

INNOVATION IN PAKISTAN'S SMES: MAKING THE CASE FOR COUPLING MODEL AND LOOKING BEYOND

Muhammad Nouman¹, Saleem Gul²

ABSTRACT

Innovation as a phenomenon has been viewed in many different ways. Starting with Joseph Schumpeter in the 1930s, we have come a long way. Despite loads of literature and research work, our understanding of what innovation is and how to study it especially in the context of SMEs remains inconclusive. Advocating a systems/process approach, the paper opines that studying innovation in the case of Pakistani SMEs will involve taking into account the local perspective. The nature of products/processes, type of SME sector, role of government and support institutions, as well as technology and market sophistication will greatly influence our interpretation and application of innovation models presented by Roy Rothwell. Owing to weak technology regimes and lack of well-placed market structures for many SME sectors in Pakistan, it is argued that we need to look beyond the first and second generation innovation models to find out why innovation has traditionally been reticent. For Coupling Model (third generation), amendments are proposed. It is argued that the role of entrepreneur, government, other institutions and suppliers needs to be given considerable weight rather than assuming a simple technology-push/market-pull paradigm. The fourth generation models cannot be ratified at this stage since most SME sectors in Pakistan tend to have simpler organizational structures and manufacturing processes weakening the case for parallel development. Additionally, most SME sectors do not operate in technology intensive markets suggesting that the fifth generation models may not be applicable either.

INTRODUCTION

The question of what is innovation and what factors influence it has been of interest to academicians and practitioners for decades. The pioneering work of Joseph Schumpeter at the beginning of the 20th century played a crucial role in providing the basis for this concept. In the two famous books, *The Theory of Economic Development and Capitalism, Socialism, and Democracy* it is argued that innovation symbolizes the driving force of economic development (Schumpeter, 1934, 1942). The ever-increasing importance of innovation has resulted in researchers taking greater interest in it. However, despite the fact that academic literature on the subject has increased considerably, there is little in terms of consensus on how best to study the phenomenon. If the number of papers on the topic has evolved exponentially during the last decade, there is still no precise prescription for successful innovation (Rothwell, 1992). Many researchers have tested the effect of a large number of variables having a possible relationship with innovation. However, even though they tested similar variables, they found differing degrees of association with the rate of innovation (Souitaris, 1999, 2002) that underlines the inconsistency and inconclusive nature of research (Wolfe, 1994). According to Coombs, et al. (1996) innovation as a process is still poorly understood. To

add to this, the dearth of research on the topic in developing countries such as Pakistan, means that very little is known about innovation and the factors affecting it.

Innovation and SMEs

Kahn, et al. (2003) point out that before 1994 there were very few papers published about innovation that focused on small businesses. In the years since then many studies have been undertaken that are based on testing hypotheses about the effect of factors such as 'smallness' of a firm on innovative outcomes. Studies that conclude a positive affect of smallness suggest that SMEs have better operational expertise and customer knowledge (Dahl & Moreau, 2002) and are characterised by limited bureaucracy and family-oriented structure (Sivades & Dwyer, 2000). Rothwell and Dodgson (1994) note that SMEs can take advantage of external networks while Van-Dijk, et al. (1997) suggest that they are better at forging useful alliances. Authors such as Kassicieh, et al. (2002) highlight the role of SMEs in commercializing disruptive technologies that produce discontinuous innovations.

As opposed to this, many other studies have found a negative relationship between small firms and innovation. Dyer and Handler (1994) suggest that one factor

1 Assistant Professor, Institute of Management Sciences, Peshawar, Pakistan, Email: muhammad.nouman@imsciences.edu.pk

2 Assistant Professor, Institute of Management Sciences, Peshawar, Pakistan Email: s.gul@imsciences.edu.pk

responsible for this is SMEs' control structures and reluctance to pass on decision-making. Weak external contacts (Srinivasan, et al., 2002), lack of education and training (Romano, 1990), limited or no resources/capabilities for R&D activities (Hausman, 2005) have been highlighted as some of the other factors. A set of possible advantages and disadvantages small firms possess with respect to innovation are given below:

It is important to note that the existence of vast amounts of literature on the subject indicates not just the importance of the subject but also the inconclusive nature of results (Tether, 1998). This goes back to the earliest discussions on the subject generated by Schumpeter whereby SMEs were mentioned as the major source of innovation (Schumpeter, 1934) but later on it was suggested that large firms were likely to be the driving force behind technological developments (Schumpeter, 1950). The issue is further compounded since Coad and Tamvada (2008) suggest that for developing countries the requirements concerning the SME sector might well be different from developed countries raising questions about how innovation might be studied in different parts of the world.

Innovation: The Pakistan Perspective and SMEs

According to the World Economic Forum (WEF) (2008) report 'Global Competitiveness Report (2008-09)' that considers innovation as one of the twelve pillars to determine a country's global competitiveness index, Pakistan is overall ranked 82/134 for innovation. This is a sharp decline from 2007-08 whereby the ranking was 69/131. While the reasons for this decline need to be explored further, it is also important to as-

certain whether the WEF revised and possibly introduced stricter criteria for ranking innovation in its 2008 edition or not. Regardless of that, some of the factors highlighted in the report as being problematic for doing business in the country are government instability, inefficient government bureaucracy, inadequate supply of infrastructure, inadequately educated workforce, policy instability and access to finance. Further, the report points out that Pakistan has a competitive disadvantage for factors such as capacity to innovate, quality of scientific research institutions, company spending on R&D, university-industry research collaboration, government procurement of advanced technology products, availability of scientists and engineers and utility patents.

Innovation and risk taking have traditionally been reticent in Pakistan due to the intrusive role of government in the marketplace. This caused the business sector to develop by capitalizing on rent-seeking rather than entrepreneurship. Although the development of SME sector to some extent reflects the characteristics of entrepreneurship, it has been mostly informal and the government's focus has primarily remained the large formal sector (Haque, 2007). Unfortunately, even this focus has not been well-directed since successive governments protected the large sector from market forces of competition. This meant that beneficial effects resulting from technology diffusion and innovation, efficient use of resources, and managerial and organisational skills could not be realized (Hussain, 1999). The trickle down effect has been that the SMEs have also been severely restricted in their ability to innovate. Suggested as evidence by Berry (1998) Pakistan has been historically lagging seriously in the overall quality of its support systems for SMEs. A crucial evidence of the neglect

Advantages & Disadvantages for Small Firm Innovators

Advantages	Disadvantages
Speed of Decision-Making	Lack of Formal Systems for Management Control, e.g. of project times & costs
High Quality Communications – everyone knows what is going on	Lack of Access to Key Resources, especially Finance
Informal Culture	Lack of Key Skills & Experience
Shared and Clear Vision	Lack of Long-Term Strategy & Direction
Flexibility Agility	Lack of Structure & Succession Planning
Entrepreneurial Spirit and Risk Taking	Poor Risk Management
Energy, Enthusiasm, Passion for Innovation	Lack of Application to Detail, Lack of Systems
Good at Networking Internally & Externally	Lack of Access to Resources

Source: Tidd, J. and Bessant, J., 2009¹

¹ Tidd, J. & Bessant, J., 2009. *Managing innovation: integrating technological, market and organizational change*. 4th ed. Chichester: John Wiley. pp. 61.

Size	Sector	Employment (Full Time Employees)	Productive Assets (Million Rupees)
Small	Manufacturing	< 50	30.0
	Service	< 50	20.0
	Trade	< 20	20.0
Medium	Manufacturing	51 – 250	30.0 – 100.0
	Service	51 – 250	20.0 – 50.0
	Trade	21 – 50	20.0 – 50.0

Source: SME Policy 2007, 2007²

meted out to this sector of the economy is that Pakistan still does not have a formal and recognized definition for SMEs. The classification as recommended in the SME Policy 2007 (Anon., 2007) of the Government of Pakistan is provided below:

One consequence of this classification is that Pakistan also does not have any recognized differentiation between micro and small enterprises.

Conceptualization: Innovation as a System/ Process/Model

One of the fundamental issues concerning innovation is the variety of ways in which people have formulated their understanding of the phenomenon. In one of his initial takes Schumpeter (1936) defines innovation as setting up of a new production function. He further points out five specific cases leading to this new production function, which include: (1) the introduction of a new good, (2) the introduction of a new method of production, (3) the opening of a new market, (4) the conquest of a new source of supply of new materials, and

(5) the carrying out of a new organization of any industry (creating a monopoly position or the breaking up of a monopoly). Another aspect to innovation is that it is viewed as a continuous process. Kline and Roseberg (1986) suggest that most innovations go through changes, sometimes drastic, during their lifetime. However, keeping definitions aside, the more important issue for researchers has been to understand how innovation actually takes place (Fagerberg, 2005) and how can we conceptualize it in order to understand and manage it better.

Tidd and Bessant (1997) take up a process view of innovation describing it as turning ideas into reality and capturing value from them. For Van de Ven, et al. (1999) it is a collective and complex process with many dimensions that requires input and support from a number of internal and external elements.

Rothwell (1992, 1994) suggests that our understanding of innovation process has evolved from the more simple linear models to more complex interactive models.

Rothwell's Five Generations of Innovation Models/Processes

Generation	Key Features
First	Simple linear model based on the concept 'technology push'
Second	Simple linear model based on the concept of market needs also termed as 'needs pull' or 'market pull'
Third	Coupling model that underscores interaction & feedback loops between different elements
Fourth	Parallel model where its emphasis on linkages & alliances through upstream & downstream integration
Fifth	Systems integration & extensive networking, focus on continuous innovation with flexible & customized response

Source: Tidd, J. and Bessant, J., 2009³

2 SME Policy 2007, Government of Pakistan, pp.14.

3 Tidd, J. & Bessant, J., 2009. Managing innovation: integrating technological, market and organizational change. 4th ed. Chichester: John Wiley, pp. 67.

Many researchers have taken a system-oriented approach to studying innovation. This system or process view has also helped them differentiate between invention and innovation better and explain the time-lag that exists between invention and innovation. However, it is pertinent to note that a number of variants of systems of innovation have been conceptualized. For instance Freeman (1987) puts forward the concept of National System of Innovation whereby the system comprises of a network of public and private sector institutions that variably interact or intermix with one another to trigger innovations. Following Freeman, there have been a number of approaches suggested by others as to how we can understand national systems of innovation. Other variants to the system approach include but are not limited to the Sectoral System of Innovation (Breschi & Marlerba, 1997) and Regional System of Innovation developed by Cooke, et al. (1997) and Braczyk, et al. (1998).

An important dimension to understanding and choosing systems approaches when studying innovation in Pakistan's SMEs is not to be influenced by any particular approach too hastily. Which SME sector is being looked at, what kind of products and processes does that sector deal with, what kind of market segments is the SME sector catering to and which region of the country is the particular sector located in are some of the questions that will need to be considered before making a decision. Edquist (2005) suggests a clustering of the three approaches mentioned earlier into a more "generic" systems of innovation approach. However, a researcher should keep room available for possible selection of a particular systems approach depending on the nature of the particular SME sector under consideration. At this stage, suffice is to recommend a process or system view of innovation whereby nothing can occur in isolation. If innovation has to be understood better it will have to be studied in its totality. Underlying this view is the opinion that innovation can occur only if all the key players and factors including those internal to an SME (entrepreneur/owner/manager, product/process types, technologies deployed, organizational structure etc.), as well as those external to it (suppliers, distributors, customers, competitors, support institutions such as government and facilitating organizations, service providers as well as the public and private sector as a whole interconnect, coordinate and support each other. A collective approach will need to be developed with a view that innovation does not manifest itself in isolation and that there are indeed a number of drivers and barriers that intermingle with and affect each other to influence innovation in its existing context. Unless we understand these interrelationships within the system, it will be more difficult to formulate a thorough view of what is going on; why things are the way they are and how they can be changed or improved.

Third Generation Model and Beyond: Making the Innovation Case for Pakistan

As suggested earlier, the role of the government and other related actors in shaping the SME sectors in Pakistan has been intrusive resulting in a significant influence on why or why not these SMEs innovate. However, the importance of market forces in deciding what kinds of products these SMEs produce and how far they are willing to stretch to innovate in terms of their processes cannot be ignored either. The traditional 'First' and 'Second' generation models pointed out earlier fail to account for this two-dimensional impact. This paper suggests that innovation in Pakistan, which has a competitive disadvantage for technology due to weak support systems from private sector service providers, the government will have to aggressively espouse a 'technology push' agenda in terms of concrete policy interventions and actions. However, an essential characteristic of markets in Pakistan, like anywhere else in the world, is that they are dynamic. Thus, the 'coupling' between evolving technologies and changing market needs will be an essential challenge of successfully initiating and managing innovation in Pakistan's SMEs.

It is pertinent to mention that the 'Coupling Model' espouses a multi-factored approach to explain success or failure of innovation process in a firm or industry. In the case of Pakistan's SMEs that lack traditional R&D focus, the role of entrepreneur/owner will become pivotal in managing the 'coupling' between technology push and need pull. Also, SMEs because of their smaller size cannot be looked at individually in this case. Rather innovation can be understood better in the context of an SME sector comprising of all interacting players.

Bringing in the Fourth Generation Model that is based on the concepts of integration and parallel development, it is proposed that any SME cannot successfully innovate merely through the feedback loops resulting from technology push and market pull. Neither will government or other institutional support suffice. It is important that some level of minimal integration takes place between SMEs and their suppliers resulting in networks. These networks will help SMEs and the entrepreneurs/owners to apply new ideas (new/improved products and/or processes) more effectively. However, the case for parallel development whereby an organization runs its different departments simultaneously rather than sequentially may not have a strong basis simply because SMEs in Pakistan tend to have very simple organizational structures and do not involve complex manufacturing or production processes whereby multiple activities are performed by multiple departments.

The Fifth Generation Innovation Model is based on speed to market and the rapidly changing nature of technology. However, most of the SME sectors in Pakistan are not operating in high technology intensive mar-

kets. Consequently, this paper stops short of adding input from this model. Provided below is Figure 1.1 that is based on the above discussion;

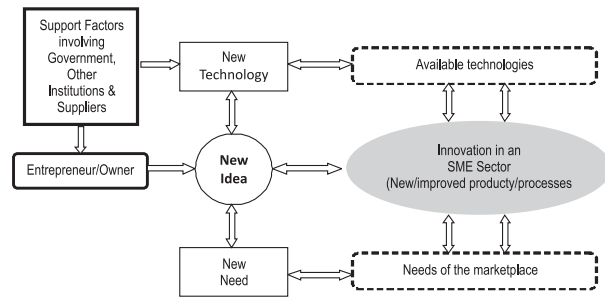


Figure 1.1: Revisiting the Coupling Model

Conclusion and Avenues for Further Research:

This paper contributes to our understanding of innovation in four ways. One, existing literature about innovation is reviewed to highlight the inconclusive nature of the subject. Second, disagreements amongst researchers about whether SMEs have an advantage or disadvantage when attempting innovation are highlighted. The work of Tidd and Bessant (2009) provides a valuable insight in this regard. Third, the discussion leads to providing a perspective on innovation in Pakistan's SMEs. Possible reasons about why innovation has traditionally been reticent in Pakistan are mentioned. It is opined that the intrusive role of the government has played a significant role in this regard. Fourth, while advocating a system or process-oriented approach to studying innovation in SMEs, it is suggested that third generation model by Rothwell offers the most suitable approach in Pakistani context. However, further empirical evidence in Pakistan's case will be needed to conclusively suggest whether fourth and fifth generation models are relevant to particular SME sectors.

REFERENCES:

- Berry, A., 1998. The potential role of SME sector in Pakistan in a world of increasing international trade. *The Pakistan Development Review*, 37(4), pp. 25-49.
- Braczyk, H., Cooke, P., et al., 1998. *Regional innovation systems: the role of governances in a globalized world*. London: Routledge.
- Breschi, S. & Malerba, F., 1997. Sectoral innovation systems: technological regimes, schumpeterian dynamics, and spatial boundaries. *Systems of innovation: technologies, institutions and organizations*, pp. 130-156.
- Coad, A. & Tamvada, J. P., 2008. *The growth and decline of small firms in developing countries*, In Papers on Economics and Evolution, Max Planck Institute of Economics, Evolutionary Economics Group.
- Cooke, P., Gomez, M. U., et al., 1997. Regional innovation systems: institutional and organisational dimensions. *Research Policy*, 26(4-5), pp. 475-491.
- Coombs, R., Narandren, P. & Richards, A., 1996. A literature-based innovation output indicator. *Research Policy*, 25(3), pp. 403-413.
- Dahl, D. W. & Moreau, P., 2002. The influence and value of analogical thinking during new product ideation. *Journal of Marketing Research*, 39(1), pp. 47-60.
- Dyer Jr, W. G. & Handler, W., 1994. Entrepreneurship and family business: exploring the connections. *Entrepreneurship: Theory and Practice*, [Online]. 19(1), Available at: All Business <http://www.allbusiness.com/management/483419-1.html> [Accessed 09 April 2009].
- Edquist, C., 2005. Systems of innovation: perspectives and challenges. In: J. Fagerberg, D. C. Mowery & R. R. Nelson, eds. 2005. *The oxford handbook of innovation*. New York: Oxford University Press, pp. 181-208.
- Eggert, A. & Ulaga, W., 2002. Customer perceived value: a substitute for satisfaction in business markets? *The Journal of Business and Industrial Marketing*, 17(2-3), pp. 107-118.
- Fagerberg, J., 2005. Innovation: a guide to the literature. In: *The oxford handbook of innovation*. New York: Oxford University Press, pp. 1-26.
- Freeman, C., 1987. *Technology, policy, and economic performance: Lessons from Japan*, London: Pinter Publishers.
- Haque, N., 2007. Entrepreneurship in Pakistan. *PIDE Working Papers*, 2007(29).
- Hausman, A., 2005. Innovativeness among small businesses: theory and propositions for future research. *Industrial Marketing Management*, 34(8), pp. 773-782.
- Hussain, I., 1999. *Pakistan: the economy of an elitist state*, Oxford: Oxford University Press.
- Kahn, K. B. et al., 2003. Editorial: Identification and consideration of emerging research questions. *Journal of Product Innovation Management*, 20(3), pp. 193-201.
- Kassicieh, S. K., Kirchoff, B. A., Walsh, S. T. & McWhorter, P. J., 2002. The role of small firms in the transfer of disruptive technologies. *Technovation*, 22(11), pp. 667-674.
- Kline, S. J. & Rosenberg, N., 1986. An overview of innovation. In R. Landau & N. Rosenberg, eds. 1986. *The positive sum strategy: harnessing technology for economic growth*, Washington D.C.: National Academy Press, pp. 275-304.
- Linder, J. C., Jarvenpaa, S. L. & Davenport, T. H., 2003. Toward an innovation sourcing strategy. *MIT Sloan Management Review*, 44(4), pp. 43-49.
- Romano, C. A., 1990. Identifying factors which influence product innovation: a case study approach. *Journal of Management Studies*, 27(1), pp. 75-95.
- Rothwell, R., 1992. Successful industrial innovation: critical factors for the 1990s. *R&D Management*, 22(3), pp. 221-240.
- Rothwell, R., 1994. Towards the fifth-generation innovation process. *International Marketing Review*, 11(1), pp. 7-31.

- Rothwell, R. & Dodgson, M., 1994. Innovation and size of firm. In: R. Rothwell & M. Dodgson, eds. 1994. *The handbook of industrial innovation*. Cornwall: Edward Elgar Publishing.
- Schumpeter, J. A., 1934. *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge, Mass: Harvard University Press.
- Schumpeter, J. A., 1936. *The theory of economic development: an inquiry into profits, capital credit, interest and the business cycle*, Cambridge: Harvard University Press.
- Schumpeter, J. A., 1942. *Capitalism, socialism and democracy*. New York: Harper.
- Schumpeter, J. A., 1950. *Capitalism, socialism and democracy*. 3rd ed. New York: Harper.
- Sivadas, E. & Dwyer, F. R., 2000. An examination of organizational factors influencing new product success in internal and alliance-based processes. *Journal of Marketing*, 64(1), pp. 31-49.
- Souitaris, V., 1999. Research on the determinants of technological innovation: a contingency approach. *International Journal of Innovation Management*, 3, pp. 287-306.
- Souitaris, V., 2002. Technological trajectories as moderators of firm-level determinants of innovation. *Research Policy*, 31(6), pp. 877-898.
- Srinivasan, R., Lilien, G. L. & Rangaswamy, A., 2002. Technological opportunism and radical technology adoption: an application to e-business. *Journal of Marketing*, 66(3), pp. 47-60.
- Tether, B. S., 1998. Small and large firms: sources of unequal innovations? *Research Policy*, 27(7), pp. 725-745.
- Tidd, J. & Bessant, J., 1997. *Managing innovation: integrating technological, market and organizational change*, Chichester: John Wiley.
- Tidd, J. & Bessant, J., 2009. *Managing innovation: integrating technological, market and organizational change*. 4th ed. Chichester: John Wiley.
- Van de Ven, A., Polley, D., et al., 1999. *The innovation journey*, New York: Oxford University Press.
- Van-Dijk, B., Den Hertog, R., Menkveld, B. & Thurik, R., 1997. Some new evidence on the determinants of large and small-firm innovation. *Small Business Economics*, 9(4), pp. 335-343.
- Wolfe, R. A., 1994. Organizational Innovation: review, critique and suggested research directions. *Journal of Management Studies*, 31(3). Abstract only. Available at: Wiley Interscience <http://www3.interscience.wiley.com/journal/119266398/abstract?CRETRY=1&SRETRY=0> [Accessed 13 October 2008].
- World Economic Forum., 2008. *The global competitiveness report*. eds. Porter, M. E. & Schwab, K. Geneva: World Economic Forum.