Innovation and Pakistan’s Economy

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Innovation is essentially characterized by ‘newness’, but it is not a new phenomenon itself. Perhaps, it is as old as mankind. The great variety and diversity of products and services around us is actually a result of a continuous process called innovation, the process of creating something ‘new’. The terms innovation and invention are used in different contexts: invention is the discovery of new processes, principles, or products and innovation, on the other hand, is the commercialization of these processes, principles or products for generating value for firms and customers.

Recently, especially after the development of endogenous growth model, and efforts to explain the ‘East Asian Miracle’, much time and effort is being allocated for researching innovation. Innovation is considered to be the basis for competitiveness: the real challenge for survival and growth of a firm, industry and an economy in the modern times. Now in many countries innovation policies are being framed and implemented, in combination with science and technology policy, and industrial policy to improve competitiveness based on productivity and, more importantly, innovation.

Economists have long been referring to the active role of entrepreneur, pressure of competition, specialization and technology as possible responsible agents for innovations. Joseph A Schumpeter (1883 –1950) was perhaps the first economist (and a social theorist) who explained the process of long term economic change on the basis of innovation. Schumpeter distinguished five ‘types’ of innovation: product innovation, process innovation, market innovation, sources of supply innovation, and organization innovation. At that time, ‘innovation studies’ as a distinct branch of economic science was not present, however Schumpeter brought the questions of ‘how’ and ‘why’ of innovation to the center stage. Moreover, his writings on the subjects of innovation and entrepreneurship, their roles in finding ‘new combinations’ for ‘creative destruction’ have attained the rank of classics in the field of innovation research, and theories of development. Despite disagreements, researchers in innovation, especially those interested to explore its social character and not the technological alone, still benefit from the writings of Schumpeter. As the basic challenge for Schumpeter was to develop a theory of economic change and development, so innovation and entrepreneurship emerge as his ‘answers’, and not the ‘questions’ to be explored by himself. However, his writings inspired the subsequent disciplined research into the ‘how’ and ‘why’ of innovation as a comparatively new phenomenon.

Although the legacy of Schumpeter rests in the application of social sciences perspective to the analysis of innovation, however later on technological development was regarded to play a dominant role. In the historical context, R&D, and Technological Development were considered to be synonymous to ‘innovation’ especially in the 1960s and 1970s. Fagerberg, J. (2005) reports that innovation studies started to emerge as a separate field of research in the 1960s. An important event in this process was the formation of the Science Policy Research Unit (SPRU) at the University of Sussex, UK in 1965. The name of the centre illustrates the tendency for innovation studies to develop under other nomenclatures such as ‘science studies’ or ‘science policy studies’. Notwithstanding, the most recent literature on innovation is multidisciplinary, and science & technology sides of innovation formulate only a part of it. So, we may conclude that although R&D, technological development, and innovation are
interrelated and sometimes overlapping, but conceptually they are different. Hence, innovation is related to the commercialization of inventions and discoveries even of a very small significance in terms of scientific knowledge, and R&D on the other hand is related to inventions.

At the macroeconomic level, innovation i.e. the invention and application of new technologies, products and production processes is a key driver of productivity growth. In the context of Pakistan’s Economy, there is a deficiency of systematic research studies on the process of innovation and its implications. A few examples of studies on competitiveness and related issues are Ahmad, Chaudhary, and Ilyas (2008), Bhutto, Rashdi, and Abro (2012), Khan (2006), Mahmud and Ahmed (2012).

Modern approach to study innovation at micro or macro levels is “Innovation as a system”. The usefulness of ‘systems’ approach to study innovation emerges from its broader and detailed cognition of the innovation process because practically firms don’t innovate in isolation, and it would be naïve to assume it so, specially for developing policy guidelines to promote innovation. As Malerba (2002) described innovation to be a collective process, he stressed that in the innovative process firms, interact with other firms as well as with non-firms organizations such as universities, research centers, government agencies, financial institutions and so on. He further clarified that the systems approach placed a lot of emphasis on inter-disciplinarity, stressed on the historical perspective and has put learning as a key determinant of innovation.

So, it can be concluded that the academic research and its practical applications should be developed in harmony with each other, specially in the context of a resource scarce economy like Pakistan. This can be done practically by allowing for industry positions for univerity and research scholars. The industrialists and entrepreneurs in Pakistan should realise that it is in their own interest to have direct linkages with the academia and universities so that knowledge creation process (in universities) is in line with the requirements of knowledge and technoloy (in industries). Lessons should be learnt from fast growing economies like China, and India in our neighbourhood; and also from developed economies like Japan, Germany, Korea, and USA, for example.

**Appraisal of the Technical Effectiveness of Decision Making Units (DMUs) using Data Envelopment Analysis (DEA)**

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In the recent years, the factors affecting economic growth in developing countries have been receiving growing attention. Productivity has long been accepted as an engine of economic growth and a determinant of international competitiveness. A greater growth in output because of growing total factor productivity is considered superior to an input-driven growth as inputs are imperiled to diminishing return. Technological change is one of the major sources of sustainable organizational effectiveness. In addition, a systematic comprehension of the factors that affect productivity is also very important. The quantification and examination of productivity change is always a controversial topic and has gained much interest among organizational researchers and practitioners.
An effective technology and performance management system stimulate productivity by establishing clear performance standards and priorities at the beginning of the performance cycle. The use of technological change and performance indicators in business is not novel. Many companies have been gauging quantity, quality, cycle-time, costs, efficiency, productivity, etc., of their products, services and processes on the condition that methods of measuring those phenomena have existed.

The basic problem in designing an effective high technical efficient and performance management system is establishing clear technological and performance standards and measures at the beginning of the performance cycle. The early works on this problem focused on separate measures for productivity and there was a false concept to pool the measurements of the several inputs into some acceptable indicator of efficiency. These insufficient approaches were based on giving a mean productivity for a particular input (while overlooking the rest of inputs), and building an index of efficiency with a weighted mean of inputs, which was then compared with the output. Reacting to these insufficiencies of isolated indices of productivity or labor, productivity or capital etc., Farrell projected an activity analysis method that could more suitably cater to the issue. His indicators were aimed at to be applicable to any productive organization. Awkwardly, he limited his mathematical cases to one output circumstances, though multiple output case could have been made. Building on his work, Charnes et al. (1978) reacted to the necessity for suitable processes to assess the comparative efficiencies of multi – input, multi – output production units, presented a rigorous methodology which was later called ‘Data Envelopment Analysis (DEA).

Technological related measurement is necessary for two reasons. Firstly, in a small unit group, there must be objectivity and consistency in performance measurement. Secondly, better performance is expected with the passage of time. Therefore, units with deteriorating performance must be known so as to create indispensible enhancements. Performance of a ‘Decision Making Unit’ (DMU) can be assessed either in cross-sectional or in time-series style, and DEA is a useful method for both sorts of evaluation.

‘Data envelopment analysis is a method which is non-parametric and is attributed to Charnes, Cooper, and Rhodes (1978). In this method several inputs and outputs could be used to measure the performance of an entity. It is used to assess the efficiency of DMUs and appraise their relative efficiency.

Data envelopment analysis assesses the comparative efficiency of units that are homogeneous by considering several inputs and outputs. Inputs are usually means used by DMU and outputs are yields produced and/or performance methods of DMU. Efficiency is accorded as the quotient of weighted-sum of outputs to weighted-sum of inputs. Data envelopment analysis has been widely employed to compare the efficiencies of nonprofit and profit organizations for example schools, shops, hospitals, branches of banks and other production or service units in which there are comparatively homogeneous DMUs.

For a specified set of inputs and outputs of a DMU, Data envelopment analysis produces a unique and all-inclusive efficiency score – a measure of performance. In background, an empirically based ‘best practice’ or ‘efficient frontier’ is constructed as a result of detecting a set of efficient DMUs (located at efficient
frontier) and in-efficient DMUs (not located at efficient frontier).

The benefit of data envelopment analysis over other approaches of efficiency determination, (for example regression or cost benefit analysis) is that there is no need to know the relative weights of the variables. Multiple outputs and multiple inputs can be handled in this approach. Its superiority is based on a Distance Function Approach (DFA). Moreover, no specific behavioral assumptions of the firm (e.g. cost minimization or profit maximization) are made. Also, it makes no assumptions concerning the distribution of efficiencies. In addition, no prior information concerning the prices of either inputs or outputs is required.

Many variants of this technique exist, different in how efficient frontier is obtained and in how the distance to the frontier for in-efficient DMUs is quantified. According to Zhu (2002), over the past 30 years, various data envelopment analysis models have been extensively employed to appraise the technical effectiveness of decision making units ‘DMUs’ in organizations and industries.

**Scitovsky Paradox**

*This theory states that in welfare economics there is no increase in social welfare by a return to the original part of the losers. If an allocation A is deemed superior to another allocation B by the Kaldor compensation criteria, by a subsequent set of moves by the same criteria, we can prove that B is also superior to A. The paradox occurs when the gainer from the change of allocation A to allocation B can compensate the loser for making the change, but the loser could also then compensate the gainer for going back to the original position.*

Information and Communication Technology, and Knowledge Economy of Pakistan

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In Pakistan, after the Deregulation Policy in July 2003 and ‘Mobile Cellular Policy’ in January 2004, ICT emerged as a sector of the economy; producing software, hardware and internet services and earning revenue. Subsequently, ‘Pakistan ICT Indicators’, a report by Federal Bureau of Statistics, probed ICTs in four industries i.e. IT, Telecom, Internet Services & Electronic Media. The latest effort is the drafting of National ICT Policy 2012 for which currently discussions within the industry and with stakeholders, partners and customers are being undertaken in order to develop a wholesome strategy.

The uplift in the ‘Information Technology’ sector in Pakistan owes it to the incentives like 100% equity ownership as well as profit repatriation for foreign investors, funding of software companies to get international certifications like ISO-9000 and CMM, tax holidays among others. Till May 2011, 1844 IT companies had been registered with Pakistan Software Export Board (PSEB). Majority of these are in Karachi and Lahore.

Modern vocabulary has replaced traditional economy with ‘knowledge economy’. It is the modern type of economy that banks on knowledge at least as much as much it depends on the capital, labor and other factors of production. So, the new concept of economy revolves around ‘knowledge creation’. It would be safe to state that ICT has proved to be a
‘catalyst’ in the process of knowledge creation. Knowledge economy is assessed by World Bank in its report listing Knowledge Economy Index (KEI). KEI is composed of Economic Incentive Regime, Innovation, Education and ICT. Pakistan has had 123rd, 122nd, 115th and 117th rank out of 146, 146, 140 and 145 ranks respectively in 1995, 2000, 2008 and 2012 showing an improvement at a snail’s pace during the last 17 years.

For Pakistan, the limiting factors in becoming a Knowledge Super Power are as follows: i) the lack of relevant micro level data on ICT that is necessary for in-depth analysis; ii) the lack of youth channeling which is an asset of labor surplus economy of Pakistan; iii) low level of digital literacy that hinders the users of ICT to be more economically productive and limit them to petty and entertainment-related usage of ICT &; iv) electricity crises which currently exists in its worst form and directly undermines the productive effect of ICT in our knowledge economy. Overcoming these limiting factors can make our economy a live wire and can contribute towards its becoming a Knowledge Super Power.

STARVE THE BEAST

"Starving the beast" is a political strategy employed by American conservatives in order to limit government spending by cutting taxes in order to deprive the government of revenue in a deliberate effort to force the federal government to reduce spending. The short and medium term effect of the strategy has increased United States public debt rather than reduced spending.

The term "the beast" in this context refers to the American government and the programs it funds, particularly social program such as welfare, Social Security, and Medicare; and does not usually refer to spending on military, law enforcement or prisons.