Innovation in Small and Medium Enterprises (SME’s) and its impact on Economic Development in Pakistan

Qazi Abdul Subhan
Assistant Professor (Economics)
E. Mail: qsubhan@gmail.com
Ph.: 0092-51-9260002 Ext: 306
Fax No: 0092-51-9260889
Mobile No. 0092-300-5091039

Mian Rahat Mehmood
Professor (Management)
E. Mail: rahat_mehmood@yahoo.com
Ph.: 0092-51-9290828
Mobile No. 0092-301-8500321

Dr. Abdul Sattar
Assistant Professor (Economics)
E. Mail: abdulsattar77@yahoo.com
Ph.: 0092-51-9260002 Ext: 324
Fax No: 0092-51-9260889
Mobile No. 0092-331-5347486

Bahria Business School
Bahria University, Islamabad, Pakistan
Abstract:

Small and Medium Enterprises (SME’s) are the driving force for the promotion of an economy (Khan 2004). Due to its significance, all the countries either, developed or developing, are concentrating on the development of SME’s. It is admitted fact that encouraging entrepreneurship is a key to improve competitiveness, boost trade volume, fostering economic activities and creation of job opportunities. Small enterprises are considered as main driver for innovation, poverty reduction, employment generation and social integration. Due to innovation in SME sector, the production capacity may amplify which has significant impact for the promotion of economic and social development.

The present study focuses on the significance of innovation in small and medium enterprises and its effect on economic development of Pakistan. Many researchers have endeavored to address the issues of innovation like Srinivasa and Sutzb (2008) who have focused on significance of product innovation, especially in the developing countries. According to them, there is huge potential in developing countries which can be explored through process innovation. The current research is also a value addition in the body of knowledge concerned with innovation in SME’s and its subsequent effects on economic development of the country.

Following (Milbergs 2005), innovation can be measured through R&D expenditure, number of patents, publications, technology intensity, high tech exports and share of high tech exports in total manufacturing exports. Due to non availability of data, it is not possible to use all parameters for process innovation measurement. In the present study, number of patent applications for residents and non residents, trademark applications for residents and for nonresident, high tech exports and share of high tech exports in total manufacturing exports are used to measure the process innovation in the country. Main economic and social variables, included in this research, are exports to GDP ratio, SME’s growth, GNP growth, industrial share in GDP, employment level, Consumer price index, volume of exports & imports and exchange rate., Log linear regression model has been constructed by using E. Views (software). The period of analysis is from 1980-2012. The proposed results are in favor of positive correlation between process innovation and SMEs growth and consequently, SMEs growth has positive linkage with economic development.

Keywords: Process Innovation, SMEs Growth, Economic Development
1. Introduction

Pakistan is an agrarian country with 2.4 percent GDP growth in 2010-11. The agriculture sector grew an estimated 1.2 percent, against a target of 3.8 percent. The manufacturing sector contributes in GDP (Gross Domestic Product) by 18.7 percent in 2010-11 with the assistance of Large Scale Manufacturing (LSM) by 12.1 percent and with involvement of small and medium sector by 5.1 percent. The services sector contributes 53.3 percent in GDP during 2010-11 and produces 4.1 percent, as compared to 2.9 percent in 2010-11. Pakistan’s total labor force is about 58.41 percent and out of which approximately 3 million labor force is estimated as unemployed in 2010-11, with an unemployment rate of 5.5 percent (2010-11) (Source: Federal Bureau of Statistics). Agriculture remains the overriding source of employment in Pakistan and employs 44.96 percent of total labor force, followed by trade with 16.28 percent. Manufacturing sector merely employs 13.34 percent along with and services 12.2 percent of total labor force respectively.

Geographically, Pakistan is a land of potential natural resources like coal, gas, oil, gold with a very strategic location, relatively cheap land for setting up industries with a market of around 177 million people. Pakistan provides an easy access for business with Central Asian States and China through silk routs. Through process innovation, productivity in the country can lead Pakistan to emerging economies like Malaysia, China and Thailand.

There are some prerequisites for development like political stability, development in human capital, consistency in developmental policies, transparent monitoring and better infrastructure. In this regard, Pakistan is far behind than other developing economies and gradually becoming fragile in terms of agriculture as well as industrial outputs due to lack of innovative mechanism, which is only possible through mass literacy, better prepared healthy workers and conducive investment friendly government policies.(Todero, 2009)

There is an immense need to restructure the industrial sector in Pakistan which is broadly decomposed into large scale manufacturing and small scale manufacturing sectors. Since incarnation of Pakistan, there is no any consistent effort which has been done for the development of small scale industries. It is amazing that there is no data availability of public sector investment in small scale manufacturing sector till 2010 (Economic Survey of Pakistan 2009-10). Nevertheless, for the survival of economy, it is indispensible to introduce of process innovation, in especially, small scale industries which require less capital as compare to large scale industries.

It is general presumption that those economies which are at initial stages of their development like Pakistan, process innovation is more suitable for their economic revival because product as well as incremental innovation are only possible when there is sound industrial sector development (Bhalla, 1987). Pakistan is lacking behind in industrial sector development. According to SMEDA (Small and Medium Enterprises Development Authority), around 87% of industrial sector consists of small and medium enterprises. So, for process innovation there are ample opportunities especially in SMEs sector.
SME’s are considered as an engine for economic growth as well as for economic development especially in the developing countries. Small and medium enterprises play an important role in the development of a country. SMEs contribute to economic development in various ways by creating employment for rural and urban growing labor force, providing desirable sustainability and innovation in the economy as a whole. There is a large number of people rely on the small and medium enterprises.

SMEs are providing the first step for development in the economies towards industrialization. However, SMEs have their significant effect on the income distribution, tax revenue, and employment, efficient utilization of resources and stability of family income. SMEs have a propensity to employ more labor-intensive production processes than large enterprises. Consequently, they contribute significantly to the provision of productive employment opportunities, the generation of income and, eventually, the reduction of poverty.

According to the statistics in industrialized countries, SMEs are major contributors to private sector employment. Empirical studies have shown that SMEs contribute to over 55% of GDP and over 65% of total employment in high income countries. SMEs and informal enterprises, account for over 60% of GDP and over 70% of total employment in low income countries, while they contribute about 70% of GDP and 95% of total employment in middle income countries.

In Pakistan, SME sector is classified into micro enterprises, small enterprises and medium enterprises based on two approaches; one is based on number of employees and other is based on capital formation. According to SMEDA (Small and Medium Enterprises Development Authority) estimates, there are 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 25% of exports of manufactured goods besides sharing 35% in manufacturing value added. Due to its significance, promotion of SME’s has become a focal point of government policies for economic revival, poverty alleviation and employment generation.

SMEs play significant contribution in the transition of agriculture-led economies to industrial ones furnishing plain opportunities for processing activities which can generate sustainable source of revenue and enhance the development process. SMEs shore up the expansion of systemic productive capability. They help to absorb productive resources at all levels of the economy and add to the formation of flexible economic systems in which small and large firms are interlinked. Such linkages are very crucial for the attraction of foreign investment. Investing transnational corporations look for sound domestic suppliers for their supply chains.

SMEs are the major growing force behind the fastest growing economy of China, in terms of contribution to the national GDP (accounting for 40%), scale of assets, diversification of products, and the creation of employment. Similarly, the role of SMEs is well acknowledged in other countries such as Japan, Korea and all other industrialized economies in terms of
creating employment, reducing poverty and increasing the welfare of the society. Experts and economists are unanimous about the role and importance of small and medium enterprises in the development of Pakistan economy. The statistical data and empirical studies about SMEs highlight the bulk share of SMEs in the economy.

There are number of factors responsible for the importance of SMEs in Pakistan. First, SMEs bolster an entrepreneurial spirit and put forward flexibility in the economy. Second, SMEs originate the fastest growing export sub-sectors, such as cotton weaving and surgical instruments. Third, they can support the poverty alleviation endeavors through employment generation process. Above all, SMEs are more efficient in resource allocation as compare to that of large scale industry from a social point of view. They provide and facilitate the more number of people as compare to that of large scale industry.

It is levelheaded to say that Pakistan economy is an economy of SMEs. The significant role of SME is plainly indicated by research and statistics. However, efforts had remained restricted focusing on the large enterprises, and neglecting small and medium enterprises which are the bone back of the economy. For instance, institutions established to facilitate business activities, like Board of Investment (BOI), Export Promotion Bureau (EPB), Federal Board of Revenue (FBR), etc, have focused their efforts on large scale industry.

SMEs are a distinctive mainstay of the economy that requires owing attentiveness. The evidence shows that small firms are discriminated against relatively large firms on the basis of efficient management, managerial skills, devotion and dedication to their job description. In the developing countries like Pakistan, large scale firms can resolve their financial and managerial hurdles due to possessing sound experience and financial position but SMEs, due to their small size and the resulting peculiarities, are far less capable of adjusting and carrying on successful business. While spared direct statutory or administrative discrimination, SME remain subject to unequal treatment, which distorts the competitive environment for business (Khan 2004)

There are also some hidden and apparent obstacles in the path of growth of small and medium enterprises in Pakistan. The most important are; political instability, law and order situation, financial constraints, energy crisis, taxation problems, labor issues, lack of coordination and regular information exchange mechanism among institutions, etc. What it requires is to pursue the precise policy and regulatory reforms to turn SMEs into an effectual instrument for the enhancement of economic growth and employment. Furthermore, the environment for SME is persistently changing, especially in the scenario of globalization and openness of the economies. Therefore, the course of action for SMEs should be set for long-run period keeping in mind the predictable behavior of all stockholders.

In this paper, two main issues of the Pakistan economy are discussed; promotion of Small and Medium Enterprise with the help of process innovation and the impact of improved SME sector on economic development in Pakistan. Main fruits of SMEs development are in the shape of employment generation and transformation from low income economies to high
income economies. However, studies\textsuperscript{1} report that SMEs account for approximately 65\%-70\% of GDP regardless of the development stage of the economy.

1.1 Objective of the Study

Two main objectives of the research are as follows:

a) To analyze the impact of process Innovation on SME’s growth
b) To explore the effects of strong SME’s on economic development in Pakistan

To achieve these objectives, log linear regression model has been used to ensure the effects of process innovation on SMEs growth and its subsequent effects on economic development of Pakistan.

It is observed that as the Small and Medium Enterprises are growing through process innovation, it provides the raw material for the large scale industries which amplify the production in the country. As production increases, it provides the options for the customers and a large number of varieties of products would be available in the market which creates a competitive environment in the country. In brief, according to national income account equation\textsuperscript{2} the consumption at domestic level increases which has direct relation with overall GDP (Gross Domestic Product) of the country.

1.2 Organization of the Research

The rest of the study has been organized in the following manner. In section 1, introduction, significance and objectives of the research have been mentioned. In section 2, review of the literature has been presented. Section 3 consists of the construction of data and methodology. In section 4, empirical analysis of the data is presented. In the last section, conclusion has been formulated in the light of empirical results. At the end, references have been mentioned.

2. Literature Review

2.1 Introduction

In this section, different point of views of prominent scholars about the application of process innovation in SMEs sector has been presented. This section also highlights the significance of process innovation along with its impediments in its application especially in developing countries like Pakistan. In the later part of the literature review, linkage between strong SMEs sector with economic development has been developed.

2.2 Need for Process Innovation in SME Sector in Pakistan

Small and medium enterprises are considered as backbone for domestic resource mobilization. There are several researches, 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 economy (Ohashi, 2007, Doborn & Soraino, 2009).

\textsuperscript{1} For further study see Khan (2004)
\textsuperscript{2} For further details see Branson (2000)
With the help of new technology and innovative ideas, an entrepreneur can achieve economies of scale with the expansion of their businesses. All aliened economic activities like marketing, investment, employment generation and consumption can be functional, if process innovation would be taken place. The product innovation cannot be possible without process innovation. A country can hire the expertise from other countries where the process innovation is successfully experienced like in East Asian economies and in developed countries to formulate basic infrastructure of process innovation.

Kharbanda (2000) has emphasized on cluster development for the promotion of SMEs sector through process innovation. According to his research, small and medium sector constitutes approximately 80% of industrial enterprises in Indian economy. India has nearly three million SMEs, which account for almost 50 per cent of industrial output and 42 per cent of India’s total exports. Along with SMEs significance, the author has thrown light on main problems and their impediments with the help of process innovation. For that purpose, a conducive policy environment is utterly required like investment policies, liberalization policies and introduction of modern technologies. To promote SMEs sector, sourcing of new technology, innovation and effective transfer, in the presence of SMEs cluster, are essential. It will result in indigenous industrialization and self reliance of the country.

Hall, Lotti and Mairessi (2009), have analyzed the impact of process innovation on the productivity of SME’s through structural model in Italy. They demonstrates that there is a massive need to investigate that when and how innovation can be taken place in any sector rather than indulging in any painstaking requirement for deep study about the size of business, public policies, effect of R&D on productivity and productivity levels in different sectors. Further they explain that there are two types of innovation; product innovation and secondly, process innovation. The study is based on primary date source covering the period from 1995 to 2003. Cobb Douglas Model (CDM) has been used for the analysis.

The findings of these studies are in favor of positive impact of R&D decisions on process innovation in SME’s and variability in R&D innovation productivity relationship is much greater for Italy than for other countries as well. Another result of Hall, Lotti and Mairessi (2009) is that size of firm is negatively associated with the intensity of R&D. In other words, they 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 results of their study show that product innovation has positive impact on firm’s labor productivity. They have emphasized on process innovation due to its higher impact on productivity level in Italy. Moreover, larger and older firms are less productive rather than innovative and modern small firms.

According to Gault (2010), there are global challenges of climate change, limited supply of energy, food and water. World consumption of water has increased and sources are gradually vanishing due to industrial and human pollution. One positive effect of these challenges is that it should be used as the 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 the humanity in 2009. Since 1989, there are drastic changes in new products, processes, practices, and markets emerged due to globalization.
There have been innovations in response to the global opportunities provided by the change Gualt (2010).

Another challenge has emerged that how innovation works, locally as well as globally, and how the changes have been occurred over the period Gault (2010). The knowledge of process innovation can also contribute to well being and help the government to address the global challenges. The effect of innovation on different industrial sectors and particularly on small and medium enterprises has many dimensions. How it works for the betterment of these enterprises keeping in view the current scenario is a big challenge Gault (2010).

Motohashi (2001) have used process innovation to up lift the performances of traditional SME’s and proposed a pro-competition policy to induce entrepreneurship and process innovation in SME’s. The government has made an amendment in SME Basic Law on supporting business innovations. Plant level pattern on industrial dynamics suggests both policies for new business start-up and innovation creation in existing firm are important. There are positive effects on sale growth due to program of the Creative Activity Laws.

Kalantaridis and Pheby (1999) have analyzed innovativeness in SMEs sector in two ways. Firstly, success cases of local innovation systems at the expense of less successful areas, which are thus in greater need of policy intervention. This paper aspires to address this 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 or hinder 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.

In response, the authors develop a typology of SMEs based upon the extent and timing of innovation; the underlined aim is to undertake a comparative analysis of the causes, processes and obstacles to innovative activity. It is argued that: (1) there appears to be some relationship 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.

2.3 SME and Economic Growth
It is generally presumed that SMEs development has positive impact on economic growth of a country through employment generation. With the development of SMEs, particularly through process innovation, allocative as well as distributive efficiencies would be amplified. The production capacity of industrial units will increase which helps in expansion of the businesses. Through employment generation, income availability would increase which may assist in boosting the social standard. Ultimately consumption would increase which has positive impact on national income through national income equation; \( Y = C + I + G + X - M \). But it is one side of the coin. The other side indicates that there is no impact of SMEs
development on economic growth as Cravo (2010) has highlighted in his study. There are some important factors like investment policy, external sector policies, which have greater impact on economic growth rather than SMEs development.

Cravo (2010) has analyzed the impact of strong SME’s sector on economic growth of Brazilian economy. The author examines the relationship between the small and medium enterprise (SME) sector and economic growth for a panel of 508 Brazilian micro-regions for the period 1980–2004. It observes the significance of SME sector with respect to two main variables; the share of the SME employment in total employment, and the level of human capital in the SME sector. Moreover, it examines how these aspects of SMEs influence the economic growth in regions with dissimilar level of development. The empirical findings show that Brazilian SME sector has no significant correlation with economic growth but SMEs’ human capital is more important for growth in more developed regions.

This proposition does not fit for all the countries as the experience in other countries (Bangladesh and China) show that there is positive correlation between SME sector and Economic growth. A study, conducted by Institute of Cost & Management Accountants of Pakistan (ICMAP) and Federation of Pakistan Chambers of Commerce & Industry (FPCCI) in 2000. According to the study, SMEs are the starting point for the development in countries which are in transition and making struggle their best for industrialization. SME’s are one of the potential sources of employment generation, investment and aliened economic activities. The management of SME is easier than the large scale industries. Less capital is required for start up the SME business. The study has suggested that even if a person has fewer amounts, he should use it for capital formation. According to the study, in Pakistan, if the strategic planning for SME development is made successful, then middle class entrepreneur can play a pivotal role for the development of the country. The authors have concluded that SME’s has positive correlation with economic growth.

Keeping in view the above studies, some propositions can be developed about the relationships between process innovation and SME’s performance. Moreover, the relationship between SME growth and economic development can also be developed due to its positive effects on economic development as it has been derived from previous studies like (Gault, 2010, Motohashi, 2001 and Khan, 2004).

Khan (2004) has explained that small enterprises are an important part of a nation’s economic and social structure. On global perspective, small enterprises have acquired a significant stature in the economic development of a county. There are many successful stories in the world where an appropriate strategy has been adopted for establishment and promotion of small and medium scale industries.

Steensma, Marino and Weaver (2000) have emphasized on adopting of cooperative strategies by the small firm to make a significant contribution in achieving economic strengths. According to them, cooperative strategies consists of structured cooperative agreements between firms like marketing coalition, research & development agreements and distribution agreements to minimize the cost. Such cooperation may allow these entrepreneurial firms to increase production through innovative process, expand their production capacity through
joint production agreements, share marketing expenses and expertise with long-term marketing arrangements, and reach foreign markets with distribution agreements.

These agreements may not be confined up to domestic firms but we can also expand the spectrum of cooperation to firms in foreign countries. Especially with those countries which are in transitional phase like China, Malaysia, Taiwan and Korea with divergent cultural values.

Lefebvre and Elisabeth (2001), has analyzed the innovative capabilities of SME’s as latent determinants of export performance. They have made an analysis of empirical data from a longitudinal survey of 3,032 manufacturing SMEs over a three-year period which point out that these firms became progressively more active in foreign markets.

Lefebvre and Elisabeth (2001) have used Tobit and Probit model to show the impact of innovative capabilities of SME’s as a leading determinant for exports performance. The findings of the research indicate that innovative capabilities are having determinants of export performance but their relative importance vary according to the knowledge intensity of the industrial sectors in which they are actively in operations. In high knowledge industries, all technological capabilities are significantly positive related to export performance while commercial capabilities are more prominent in low-knowledge industries. However, in low, medium or high-knowledge industries, Research & Development and knowledge intensity remain among the five strongest determinants. Due to its positive link with exports performance, we can assume that it will lead to improve economic growth of a country because of national income identity equation (Y=C+I+G+X-M).

Through domestic resource mobilization, the government can reduce its dependency on donor agencies. To promote the SME’s in Pakistan, government of Pakistan has formulated SME Policy Task Force in 2004 and they recommend that private sector led economic growth strategy should be primarily based on SME development.

Keeping in view the significance of SME’s Sector, SMEDA is also trying its best to promote the SME culture in Pakistan. There are some important projects which have been completed under Public Sector Development Program (PSDP) but still there is a lot of potential to be explored through process innovation. Some of the PSDP projects being implemented in Punjab Region like Sports Industries Development Centre (SIDC), Sialkot, Sialkot Business and Commerce Centre, Agro Food Processing Centre (AFPC), Multan, Gujranwala Business Centre( GBC), Cutlery Institute of Pakistan(CIP), Wazirabad, Women Business Incubation Center (WBIC), Lahore and Foundry Service Centre (FSC), Lahore. In spite of all the efforts conducted by the government of Pakistan, there is still an ample space for improvement in utilizing domestic potential resources through process innovation for restoring economic strength of the country.

In Pakistan, around 60% of total population is living in rural areas and they are busy in small businesses like fruit production, fishing, garments, knitting and handmade embroideries primary education, crops cultivation, production, sugar cane, dates production, ginning, wood and many other areas which are the basic startups for many people.
3. Data and Methodology

3.1 Introduction
To see the impact of process innovation on the performance of small and medium enterprises and the effect of strong SME on economic development, an econometric model has been developed. The period of analysis consists of 1980 to 2012. Following Milbergs, 2005, three main measures for process innovation has been taken in this research; number of patent applicants, either resident or non residents, number of trademark applicants, either resident or non residents, high-tech exports and high-tech exports as percentage of manufacturing exports. To measure the performance of SMEs sector, SMEs growth is taken as a benchmark indicator. As well as economic performance is concerned, two economic parameters have been selected; growth in real GDP Per Capita and growth in GDP, as referred by Todero, 2009.

3.2 Choice of Variable
The lack of availability of the data, especially in developing countries and most particularly on small and medium enterprises and measurement of innovation, has made this analysis in fix. Main economic and social variables, selected for the analysis are share of SME in GDP, inflation, value of exports as percentage of GDP, value of imports as percentage of GDP, public expenditure on education as percentage of GDP, openness Index have been selected. To measure the process innovation, patent applications, residents or nonresidents, Trademark applications, direct nonresident or resident, High-technology exports (current US$) and High-technology exports (% of manufactured exports) are selected.

The data have been collected from different national and international sources. Macroeconomic parameters like GDP Growth rate per capita, GDP Growth rate, Inflation rate, value of exports as percentage of GDP, value of imports as percentage of GDP and value of trade balance a percentage of GDP have been collected from Asian Development Outlook 2011, Economic Survey of Pakistan (Various issues), published by ministry of finance, government of Pakistan and Key Indicators 2010. There are certain missing values in the data for 1995, and 1997 which have been generated through indirect method (average method). The data gaps were filled up by estimating average values for a given series. (Maddala, 1977, pp. 201–207)

3.3 Methodology
To analyze the impact of process innovation on SMEs performance, two log linear regression equations have been constructed as 3.1, 3.2 respectively. To measure the effects of process innovation on the performance of SMEs and the effects of SME performance on economic development, log linear regression model has been used for both equations. To estimate the regression parameters, a software; E. Views has been used. Two regression equations have been constructed as follows.
3.4 Effects of Process Innovation on SMEs Growth
To know the effects of process innovation on SMEs growth, following econometric equation has been constructed.

\[ SMEG = \alpha_1 + \alpha_2 GRPC + \alpha_3 PEDUG + \alpha_4 VXGDP + \alpha_5 PAN + \alpha_6 TMT + \alpha_7 HTEX + U \] \hspace{1cm} (3.1)

Where
- SMEG is Share of Small and Medium Enterprises in GDP
- GRPC indicates GDP Growth rate per capita
- PEDUG is Public Expenditure on education as percentage of GDP
- VXGDP shows Value of exports as percentage of GDP
- PAN is Patent Application for non residents
- TMT is Trademark Applications total
- HTEX is High Tech Exports

Apparently, there is positive correlation between GDP growth rate per capita and share of Small and Medium Enterprises in GDP because due to increase in GDP per capita, the people will demand more money for speculation. Due to increase in demand for speculation, investment will amplify and development in SMEs sector would increase. Similarly, public expenditure on education as a percentage of GDP will have positive impact on growth in small and medium enterprises. More application for patents and trademarks indicates that more and more enterprises are transforming their businesses through process innovation. High tech exports are also one of the strongest indicators for the adoption of modern technology and the companies are indulging their self in process innovation. The results of the model has described in table 4.1.

3.5 Effects of SMEs sector on GDP Growth
To see the effects of SMEs sector on GDP growth following regression equation has been constructed

\[ GDPG = \alpha + \beta_1 SMEG + \beta_2 PAN + \beta_3 INF + \beta_4 HTEX + \beta_5 PEDUG + \epsilon \] \hspace{1cm} (3.2)

Where
- GDPG is GDP Growth rate
- SMEG is share of Small and Medium Enterprises in GDP
- PAN is Patent Application for non-residents
- INF is Inflation
- HTEX is High Tech Exports
- PEDUG is Public Expenditure on education as percentage of GDP

There are many studies, like Khan (2004), Lefebvre and Elisabeth (2001), Gault (2010), Motohashi (2001) which are in favor of positive correlation between growth in small and medium enterprises and GDP growth rate but in case of Pakistan either this positive correlation exists or not. Similarly, Inflation has negative relation with GDP growth rate. Through IS-LM Model, we can interpret that with an increase in prices, consumption of the people would come down which has negative effect on aggregate demand and overall...
national income would decrease. The detailed empirical results are shown in table 4.1 and 4.2 respectively.

4. Empirical Results and Analysis

The results for the analysis are discussed as follows.

Table 4.1: Results of Regression Analysis of Process Innovation on SME Performance

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRPC</td>
<td>-0.007105</td>
<td>0.027447</td>
<td>-0.258851</td>
</tr>
<tr>
<td>VXGDP</td>
<td>1.578543</td>
<td>0.276428</td>
<td>5.710506</td>
</tr>
<tr>
<td>PAN</td>
<td>-0.217501</td>
<td>0.133169</td>
<td>-1.633265</td>
</tr>
<tr>
<td>HTEX</td>
<td>0.077719</td>
<td>0.033572</td>
<td>2.314998</td>
</tr>
<tr>
<td>TMT</td>
<td>-0.164899</td>
<td>0.102098</td>
<td>-1.615111</td>
</tr>
<tr>
<td>PEDUG</td>
<td>0.313898</td>
<td>0.131246</td>
<td>2.391682</td>
</tr>
<tr>
<td>C</td>
<td>-1.164903</td>
<td>0.546643</td>
<td>-2.131014</td>
</tr>
</tbody>
</table>

R-squared 0.658178, Durbin-Watson stat 1.809022, F-statistic 7.702005, Prob (F-statistic) 0.000109

According to regression equation (3.1) there are certain variables which have significant positive impact on share of Small and Medium Enterprises in GDP. For instance, if there is improvement in volume of exports as a percentage of GDP then SMEs sector will show significant improvement. The T-Stat for VXGDP is highly significant with the T-Value 5.71. This result shows that if Pakistan will focus on exports then there is possibility to restore the economic strengths with the assistance of SMEs improvement. Another significant result is in favor of positive relationship between patent applications (which is a measure of innovation) and share of Small and Medium Enterprises in GDP. Though the T-Stat is merely insignificant but it indicates positive correlation between two variables (SMEG and PAN).

High tech exports are showing positive relation with share of Small and Medium Enterprises in GDP which means that exports led growth hypothesis can be applied for the betterment of the country through SMEs development. GDP per capita is significantly affecting the SMEs growth. As it has been seen in the regression results that value of t-stat for GRPC is 0.25 which indicates insignificant impact on SMEG. Another interesting result is that PEDUG (Public Expenditure on education as percentage of GDP) has shown significant impact on share of SME in GDP which rationalizes that an improvement in the public expenditure on education can amplify the share of SME in GDP. The T. Stat (2.39) indicates high significance level of PEDUG on SMEG (share of small and medium enterprises in GDP). It is admitted fact that education promotes skills and vision of the managerial staff which may be beneficial for the production of small and medium enterprises. Technical education
promotes skilled people in the country who can amplify the overall production in the country. The government must increase educational expenses to boost the economic activities.

The results of effects of share in SME growth on GDP growth is presented in Table 4.2

### Table 4.2: Results of Regression Analysis (Effect of Share of SME growth on GDP Growth)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMEG</td>
<td>-0.679840</td>
<td>0.615522</td>
<td>-1.104493</td>
</tr>
<tr>
<td>PAN</td>
<td>-1.245869</td>
<td>0.503806</td>
<td>-2.472914</td>
</tr>
<tr>
<td>INF</td>
<td>-0.402485</td>
<td>0.190380</td>
<td>-2.114113</td>
</tr>
<tr>
<td>HTEX</td>
<td>0.011525</td>
<td>0.125587</td>
<td>0.091766</td>
</tr>
<tr>
<td>TMT</td>
<td>0.746764</td>
<td>0.517953</td>
<td>1.441760</td>
</tr>
<tr>
<td>PEDUG</td>
<td>0.869062</td>
<td>0.489064</td>
<td>1.776991</td>
</tr>
<tr>
<td>C</td>
<td>4.257471</td>
<td>1.650730</td>
<td>2.579145</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.393455</td>
<td>Durbin-Watson stat</td>
<td>2.010395</td>
</tr>
<tr>
<td>F-statistic</td>
<td>2.810954</td>
<td>Prob (F-statistic)</td>
<td>0.030382</td>
</tr>
</tbody>
</table>

According to regression equation (3.2), there are certain variables, which have significant positive impact on GDP growth rate. One of the highest impacts on GDP growth rate has been observed through PEDUG. The public expenditure on education as a percentage of GDP (PEDUG) has significant impact with a significant T. Stat (1.77) value. The role of education in the promotion of economic activities is very vital and it is generally presumed that more proportion of educated people drastically improve the quality of manpower in the country. The developing countries like Pakistan must have to focus on the promotion of education because it is one of the benchmarks of economic development. As well as the impact of share of small and medium enterprises in GDP is concerned, it is not showing any significant impact on economic development in Pakistan due to non documentation of SME, which does not show significant contribution of SME in GDP. If the government of Pakistan gives proper concentration to SME, then the shares of SME in GDP would be highly significant as depicted in other emerging economies like China, Malaysia and India.

It is a general perception that inflation has negative effect on the GDP per capita because due to increase in inflation, the purchasing power of the people decreases. Their demand reduces the consumption which results in over all declines in GDP. Keeping in view the national income identity equation, consumption has direct relation with GDP. As there is decrease in consumption, GDP would also decrease and GDP Per capita would also diminishes.

High tech exports have positive relation with GDP growth but represents insignificant impact on GDP with T. Stat (0.09). This result indicates that there is a lot of potential in the external sector to explore. Due to lack of technological advancement in the country, the proportion of high tech export is very minimal, which can be amplified through process innovation. In other words if there is an improvement in high tech exports, it can drastically transform the economic strengths of the country. So for self reliance and optimal utilization of domestic
potential resources the government of Pakistan should concentrate on manufacturing of value added goods and high tech exports.

Pakistan is a developing economy where patent applications of local residents are very small as compare to non residents. Though the T Stat (2.47) of PAN (which is a measure of inflation) is significant and indicates its impact on GDP Growth, but Pakistan still requires awareness for promoting innovation output factors (Patents). D.W stat (2.01) shows that there is no autocorrelation in the analysis. Future researchers can explore the impact of patents on the developing economies like Pakistan and suggest the strategies for the effectiveness of innovation output factors.

5. Conclusion

Pakistan is a land of natural resources but due to mismanagement and lack of introduction of modern technology and innovation, it becomes a fragile country. The economic activities are lessening day by day and the country is moving towards anarchy situation. To restore the economic strengths and to revive the economic activities, it is inevitable to introduce process innovation in different small and medium sectors like in food, ceramics, leather and agriculture sector. These sectors have the potential to attract foreign investment because of two main reasons; the products of these sectors are less elastic and can be easily penetrate in the local as well as in international markets, provided that government must fulfill prerequisites of manufacturing like the provision of utilities at cheaper rates and secondly, these sectors require less investment as compare to produce at large scale. Chinese investors can play an active role to attain the benefits of these potential sectors.

This paper is an attempt to explore the effects of process innovation on Small and Medium Enterprises (SMEs). Secondly, to investigate the effects of strong SME’s on economic development in Pakistan. To achieve these objectives, log linear regression models have been developed to ensure the effects of process innovation on SMEs growth and its subsequent effects on economic development in Pakistan. Certain economic parameters like GDP per capita growth, GDP Growth, share of SME in GDP, SME parameters like public expenditure on health as percentage of GDP, inflation, value of exports as percentage of GDP, value of imports as percentage of GDP and openness Index have been selected for evaluating the impact of process innovation on SMEs growth.

Following (Milbergs 2005), to measure the process innovation, Patent applications, residents or nonresidents, Trademark applications, direct nonresident or resident, High-technology exports (current US$) and High-technology exports as a percentage of manufactured exports are used as key indicators. A Software “E. Views” has been used to do this analysis. The analysis is performed using annual data over the period 1980 to 2012. The main conclusions of the study are presented below.

One of the significant results is in favor of positive correlation between process innovation and SME’s growth. The estimates show that there is positive impact of process innovation on SME growth. With an improvement in the process innovation, there would be an increase in SME growth, which indicates that economic activities would revive in the country.
Braunerhjelm (2010) also supports this concept. It is also observed that there is direct impact of innovation on economic development. The direct link has also been proved from the study of Fagerberg, Srholec and Verspagen (2009). They have channelized the effects of high technology through process innovation on economic development.

Another important result is in favor of positive correlation between education and GDP per capita. In developing countries, like Pakistan, government is spending very little amount (less than 2% of GDP) on education. For economic development in the country, there is an immense need to focus on education improvement. There are certain other factors, which are causing to effect the growth in GDP like inflation, openness and volume of exports as percentage of GDP. In this research, education is a significant variable which plays an important role for the growth of share of SME in GDP as well as for economic development.

In Pakistan, innovation is at its infancy stage and more particularly, in small and medium enterprises. This research indicates that PAN (Patent Application for Nonresident) and TMT (Trademark Total) are two main variables which show positive and significant impacts on SME growth as well as for economic development. The T.Stat of PAN (2.47) and TMT (1.44) explain their significance levels at 5% respectively and explicate that they are one of the important variables for the economic development of developing countries like Pakistan.

References

Economic and social survey of Asia and Pacific, (March 2008), UN Economic and Social Commission for Asia and the Pacific
F.Gault (2010),”Innovation Strategies for a global economy”, International Development Research Council, Canada
Fifty Years of Pakistan in Statistics (1947-97) Volume (1,2,3) Federal Bureau of Statistics, Government of Pakistan
H.Ohashi (2007),” How to measure the outcome of Innovation; Application to Product Innovation”, Conference Paper; Towards Global Innovation Ecosystem beyond National Innovation
International Financial Statistics (IFS), August 1996.


P. Braunerhjelm (2010),”Entrepreneurship, Innovation and Economic Growth- past experience, current knowledge and policy implications”, The Royal Institute of Technology Centre of Excellence for Science and Innovation Studies (CESIS)


Pakistan Economic Survey (1990 to 2009-10), a yearly publication of Ministry of Finance, Government of Pakistan


SMBA (2006),”Economic Impacts of Innovative SME’s and effective Promotion Strategies” Asia Pacific Economic Cooperation (APEC) SME Innovation Centre.

Statistical Year Book (2009), a yearly publication of Federal Bureau of Statistics, Government of Pakistan

State Bank Reports (1990 to 2010), Annual Publications of State Bank of Pakistan


Small and Medium Enterprises Development Authority (SMEDA) Annual Report 2007, Ministry of Industries and special Initiatives, Government of Pakistan, Pakistan
S. Jeppesen (1995),” Enhancing competitiveness and securing equitable development: can small, micro, and medium-sized enterprises (SMEs) do the trick?, Development in Practice, Volume 15, Numbers 3 & 4,

Social Indicators of Development (1996), World Bank Publication


World Development Reports (1990 to 2010), World Development Indicators, World Bank Publications, Oxford University Press