

Open Innovation – A Need of the Hour for Indian Small and Medium Enterprises

Sumukh S. Hungund & K.B. Kiran*

Abstract

Innovation is the key to maintain competitive advantage in a market and gain leadership. Ideas are the most essential input for an innovation process to start. Innovation has long been considered as a prominent growth engine to brace competitiveness of the firm in the market. Also, Innovation plays a key role in providing sustainability and growth for the firm. But yet firms are not clear about the type of innovation management practices that need to be adopted for generating an idea and developing a product. A shortened product life cycle, constantly growing research and development cost, more rapid information flows, and increasingly interconnected customers have supported a paradigm shift toward an open approach to innovation. A firm needs to choose between Open Innovation practices and Closed Innovation practices for its sustainable development. Small and Medium Enterprises (SME) of Information Technology Industry in India have adopted innovation practices to the extent of fifty seven percent. Open Innovation has become one of the most recent topics for research in the area of innovation management.

Open innovation is a pioneering mechanism with increasing number of studies in the literature with large organizations and in the context of Europe and West. However, there are not many studies on Open Innovation and SME in Indian context. In addition, there are still a number of issues unclear in Open Innovation Theory due to its wide concept. Therefore, this paper aims to critically review the existing literature and develop a conceptual framework to establish a relationship between Firms, Open Innovation Practices, SME Characteristics, and firm performance. The paper establishes a need for studies in the area of open innovation among small and medium segments of the technology oriented industry. The paper also presents the research questions and research objectives of the study along with hypotheses. The paper concludes with the need of research and the contribution that will be made from this study to the world of academia.

Key Words: *Open Innovation, Closed Innovation, In-bound Open Innovation, Outbound Open Innovation and SME.*

* Research Scholar & Professor respectively of School of Management, National Institute of Technology, Karnataka - 575 025

Introduction

Innovation has been widely accepted as an essential competitive tool for any enterprise for a sustainable growth (Drucker, 1985). Innovation practices have been considered as a prominent growth engine by Large and Small & Medium Enterprises (SMEs) (Yifeng, 2011; Mashilo and Iyamu 2012.). National Knowledge Commission report (2007) reveals that innovation has the most significant impact on competitiveness for large firms, while SME's innovation will make indelible impact on increase in market share. But, SMEs are observed to have difficulty in implementing innovation practices (Iakovleva, 2013). Today, the innovation process is undergoing profound changes in the way it is managed (Chesbrough, 2003). Open innovation has become one of the hottest topics in innovation management (Wang and Tang, 2013). The open innovation approach has been flaunted by the area of innovation management and technology (Mazini et al., 2013). Open innovation, which was named and defined by Chesbrough (2003) as the "purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively". Also Open innovation models emphasizes using a broad range of knowledge sources for a firm's innovation and invention activities by including customers, competitors, and academicians to exploit the firm's IP (West and Gallagher, 2006). Also it is said that Open innovation boosts the probability of the firms to achieve business growth by evolving new products (Freel, 2006). Given the background of Innovation's significance and recent development of Open Innovation studies across the globe it is of utmost importance to find out the extent to which the Open Innovation practices have been adopted among technological SMEs in India. Hence this paper focus on the need for Open Innovation practices among software product of SMEs. The paper is divided into following sections. The paper begins with introduction followed by review of literature, conceptual framework, research questions and objectives, hypotheses statement, results and discussion and then conclusion and limitations of the study.

Review of Literature

This section discusses about various literature reviewed for the study. Lichtenthaler U. (2008) reveals that many

firms still adopt and practice closed approaches to innovation despite a trend toward open innovation is seen. Also opines that there is a need to study about practices of Open Innovation in Small firms so as to understand the relation between the approaches to open innovation and firm's capabilities & culture in managing technology.

V. van de Vrande et al. (2009) found out that SMEs both in manufacturing and service domain do engage in open innovation practices in Netherland and also opinions that medium size firms are more active in engaging open innovation practices than compared to smaller size firms. Further the findings revealed that SMEs pursue open innovation principally for market – related motives and face challenge to adopt open innovation was related to cultural issues. Also the study opines that there is need to study innovation adoption and practices in broader samples across different geographies. Open Innovation is useful in reducing costs of research and development and create new opportunities for growth. Open innovation leads to business growth (Huang et al. 2010). Jayawardhana A. and Surangi H. (2010) opines that there is significant difference in the adoption to open innovation practices within medium and small firms and reveals that growth and sustainability of the firm is attributed to the adoption of open innovation practices and also a positive trend is seen among women entrepreneurs of the handicrafts industry to adopt open innovation practices. Gumus B. and Cubukcu A. (2011) opinions that awareness of Open Innovation among Turkish firms is very low and mentions that for a sustainable growth a culture of innovation is essential in the firm. Also opines firm's characteristics are not related to innovation practices adopted by firm. Xin S. and Wang Q. (2011) feels that SMEs needs open innovation for sustaining rather than for transformation to large organization. Also mentions that practices of innovation should be carefully adopted by SMEs. But feels that the type of Open Innovation practices considered for firm performance is unexplored. Xu and Zheng (2012) in their work discuss about definition, background and research foundations of open innovation and suggests about the need to study factors influencing open innovation. Huizingh E. (2010) opinion that there are many open innovation issues needs to understand better and feels

that still there is lack knowledge about practices of open innovation.

Kafourous M.I. and Forsan N. (2012) suggest that university collaboration with firm need to be explored and an integrated approach of open innovation and firms' performance needs to be investigated. Tian and Feng (2010) investigated the types of external technology sources in open innovation and finds that apart from competitors, the external technology sources include suppliers, users, universities and research institutes, R&D service companies. Abulrub A. and Lee J. (2012) opinioned that company size and market type influences to adopt open innovation practices. Further feels that external partners are very important for firms to adopt open innovation. Since the study considers both large and small companies, the results need to be investigated only for SMEs. Balasubrahmanya M.H. (2012) SMEs internal technical competence and their nature of innovation help them to fetch external support. Further felt that SMEs technical competency clubbed with external support will help them exploit market opportunities to achieve higher innovative performance. Further suggests that there is a need to study the type external support need for SMEs in the Indian context. Lukas et al. (2012) reveals that successful innovation for a company requires a continuous and sustainable flow of innovation in order to stay competitive and this can only be achieved through collaborative approaches. Janeiro et al. (2013) finds that successful firms tend to rely more on universities for innovation. Further opines that a causal relationship exists between firm's innovation and access to external sources like universities. The study stresses a need to study the reasons encouraging the firms to seek out external partners to a greater extent than others, and how access to external knowledge actually shapes and impacts firm's levels of innovation performance. Rangus and Drnovsek (2013) opinions that the most common practices of open innovation are customer involvement, employee involvement and pre-venturing activity. The study revealed that firms collaborate with customers and suppliers. Also results suggest that larger companies are more involved in open innovation activities and smaller companies are more inclined to selling/licensing of their IP. Ades et al. (2013) analyses three cases of firms whose innovation

management processes have been fused and finds that the implementation of Open Innovation practices is challenged by cultural issues. Segers (2013) observed that there is a strong collaboration between research institutions, universities, venture capitalists, high-risk finance providers, existing large companies, and new biotechnology firms in Belgium. Also feels that basic innovative activity occurs mainly in university-based new biotechnology firms (i.e., new, small firms that are spin-offs from university research centres performing state-of-the-art research). Further mentions that there is a need to study the practices of open innovation and performance of firms, and the observation about collaboration also needs to be examined and validated in high technology based industries. Revutska (2013) feels that the makeover of companies in the open innovation business model perspective is from the viewpoint of strategic development. Companies benefit from the quick commercialization of their ideas and will be able to improve their experience through the diffusion of innovations, among other companies in the market i.e. startups and spin-offs. Further mentions that university education centers play a vital role in the process of open innovation models creation. These centers may be involved in the formation and commercialization of knowledge and innovation. Deegahawature (2014) suggest that firms implement inbound open innovation at a moderate level and suggest that firms that adopt inbound open innovation should be cautious on capabilities and environment turbulence. Accordingly, this study contributes to open innovation literature by stressing the importance of capabilities, and insisting the applicability of capability perspective in implanting open innovation but fails to explain about technology exploration through external agents like academia. Hence there is a need to study the collaboration activities and its influence. Kafourous and Forsan (2012) feel that a study on industries in which intellectual property laws are less effective in protecting intellectual property may produce different results.

The literature review suggests that the studies conducted so far in view of Open Innovation are largely in the context of the West. However there are limited studies which compare both open innovation practices and closed innovation practices. From the empirical

studies of Lichtenthaler U. (2008), V. van de Vrande et al. (2009), Tian and Feng (2010), Gumus and Cubukcu (2011), Abulrub and Lee (2012) it is clear that studies have only concentrated on adoption of open innovation only. Very few studies discuss about Open Innovation practices and firm performance (Mazzola E. et al. 2012, Cozzarin, 2004, and Santos et al. 2014) but these studies are in the context of European and American firms. Also there is little or no systematic evidence on Open Innovation approach adopted and its influence on firm performance (Sisodiya et al. 2013). Hence there is a definitive need to compare different open innovation practices and its influence on firm performance.

Conceptual Framework for the Study

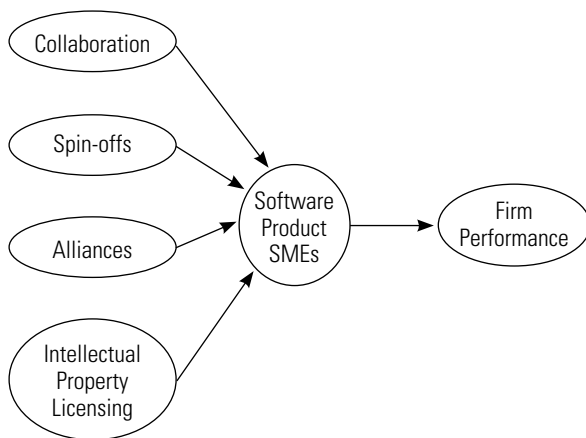


Fig 1: Conceptual framework of the study
Source: Literature Review

Firm Performance which is dependent variable is measured through change in Market share (Y). The Open Innovation practice which is the independent variable is measured through the extent to which the following practices are adopted by the software firms. The practices include collaboration with academic institution or universities (X1), suppliers (X2), customers (X3), and R&D labs (X4), spin-offs (X5) made by the organizations as teams of product development or as separate entity, Alliances (X6) made with other organization and licensing of Intellectual property (X7). This is represented through the diagram in the fig 1.

This can be represented as

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7)$$

$$Y = a_0 + a_1X_1 + a_2X_2 + a_3X_3 + a_4X_4 + a_5X_5 + a_6X_6 + a_7X_7 + e$$

Research Questions

The study proposes to investigate the conceptual framework shown in fig 1 through the following research questions:

1. What is the current status of awareness and adoption of Open Innovation practices among Software SMEs?
2. Do Open Innovation practices influence the performance of firm?

Research Objectives

The research questions are met by the following research objectives:

1. To assess the awareness level and adoption level of Open innovation.
2. To examine whether the Open Innovation practices influences firms performance.

Hypothesis Statement

To measure the research objectives following hypotheses is stated. H_{1a} and H_{2a} measure the research objective 1 and H_{3a} measure the research objective 2.

- H_{1a} : There is a significant level of awareness of Open Innovation among firms.
- H_{2a} : There is a significant level of adoption of Open Innovation among firms.
- H_{3a} : There is a significant influence of Open Innovation practices on firm performance.

Research Methodology

The primary data is gathered based on a structured questionnaire from innovative software SMEs. A googledocs has been developed and the questionnaire link is sent to the CEOs/CTOs/VPs/Product heads of various software product organizations through an e-mail. The sample has an appropriate mix of core product companies, product & services companies and product as service companies which cover the domain of software product segment. The survey link has been sent to 40 companies and received the completed response from 30 companies with a response rate of 75%.

Dependent Variable and Independent Variable

In the current study, the dependent variable is Firm Performance, which is measured through market share.

A multiple regression is performed to measure the firm performance.

The key independent variables are open innovation practices such as Collaboration, Spin-offs, Alliances, Intellectual Property Licensing. The responses for the predictors have been collected on a likert scale for open innovation practices.

Results & Discussion

The reliability of the items of questionnaire is measured by conducting a reliability test for all items which are on ordinal scale. The Cronbach's α is found to be 0.742 for 47 items on ordinal scale for 6 items which discusses firm performance, the Cronbach's α is found to be 0.683 and for the items which measures Open Innovation approaches and practices, the Cronbach's α is found to be 0.725 . All the values are found to be acceptable

The awareness of the term open innovation is only 46.7%. This indicates that the term has a considerable awareness. From one-sample test, it is very much evident that among the firms there is a significant awareness of the term Open Innovation. The results of the One-Sample Test have been presented in table 5.1. From the table 5.1 it is observed that the t value is 5.037 which is significant at 95% confidence interval. This indicates that statistically H_{1a} is accepted. This means the awareness of the term Open Innovation among firms is a significant. Whereas the adoption of the Open Innovation practices among firms is only 43%. From a one-sample test, it is evident that the firms are willing to adopt or have adopted Open Innovation practices. From the table 5.2 it is observed that t value for adoption of Open Innovation is 4.709. The t value is statistically significant at 95% confidence level. Hence H_{2a} is accepted. This indicates that firms among the sample are willing to adopt Open Innovation practices.

The table 5.3 represents a regression model of the firm performance and open innovation practices. The table 5.3 it can be said that the predictor variables i.e. independents variables has a good relation with the dependent variable and the model is also significant at 95% confidence interval. Also from the table 5.4 it is clear that collaborations with the supplier is the most adopted practice among the open innovation practices

practiced which has considerable influence on firm performance. It could be seen that the t value for the collaboration with supplier is significant at 95%. Also collaboration with academic institutions may influence the firm performance.

6. Limitation and Conclusion

The study also infers that the concept of open innovation is still very new to the Indian organizations particularly to the small and medium segments. But still organizations are open to new practices. Even though the term might be new but the practices are being followed. Also the results indicate that Open Innovation practices help the firms to improve their performance. Collaboration is the key to Open Innovation practice that firms have adopted extensively for firm performance. The collaboration with suppliers and academic institution are preferred compared to customers and R&D labs. The concept of Spin-offs and Intellectual Property is still new. The results on a large sample may differ and needs to be explored. Thus the results of pilot study indicate that there is a need to study practices of Open Innovation among the small and medium organization, so that they can prosper and sustain the growth. This could also help the firm to grow to the next level. The limitation of the current study is that the sample is size is too small. The study is limited to the companies located in the Bangalore Ecosystem.

	Awareness of OI		t	df	Sig. (2-tailed)
	Yes	No			
Aware of the term "Open Innovation"	46.7%	53.3%	5.037	29	0.000

Table 5.1: One Sample test on Awareness of OI
Source: Author

	Adoption of OI		t	df	Sig. (2-tailed)
	Yes	No			
Adoption of Open Innovation practices	43%	57%	4.709	29	0.000

Table 5.2: One Sample test on Adoption of OI
Source: Author

R	R Square	Adjusted R Square	Std. Error of the Estimate	F	df	Sig.	Durbin-Watson
0.673	0.453	0.279	0.989	2.603	7	.041	2.012

Table: 5.3: Model Summary of Regression
Source: Author

Independent Variables	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	6.382	1.306		0.000
Collaboration with Universities	0.403	0.207	1.946	0.065
Collaboration with Suppliers	0.475	0.229	2.078	0.050
Collaboration with R&D labs	-0.172	0.260	-0.660	0.516
Collaboration with customers	-0.378	0.255	-1.480	0.153
Licensing idea/technology IPR to partners	-0.196	0.184	-1.068	0.297
Alliance for new product development	-0.303	0.231	-1.312	0.203
Spin-off my product team to develop a product	0.159	0.186	0.856	0.401

Table: 5.4: Summary of Coefficients
Source: Author

Acknowledgement

This paper was presented in ICSMS 2015 at IMT Nagpur. I thank the Conference team for providing me an opportunity to present my paper at the conference.

References:

- Abdul-Hadi G. Abulrub and Junbae Lee. "Open innovation management: challenges and prospects", *Procedia - Social and Behavioral Sciences*, 41, 2012, 130-138.
- Ades et al., "Implementing Open Innovation: The case of Natura, IBM and Siemens", *Journal of Technology Management & Innovation*, 8, 2013, 12-24.
- Balandin, S., "Experience and Vision of Open Innovations in Russia and Baltic Region: the FRUCT Program", *IEEE*, 8, 2010, 5-10.
- Balasubrahmanya, M.H., "External Support and Innovation Performance of MEs in Bangalore: Role of Firm Level Factors", *IEEE*, 2012, 65-70.
- Budiono, A. and Loice, R, "Business Process Reengineering in Motorcycle Workshop X for Business Sustainability", *Procedia Economics and Finance* 4, 2012, 33-43.
- Henry Chesbrough,. "The era of open innovation", *Sloan Management Review*, 44 , 2003, 35- 41.
- Henry Chesbrough, "Open Innovation: The new imperative for creating and profiting from Technology", *Harvard Business Review*, 2004, 10-20.
- Henry Chesbrough, Wim Vanhaverbeke,. and Joel West, "Open Innovation Researching a new Paradigm", *Oxford university Press*, 2006, 1-27.
- Deegahawature, "Capabilities and Implementation of Inbound Open Innovation: Evidence from LMT Firms in Technologically Less Advanced Countries", *European Journal of Business and Management*, 6, 2014, 286-295.
- Peter Drucker, "Innovation and Entrepreneurship: practice and principles", *London: Heinemann*, 1985, 1-6.
- Gumus B, and Cubukcu A, "Open Innovation Survey in Top Turkish Companies", *IEEE* , 2011,1-6.
- Hakkim R. and Heidrick T, "Open Innovation in the Energy Sector", *IEEE*, 2008, 565-571.
- Huang T, Wang W, Yun K., Tseng C, and Lee C, "Managing technology transfer in open innovation: the case study in Taiwan", *Modern Applied Science*, 4, 2010, 2-11.
- Huizingh E, "Open innovation: State of the art and future perspectives", *Technovation*, 2010, 1-8.
- Lakovleva T, "Open Innovation at the Root of Entrepreneurial Strategy: A Case from the Norwegian Oil Industry", *Technology Innovation Management Review*, 2013, 17-22.
- Janerio P, Proenca I, and Goncalves V, "Open innovation: Factors explaining universities as service firm innovation sources", *Journal of Business Research*, 2013, 2017-2023.

17. Jayawardhana A, and Surangi H, "Open innovation practices in women owned handicraft manufacturing smes: a case from central province, Sri Lanka", In: ICBI. 20101-16.
18. Jianzhong, L. 2010. Research on the Mechanism of Hi-tech Enterprises' Open Innovation on the Basis of Knowledge Chain. IEEE, 163-167.
19. Jonthan Y, and Athreyi K, "Exploring innovation through open networks: A review and initial research questions", *Management Review*, 25,2013, 69-82.
20. Kafouros M, and Forsan N, "The role of open innovation in emerging economies: Do companies profit from the scientific knowledge of others?", *Journal of World Business*, 47, 2012, 362-370.
21. Kolaskar A, Anand S, and Goswami A, "Innovation in India", National Knowledge Commission, 2007, 7-31.
22. Lichtenthaler U, "Open Innovation in Practice: An Analysis of Strategic Approaches to Technology Transactions", *IEEE transactions on engineering management*, 55, 2008, 148-157.
23. Lukac D, Rihter J. D, Rogic M, and Mikela M, "Open Innovation Model in the ICT Industry – The Case of the German Telekom", *IEEE*, 2012, 48-51.
24. Mashilo M, and Iyamu I, "The Openness of the Concept of Technology Open Innovation", *IEEE*, 2012, 487-492.
25. Mazinia S. R. et al., "Open innovation and user's involvement in new product development: a case study in the automotive sector", *Product: Management & Development*, 11, 2013, 49-55.
26. Munkongsujarit S, and Srivannaboon S, "Key Success Factors for Open Innovation Intermediaries for SMEs: A Case Study of iTAP in Thailand", *IEEE*, 2011, 1-10
27. Revutska N, "Open innovation as a strategic model of modern business", *European Scientific Journal*, 1, 2013, 1857-7881.
28. Segers, P. 2013. Strategic Partnerships and Open Innovation in the Biotechnology Industry in Belgium. *Technology Innovation Management Review*, 23-28.
29. Sun X, and Wang Q, "Open Innovation in Small and Medium Enterprise under the view of Knowledge Management", *IEEE*, 2011, 4690-4693.
30. Susanne D, and Pirjo S, "Success Factors of Open Innovation - A Literature Review" *International Journal of Business Research and Management*, 4, 2013, 111-131.
31. Tian D, and Feng Y, "The Categories of External Technology Sources in Open Innovation", *IEEE*, 2010, 1-4.
32. Wim Vanhaverbeke, "Rethinking Open Innovation Beyond the Innovation Funnel", *Technology Innovation Management Review*, 2013, 6-10.
33. Venturini and Verbano, "Openness and innovation: an empirical analysis in firms located in the Republic of San Marino", *International Journal of Engineering, Science and Technology*, 5, 2013, 60-70.
34. Vrandea, V. et al. "Open innovation in SMEs: Trends, motives and management challenges", *Technovation*, 29, 2009, 423-437.
35. Wang W, and Tang J, "Mapping Development of Open Innovation Visually and Quantitatively: A Method of Bibliometrics Analysis", *Asian Social Science*, 9, 2013, 254-269.
36. West J, and Gallagher S, "Challenges of open innovation: the paradox of firm investment in open-source software", *R&D Management*, 36, 2006, 319-331.
37. Xu Y, and Zheng J, "Open Innovation Literature Review and Outlook", *IEEE*, 2012, 558-562.
38. Yifeng Xie, "Open Innovation of small and medium sized enterprises and R& D Public Services Platform: A case about the VIC model of Zhangjiang Hi-tech Park", *IEEE*, 2011, 1-5.