

Innovation Approaches, Practices and Firm Performance Among Select Software Product SMEs: A Case of Bangalore Firms

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Abstract

Innovation is considered as a topic of interest among both academicians and practitioners. Right from Schumpeter till current day researchers have worked extensively in the area of innovation yet the topic appears to be fresh and new. Henry Chesbrough coins the word 'open innovation' and 'closed innovation' in his pioneer work. Small and Medium Enterprises (SMEs) are very much essential for the growth of any economy. In India, SMEs plays a vital role in the development and growth of the economy. Indian SMEs adopt innovation for sustaining rather than for transforming. A rigorous review of literature identifies the research gap to study the innovation approach adoption and its influence on firm performance among SMEs.

The research adopts a mix research approach to examine the SMEs of Bangalore region. A structured online survey is administered to 213 survey participants who are identified through criterion based snowball sampling method. The results indicate that firm-level factors such as age, size, experience and culture have a significant influence to adopt innovation approach whereas investment in Research and Development do not influence SMEs to adopt Innovation. Whereas external factors such as ecosystem and competition have a significant influence to adopt an innovation. Customers influence to adopt an innovation is minimal, technological advances and government policies do not play any role in innovation adoption. Further, the Open Innovation practices such as collaboration, Spin-offs, and alliances positively influences firm performance. Intellectual Property Rights trading is still not encouraged by the SMEs in the Indian context. Closed Innovation approach does influence the firm performance. Hence the decision makers of SMEs should cautiously choose the innovation approach that is suitable for their firm at that point in time. The SMEs must consider adoption of innovation approach as a strategic choice for their growth and sustainability.

Key Words: *Open Innovation, Closed Innovation, Firm Performance, Firm level Factors and External factors.*

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1 Introduction

The term Innovation is widely accepted by industry and academic professionals as an essential competitive enabler for any enterprise to sustain growth (Drucker, 1985). Innovation has been seen as an engine to support competitiveness of the firm. Firms irrespective of size practice innovation to sustain a competitive advantage (Yifeng, 2011; Mashilo and Iyamu, 2012). Organization for Economic Cooperation and Development (OECD) found that innovation is the primary factor that determines a country's long-term economic growth and increases in productivity and that innovation is even more important to an economy than either capital or labor resources alone (OECD, 2008). National Knowledge Commission report (2007) reveals that innovation has the most significant impact on competitiveness for large firms while for SME's innovation will make an indelible impact on the market share.

The innovation process is undergoing profound changes in the way it is managed (Chesbrough, 2003). Innovation approach is categorized as Closed Innovation and Open Innovation. Closed innovation approach is said to be a process where firms developed innovates by using only internally their in-house resources and technologies and then commercialized those innovations on their own. Whereas Open innovation, which was named and defined by Chesbrough as the "purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively." Companies may practice two types of open innovation approach i.e. inbound open innovation and outbound open innovation (Chesbrough and Crowther, 2006).

1.1 Importance of MSMEs in an Economy

Small and medium enterprises (SMEs) occupy an important and strategic place in economic growth and equitable development in all countries. MSMEs enable fostering of entrepreneurship and have more flexibility in production with the potential of developing managerial skills, individual initiatives, and rich personal relations. Therefore, it is often promoted as a source of technological innovations among developed economies (Bala Subrahmanya, 2005). SMEs are responsible for the majority of industrial units and contribute to the

major proportion of employment, output, and exports in most developing and developed economies. In developing countries, SMEs are responsible for most jobs and income generation opportunities and can be identified as the main driver for poverty alleviation. In most national economies, SMEs account for a majority of business establishments (Chew and Yeung, 2001).

1.2 MSME in India

The micro, small and medium enterprises (MSME) sector contributes to the manufacturing output, employment generation, and exports of the country. MSME sector values for 45 percent of the manufacturing output of India. Also contributes around 40 percent of the total export of India. This sector is projected to generate employment for 101.26 million individuals in over 44.77 million firms across the country. MSME accounts about 8 percent of the country's Gross Domestic Product. Indian MSME manufactures over 6000 products ranging from basic commodities to highly specialized products (MSME report, 2015-16). The Indian MSMEs not only manufactures traditional goods such as products in leather, jewelery, gems, agricultural products etc. but also provides value added (FICCI-MSME Report, 2012).

1.3 Innovation

Joseph Schumpeter is said to be the first economist to state the importance of innovation and asserts that innovation represents the driving force of economic development. The key process in the economic force of changes is the introduction of innovation and culture of innovation in the enterprise (Schumpeter, 1934). Edwards and Delbridge (2001) define an innovative firm as one that identifies, interprets and applies knowledge efficiently and as appropriate throughout the organization. Innovation can be defined as the application of new ideas to products, processes or any other aspect of a firm's activities. Innovation is concerned with the process of commercializing or extracting value from ideas (Rogers, 1998). Roy and Wield (1985) view technological innovation as the transformation of an idea into a new or improved saleable product or operational process in industry or commerce. Innovation does not occur when a new idea is generated, rather when that idea is successfully commercialized. Innovation is viewed as the creation, development, and introduction of new product/services,

or product/service components, or a new procedure or process for doing things to benefit one or more of the stakeholders in an organization (Birchall et al., 1996). Hence, Innovation can also be defined as a process of problem-solving of customer's unheard need that can also benefit the society at large.

1.4 Research Gap

An extensive literature review suggests that the studies conducted so far are in the view of Open Innovation largely in the context of the West and China. However, there are limited studies which compare both open innovation practices and closed innovation practices. Also on factors influencing adoption of innovation, the internal factors identified are firm age, firm size, investment in R &D and R &D importance and firm culture. Earlier studies have not focused too much of entrepreneurs' experience and education. Also among the external factors influencing adoption of innovation studies are scarce. From the empirical studies of Lichtenthaler (2008), Van de Vrande et al., (2009), Gumus and Cubukcu (2011), Abulrub and Lee (2012), Tian and Feng(2010), Lee. et al. (2015) and Sikimic et al. (2016) it is clear that studies have only concentrated on adoption of open innovation. Vanhaverbeke, Vermeersch and De Zutter (2012) opines that adoption of open innovation practices in SMEs is quite a different from large organizations and hence there is need to study the practices of open innovation as adopted among SMEs. Lukac et al. (2012) suggest that cultural issues in the adoption of innovation practices need to be analyzed. Studies which take into account of the influence of firm culture on practices of Innovation are also scarce. Very few studies discuss innovation practices and firm performance (Mazzola et al., 2012; Cozzarin, 2004; Santos et al.,2014) but these studies are in the context of American and European firms and discuss only open innovation practices adopted and its influence on firm performance. Also, there is little or no systematic evidence on the adoption of type of innovation approach and its influence on firm performance (Sisodiya et al., 2013; Sikimic et al., 2016). Earlier studies do not confirm whether Open Innovation approach is better than Closed Innovation approach for SMEs (Rodriguez and Lorenzo, 2011; Choi, Lee, and Ham, 2016). Su and Lee (2012) finds that

European and American studies on Open Innovation are more published than other countries. Among the Asian countries work related to open innovation are found in Chinese, Korean and Taiwanese context only. India is the frontrunner in the Information Technology industry globally. A study on innovation approaches and practices adopted by Indian software product SMEs commands a study. Hence there is a definitive need to study innovation approaches, practices and their influence on firm performance among Software product SMEs.

1.5 Statement of Problem

Any firm grows with the experiences within & outside the environment. The large firms have their own R&D division, and also a recent trend is seen in these firms of making their firm boundary permeable and adopting innovation as their strategy to be market leader, Whereas small and medium firms are seen to depend on R&D of large firms, and yet the competitiveness of the SMEs make a mark on the contribution to the GDP.

Given the present scenario, it is of critical interest to assess what influences Technological SMEs to adopt innovation in open & closed formats. The current practices of innovation approach need to be enumerated by studying the characteristics of firms & the dynamics that govern it. The current study is an attempt to evaluate forms & formats of Innovation practices and its influence on the performance of the firm.

1.6 Conceptual Framework of Study

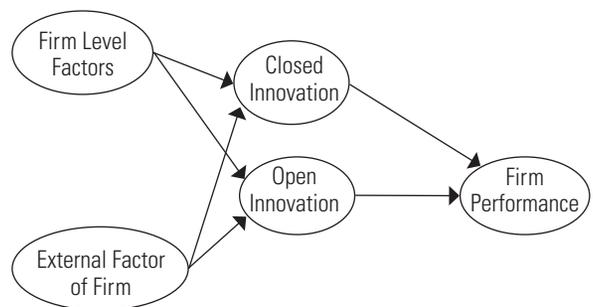


Fig 1 Conceptual Framework for the Study (Source: Literature Review)

SME's Firm performance is dependent on innovation practices adopted and practiced by these firms. The firm's strategic choice of innovation practices are of two types i.e. Open Innovation and Closed Innovation. The Open Innovation practices include Collaborations with external agents like Academic Institutions, Suppliers, Customers and R&D Labs, Spin-offs of products from parent organization, Intellectual Property Rights trading and Strategic Alliances. Closed Innovation practices include internal Research & Development. The adoption of open innovation or closed innovation is influenced by firm level factors or external factors or both. The firm level factors include that influences adoption are Size of the firm, Age of the firm, Education level of Manager/Entrepreneur, Work experience of Manager/Entrepreneur, Research & Development and firm culture. The external level factors that influence innovation adoption are Competition, Technological Advances, Customers, Ecosystem and Government Policies.

1.7 Research Questions

The research questions for the study are:

1. What are important motives and challenges for SMEs to adopt Innovation?
2. Is there an association between awareness of Innovation approach and its adoption?
3. Do firm internal factors and external factor influence to practice Open/Closed innovation?
4. Given the nature of Open/Closed Innovation, How does it influence firm performance?

1.8 Research Objectives

The research objectives of the study are:

1. To outline the motives and challenges for SMEs to Practice Innovation;
2. To find out the association between awareness level and adoption level of innovation approaches among Indian SMEs;
3. To examine whether the internal and external characteristics of firm influences to practices Open Innovation or Closed Innovation or both;
4. To examine whether the Open Innovation practices influences firm's performance

5. To examine whether the Closed Innovation practices influences firm's performance &
6. To determine policy implications for the promotion of Open/Closed Innovation in the SME sector.

1.9 Statement of Hypotheses

SMEs have an awareness of open innovation practices and closed innovation practices. Also, these SMEs have adopted these practices of innovation. To test the association between awareness of innovation approach and its adoption, following hypothesis is stated.

H_{01} : There is a no significant positive association between awareness and adoption of Innovation approaches.

H_{A1} : There is a significant positive association between awareness and adoption of Innovation approaches.

Adoption of Innovation among SMEs is influenced by firm level factors or external factors or both firm level and external factors to the firm. Hence to test the influence of these factors on the adoption of innovation approach among SMEs, following hypothesis is stated.

H_{02a} : There is no significant influence of internal factors of the firm to adopt Innovation approach

H_{A2a} : There is a significant influence of internal factors of the firm to adopt Innovation approach

H_{02b} : There is no significant influence of external factors of the firm to adopt Innovation approach

H_{A2b} : There is a significant influence of external factors of the firm to adopt Innovation approach

H_{02c} : Adoption of Innovation approach by SMEs is not significantly influenced by both Internal and External factors of the firm.

H_{A2c} : Adoption of Innovation approach by SMEs is significantly influenced by Internal and External factors of the firm.

Innovation approach practiced influences firm performance of SMEs. Hence to test the influence of SMEs adoption of open innovation approach on its firm performance, following hypothesis are stated.

H_{03a1} : Practices of Open Innovation approaches do not significantly improve performance of the firm

H_{A3a1}: Practices of Open Innovation approaches do significantly improve performance of the firm

H_{03a2}: Practices of Open Innovation approaches do not significantly influence the firm's market share

H_{A3a2}: Practices of Open Innovation approaches do significantly influence the firm's market share

H_{03a3}: Practices of Open Innovation approaches do not significantly influence the firm's Revenue

H_{A3a3}: Practices of Open Innovation approaches do significantly influence the firm's Revenue

H_{03a4}: Practices of Open Innovation approaches do not significantly influence the firm's Product Sales

H_{A3a4}: Practices of Open Innovation approaches do significantly influence the firm's Product Sales

H_{03a5}: Practices of Open Innovation approaches do not significantly influence firms to develop more products

H_{A3a5}: Practices of Open Innovation approaches do significantly influence firms to develop more products

Innovation approach practiced influences firm performance of SMEs. Hence to test the influence of SMEs adoption of closed innovation approach on its firm performance, following hypothesis are stated.

H_{04a1}: Practices of Closed Innovation approaches do not significantly improve performance of the firm

H_{A4a1}: Practices of Closed Innovation approaches do significantly improve performance of the firm

H_{04a2}: Practices of Closed Innovation approaches do not significantly influence the firm's market share

H_{A4a2}: Practices of Closed Innovation approaches do significantly influence the firm's market share

H_{04a3}: Practices of Closed Innovation approaches do not significantly influence the firm's Revenue

H_{A4a3}: Practices of Closed Innovation approaches do significantly influence the firm's Revenue

H_{04a4}: Practices of Closed Innovation approaches do not significantly influence the firm's Product Sales

H_{A4a4}: Practices of Closed Innovation approaches do significantly influence the firm's Product Sales

H_{04a5}: Practices of Closed Innovation approaches do not significantly influence the firms to develop more products

H_{A4a5}: Practices of Closed Innovation approaches do significantly influence the firm to develop more products

1.10 Research Design

Research design briefly describes the blueprint that the researcher has used for the collection, measurement, and analysis of data to better understand the topic of adoption of Innovation approach and its influence on firm performance among software product SMEs. Given the fact that research related software product SMEs limited to Bangalore, to the best of the researcher's knowledge, this research uses both inductive and deductive reasoning. The conceptual model is deduced from relevant literature on innovation and SMEs. A questionnaire survey has been conducted among the decision makers of software product firm located in Bangalore to empirically test the conceptual framework. This forms the inductive framework of the study. The research is both exploratory and descriptive limited to the case of Bangalore. To achieve the purpose of the study, quantitative as well as qualitative methods have been applied. Data was collected primarily through a survey of 213 decision makers of software product firms in the form of self-administered web survey as well as interviewing about ten experts who are owners of software firms, senior members of a trade association and domain specialists in the area of Innovation. The survey instrument consisted of the 11-page questionnaire. A total of 78 items is used. 16 items collect the basic profile of the firm which is measured on a nominal scale, 33 items collect the factors that influence and drives innovation in the firm and awareness and adoption of innovation. These are measured on an ordinal scale (5-point Likert scale) and nominal scales. 23 items collected innovation approaches and were measured on an ordinal scale (5-point Likert scale) and six items collected data on firm performance and were measured on a 7-point scale. The secondary sources of information were gathered from books, research papers published in journals and industry reports. Most of the literature were found through NITK Digital Library. The validity of the instrument is obtained with the help of experts

and pilot tested for a small group of respondents and reliability was tested using Cronbach's alpha. The criterion for deciding on the population was (i) Firm should be located in Bangalore (ii) Firms should be in the business line of the core product, or product and service or product as service category (iii) Headcount of the firm should be less than 250. Since the selection of survey participant had many criteria, a criterion-based sampling and snowball sampling is used for the purpose of the study. Data collected is analyzed using SPSS 21 version. Statistical tools such as Chi-Square Test, Kruskal-Wallis Test, Multinomial Logistic Regression and Ordinal Regression are used to analyze the data set for inference and interpretation.

1.11 Results and Findings

The research instrument is tested for reliability, and Cronbach alpha is found to be fit, and the content validity of the instrument is carried out by experts and found to be fit. The KMO test indicates that sample size considered for the study is adequate. The multinomial logistic models and the ordinal logistic models used to test the hypothesis.

The key findings of the study are:

- There is a strong association among the SMEs on awareness of innovation approach and its adoption.
- More 50% of the firms have Intellectual Property Rights from their R & D activities. Firms funding pattern do not differ in the adoption of innovation approach.
- The firms who own IPR from their R & D activities differ in their adoption of innovation approach.
- The motivating factor in adopting an innovation is to become a market leader, customer satisfaction and competition.
- Government policies do not motivate firms to adopt an innovation.
- The time factor is the major challenge to adopt and practice innovation, and the fund's availability is also the challenge for firms to adopt and practice innovation.
- There is a positive association between awareness of innovation approach and its adoption.

When the internal factors alone is considered and external factors as control variable then it is found that internal factors that influence the firm to adopt open innovation as compared to both the approaches are Firm age, Firm size, Education level, Experience of the decision maker, the culture of the firm.

When the internal factors alone is considered and external factors as control variable then it is found that internal factors that influence the firm to adopt closed innovation compared to the adoption of both the approaches are Firm Age, Firm Size, Experience of the decision maker, the culture of the firm and to an extent the emphasis on R&D.

When only Firm external factors are considered and the internal factors are considered as control variable, external factors such as competition, and Eco System has influence to adopt both approaches compared to open approaches and customers, Government Policies, and Technological Advances do not influence the SMEs to adopt open innovation or closed innovation approach compared to both the approaches.

When both firm level and external factors influence is considered together, the firm level factors such as age, size, education, experience, emphasis on R & D and culture of the firm influence to adopt open innovation as compared to both the practices, Whereas external factors such as such as competition, customers, ecosystem and technological advances influences firm to adopt open innovation as compared to both the approaches. When both firm level and external factors influence is considered together, firm-level factors and external factors to the SMEs do not influence to adopt closed innovation.

The open innovation practices such as idea generation from both internal and external sources, collaborations with academic, R&D institutes and customers, and spin-off have a significant influence on firm performance. The closed innovation approaches such as idea generation through internal sources significantly influence firm performance.

Open innovation practices such as idea generation by both internal and external sources, collaboration with academic institutes, Intellectual Property Rights purchases, and Spin-off significantly influences to the firm to develop more products.

Open innovation practices such as idea generation by both internal and external sources influences to improve the market share of the firm.

Open innovation practices such as idea generation by both internal and external sources, collaboration with academic institutes, collaboration with R&D institutes, collaboration with the customer, Spin-off, and alliance significantly influences to improve the overall firm performance.

1.12 Conclusion of the study

SMEs in the software product segment adopt both open innovation approach and closed innovation approach for better firm performance. There are certain internal factors and external factors which influence software product SMEs to adopt certain innovation approach. When only influence of internal factors are considered, then the study found that factors such as firm age, firm size, education level, experience of the decision maker, culture of the firm influences the SMEs to adopt open innovation approach as compared to adoption both the approaches and Firm Age, Firm Size, Experience of the decision maker, culture of the firm and to an extent the emphasis on R&D influences SMEs to adopt closed innovation approach compared to of both the approaches. Firm external factors considered only factors such as competition, Customers, Eco System, Government Policies, and Technological Advances do not influence the SMEs to adopt open innovation or closed innovation approach compared to both the approaches.

When both firm level and external factors influence is considered together, the firm level factors such as age, size, education, experience, emphasis on R & D and culture of the firm influence to adopt open innovation as compared to both the practices, Whereas external factors such as such as competition, customers, ecosystem and technological advances influences firm to adopt open innovation as compared to both the approaches. When both firm level and external factors influence is considered together, firm-level factors and external factors to the SMEs do not influence to adopt closed innovation.

SMEs which adopt open innovation approach and practices idea generation by both internal and external

sources, collaboration with academic institutes, collaboration with R&D institutes, collaboration with the customer, Spin-off, and Alliance have found that their overall performance improves. The SMEs can improve their market share by practicing open innovation practices such as idea generation by both internal and external sources. SMEs can develop more products if they practice the open innovation practices such as open innovation practices such as idea generation by both internal and external sources, collaboration with academic institutes, Intellectual Property Rights purchases, and Spin-off. SMEs adoption of closed practices such as practices such as idea generation by internal sources only and Product development by internal sources only helps the firms to improve firm performance. Closed innovation practices such as idea generation by internal sources only help the SMEs to enhance firm market share. Closed innovation practices such as product development by internal sources only help SMEs in the development of more products. Overall SMEs which adopts a mix of open and closed innovation approach to improve the firm performance.

1.13 Policy Suggestion for the Promotion of Innovation

In the current scenario, the government policies are not having an influence on the innovation approach adopted by the SMEs. There is an intervention needed by the government in the promotion of innovation among the SMEs. SMEs feel that if the government can provide a dynamic ecosystem that will help the SMEs in their thought process. SMEs feel that lack of funds is the major reason for not being innovative. The government can propose to provide funds for those SMEs who are being innovative and who have developed innovative product or service for solving the major societal problem. Also, Government can propose tax soaps for the companies who provide innovative solutions. The government should propose a comprehensive tax structure that can help the companies to save funds for their innovation activity. Government's technological projects which are undertaken by technically institutes should have an industry collaborating partner. This would help to bridge the gap between academic and industry interaction.

1.14 Managerial Implication

The results of the study have a huge implication on the practicing manager and decision makers of technological firms in the SME segment. The adoption of innovation approach has to be carefully selected considering the markets and domain of the business. No single innovation approach is suited for SMEs in the Indian context of Software product segment due to changing business and technological requirements. The SMEs have to strategically choose a combination of open innovation practices and closed innovation practices for the better performance of the firm. The open innovation practices such collaboration with various partners and alliances should be carefully selected and should be strategic importance to the company. Managers should carefully evaluate both the open innovation and closed innovation practices and must opt for a combination of open innovation and closed innovation practices for both idea generation and product development. Practices such as Spin-offs and trading of IPR is very nascent in the context of Indian technological SMEs and SMEs should carefully adopt these practices

1.15 Contribution of the study

This study contributes to the academic knowledge of innovation and SMEs. The study provides a dimension in the selection of innovation approaches and practices for the technological SMEs. The factors influencing SMEs to adopt innovation has been studied extensively, but a void was there on external factors influence on adoption of innovation. The study has addressed this issue. Also, the innovation approaches that have been adopted by technological SMEs in India has been addressed, and study attempts to fill the gap to compare the both open innovation approach and closed innovation adopted by technological SMEs and its influence on firm performance.

1.16 Limitation of the study

Some limitations need to be considered. Firstly, the study findings are not generalizable to the entire population of Indian Software SMEs. Nevertheless, the study findings apply to Software product SMEs in Karnataka. Secondly, the present study was able to analyze the change in firm performance only not the actual performance. The third limitation was that the study was limited only to the ecosystem of Bangalore.

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