is that the impact of process innovation is positive and significant on all three types of operative, financial and competitive performance of small and medium enterprises which indicate key way to success of developing economies like Pakistan. As it is mentioned in earlier literature, that survival of the low income countries is implicit in the adoption of modern technology (Khan, 2004). The main question is that how to adopt modern technology in the current economic turmoil, specifically, in Pakistan. There are certain economic and social challenges which are indigenous in nature and generically we can resolve them with better management of given resources. First and foremost step towards the adoption of modern technology is the formation of business friendly policy and regulatory framework to suit their needs (Sattar & Mehmood, 2011).

In previous history of Pakistan industrial sector reforms, the industrial policies have been formulated with the concentration on large scale enterprises (Industrial Vision, 2015). The findings of the present study provide guideline for the government to realize the importance of small and medium enterprises and most importantly, the value of innovation which is amplifying the strengths of enterprises in terms of their performances (Miller, 1998).

The main findings of the study support all three hypotheses inferred in previous section (see chapter 3) about the impact of innovation on three types of performance of small and medium enterprises. Main stance in the study is that process innovation has significant impact on three respective performances (operating performance, financial performance and competitive performance) of
SMEs in Pakistan. It has been observed from the results of the present study that process innovation is having a positive and significant impact on all three types of performance of SMEs in Pakistan. Comparatively, process innovation is more influential on operating performance of the enterprises rather than financial as well as competitive performances of small and medium enterprises in Pakistan. The main reason behind this positive influence of innovation on operating performance of the enterprises may be that adoption of modern method of production basically changes initial infrastructure and brings structural changes in the enterprises which affect the operating performance at the first stage.

The findings in Table 5.1, show that number of patents granted (PAT) which is a proxy for measuring innovative activities in the enterprises, has a high significant effect on operating performance of SMEs. The t-statistic of the estimated slope coefficient of the variable PAT is greater (7.98) as compare to t-statistic for PAT (3.81) in financial performance and t-statistic of PAT (2.59) for competitive performance of SMEs. Overall, impact of innovation on the performances of small and medium enterprises is positive.

The effects of innovation on SMEs performance have been observed with the help of other financial variables like working capital ratio, size of the firm, sales as percentage of total assets, cash flow ratio, debt equity ratio, annual growth in total assets, annual growth in total sales and time consistent risk factor. The interrelation among the above said variables are explained in the previous section.
The second objective of the present study is to explore the method of introducing innovation in SMEs in Pakistan. To achieve this objective we have to see the current status of innovation in Pakistan. Mian and Qureshi (2010) have segregated the global economies into three main categories;

- Innovation driven economies,
- Efficiency driven economies and
- Factor driven economies.

For transformation of traditional subsistence economy to innovation driven economy, these three types of economies are interconnected respectively. They have explained that innovation driven economies are those economies in which there is knowledge intensity, expanding services and have greater potential for innovative entrepreneurship. These economies are considered as developed economies. They further explained that efficiency driven economies are those economies in which there is increased industrialization with effective supply chain management and economies of scale and there is dominance of large scale industries but supply chain has been covered by the small and medium scale enterprises.

The authors have further explained that factor driven economies are those economies in which developing and least developing economies are main examples like Pakistan. In this type of economy; the countries are engaged from subsistence agriculture to extraction of natural resources and regional-scale intensive agglomeration. Pakistan falls in factor driven economy which is the basic requirement of innovation. To become a part of innovation driven economy is an objective
of LDCs (least developing countries) like Pakistan. To achieve this objective, there are certain prerequisites like provision of basic utilities, basic infrastructure, and formation of rules and regulations with effective enforcement mechanism.

As far as Pakistan economy is concerned, small and medium enterprises (SMEs) with less than 100 employees constitute nearly 90% of all 3.5 million private firms that employ 80% of the non-agricultural labor force and their share in the annual GDP is 40%. The firm structure is dominated by sole proprietorships and most are family run businesses with no culture of taking it to the public sector. A vast majority of small businesses are grown up as informal sector (SMEDA, 2007). Most of the people are engaged in construction, wholesale, retail trading, hotels, transport, communications and storage industries in urban areas.

Mian and Qureshi (2010) have argued that, total early stage entrepreneurial activity (TEA) rate in Pakistan is 9.08 % which is lower than the average TEA rates for the factor driven economies (22.8 %) and efficiency driven economies (11.7 %). Nevertheless, this is greater than the average TEA rate of innovation driven economies (5.6 %). The Established Business Ownership (EBO) rate in Pakistan is 4.7% which is lower than average EBO rates for Pakistan's peer factor driven economies (12.6 %), as well as efficiency driven (7.6 %) and innovation driven (7.0 %) economies.

Despite social and economic problems in Pakistan, there are two main potential opportunities for the revival of economic strength of Pakistan; 1) more than 50% of total population is below 30 years of age which provided a potential opportunity to utilize this resource through labor intensive technologies. The second potential opportunity for the revival of Pakistan economy is the awareness about indigenous technology transfer and the creation of liaison between firm and
research institutes and universities. According to some estimates, Pakistan has increased its R&D investment by 600% during 1999 to 2007 (Mian & Qureshi, 2010).

By utilizing the experiences of other countries that have strengthened their economies with adoption of modern technology, we may search out the path of development for our country (Mason & Harrison, 2002). In this regard, the significance of venture capital is very vital as it has been frequently used to accomplish the deficiency of capital and technical expertise required for the promotion of entrepreneurship (Keuschnigg, 2004, Fried & Hisrich, 1994, Mason & Harrison, 1995). The models of venture capital are well established and well recognized in the transitional economies which can be used as a remedy to cope up the economic and technical problems of small and medium enterprises. In other words, the level playing field is ready to be used. There is an immense need for availing the opportunity of utilizing the potential human and capital resources. In the next chapter, conclusion of the present study has been discussed.
Chapter 6

Conclusions

The present study is an attempt to find out the impact of process innovation on operative, financial, and competitive performance of small and medium enterprises, listed on Karachi Stock Exchange, Pakistan. The main objective of the study is to explore the impact of innovation on the performance of the SME enterprises. Based on the study of Wright, et al. (2001), three types of the firm performance have been discussed in the present study i.e. operating performance, financial performance and competitive performance respectively. The present study considers those variables which can affect operating, financial and competitive performance of the enterprises such as size of the firm, leverage, cash flow ratio, sale returns, profitability and productivity factors to get comprehensive results. These variables directly or indirectly have an impact on all three types of performance of SMEs.

To analyze the impact of process innovation on three types of performance of small and medium enterprises, panel data has been used. Fixed Effect Model (FEM) econometric technique has been used to assess the impact of innovation on performances of SMEs. A software EViews-06 has been used to derive the empirical results of the present study. The analysis has been performed by using annual data over the period of 1999 to 2009. The main results of the study are presented below.

One of the most significant results of the present study is positive and significant impact of size of the firm, which has been measured through natural log of total assets (NLTA), on all three types of performance of small and medium enterprises. In the present study, the results show that size of the firm is a highly significant variable which plays a pivotal role in all three types of performance. The...
results of the present study show that as size of the firm increases, its productivity level also increases due to economies of scale. These results are also consistent with the previous studies like Majumdar (1997), Lee (2009) and Mehmood (1999). Mehmood (1999) has explained in his study that there is a huge potential in SME sector in Pakistan which can be explored through innovative and flexible SMEs based on complementary specialization and networking in the region. In other words, size of the firm can give a boost to economic activity in the country due to their exploration of dynamic economies of scale.

Another significant result of the present study is positive and significant impact of process innovation on the performance of small medium enterprises. In the present study, innovative activities of the firms are measured through the number of patent statistics (PAT) which are granted annually to the firms. It has been observed that innovation has a positive and significant impact on all three types of performances of small and medium enterprises. These results can be helpful for public policy makers who are keen to formulate developmental policies for the welfare of the general public in Pakistan. They must concentrate on innovative SMEs policies to tap the potential of small and medium enterprises.

These results are consistent with the previous studies like Oltra, Kemp and Vries (2008). There are two points of view in the literature: either small or medium enterprises are driving forces for innovation or through innovation, SMEs performance are improving. It has been observed that two way causality between innovation and small and medium enterprises are in favor of positive correlation between both variables (Motohashi, 2001, Roper, 1997, Nakamura & Ohashi, 2008). In developed economies, the innovation promotional policies are on their priority agendas because they
realize that the survival of their economic strengths mainly depends on their innovative activities (Nauewelaers & Wintjes, 1999).

The situation of innovative activities in Pakistan is not encouraging due to low and obsolete technology (PPSD, 2005). Along with it, there is lack of technical skills and awareness about technological advancement which is one of the major barriers in the way of knowledge based modern economy (Mehmood, 1999). In this environment, a little effort of innovative activities depicts significant effect on the performances of respective SMEs. The results of present study also present the same picture that process innovation has significant impact on the performance of enterprises which provides a concrete path of development.

Another important result of the present study is positive and significant relationship between time consistent risk and operating performance of the enterprises. Theoretically, those firms which are risk lovers are gaining more benefits in terms of expansion of their businesses and due to provision of new and innovative products in the market, they are enjoying a competitive edge among the stakeholders. Following the studies of Reddy et.al (2012), Gerhart (2000), and Huselid and Becker (2000), the operating performance of the enterprises have been measured through annual growth in total assets (AGTA). The value of t-statistic of the estimated slope coefficient of the variable risk factor is 2.60 which is significant and indicates positive impact on the operating performance of the small and medium enterprises.
One of the important results of the present study is positive and significant relationship between cash flow ratio (CFR) and financial performance of small and medium enterprises, as discussed in table 5.2. The CFR is measured through firm’s earnings after tax plus noncash charges or depreciation (Fuller, et al. 1987). In other words, if there is improvement in the firm’s earnings after tax, it means that the financial performance of the enterprises has amplified drastically. According to table 5.2, the t-value of cash flow ratio (CFR) is 8.77 which indicate strong and significant impact on the financial performance of the enterprises. In other words, if the firms want to amplify their financial performance of their enterprises, they have to increase their cash flow ratio.

Another considerable result of the present study is positive and significant relationship between sales as a percentage of total assets (SPTA) which is a proxy for efficient utilization of assets and financial performance of SMEs. The t-statistic of the estimated slope coefficient of the variable SPTA is 5.50 which show high significant impact of SPTA on the financial performance of SMEs. The SPTA is an indicator of efficient use of assets. It is comprehensible that when assets are utilized efficiently, the financial performance of the enterprises would amplify more consistently. Basic rationale behind this positive relationship between SPTA and ROA is that in Pakistan, most of the small and medium enterprises have limited capital availability. The entrepreneurs are using this limited capital efficiently (Khawaja, 2006).

In the present study, the competitive performance has been measured through net profit margin (NPM) of the enterprises based on the study of Reddy et al. (2012) and Gattis (2009). Another key result of the present study is concerned with positive and significant effects of innovation on the competitive performance of small and medium enterprises. This positive and significant relationship between
innovative activities and competitive performance of SMEs has been supported with existing literature like Nelson et al. (2003), and Lall and Albaladejo (2003). Moen (1999) has explained that firm size has a strongly positive impact on the competitive performance of the enterprises, especially in SMEs.

In light of the findings of the present study, it is clear that innovation has a positive impact on the performance of SMEs. These results are also consistent with the previous studies like Swang et al. (2006), Sternberg (1990), Freel (2000) and Hall, et al. (2009). To promote an innovative culture in the country, provision of basic infrastructure like utilities, legal and institutional framework is one of the prerequisites. Further, public policies are playing a vital role in the promotion of innovative activities. If the policies are consistent and conducive for investors then it is expected that economic activities will be promoted drastically. Government along with private sector may explore the opportunities of venture capital to promote innovative activities in small and medium enterprises. It is one of the potential areas for grooming researchers to explore the effects of venture capital on the performance of small and medium enterprises.

6.1. Limitation of the Present Study in Terms of its Refinement

There are certain limitations of the present study which may be catered in order to extend the research area in terms of its refinement. The present study has an enormous potential to be explored along with several dimensions. The present study has explored one aspect of innovation; process innovation, and has attempted to see the impact on the firm performances; operating, financial and competitive performance, of the small and medium enterprises, listed in Karachi Stock Exchange. There are around five more types of innovation; product innovation, radical innovation, incremental innovation,
services innovation and disruptive innovation, which are ready to be explored. Because of time constraint, these areas of research are beyond the scope of the present study.

The present study is a piece of positivist epistemology in which secondary data has been used to evaluate the impact of process innovation on the performance of SMEs. It may be possible that for qualitative study, the data may be gathered through survey method or through focus groups from small and medium enterprises. Otherwise, it may also be possible to make a mixture of qualitative and quantitative areas of research. It may be possible to conduct the research for sector specific and the effects of different types of innovation can be explored with the help of qualitative and quantitative set of data simultaneously or separately.

In the present study, the unit of analysis is small and medium enterprises (SMEs). To refine the concept of research area, it may be transformed as manufacturing industries in Pakistan. The impact of process innovation or any other type of innovation can be observed on the performance of manufacturing industries. To achieve certain objectives of study, different data collection techniques may be used to collect the information about the manufacturing units like through questionnaire or through published materials. The cultural effects can also be introduced in the study to indicate the attitudes of people towards the work in our manufacturing industries.

In the present study, the effect of SME development on the economic growth has not been observed due to firm level data because the firm level data may have micro effect on the economy. This effect may be observed by taking national level data about industrial sector in Pakistan and the effect of innovation may be analyzed by developing a macroeconomic theoretical framework. In that framework, macroeconomic indicators like GDP (Gross Domestic Product) growth, investment,
exports, employment, inflation and foreign remittances may be included to explore the effects of innovation on industrial sector of Pakistan and its subsequent effects on the economic growth of Pakistan.

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