

# **Open Innovation through Virtual Business Network: Perspective from Small and Medium Enterprises**

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## **Abstract**

Open innovation is a growing issue in today's manufacturing industries, especially within small and medium size enterprises (SMEs). Due to resource scarcity, SMEs need to be collaborated to share knowledge and expertise to develop innovative products or processes in order to be competitive. In this research study, generic concept on open innovation is elaborated along with required innovation model and methodology. In addition to, a framework is proposed in order to facilitate open innovation management within collaborative partner industries. Fundamental issues associated with business network for open innovation are outlined in this study along with possible challenges for open innovation. This research study is concluded with managerial implications and with future works.

## **Keywords**

Open Innovation; Virtual Business Network; Smes; Methodology; Framework

## **1. Introduction**

Global business competition pushes manufacturing firms to be innovative in their product design and development processes. Firms need to develop new and innovative products in order to stay competitive. Such innovative products might be breakthrough products or improved version of the existing products. Manufacturing companies, especially small and medium size enterprises (SMEs) are needed to explore product or process innovation in order to survive within competitive market place. It is critical to create collaborative business environment, where companies, especially SMEs can collaborate with each other for added benefits. Such business paradigm is created through the active participation of individual companies by sharing their specific knowledge and expertise between each other.

The role of individual company within a business network affects the overall success and failure of the network. Before approach such changed business environment, companies need to establish trust and common goals for availing added benefits. This network promotes innovation within companies, which might be difficult to achieve by individual company outside the business network. This innovation philosophy facilitates companies to achieve new skills and knowledge that can be used by the companies in their future production processes. There needs specific methodology and tools to create such innovative atmosphere within the business network. Such methodologies and tools can be used depending on the nature of innovation goals and perspectives.

The innovation can be both open and close types (Lakatos and Bacali, 2015). Both types are necessary for the growth of an enterprise and specific type is dependent on the enterprise's needs, processes, and capacities and on customers' preferences. The close innovation is generally confined within an enterprise, where core competencies are applied to develop innovative product or processes. Whereas, an open innovation is exceeded the boundary of an organization and orchestrates by the active involvement of more than one organizations. Such open innovation succeeds based on the core competencies and sharing of skills among collaborative organizations. This kind of innovation opens up the possibility of building trust and innovation cultures among organizations.

Any innovation, which is the outcomes from collaborative organizations, are known as open innovation. This kind of innovation initiates after identified business opportunity by a partner organization known as 'broker' and shares the business opportunity with other partner organizations that finally form a business network. This business network nurtures the innovative idea to develop new product or new business process according to the market needs. Today's advancement of information and communication technology (ICT) promotes to create such collaborative business network, where the initiation of open innovation starts up. This open innovation culture among the business network helps organizations to keep pace with competition and to retain sustainability.

This study presents a methodological framework to create collaborative business network within SMEs that facilitates open innovation. The determinants and sequential model of open innovation are also illustrated within the scope of this research. In addition to, an innovation management model is presented to demonstrate the factors affects open innovation within SMEs. The research is concluded with the statements of overall research outcomes and future research directions in the field of interest.

## **2. Literature review**

There is currently a broad awareness of open innovation and its importance to manufacturing companies. The implementations and trends for open innovation are discussed in the literature with respect to strategic, organizational, knowledge, legal and business perspectives and its economic implications (Chesbrough et al., 2007; Dittrich and Duysters, 2007; Enkel et al., 2009; Enkel, 2010). In general, today's business environment is not purely based on open innovation but companies are involved simultaneously in closed as well as open innovation activities (Kim and Park, 2010). Open innovations are orchestrated between companies, which are physically or virtually connected within a business network.

The innovation associated with closed activities cannot often meet the growing market demand through shortening the innovation steps and reduced time to market. On the other hand, open innovation promotes faster innovative product to the market through sharing resources between partner companies. Too much open innovation often negatively effects on companies long-term success, because it damages the overall control and core competencies. It is therefore, necessary to maintain a balance between open and close innovation within companies. To make the required balance it is important to identify and establish the cause-and-effect relationship between open and close innovation. This enables manufacturing companies to find the appropriate efforts and mechanism to integrate with each other, which ultimately explores non-economic approaches to enrich companies' portfolios.

In order to enrich the capabilities of manufacturing companies in open innovation activities it is essential to merge companies' knowledge base through the integration of suppliers, customers and external knowledge sourcing. By this phenomenon, a company can increase its innovativeness (Laursen and Salter, 2006; Piller and Walcher, 2006). Adoption of other approaches such as new forms of customer integration such as crowdsourcing, mass customization, customer community integration (e.g. Facebook, Twitter, WhatsApp, etc), etc., promotes open innovation within companies (Howe, 2008; Lakhani et al., 2008; Piller and Fredberg, 2009; Piller 2009).

Co-creation, which is a form of open innovation initiates through alliances, cooperation and joint ventures among complementary partners. This strategy is widely researched in the open innovation management literature. Through this business model, companies combine the outside-in process that contributes to gaining external knowledge with inside-out process to bring ideas to market (Enkel, et al., 2009). It focuses on peer-production through integrating business communities, consumers and lead users (Prahalad and Ramaswamy, 2004; Franke et al., 2006). The co-creation strategy can be seen as an increasing awareness of corporate venturing activities, where new business

models, such as new ventures and spin-offs are evolved along with cross-company innovation (Vanhaverbecke et al., 2008; Enkel and Gassmann, 2010).

### **3. Open innovation: SMEs perspectives**

Open innovation can be defined from the business perspective as the initiative of new idea of a product or process, which occurs outside individual firm's boundary. In general, there are close and open innovation. Close innovation occurs within firm's capacity and capability, whereas, open innovation occurs outside firm's boundary.

From study, it is noticed that SMEs are less active than large firms in most innovation activities (Lee et al., 2010). It is also studied that more innovative ideas are originated from SMEs external sources and training for innovation than large firms (Lee et al. 2010). The causes of less innovation in SMEs are due to little necessary and shortage of resources in spite of necessity.

Customization process is more common in SMEs than in large firms, which contributes the necessity of innovation in SMEs. For such reason it is often necessary for small firms to adopt business model that supports innovation and customization. In order to marketing innovative ideas to mass customer segment SME's need to form network of companies. This network formation supports SME's to publish its innovative ideas rapidly and within a wider community. This commercialization process enables SME's to find ways to bring its ideas to the market instead of producing customized products for individual customers.

In any innovation process there needs training, both internal and external research and development, knowledge, capital goods (facilities, machines, tools, etc.), marketing procedure, supports for product/process innovation, etc. SMEs suffer all such resources scarcity, which can only be met by business collaboration. Such form of collaboration initiates an open innovation. This open innovation orchestrates through sharing costly resources and technologies within the SMEs business network. In an open innovation, SMEs share the necessary knowledge and expertise across the network.

Information and communication technology (ICT) plays a vital role to accelerate open innovation within SMEs network. This ICT enables SMEs network to communicate with each other in order to decide for any business agenda. It supports real time information exchange within SMEs network and creates cross channel communication among customers, suppliers and various stakeholders. There is strong correlation between the number of innovation and the external information usages in SMEs network.

### **4. Model for open innovation: special focus on SMEs**

There are always resources limitations within SMEs which reduce their ability to develop innovative products or services. As discussed business networking can increase potential for SMEs to be innovative that ultimately contributes to sustain within competitive business environment. In order to be innovative with the help from business network there needs specific model, which supports open innovation. This research proposed a model that will support open innovation within SMEs network. Different steps within the proposed model is highlighted in Figure 1. From Figure 1 it is seen that there are six phases within the model, namely primary research and development, incubation innovative idea, formulate supportive technology and tools, product design and development, production process and distribution and warranty and after sales service.

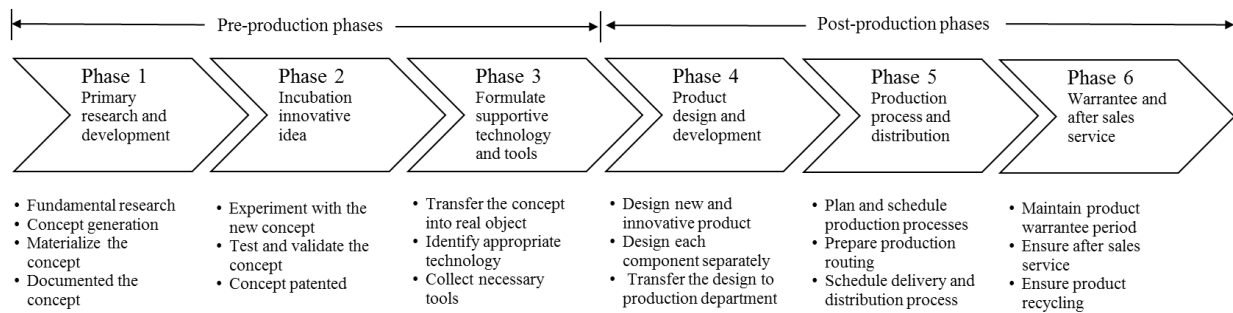


Figure 1. Open innovation model suitable for SMEs

In the first phase of the model concerns with initial research and development, where the idea of the new and innovative product is comes from. At this phase, the concept of the product is materialized that is generated first of all. The concept is also documented before proceed towards the next phase. In the second phase of the model, the idea as generated in the first phase is incubated and necessary experiments are to be done to justify the concept, which will be patented finally after test and validate the concept. In the third phase, required supportive technology and tools are identified. In case of tools scarcity it is recommended to collect them at this phase.

In the fourth phase of the model, design of the new and innovative product is initiated. Each component of the proposed new product is design separately. When the design is done it is forwarded to the production department. At phase 5, necessary planning and scheduling of the production processes are performed. In addition to planning and scheduling required production routing and schedule for delivery and distribution processes are also accomplished at this phase. Product warrantee and after sales service are maintained at phase six of the model for open innovation. Product recycling is also ensured at this phase.

The presented model will be beneficial for the SMEs to initialize their plans to achieve innovative products. It guide them step by step for formalize the product from conceptual design to an end. The model is divided into two categories such as pre-production phase and post-production phase. At the pre-production phase, required research and development, incubation of innovative idea and supportive technology to develop innovative product is included. On the other hand, product design and development, production process and distribution and warrantee, after sales service and product recycling are involved in the post-production phase.

## 5. Proposed framework to manage open innovation within SMEs

In order to be successful in open innovation through business network, SMEs need to follow a framework to manage the network efficiently. Figure 2 proposed a framework with the objective to be useful for SMEs to execute the open innovation. From Figure 2, it is noticed that open innovation is the central theme which is interconnected with many critical factors, which can be categorized as firms or SMEs external forces and internal capacities and capabilities. In addition to external and internal factors open innovation also interconnected with technology and tools which is ended up final product design.

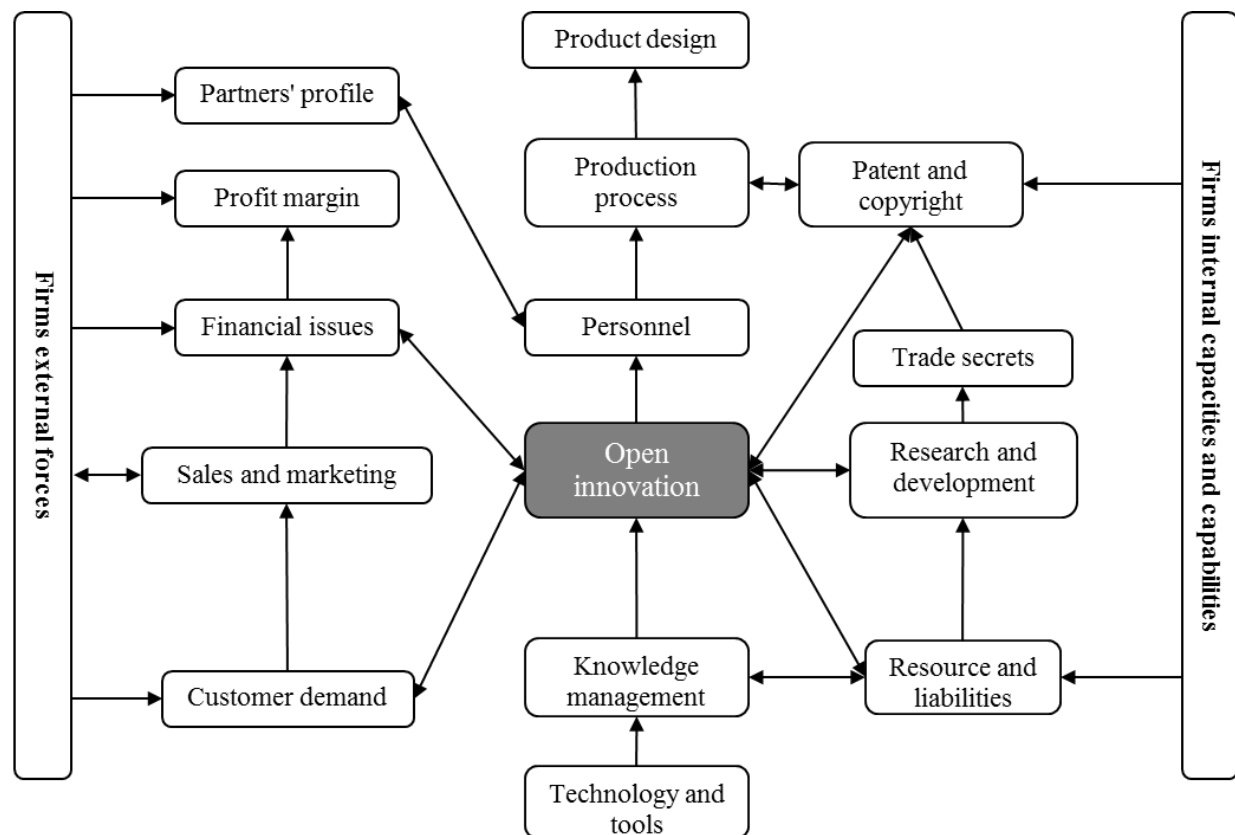


Figure 2. Framework for managing open innovation within SMEs

The firms' external factors are composed of partners profile, profit margin, financial issues, sales and marketing and customer demand. The customer demand and financial issue are directly associated with open innovation. After getting the customer order it goes to sales and marketing department which is forwarded to financial issues to calculate the profit margin.

As like as firms external forces there are many internal capacities and capabilities that supports open innovation within SMEs business network. The internal factors are resources and liabilities, research and development, trade secrets, patent and copyright issue, which are directly interconnected with open innovation.

The central part of open innovation issue is concern with technology and tools that are directly related with necessary knowledge management. During open innovation it is also necessary to interact with personnel from partner organizations, which are connected with required production processes. At the end of the production process planning final innovative product is designed.

## 6. Management of business network for open innovation: factors for success in operation

Business network can be formed by collaborating two or more industries with objective to achieve specific business opportunities. Trust is an essential element to form such network. There are different types of business network exists within manufacturing industries. Specific network is suitable for industries, which is dependent on the nature of business goals, market segments, products portfolio, duration of network etc. Examples of such collaborative networks can be industrial cluster, business community, virtual organization breeding environment, business ecosystems, etc. On the type of management perspective, business network can be hierarchical and non-hierarchical.

It is very critical to manage the business network after it is successfully initiated. The success of any business network mainly depends on its management policy. Such management depends on several factors. Some most important factors to manage a business network successfully is outlined in Figure 3. The factors are categorized in

several subgroups such as formation, technology, evaluation, database and culture. Each of the subgroup contains specific factors in it.

In the formation subgroup many factors such as market trend, partners profile, partners' capacity, trust management, risk management and business model are involved. This category can be considered as the starting point of a business network, where potential market trends are studied before initializing the network. To achieve the identified business opportunity it is necessary to form the business collaboration after selecting the potential partners based on their profiles and capacities. To management any business network there needs to manage trust among the potential partners. Risk management is also critical to avoid failure within the network. Before forming the network partners need an agreement to adopt the specific business model.

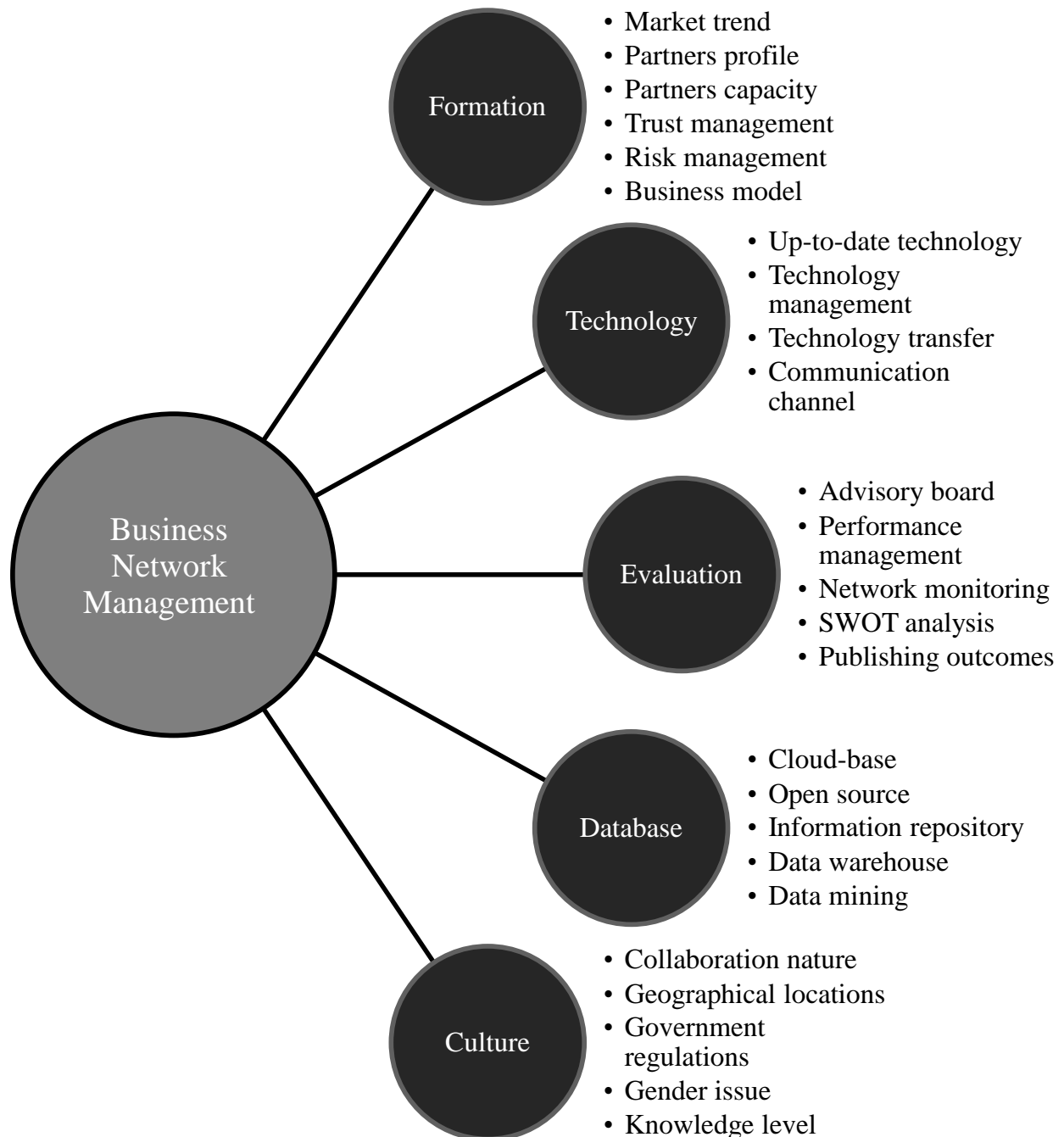


Figure 3. Factors affecting successful business network for open innovation

To establish a business network supports from up-to-date technology is very important. This technology management can contribute to the communication channel within the network. Effective technology management and transfer between network partners brings the success of a business network. Such technology transfer promotes skill sharing and real-time information exchange of business processes within the partner organizations.

The attitude to initiate a business collaboration also depends on culture. This culture factor varies depending on nature of proposed collaboration, geographical locations, government regulations, gender issue and knowledge level of the community.

To manage a business network it is critical to maintain a suitable database. This database can be cloud-based and open source that needs to be secured and easily accessible. All the information associated to the network partners and business processes should be stored and retrieved from such database. Often data warehouse and data mining are suitable to execute business network.

In any form of business network it is necessary to evaluate it before coming to an end. Such evaluation depends on performance management, monitoring processes, SWOT (strength, weakness, opportunity, threat) analysis within the network. An advisory board that consists of several experts evaluate the overall performance of a network based on its publishable outcomes.

## **7. Conclusions**

Increasing competitive pressure within business community are the driving force for companies to introduce higher quality innovative products faster and cheaper than competitors are. To meet such challenges and become innovative, companies need to adopt different mechanisms and strategies that help to achieve innovations with high levels of novelty (Danneels and Kleinschmidt, 2001).

The open innovation within manufacturing companies brings prosperity for them with respect to achieving business competition through economical advantage. This open innovation concept is especially necessary for SMEs in compare to large companies due to the sizes and resources shortages. From various studies, it is noticed that most successful open innovation examples are formulated from large companies due to the higher investment level in research and development (R&D) and to make partnerships with many companies. On the other hand, SMEs are in general cannot invest resources to R&D and stay behind from any kind of innovations. In such circumstances, it is appropriate for SMEs to move towards open innovation, where they can form a business network with the view to share resources between each other.

The business collaboration within SMEs acts as the driving force to introduce products with a higher degree of novelty. Studies found that the greatest positive impact on the degree of innovation novelty initiates from business collaborations orchestrating different types of partners (Nieto and Santamaria, 2007).

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