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Implementation of Open Innovation in The Small and Medium-Size enterprise (SMEs): A Literature Review

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Abstract. This study is a systematic literature review of three academic articles. It aims to investigate and explore the implementation of open innovation in SMEs. The review was conducted in three phases: (i) understanding the concept of innovation and open innovation; (ii) identifying references and (iii) exploring primary study which explains about the implementation of open innovation in SMEs. Finally, this paper examines how the concept of open innovation in SMEs is implemented in different countries. The result shows that open innovation in SMEs focus more on commercialization because marketing channels and global contacts to introduce them effectively to the market. Implementation of open innovation in SMEs has a significant impact to the company in the aspect of 1) motives and perceived challenges, 2) leadership, people, culture, and business improvement; 3) company size on the effectiveness of innovation endures.

Keywords: open innovation, implementation, SMEs, literature review

1. Introduction

The development of innovation is a series of stages describes in the innovation process. Furthermore, organization and governance of this innovation processes are seen as innovation management. Research and development (R&D) management consist of the discovery and innovation process, which is perceived as a broad term of innovation management. However, a specific approach to innovation management is the focus of R&D [1].

Understanding the various innovation management approaches and their respective advantages and disadvantages is critical if one is to select the best approach in a given context [1]. In the past, researchers and managers in the field of technology and innovation management were associated with strong internal R&D capabilities with innovativeness. Ideas and inventions were generated through the company's own distribution channels that came from the sales and marketing department. Generally, competitiveness is produced by companies by sharing sporadically innovative with others. In a very strict way and required control, it will deliver success of innovation, known as the characteristic of closed innovation [2].



According to Chesbrough [3], closed innovation focuses on the discovery of the innovation process, which becomes the attention of researchers in the field of technology and innovation management. To improve innovation management, portfolio management of the company is required. Thus, open innovation becomes a reference in thinking about research on technology and innovation management. Formerly, researchers only added knowledge that was in the silos. In this new role, the knowledge that comes from both inside and outside is considered to be useful and must be valued equally. By expanding the role of internal researchers to include not only the generation of knowledge but also the intermediary of knowledge. So, it is expected that knowledge can move in and out of the silo.

Small and medium-sized enterprises (SMEs) are practicing extensively open innovation activities, and are increasingly doing so. There is an ongoing debate about the practical applicability of open innovation. The use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively. Yet, in practice, companies face a number of barriers in trying to apply open innovation [4]. The main goal of this paper is to present a literature review on the implementation of open innovation in SMEs research based on peer articles academic. The major contributions of this paper are to give information about innovation, open innovation and the implementation of open innovation in SMEs by comparing the implementation in three countries.

2. Open Innovation

2.1. The perspective of open innovation

Innovation origins in the Latin “innovare”, meaning to renew, to make new or to alter. Souder [5] defines the term innovation referring to the high-risk idea that is new to the sponsoring organization, where organization believes to have high-profit potential or another favorable commercial impact for them. Synder and Duarte [6] define innovation as 1) Drucker [7], the set of tools to create a new business, and 2) Hamel [8], as the strategic innovation-the capacity to reconceive the existing business model in ways that create new value for customers and stakeholders and advantage over the competition.

The closed innovation paradigm and its associated mindset toward organizing industrial R&D have led to many important achievements and many commercial successes. Changes in knowledge in the twenty-first century provide challenges to change the paradigm that still refers to the success of closed innovation. An inwardly focused approach that still fits the knowledge environment in the early 20th century [3]. The paradigm of open innovation can be agreed as the antithesis of the application of a company that relies on product development internally and then distributing it. This is a characteristic of the traditional vertical integration model. Open innovation as a paradigm that assumes that technological progress is desired by the company, by combining ideas and channels, both internally and externally for distribution to the market [9].

Shareholders give an assessment that any products or services should be seen as an innovation that provides competitive and sustainable advantages. So that, it can be presented to customers as a result of the process of creating unique and interesting solutions. Furthermore, innovation should make connections by touching all customer points, covering a broad scope of work from core products to new offers. So that, it will drive the level of breakthrough thinking and ultimately create linkages with customer loyalty missions [6]. In addition, the application of innovation is not only on the product but also in the service sector. Service innovation is how a company produce new ideas and technologies for service offering, develop the existing service quality, and create new value for customers [10]. It includes the development of service innovation by paying attention to service quality in accordance with industry characteristic [11]. The implementation of open innovation research in large-scale industries has been studied widely. It is found that with sufficient resources, the concept of open innovation can be easily implemented. Several studies have successfully measured the implementation of open innovation. However, limited studies have been done in the context of SMEs.

2.2. Open innovation in SMEs

The process of innovation in all types of organizations to implement open innovation lies in external sources, which is also possible for SMEs. Comparing open innovation implementation between SMEs and large firms, commercialization is the focus of SMEs because they have advantages in discovery technology. However, lack of capacity in manufacturing facilities, marketing channels and global contacts in SMEs, has become a barrier to effectively introduce the company to the market. While R&D is a choice for large companies in its implementation. Figure 1 shows the open innovation model for SMEs. Active collaboration in marketing through market exploitation or analysis of customer needs is an important point in the occurrence of open innovation for collaboration between companies. It can be seen that open innovation will not happen at the commercialization phase, if a company uses only one aspect, for instance only an external marketing agent [12].

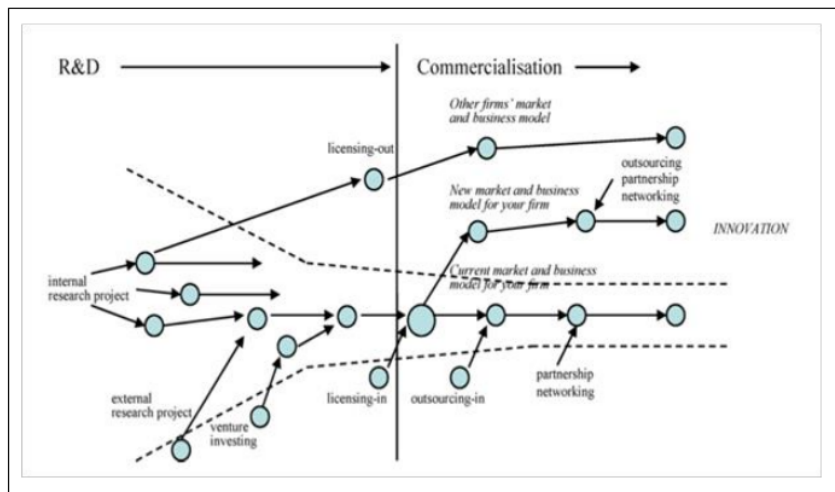


Figure 1. Open innovation model for SMEs[11]

3. Method

This study uses systematic review research by Tranfield et al. [13] and Snyder et al. [14], which consists of several stages. First, the research questions were stated, and guidelines were developed for collecting the literature. Second, a plan for classifying and describing the literature was developed. Finally, the literature was synthesized. The primary search strategy is to identify studies about the implementation of open innovation in SMEs. All relevant research articles processed with broad criteria to meet the requirements for the first entry. The main criteria are an article written about the implementation of open innovation in SMEs, published in a journal using English, and should be full-text access. The article should also be published between 2009-2013. The initial search identified 1.269 articles. The selection process was to identify the implementation of open innovation by countries. There were 300 companies found and finally, three articles were selected for this study.

4. Results

4.1. Implementation of open innovation in the Netherlands

Vrande et al. [15] describe open innovation implementation in the Netherlands. Their research investigates if open innovation practices are also applied by SMEs. The data collected from 605 sample of innovative SMEs in the Netherlands. Their research explores whether open innovation

performs are also applied by SMEs. They also investigated the motives and challenges experienced by SMEs when adopting practices of open innovation. The reflection of technology exploration and exploitation in SMEs is measured through eight variables as shown in Table 1 and Figure 2.

Table 1. Innovation practices and reflecting technology to measure open innovation

Reflecting	Innovation Practise
Technology exploration	customer involvement
	external networking
	external participation
	outsourcing R&D
	Inward IP licensing
Technology exploitation	Venturing
	outward IP licensing
	employee involvement

Technology exploration: 1) customer involvement, directly involving customers in company innovation; 2) external networking, drawing on or collaborating with external network; 3) external participation, to gain access knowledge or synchronize with others, it is obtained through equity investments in new or established companies; 4) outsourcing R&D, using R&D services from other organization, such as public research organizations, universities, suppliers or commercial engineers; and 5) Inward IP licensing, purchasing or using intellectual property (IP), such as trademarks or copyrights, patents of other organizations to advantage from external knowledge.

Technology exploitation: 1) venturing, the use of internal knowledge, human capital, and other support services from a company is a point to start a new organization; 2) outward IP licensing, advantage from firm IP by selling or offering licenses or royalty agreements to other organizations, such as patents, trademarks and copyrights; and 3) employee involvement, Taking advice, freeing them to implement ideas, or making autonomous teams realize innovation are examples of utilizing knowledge and initiatives of employees who are not involved in R & D.

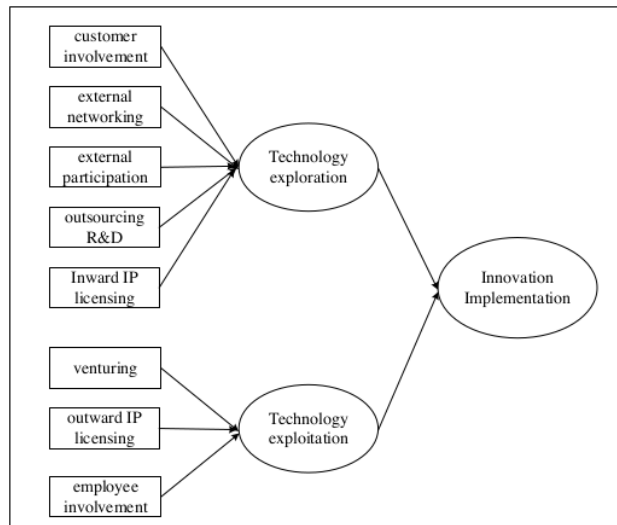


Figure 2. Illustrate the model of open innovation [15]

This study found that over a period of seven years SMEs have adopted and practiced many open innovations. In addition, the medium-sized company was more involved in open innovation than their smaller counterparts; there is no major difference between service and manufacturing industries. Furthermore, fulfillment of customer demand or following competitors becomes the motive of SMEs pursuing open innovation. Points related to cultural and managerial issues are the most important challenges from them in handling the increase in external contacts.

4.2. Implementation of open innovation in the UK

Research of Mc Adam et al. [16] was to develop and tested the model of applying innovation in SMEs via empirical study. This study used references based on existing literature and previous empirical studies to develop a conceptual model of innovation implementation in SMEs. They distributed questionnaires to 395 SMEs in the UK and applied Structural Equation Modeling (SEM) to test the validity of the model.

Measuring the innovation implementation, this postulate is based on literature and exploration case studies. It is constructed as follows: First, innovation leadership. Innovative product development and acceptance of innovation practices are influenced by the perception of leaders about the importance of innovation. The second, people and culture. The same vision of innovation and high-level team participation that is based on process and products will produce a culture that supports innovation. Sustainable processes and products will also be driven through a culture of native flexibility and reactivity to environment changes in SMEs. Hence, people and culture are a key organizational aspect of implementing innovation. They can either promote or prevent innovation efforts.

The third, product and process. The construct of innovation leadership and people culture direct the development of product and process. The fourth, total quality management (TQM). This tool is used to measure the implementation of innovation, focuses on culture and consistent values. This technique is based on lean manufacturing that contributes to moderating costs in new products. Finally, knowledge and information. The product innovation can be developed by leaders in SMEs by utilizing systematic knowledge. The innovation implementation model for SMEs can be seen in Figure 3.

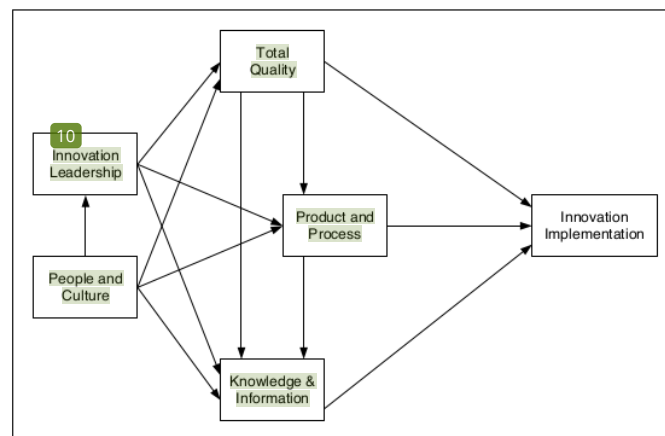


Figure 3. The innovation implementation model for SMEs [16]

The findings show that the implementation of innovation in SMEs is influenced by leadership and culture. These factors affected company activities regarding the implementation of Total Quality Management and knowledge and information, as well as product and process development.

4.3. Implementation of open innovation in China

Xiaobao et al. [17] explain handling the perspective of emerging markets for small and medium enterprises (EM SMEs) by taking into firm size effect on the effect of firm size on the effectiveness of innovation continues and the particularities of open innovation. Their study suggests a resource-based view and the social network perspective that emphasis on the importance of the innovation capacity of EM SMEs bridged by the network framework. The initial model of innovation operations in network-based EM SMEs was developed by synthesizing relevant research results. The authors determine the loading of low commercial network factors by exploring the factors that influence open innovation. Through interviews and exploration factor analysis (EFA), they identify barriers to innovation. In particular, the used a survey data of 420 innovative SMEs of China. They overcome this gap by exploring events and trends towards open innovation.

The measurement of open innovation network in SMEs (Figure 4) consists of four variables. First, innovation capacity. In implementing an open innovation system, a firm has internal and external resources. The aim to fulfill customer demand and other relevant factors come from external. It is followed by providing response and solutions to these external needs through critical knowledge originate by the internal resources. Second, innovation barriers. After-sales service employees and marketers are the core of EM SMEs but have a weakness R&D capacity. The development of the ability to do self-innovation and enthusiasm in optimizing the firm's innovation behavior can be utilized in SMEs by encouraging innovation from external partners, including suppliers, users, and universities.

Third, network openness. Open innovation network provides full access and decision authority to their members and limited access to others. Corporate alliance established in an open form have multiple benefits, including the evasion of small-number bargaining. The level, access focus, and decision authority are given to participants will influence the variation in the level of openness from open innovation networks to others. Finally, network information. Other forms of collaboration can be made possible by network representations. This collaboration can lead to experience improvements by SMEs that reflect possibilities to catch-up with big companies. The strategic choice of company alliance can also experience network constraints expressed by building a perspective of network embeddedness.

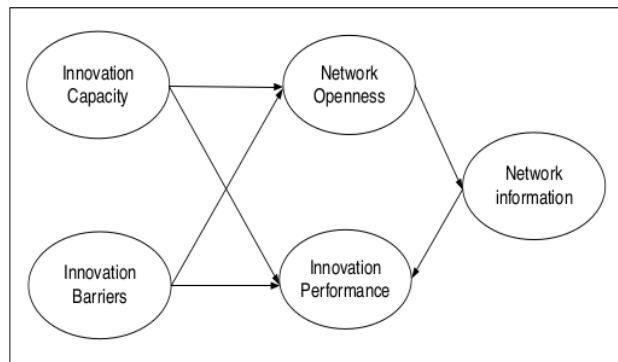


Figure 4. Model of open innovation network in SMEs [17]

This paper supports open innovation from the social network perspective and shows the open innovation of considering important choices for SMEs in the emerging market setting. Their analyses of Chinese SMEs data largely support theoretical framework and demonstrate the importance of factors across firm characteristics (innovation capacity and innovation barriers), network openness, and network information in understanding open innovation in EM SMEs.

5. Discussion

5.1. Implementation comparison of open innovation

Implementation comparison of open innovation studies shown in Table 2. All of them have common aspects such as 1) methodology: using survey research, 2) Instrument/tool: a distributed questionnaire to respondents and data were analyzed using structural equation modeling (SEM) for two papers, however Vrande et al. [15] using SPSS. In addition to the number of sample and different countries, the important thing is differences in research focus.

First, Vrande et al. [15] focus on the motives and perceived challenges when SMEs adopt open innovation practices. Using two variables to measure innovation performance: technology exploration and technology exploitation. McAdam et al. [16] focus on the effects of leadership, people and culture on innovation implementation are mediated by business improvement. They use five variables to measure innovation performance: people and culture, innovation leadership, product and process, total quality, and knowledge management. Xiaobao et al. [17] focus on the firm size effect on innovation effectiveness continuity, particularly open innovation. They use four variables to measure innovation performance: innovation barriers, innovation capacity, network information, and network openness.

Vrande et al. [15], found that the current study should encourage scholars to analyze in depth about open innovation in SMEs. Future research should broaden the scope by studying open innovation in broader samples, also capturing small enterprises and firms in service industries. McAdam et al. [16], suggestions for future research agendas could also include the model in other regions or sectors to see if these parameters influence the innovation implementation to construct. Xiaobao et al. [17], they proposed that future research in this area should be based on a larger data sample, extract medium-sized groups, small business groups, and so on by setting the threshold. They also include class variables and conduct further confirmatory analysis using ANOVA.

Table 2. Implementation of open innovation in SMEs

	Vrande et al. [15]	McAdam et al. [16]	Xiaobao et al. [17]
Country	Netherlands	UK	China
Focus	The motives and perceived challenges when SMEs adopt open innovation practices	The effects of leadership, people and culture on innovation implementation are mediated by business improvement	The effect of firm size on the effectiveness of innovation continues the particularities of open innovation.
Sample	605	395	420
Methodology	Survey	Survey	Survey
Instrument	Questionnaire	Questionnaire	Questionnaire
Tools	SPSS	SEM	SEM
Variables to measure innovation performance	- Technology exploration - Technology exploitation	- innovation leadership - People and culture - Total quality - Product and process - Knowledge information.	- Innovation capacity - Innovation barriers - Network openness - Network information

5.2. Limitation and suggestion

This study has limitations since it only used three primary studies in 2009-2013. It also uses two sources from digital libraries such as Science Direct and Google Scholar. It is suggested for future works to use more literature with a longer period with more than digital library sources and include studies from others countries.

9 Conclusion

Innovation is any product or service that creates unique and compelling solutions valued by our customer, real and sustainable competitive advantages, and extraordinary value for our shareholders. The closed innovation paradigm and its associated mindset toward organizing industrial R&D have led to many important achievements and many commercial successes. The past success of the closed innovation paradigm accounts for its persistence in the face of the changing landscape of knowledge.

Open innovation as a paradigm assumes that technological progress is desired by the company, by combining ideas and channels, both internally and externally for distribution to the market [9]. The possibilities for open innovation in SMEs also lie with external sources, which are often critical to the innovation process in any type of organization. Where large firms focus mainly on R&D in open innovation efforts, SMEs focus more on commercialization because marketing channels and global contacts to introduce them effectively to the innovation market.

Implementation of open innovation in SMEs show a significant change in the company in several aspects such as 1) motives and perceived challenges, 2) effects of leadership, people, culture, and business improvement, and 3) effect of firm size on the effectiveness of innovation continuity. The implementation of open innovation is different for each SMEs. However, they want to change their system from closed innovation that focuses mainly on R&D to open innovation by considering the external source to organizational change.

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