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Identifying enablers of technological innovation for Indian MSMEs using best–worst multi criteria decision making method

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ABSTRACT

MSMEs (Micro-small and Medium Enterprises) can alter the economic scenario of any developing nation owing to their inherent ability to transform new ideas into innovations and thus successful business enterprises. However transforming the socio-economic status of a developing country is not an easy task. Manufacturing organizations especially MSMEs need to focus on important enablers of innovation to sustain global competition. This study aims at identifying important enablers of technological innovation in the context of Indian MSMEs. Extant literature review and expert judgment are used to identify enablers of technological innovation. A novel multi-criteria decision making technique called best–worst method is applied to find out most important enablers among these. Research results indicate project resources and capabilities; technical know-how of entrepreneurs and government policies as most important enablers contributing significantly towards technological development of MSMEs.

1. Introduction

MSME growth is a prerequisite for the growth of a developing economy as these organizations comprise more than 50% of the manufacturing output of the economy (Eniola and Entebang, 2015). MSMEs contribute substantially to the economic growth of developing countries (Keizer et al., 2002; Gupta et al., in press; Manhas et al., 2015). Due to liberalization and advent of globalization developing economies are finding it difficult to sustain cut-throat competition among different firms and stay competitive (Gupta and Nanda, 2015). Competitiveness of a nation largely depends on innovation (Freel, 2000). The ability of small organization to bring out innovations is the prime element for competitiveness of that economy (Madrid-Guijarro et al., 2009). However to sustain competitiveness is not an easy task for small organizations as these are most susceptible due to variety of problems, like resource constraints, difficult access to advanced technologies, incapable managers, limited access to finance, lower production level, poor quality and regulatory obligations (OECD, 1997). These barriers are most prominent for developing countries like India which stands at a relatively lower position on the global competitive index (over all rank 60 among the 148 participating nations) (World Economic Forum, 2014). Technological innovations help organizations establish their own competencies and propel them to stay ahead of their competitors and remain competitive. The need of the hour is to identify enablers of innovation for MSMEs of a developing economy.

With this objective in mind this research aims at identifying and rank enablers of technological innovation for MSMEs in the context of a developing economy like India. Extant review of literature has been done to identify enablers of technological innovation and a novel multi-criteria decision making technique called best–worst method developed by Rezaei (2015a) has been utilized to rank these enablers.

The rest of this paper is structured in the following manner. In Section 2, an extant literature review of possible enablers of technological innovation is presented. Section 3, elaborates the steps involved in the best–worst method. Section 4, presents the results and discussions of this study. Section 5 presents the managerial implications of the results obtained and finally Section 6 highlights the limitations of this study and discusses possible future research in this area.

1.1. Definition of micro, small and medium enterprises in India

Every economy has their own criteria for defining small and medium enterprises. Most of the countries do not differentiate between micro and small enterprises as they are considered the same, the only difference is among small, medium and large enterprises. But India as per MSMED Act 2006 differentiates these organizations as micro, small and medium enterprises. Some define MSMEs in terms of number of employees; some defined it in terms of annual sales and turnover, whereas some defined it in terms of investment in plant and machinery. In India, MSMEs are defined in terms of investment in plant and machinery by MSMED Act 2006 (See Table 1). This act classified enterprises

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in two categories: one is manufacturing enterprises and the other is service enterprise.

2. Literature review

2.1. Technological innovation

According to the World Economic Forum (2014) technological innovation is one of the twelve pillars determining productivity, growth and competitiveness of a country. The term 'Innovation' seems to be derived from the Latin word 'novus' (Hsu, 2005), which means new, young or novel. A substantial group of people view innovation as a means of creativity and creation of invention. Different authors have described technological innovation in different contexts at different points of time. OECD (1997) describes technological product innovation as improving performance characteristics of the product so as to deliver a commercially successful product. A technological innovation process can be considered as the adoption of new technology or implementation of an improved production process at the organization. Technological innovation might involve change in organization structure, working processes or new and innovative ways of human resource management (OECD, 1997; Madrid-Guijarro et al., 2009). According to Tidd et al. (2001) technological innovation involves converting newly generated ideas into actions that results in visible improvement in organization. Cummings and Oldham (1997) described technological innovation as integrating new technologies, operations and most adept processes for the generation of innovative ideas adoptable by market. Further Terziovski (2008) defines technological innovation as a process of first generation of new ideas than successfully implementing those ideas for successful running of businesses. At large scale technological innovations benefit the society by proliferating growth of the whole industry and at grass root level it influences individual enterprises and partners involved by their growth. Relatively younger MSMEs and firms at entry level have enormous potential for technological innovation across different countries of the world (Chaminade and Vang, 2007; Verhees and Meulenberg, 2004).

Various researchers over the time have identified many enablers of technological innovation for MSMEs. Rothwell (1991) explained the importance of subcontracting relations and networking among small firms as potential enablers of innovative performance of small firms. Lee (1995) in their study of Korean electronic industry identified that in-house R&D and technical linkage with buyers, suppliers and educational institutes have strong impact on radical innovations of organizations. On a similar line Hayashi (2002) in the context of Indonesian SMEs argued that inter-firm cooperation through subcontracting ties would increase productivity and innovativeness of SMEs. Further Narayana (2004) focused on infrastructure facilities including transport, market information, credit, power, water, telecom, technology upgradation and quality certification as enabler of competitiveness in Indian small scale industries. Subrahmanya, 2005 and Kumar and Subrahmanya (2010) in a study of SMEs of India concluded that innovative activities are motivated by firm owners and also through linkages with large enterprises. Nanda and Singh (2009) in their study of Indian MSMEs presented the five main components comprising the technology development implementation program. These included, Manpower Competence and Management Commitment; Technology Infrastructure; Regulatory Support; Interaction with Others and Research Outputs. Kang and Park (2012) examined that internal R&D human capital or workforce and collaboration with universities as well as support from government have shown significant improvement in innovation performance of Korean SMEs. Very recently Krishnaswamy et al. (2015) studied the impact of external customer interaction and assistance on firm innovation and found that strong external networks have positive impact on innovations and thus firm growth. Also Bala Subrahmanya (2015) in his research on SMEs of India found that entrepreneur's qualification, skilled labor, relationship with suppliers, collaborations with customers and support from technology resource centers are determinant for innovation related growth of SMEs. Gupta and Nanda (2015) identified four main drivers of innovativeness for MSMEs viz. entrepreneur, linkage capability, regulatory corroboration and technology infrastructure. Based on the extensive review of literature few enablers of technological innovation for MSMEs have been identified and discussed in the following paragraphs.

2.2. Entrepreneur Role

Innovation in new firms is generally actuated by a single person called entrepreneur (Garnsey, 1998). Entrepreneur is a representative of society for change. The inherent characteristics of entrepreneur are to perform old or erstwhile activities in a new or innovative manner. (Schumpeter, 1947). It was Schumpeter (1959) who analyzed the theory of entrepreneur from a new perspective. According to him, development is the burst of economic activities. When the stationary equilibrium is disturbed, development takes place. This change or disturbance comes forth in the form of 'innovation'. For Schumpeter, the entrepreneur is an 'innovation' who is characterized by potentialities of doing new things or doing things in a new way. The entrepreneur must lead an innovation project in order to build a successful and competitive business (Ottosson, 2004). The entrepreneur represents an innovative person who aims for maximum profit with cost minimization by making various innovations (Örnek and Danyal, 2015). Entrepreneur success can be measured through a number of components such as spread of knowledge (Grossman and Helpman, 1991); enhancement of competition among firms (Feldman, 1999) or diverseness (Hassan and Olaniran, 2011). All the vital resources like technical skills, knowledge about day to day working, ability to take risks and decisions, past experience in other organizations and most necessary education are held by an entrepreneur (Edelman et al., 2002). Entrepreneur age, technical competencies, know-how and prior experience are the important enablers for innovative growth of SMEs (Mazzarol et al., 1999; Indarti and Langenberg, 2005; Islam et al., 2011; Startiene and Remeikiene, 2015).

2.2.1. Education level of entrepreneurs

The technical capability of the firm will be reflected in the educational qualification of the entrepreneur/s, and proportion of skilled labor in the total employees of the firm. Firms with a technically qualified entrepreneur as its head and skilled workforce as its base will be better equipped to undertake innovations (Subrahmanya, 2015). Even though a firm is having highly skilled and qualified staff but the decisions regarding acquiring new technology, organization-wide changes and external investments in machinery lies with the entrepreneur (Clancy, 2001). An educated entrepreneur is bound to make better decisions regarding these (Jagersma, 2008). Education level of entrepreneurs is directly proportional to the firm's success, a university level graduate often makes better decisions than a school dropout (Meng and Liang, 1996; Zaridis and Mousiolis, 2014). The advantage of having technical education background is that it would enable an entrepreneur to impress upon a trans-national-corporation towards forging subcontracting relationship and receive more technical assistance as compared to a non-technical entrepreneur (Subrahmanya, 2010).

2.2.2. Technical know-how and training of entrepreneur

Jamieson (1984) categorize entrepreneurial education into three different classes viz. first one in which entrepreneur is learning about organization, second one in which entrepreneur is learning for organization and last one in which entrepreneur is learning in the organization (i.e. training). The success of an organization mostly is affected by entrepreneurs' learning in organization. Training infuses the necessary skills and working knowledge among that have profound impact on decisions related to production activities (Jagersma, 2008). Entrepreneurs need to develop technical knowledge regarding necessary procedures and techniques relevant to work and must make use of these techniques to fulfill