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A STUDY ON RESEARCH AND DEVELOPMENT AS A DETERMINANT FACTOR FOR INNOVATION IN SMALL AND MEDIUM ENTERPRISE'S (SME'S)

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Abstract: *The research and development (R&D) influences the performance of innovation in Small and Medium Enterprises (SMEs). The Sector consisting of 36 million units, as of today, provides employment to over 80 million persons. The Sector through more than 6,000 products contributes about 8% to GDP besides 45% to the total manufacturing output and 40% to the exports from the country. Thus SMEs are considered as the backbone and hence are of critical importance for different economies in the world. Innovation in SMEs is depending upon the levels of research and development. The absorption capacity of the firm from the external knowledge impacts on the performance of the innovation. Research Development organizations (RDO) are considered as the leaders for R&D collaboration in SMEs. There is a considerable relationship between the level of R&D intensity and the innovation performance in SMEs. Some of the SMEs are involved in the outsourcing of Research and Development activities for innovation. The knowledge intensity of the firm through Research and Development activities are contributing for the innovation strategy and finally results in strengthening the enterprise in all means. The present study explores the role of Research and Development as the determinant factor for innovation in SMEs.*

Keywords: *Absorption capacity, innovation, knowledge, Research and Development, Small and Medium Enterprises, strategy.*

1. INTRODUCTION

Innovation is the emerging multidisciplinary field which is growing radically in all the fields especially in Small and Medium Enterprises. Innovation programs for promoting innovation and R&D activities can be traced back to 1980's. The first European program for developing innovation was launched in 1983. This program supported the environment which is conducive for growth, co-ordination and co-operation for innovation. Success was seen in the implementation of these programs. Later in 1990-94 craft projects were introduced. The main aim of these projects is to identify the research need, but the SMEs with lack of research sources are allowed to sub-contract research work to a suitable provider. SMEs are both developers and users of the technology (htt4).

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Overall India-based R&D Globalization and R&D Services market reached US$ 20 billion@ in 2015, up by 9.9 per cent over 2014. R&D Services market stood at US$ 7.76 billion and R&D Globalization market (Captives) stood at US$ 12.25 billion. India's R&D globalization and services market is set to almost double by 2020 to US$ 38 billion. (*Source:* http://www.ibef.org/industry/research-development-india.aspx.)

The OECD and APEC are playing a vital role in economic development of innovating SMEs in different countries. Subsequently the APEC economic leaders and SME ministers have adopted declarations on SME innovation every year since 2000. Thus; APEC SME innovation center had proposed a research project that contains surveys, analysis and analysis and synthesis, and comprehensive investigations on SME innovation policies among APEC economies in order to meet various needs of SME innovative policies. The main focus of the research project is placed on mutual learning, the establishment of cooperation network and efforts to reduce impediments to SME innovation. The center has undertaken the research partially funded by APEC after the approval of member economies (Yang Hae Jin, 2006).

Innovation is often considered as equivalent to the management of Research and Development or management of technology (Zabala-Iturriagagoitia, 2014). The importance of innovation is known long back. The extent of innovation in SMEs are determined by number of factors which determines the capacity to innovate. This shows impact on innovation strategies and the degree of novelty in innovations by SMEs. Some of the determinants of innovation are Research and development, firm size and the technology intensity of the firm (Becheikh, 2006).

The collaboration of SME enterprises with several internal and external sources led to the enhancement of innovation. Research and Development act as a determinant factor for innovation in SMEs. Making inter-firm relations and international R&D relations are very much essential for innovation (Batterink, 2010). Thus, they exploit the knowledge creation, knowledge transfer and knowledge management. All these finally result in the formation of internationalization. Thus, a successful innovation is formed (Blind, 2013). R&D is considered as primary source in driving innovation. R&D can clearly make us understand what are all the variations are happening in the firm. The technological innovation requires R&D likewise the development, diffusion of innovation management requires research. Thus crucial research acts as the responsible for innovation (Volberda, 2013).

The firms which are having active Research and Development are highly competitive and are considered as technology experts in niche market. The firm involves continuous challenge in making strategic decisions and technology

positioning. Hence R&D management is very important for every firm (Teirlinck, 2013). Some of the research findings of US states that by surveying on Japanese research institutes the US programmes were modeled. At first SMEs started with low information gap and later extended to high information gap facilities which facilitated high absorption between the research and development and the innovation activities. Thus innovation and Research and Development establish a one-to-one relationship. The innovation research and development are mutually dependent on each other in different ways. (Izushi, 2003).

Some of the research findings in Romania states that the intangible assets of the firm which constitutes the all organizations different stocks of knowledge which can be singular or collective which can't be left behind. It must be mobilized and developed. Since the global objective of SMEs is the competitive advantage. This stimulates the demand for innovation and stimulates the research and development. This enhances the growth of entrepreneurship and knowledge-based economy in the implementation of new technologies and innovated products (Holban, 2011).

The research conducted in Cyprus, a small developing country states that the variables which are responsible for innovation in SMEs are Strategy of the firm, expenditure on R&D, overall performance of the firm and other resources. The managers and the policy makers can change the innovativeness of the firm by identifying the determinant factor of the firm (Kridel, 2013).

The nature and dynamics of the Australian SME highlights that the research and development had changed the innovation capacity of the firm. The researchers clearly interact with the firm about the newly launched innovation system. It also explains the systematic action research which is applied in the firm, how use full the research in creating innovativeness. It clearly explains the innovation and research and development (Kocher, 2011).

2. LITERATURE REVIEW

Several studies from long years back had been concluded that innovation is the key factor for the survival, growth, competitive advantage and development of SMEs (Railean, 2011). Several studies had explained the link between the Research and Development and innovation (Raymond, 2010). SMEs which involve in the Research and Development (R&D) activities can improve their creative techniques and innovation methods. These methods are rarely used in the firm management. But the creative techniques and innovation methods includes the training (BURZ, 2014). Sustainability development is usually seen in large firms. Since the last decade sustainability oriented innovation is seen in the SMEs also. The interaction between the external factors like customers, authorities and mainly the research institutes increases the innovation capacities for the contribution of sustainability oriented

innovations (Klewitz, 2014). The external relationships enhance innovation with networks. Innovation in linkage with Research and Development laboratories and Universities results in the successful product innovation (Lasagni, 2012), (Pullen, 2012). Successfull pharmaceutical SMEs in Iran had used a combination of innovation with the internal sources of Research and Development. This resulted in the positive relationship of organizational innovation capability, firm performance, financial development and product development (Dadfar, 2013), (Veglio, 2015).Some of the studies are also conducted to find the effect of the organizational and environmental factors on innovation in SMEs. Further it is concluded that it is truly based on the organizational structure, business environment and other factors effects on the formation of innovation (Prajogo, 2014). There exists a non-linear relationship between the firm profitability and the firm determinants like the firm size, long-term debts, managerial control and the intensity of research and development. This study had concluded that the profitability distribution of Portuguese service SMEs research and development intensity serves as a catalyser (Nunes, 2010). By out sourcing the research and development and innovation activities in the firm. These activities results in the achieving and sustainability of competitive advantage. Generally SMEs lack internal sources for the performance of innovation activities. Hence, Solvenian manufacturing and service firms partially outsourced the research and development and innovation activities (Hojnik, 2012). The effectiveness of the innovation lies on the linkage of the SME networks and the Public research organizations also. By integrating the social capital approach, knowledge- based view; relational view the relation between the innovation and public research organizations can be evolved (Masiello, 2015). The innovation policy of the German government includes several different kinds of programmes to promote Research and Development and knowledge transfer. The number of the research performing SMEs had been increased and the knowledge exchange between the Universities and research centers is also increased. Thus innovations in SMEs are more successful (Belitz, 2013). Technological development of every country is based on the investment in the innovation and scientific research especially in SMEs. This finally results in the economic growth and development of the country (Rebić, 2014). Technological development of every country helps in maintaining strategy to develop innovation and investment in research and development. These strengthen the SMEs to penetrate into domestic and international markets. Further this helps in the sustaining of competitiveness (Bermúdez, 2013), (Motwani, 1999). Several business networks gives the competitive advantage for the firm and contribute to the regional development. Several studies had been conducted to analyze these networks and concluded that it is based on the firm and investment in research and development and the technology transfer and the knowledge has the positive influence on the research and innovation in the firm (Becerra Rodríguez, 2013). The knowledge flows in the front end of the firm with the collaboration of the research

and development mostly in the pharmaceutical SMEs. It clearly specifies the internal research and development is very much necessary for innovation (Braun, 2012), (Hoveskog, 2011), (Antonieta Monserrat Vera Muñoz, 2014). The knowledge acquisition, knowledge absorptive capacity and innovation performance of the firm lies within the collaboration of research and development (Yu-Lin Wang, 2010), (Corral de Zubielqui, 2015). Investment in research and development and the growth of the firm are related to each other in different ways. The growth of the firm is related to the sales growth of the company. The growth of the different activities of the firm is related based on the different dynamics of innovation (Deschryvere, 2014). Some of the studies also concluded that the network and the other resource collaborations like the collaboration with the universities and the research institutes. These helps in the knowledge generation, transfer and thus contribute to the effectiveness of innovation (CLIFTON, 2010).The usage of web 2.0 technologies in innovation strategies particularly in research and development gives more results. The implication of these technologies gives effects on the evolution; dynamics of innovation and entrepreneur turnover of the firm (Gagliardi, 2013). Successfull innovation is caused due to the presence of many resources in the firm. Lacking of any of the resource may does not lead to the formation of effective innovation. Research and development is one of the rare resource which usually seen in SMEs. Industry knowledge and R&D cooperation leads to the product development, new ideas and customer sales and services in SMEs (HALME, 2013). The future of the research in SMEs lies in the technological innovations. The social responsibility of the SME is to research. The range of opportunities in building the theory in research is discussed in some of the studies (Tan, 2009). SMEs is more innovative with research and development and further they are more connected with the networks and institutions like universities. Universities and private establishments of research are more responsible for successful innovation (Hemert, 2013), (Fliaster, 2014). Firms engages in the international collaborations with internal R&D collaborations. This improves the effectiveness of the innovation performance and mutually the firm growth and development (Ebersberger, 2013), (Link, 2014). Innovation is nothing but changing and rearranging the research and development and production of technology which results in the growth and development of the firm (ÇETİNKAYA BOZKURT, 2014). The internal and external sources of the SMEs determine the access to technology of the firm. The interaction with the technology centers and industrial research institutes leads to the formation of technology transfer and absorptive capacity of the knowledge in the firm (Hervas-Oliver, 2012). The importance of innovation is based on the science and technology drivers such as the research and development and human capital (Parrilli, 2012). Some of the single owned firms are able to convert the research and development in to innovation than the multiple owned firms. Since these are utilizing the external sources of knowledge and human capital (Deng, 2013). Research and Development influences

the innovation performance in SMEs. The effect of internationalization is high when the effect of R&D in innovation is high. The international networks are also building (Ren, 2015), (Shah, 2013), (Löfgren, 2014). Some of the studies also highlighted the importance of innovation and investment in research and development. This also increases the technological capacity of the firm. The innovation management tools and techniques by the SME research unit in implementing the open innovation strategy. These innovation management tools structures the innovation strategy based on the collaboration and technology transfer (Igartua, 2010). The determinants of cultural and geographical proximity in international R&D involves the SMEs and promotes the innovation system. The international cooperated R&D projects involve the process of innovation in SME (Teixeira, 2013). The internationalization strategy and the cooperation with research centers and other public entities stimulus the process of innovation (Frey, 2013), (BUSE, 2010), (Ripolles Melia, 2010). Some of the studies had concluded and specified the use and purpose of the living research laboratory for innovation in SMEs. So that the innovations can be created, tested and evaluated in every day environment in SMEs (Dhakal, 2013).

3. RELATIONSHIP BETWEEN THE RESEARCH AND DEVELOPMENT AND INNOVATION

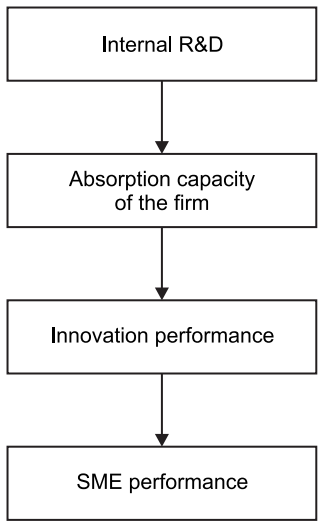
There is a positive relationship between intensity of the research and development and innovation performance of SMEs (Battisti, 2010). The research technology agents plays a significant role as technology transfer agents. There must be a contingency relationship between the industry environment, strategy, organizational structure and other factors for successful technology transfer from technology organizations to SMEs. The inter-firm collaborations and government R&D supports on the innovation. The firms with internal R&D are having strong international relationships than the domestic firms (Kang, 2012). The investment in the R&D and innovation output is also directly related to sales growth and firm growth. This relationship s stronger in continuous innovators and less in occasional innovators. The investment in the R&D shapes the outcome of the innovation in SMEs. There by it relates on the firm growth also. The interaction between the R&D and innovation are directly related to the SMEs performance.

The SMEs undergo outsourcing for the purpose of research. The corporate research organizations, alliances of different organizations are involved. The SMEs which are lack of resources, efficiency in R&D and technology transfer undergo outsourcing (Albors-Garrigos, 2011). The R&D has significant effects on innovation, international technology association networks and finally the firm performance (Qiao, 2014). The firm having internal R&D is characterized by the knowledge. The absorptive and desorptive capacity of the knowledge depends on the firm. The innovation strategy is build through these knowledge which results in the product development (Kach, 2015).

4. RESEARCH AND DEVELOPMENT AND SME PERFORMANCE

The four different types of collaborative activities which are inter-dependable are in-house R&D, technology acquisition, R&D collaboration and networking. The technology acquisition is the most efficient type of collaboration for R&D of service SMEs. More specifically, in-house R&D, technology acquisition, and R&D collaboration are positively related to product/service innovation, patenting activity, and process innovation, respectively. However, networking is not significantly related to any three types of R&D performance. In addition, the service SMEs' strategic focus did not match their strategic purposes, suggesting a need for adjusting their collaborative activities. The results have important implications for managers and policy-makers interested in facilitating open innovation in service SMEs through various collaborative activities. Thus, the R&D and SME performance are inter-linked. The SME performance is depend on the collaboration of internal R&D.

The below mentioned table shows the relationship between the internal R&D and innovation:



5. CONCLUSION

This paper concludes that research and development acts as a determinant factor for innovation. The innovation performance is well distinguished by the R&D intensity. The strong innovation performance is associated with well developed intramural R&D. This in turn helps in the growth of internationalization, networks, various research organizations and alliances and finally the growth of the SME. Thus, SMEs can focus on strengthening their knowledge resources and organizational routines

by means of systemic R&D and engage in international collaboration. R&D acts as the main driver for the innovation in SMEs. The in-house R&D and innovation performance has an impact on the success of SMEs. In-house R&D seems to be particularly effective only if combined with external knowledge sourcing.

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