A Multi-Dimensional Causal Model of Effective Factors on Open Innovation in Manufacturing SMEs in Iran

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ABSTRACT

Open innovation makes the success of SMEs’ performance in a dynamic environment. The present article conducted with the aim of identifying the most important effective factors on open innovation and reviewing the causal relationships among them. To study the most important factors, the data collected by questionnaires filled by 275 experts, and analysed by SPSS and PLS. Causal relationships among studied factors were identified by fuzzy DEMATEL technique, the data collected from 12 experts and analysed by MATLAB and EXCEL. According to the results, economic factors as a one of the casual factors is the most effective factors. However, employees factor is the most factor affected from the others. Just strategy of organisation has one step casual loop and effects on itself directly and it has the most interaction with others. Besides, ecological issues have no influence on the others.

KEYWORDS

Causal Relationships, Fuzzy DEMATEL, Manufacturing SMEs, Open Innovation, SMEs

1. INTRODUCTION

Today, innovation is considered a key factor for the success of firms in the marketplace (Hult et al., 2004) to drive competitive advantage and improve performance (Forsman & Temel, 2011; Smith et al., 2008). Chesbrough (2003a) discusses two kinds of innovation: Closed Innovation (CI) and Open Innovation (OI). CI returns to 20th century when the universities and states did not take any activities for commercialising the science (Parhizgar et al., 2013). The process that large companies internally explored, developed, and commercialised technologies identified as CI (Chesbrough, 2003b). Henry Chesbrough introduced OI 14 years ago and defined it as “the use of purposive inflows and outflow of knowledge to accelerate internal innovation and to expand the markets for external use of innovation” (Chesbrough, 2006). In OI model, the firm looks beyond its internal environment and limited resources for ideas and opportunities (Chesbrough, 2003a; Spithoven et al., 2013). OI is based on two main dimensions, “Exploration” and “Exploitation” (Chesbrough & Crowther, 2006; Enkel et al., 2009). Exploration refers to the process of search and integration of external knowledge that includes networking and collaboration with other organisations such as universities, suppliers, partners, and customers in the development of products, services and internal use of intellectual property licences among others (Chesbrough & Crowther, 2006). Even the largest firms need to open their innovation activities by collaborating with other organisations in order to keep pace with technological developments (Chen et al., 2011). Small and medium-sized enterprises (SMEs), as the majority of firms in the service and manufacturing sectors, play significant roles in the growth
(Abdullah et al., 2016), development, and industrialisation of many economies (Shafiei Nikabadi & Zaman, 2016). However, SMEs have difficulties keeping up-to-date, developing, and commercialising innovations (Schmidt et al., 2016) and Current innovation processes in SMEs are characterised by nonlinear collaboration forms which involve different stakeholders from various origins (Schulz, 2014). Although one of the most pressing for academics and practitioners alike relates to how OI can be implemented (Gassmann, 2006), few studies have emerged about investigating OI practices in SMEs (Huizingh, 2011; Lee et al., 2010; Van de Vrande et al. 2009; Laursen & Salter 2006). In Iran, about 75% of manufacturing firms are SMEs (Shafiei Nikabadi & Zamanlo, 2012). However, there are only few domestic studies about OI implementation in manufacturing SMEs (MSEMs). Comprehensive exploring about effective factors OI in MSMEs in terms of different aspects and examining causal relations among studied factors are expected to help MSMEs desirous of adopting OI. Thus, in order to help Iranian MSMEs due to successful OI implementation, the paper aims to answer this question “What is the Causal model of effective factors on OI in MSMEs?” after identifying the most vital effective factors on OI among MSMEs in Iran.

2. LITERATURE REVIEW

OI is a paradigm that can use external ideas as well as and internal ideas (Monsef & Wan Ismail, 2012). According to the studies, the use of OI can increase the product success rate up to 50% and research productivity and internal development up to 60% (Enkel et al., 2009). In terms of process, studies consider three main processes for OI (Greco et al., 2015; Kian et al., 2015; Enkle et al., 2009; Gassmann & Enkel, 2004). The Outside-In process, this process is normally used by companies that are interested in entering knowledge form outside resources (Chesbrough & Bruno, 2013) such as suppliers and customers (Greco et al., 2015; Kian et al., 2015) Gassmann and Enkel, 2004; Enkle et al., 2009). The inside-out process, companies look for external organisations with business models that will better exploit and commercialise their particular technology (Kian et al., 2015). The coupled process, it refers to co-creation with complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success. (Greco et al., 2015; Enkle et al., 2009; Gassmann and Enkel, 2004).

A closer look into different industry sectors indicates that OI are most widely adopted in High-Tech manufacturing sectors and Low-Tech manufacturing sectors have the lowest rate of adoption (Chesbrough & Bruno, 2013). The first step towards OI is the outsourcing of R&D to reduce costs and risks and to use complementary assets to fuel growth (Gassmann et al., 2010). Researches indicate that OI is a systematic shift and R&D alone cannot fully implement open innovation, so other parts of the organisation such as human and resource management must get on board for it to work effectively (Chesbrough & Bruno, 2013). Ibarra et al. (2015) with the purpose of mapping the challenges for the OI model’s implementation in the industries of telecommunications, pharmaceutical, biopharmaceutical and automobile services found that these challenges are presented in three stages: organisational change management, external relationship management with innovation and commercialisation sources and effectiveness of intellectual property protection. Besides, cultural barriers affect OI implementation in MSMEs as much as large companies (Van de Vrande et al., 2009), the attitude against adopting external ideas is the most mentioned across the OI literature (Mortara & Minshall, 2011), Lichtenthaler (2008), Chesbrough and Crowther (2006) mentioned this syndrome as the most important challenges for OI implementation. Towards OI implementation, companies need to exchange ideas with external knowledge sources such as customers, suppliers, competitors, and other business stakeholders to create products and / or services through innovative information exchange (Wallin & Von Krogh, 2010; Hippel, 1988). As a result, firms have been already interacting with other organisations such as universities and suppliers in order to improve their innovation performance (Vanhaeverbeke et al., 2014), because a large amount of external subjects such as research institutions, suppliers, customers, consultants and competitors may provide the firm
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