International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 12 | Dec -2016 www.irjet.net p-ISSN: 2395-0072

FACTORS AFFECTING INNOVATION CAPABILITY OF INDIAN SOFTWARE FIRMS (WITH SPECIAL REFERENCE TO INDORE CITY)

SHARDA HARYANI, Dr. V.B GUPTA

Assistant Professor, Prestige Institute of Management and Research,Indore
e-mail : sharda_haryani@pimrindore.ac.in
Professor, School of Data Science and Forecasting, Devi Ahilya Vishwavidhyalaya, Indore
e-mail : guptavb@hotmail.com

ABSTRACT

Innovation management is a new concept that every company and country all over the world is giving strong consideration and priority. Virtually, in every industry, from aerospace to pharmaceutical and from banking to computer, the dominant companies had demonstrated an ability to innovate. Software is not only a highly innovative and economically important sector in its own right, but it is often also an important element of innovation in other sectors. Many process and structural innovations depend heavily on organizational changes that are facilitated by software innovations. The main purpose of this paper is to establish a better understanding of the innovative performance of companies, considering the possible factors of innovative capability of software companies. This includes measuring the quality of performance by means of latent variable and analyzing the usefulness of these indicators. A self structured questionnaire is used for data collection. The sample of the study will be constituted of Indian software companies. The target respondents would be software industry practitioners i.e. software engineers, analysts, project managers, R&D managers, CEO, etc. The study helps us to identify the important factors of innovation. This is beneficial for software companies to decide on the different parameters necessary for innovation.

Key Words: Innovation capability, Innovative Strategies, Technological Orientation.

INTRODUCTION

Innovation may be broadly defined as the successful commercial introduction of a new product, service or process. More specifically, according to the OECD's Oslo Manual (OECD, 2005), innovation refers to the implementation of "technologically new products and processes and significant technological improvements in products and processes". An innovation has been implemented if it has been introduced on the market (product or process innovation) or used within a production process (process innovation). Innovation management is a new concept that every company and country all over the world is giving strong consideration and priority. But, it took longer than expected for the developing countries especially India, to acknowledge the importance of innovation to the growth of a company and the development of an economy. In the present day environment, there is an added pressure to be more socially and environmentally responsible and there are risks which need to be mitigated and managed before an organization can be succeeded and remain market leader in their operations. The survival of any organization depends on its ability to manage and build in the concept of innovations.

Companies that have established themselves as technical and market leaders had shown ability to develop successful new product and properly manage changes (Oloyede B., 2002). The ability of a firm to manage innovation and absorb changes will determine the extent, such firm will go in the industry and an economy. The software sector lies at the heart of the modern economy, serving as a driver, an enabler and a diffuser of innovation across all sectors and industries. The software sector is evolving rapidly and its innovations are impacting on almost every industrial sector across the world. A deeper look inside the Indian software companies gives a completely different picture. Numerous studies have been conducted on the Indian software industry especially in relation to the outsourcing aspect of the software companies. On closely monitoring all the relevant literature in this field, it was found that not much of an exhaustive and structured work has been done on collaborating the organizational innovation capability dimensions and innovation success in Indian software companies. Although a number of metrics have been proposed in literature, only a few of them have been validated in industry trial. Most of the metrics are validated through statistical analysis. This lack of reliable metrics could be the main reason why industry claims that they do not have enough metrics. Hence, industrial trials are imperative to establish the reliability and usability of the metrics. Moreover, there was no collection of metrics for innovation measurement that can be used by software industry. Owing to this lacuna, this research aimed at intensely exploring the

dimensions of organizational innovation capability which contribute towards the success in innovative software products or services

LITERATURE REVEIW

According to Drucker(1985) "Innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. Innovation is the successful exploitation of new ideas". Albury (2005) explained innovation as "Successful innovation is the creation and implementation of new processes, products, services and methods of delivery which result in significant improvements in outcomes, efficiency, effectiveness or quality". Hartley (2005) defined Innovation as "the successful development, implementation and use of new or structurally improved products, processes, services or organizational forms".

Rogers (2003) in his book *Diffusion Of Innovations* defined innovativeness as "the degree to which individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of the system" and diffusion as "the process, in which an innovation is communicated through certain channels over time among the members of the social system". Industrial innovation includes the technical, design, manufacturing, management and commercial activities involved in the marketing of a new (or improved) product or the first commercial use of a new (or improved) process or equipment" (Freeman,1982). Each of these definitions signify a different aspect of innovation e.g. perspectives, levels and types (Mathiassen and Pourkomeylian, 2003).

A little empirical evidence in literature is found about development and validation of organizational innovativeness scales. Authors, like Miller and Friesen (1983), Subramanian and Nilakanta (1996),Capon et al. (1992), Avlonitis et al. (1994), Hurley and Hult (1998), Lyon et al. (2000), Guimaraes and Langley (1994) and North and Smallbone (2000), address the concern of effectively measuring organizational innovativeness. Scales used in the area of innovative capability often adopt only product innovativeness as important construct (Danneels and Kleinschmidt, 2001; Song and Parry, 1997; Sethi et al., 2001), instead of overall innovative capability. Product innovativeness is the outcome-oriented innovative capability construct, whereas the important underlying factors, such as behavioral changes, process innovation, organizational culture and strategic orientation towards innovation were unnoticed.

Various forms of Innovation are present in literature, such as product or process innovation, administrative or technological innovation, radical or incremental innovation, etc. (Zaltman et al., 1973; Utterback, 1994; Cooper, 1998). The importance of different dimensions is emphasized by authors. Schumpeter (1934) suggests a varied range of possible innovative alternatives, namely identifying new markets, developing new products or services, discovering new sources of supply, developing new methods of production, and developing new organizational forms. Miller and Friesen (1983) spotted four factors of innovation: new product or service innovation, risk taking by key executives, methods of production or rendering of services and seeking unusual and novel solutions. Whilst Capon et al. (1992) focuses on three dimensions of organizational innovativeness i.e technological sophistication, market innovativeness and strategic tendency to pioneer.
Software firms have significant experience in adopting innovative practices for designing and developing products (Nambisan, 2002).Therefore, the software industry presents a valuable context to explore issues related with innovation studies.

OBJECTIVE

The main objective of this study is to explore the imperative factors that influence innovation capability of Indian software firms.

RESEARCH METHODOLOGY

The research is exploratory in nature and the data used for the analysis is primary in nature. The sample of the study was constituted of 150 respondents from Indore city. Non Probability judgemental sampling method was used to select the respondents. The target respondents were software industry practitioners i.e. software engineers, analysts, project managers, R&D managers, CEO, etc. The data was collected using a self structured questionnaire. The questionnaire was designed following a wide review of the literature on innovation capabilities of software firms. It was divided into two parts. The first part was based on personal profile of the respondents. The second part was based on the innovation process taking place in their firm. The third part consisted of 20 close ended items based on five point Likert scale (Strongly Agree – 5 to Strongly Disagree – 1).To check the reliability of the questionnaire , the Cronbach's α test was

applied. The inter item correlation of none of the items was less than 0.196 thus all the items were significant and considered in analysis. As a general rule alpha coefficient greater than or equal to 0.5 is considered acceptable and is a good indicator of reliability. The Cronbach's Alpha for the questionnaire was found to be 0.899. The data was then tested for Kaiser-Meyer-Olkin Measure of sampling adequacy and Bartlett's test of sphericity. High value of KMO i.e. 0.723 which is greater than0.5 indicate that sample is sufficient for factor analysis. The Bartlett's test of sphericity is .000 which is less than .05 indicating that there exists significant relationship among the variable. The data was subjected to Principal Component Method of Factor Analysis using Varimax Rotation. As a result of factor analysis, 5 factors were extracted namely: Technological Orientation, Interdepartmental Coordination, Competitor Orientation, Customer Orientation and Innovative Strategies.

FACTOR ANALYSIS

The factor analysis was carried out on 20 significant items that resulted into 5 factors that Technological Orientation, Interdepartmental Coordination, Competitors Orientation, Customer Orientation and Innovative Strategies. The total percent of variance for all the factors was 73.512% and the Eigen value for each factor was more than 1. The details of these factors, with their item loads, eigen values and percent of variances are tabularized and shown in Table 1 in annexure. The factors extracted are discussed in detail below.

Technological Orientation

Technological Orientation emerged as first factor with highest factor load. It comprises of seven items which were Our firm encourage and support the informal R&D, internal technological efforts and learning activities, Our organization has strong relationships with the clients who are the leaders in applying cutting edge technology in their industries, Advanced technologies and methods are used to develop new products in our firm, We are often one of the first in our industry to detect technological developments that might potentially affect our business, Our firm tries to improve capabilities of designing, engineering, prototyping, and testing. Our firm periodically review the likely effect of changes in technology on our business, Our organization is considered to be a leader in adopting new technologies. The total load of this factor is 5.371 and explains 25.712% of variance .In OSLO manual guidelines for collecting and interpreting innovation data 'Innovation comprises commercialisation of new technologies or technological change,at environments where technologies change frequently, firms need innovations to sustain their performance'(OECD, 1992). In past studies, firms with a strong technological orientation give importance to new products and new markets. This leads a strong and efficient innovative capability (Ritter and Gemünden, 2002). A study by Gatignon and Xuereb (1997) says that firms that want to make innovations to increase their competitive power, they should develop their technological orientation and their innovative capability. Technological orientation means that firms acquire new technological knowledge to produce solutions, to meet potential needs of customers and to develop their new product by means of this new knowledge (Athuene-Gima and Ko, 2001). Ritter and Gemünden (2002) in their study found that a technological-oriented firm allocates more financial resource to R&D, employs high qualified personnel and creates an organisational culture that supports learning and creativity. Hence we conclude that technology-oriented firms also have strong innovative capability.

Interdepartmental Coordination

Interdepartmental Coordination evolved as second factor. It comprises of three items which were All departments act together in firm's plans and strategies, Customer knowledge is shared with all related departments in our firm, The inter departmental meetings and coordination fosters innovation. The total load of this factor is 2.379 and explains 12.940% of variance. According to Han et al. (1999), due to lack of rules and procedures in the organisation, members are generally confronted with some uncertainties about innovations. Interfunctional co-ordination provides linkage between different functional units, and it serves as a bridge to decrease insecurity and conflicts. It increases mutual trust and dependency among people that work on different functions (Olson et al., 1995). Interfunctional co-ordination enables communication and exchange about customers, competitors, and environmental threats, and opportunities among functional departments of a firm. It provides an environment that enables to realise innovation opportunities rapidly and easily, and to transform them to successful innovations (Zmud, 1982).A successful innovation is not possible without interdepartmental co-ordination.

Competitors Orientation

Competitors Orientation emerged as third important factor that influence innovation capability of the software firms. It comprises of three items as Our firm seeks persistent opportunities that provide competitive advantages, Our firm tries to be initiator against competitors about producing new product and ideas and Our firm gives rapid and efficient response to competitors' actions. The total load of this factor is 2.182 and explains 12.366% of variance. Competitor orientation can be defined as ability of firm to define, analyse competitors' activities and to response to them (Gatignon and Xuereb, 1997). Narver and Slater(1990) in their study establish that firms should understand the strong and weak sides of competitors in short-term and capabilities and strategies of current and potential competitor in long-term. The understanding and following competitors' products and processes could effectively change the competition power of current products (Mavondo, 2000). According to Han et al.(1998), a competitor-oriented culture facilitates making innovations. Competitor orientation comprises being better and more different from competitors (Liu, 1995). Thus competitor orientation compares the firms' own capabilities with their competitors' capabilities and then it causes the firms to develop their own capabilities more effectively.

Customer Orientation

Customer Orientation evolved as forth factor. It comprises of four items which are; We periodically review our service development efforts to ensure they are in line with what our service users need, Our firm often change service model as per the customer demand, Our firm launches new and effective projects on customers complaint, Our firm lay emphasis on customer relationship management. The total load of this factor is 2.463 and explains 12.293% of variance. A customer oriented firm can be defined as a firm that has an ability to define, analyse, understand customer wants and response to this wants (Gatignon and Xuereb, 1997; Zhang and Doll, 2001). It refers to firms to understand target customers adequately to create superior value for customer (Narver and Slater, 1990). According to the results of Montoya-Weis and Calantone's study (1994), inadequate knowledge of customer laid to the failure of new products (Frambach and Schillewearth, 2002). Kahn (2001) and Han et al. (1998) found a positive relationship between customer orientation and innovativeness of the firm. Deshpande et al. (1993) also found in his study a significant relationship between customer orientation and innovativeness. Both also have significant influences on firm performance. Therefore, factors related to understanding of potential customer needs and making innovation decisions suited to these needs are important for new products that firms serve to markets to be successful.

Innovative Strategies

Innovative strategies emerged as last and fifth factor. It consisted of three items which were, our firm manage internal and external as well as tacit and explicit knowledge to generate innovations, Our firm investigate continually for potential products that will provide competitive superiority in the future, Our firm uses joint venturing and other financing methods to commercialize innovations. The total load of this factor is 1.976 and explains 10.202% of variance. Innovation strategy designates to what degree and in what way a firm uses innovation to perform its business strategy and to develop its performance (Gilbert, 1994; Gatignon and Xuereb ,1997). According to market characteristics, different strategic orientations have different effects on innovation performance. Innovation strategy contains activities such as development of specific new products
and services, entering new markets and undertaking of great R&D project. Without a strategy for innovation, innovative capability and innovation success is not possible (Lawson and Samson, 2001). Linkage between innovation and strategy is important for effective innovation management.

CONCLUSION

Innovation is a word used to describe a vast number of changes to firms' activities that lead to improved firm performances. As we have seen these changes can relate to new or improved product or process, investment in new machines ,marketing expenditures, investment in training, creation of intellectual property or the purchase of technology. The multifaceted nature of innovation makes a concise measure of innovation, which is not appropriate for all the firms.
Software industry has generally a rather different structure from other industries. While product design and development are less important in manufacturing industries, it is very important topic for software industries. Software development is completely a design event. Also personnel are most important resource to develop software or products in software industry. In our study we investigated five factors namely Technological Orientation, Interdepartmental Coordination, Competitor Orientation, Customer Orientation and Innovative Strategies which influences the innovative capability of software firms with context to Indore city. The proper understanding of these factors can lead the firm to success.

LIMITATIONS

This research has also some limitations same as previous studies in the literature. Clarifying these limitations will benefit future studies when used as guidance. First, this research was based on software firms, and design of research, analysis, results and interpretation were realised by taking into account characteristics of software sector. Findings may vary in other sectors. The study was carried on small software firm based in Indore city. The responses may vary for different geographical areas. The increased sample size may lead to different results. Finally the scale has reliability of 0.89, future researcher should develop more reliable measure for this scale

REFERENCES

[1] Albury, D. (2005). Fostering Innovation in Public Services. *Public Money & Management*, 25 (1), 51-56.

[2] Atuahene-Gima, K. and Ko, A. (2001). An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation. *Organization Science*, 12(1), 54–74.

[3] Avlonitis, G. J., Kouremenos, A., and Tzokas, N. (1994). Assessing the innovativeness of organizations and its antecedents: Project Innovstrat. *European Journal of Marketing*, 28, 5-19.

[4] Capon, N., Farley, J. U., Hulbert, J. and Lehmann, D. R. (1992). Profiles of Product Innovators Among Large US Manufacturers. *Management Science*, 38, February,157-169.

[5] Cooper, J. R. (1998). A Multidimensional Approach to the Adoption of Innovation. *Management Science*, 36(8), 493-502.

[6] Danneels, E. and Kleinschmidt, E. J. (2001). Product innovativeness from the firm's perspective: its dimensions and their relation with product selection and performance. The *Journal of Product Innovation Management*, 18, 357-373.

[7] Deshpandé, R, Farley, J.U. and Webster, F.E. (1993). Corporate culture, customer orientation and innovativeness in Japanese Firms: A Quadrad Analysis. *Journal of Marketing*, 57, 23–27

[8] Drucker P., (1985). *Innovation and Entrepreneurship*, Butterworth-Heinemann, Oxford.

[9] Frambach, R. and Schillewaert, N. (2002). Organizational innovation adoption: A multi-level framework of determinants and opportunities for future research. *Journal of Business Research,* 55 ,163-176.

[10] Freeman, C. (1982). *The Economics of Industrial Innovation,* (2"" edn). Frances Printer, London.

[11] Gatignon, H., and Xuereb, J.M. (1997). Strategic orientation of the firm and new product performance. *Journal of Marketing Research*, 34(1), 77–79.

[12] Gilbert, J.T. (1994). Choosing an innovation strategy: Theory and practice. *Business Horizons*, 337(6), 16–21.

[13] Guimaraes, T., & Langley, K. (1994). Developing innovation benchmarks: An empirical study. *Benchmarking: An International Journal*, 1(3), 3 - 20.

[14] Han, J.K., Kim, N., and Srivastava, R.K., (1999). Market orientation and organizational performance: Is innovation a missing link? *Journal of Marketing*, 62, 30–45.

[15] Hartley,J. (2006). Innovation and its contribution to improvement: A review for policymakers, policy advisers, managers and researchers. London, UK.

[16] Hurley, R. F. and Hult, T. M. (1998).Innovation, Market Orientation, and Organizational Learning: An Integration and Empirical Examination. *Journal of Marketing*, 62, 42-54.

[17] Kahn, K.B. (2001). Market orientation, interdepartmental integration and product development performance. The Journal of Product Innovation Management, 18, 314–323.

[18] Lawson, B. and Samson, D. (2001). Developing innovation capability in organizations: A dynamic capabilities approach. *International Journal of Innovation Management*, 5 (3), 1–23.

[19] Liu, H. (1995). Market orientation and firm size: An empirical examination in UK firms. *European Journal of Marketing*, 9(1), 57–71.

[20] Lyon, D., Lumpkin, G., and Dess, G. (2000).Enhancing Entrepreneurial Orientation Research: Operationalizing and Measuring a Key Strategic Decision Making Process. *Journal of Management,* 26(5),1055-1085.

[21] Mathiassen, L. and Pourkomeylian, P.(2003).Managing knowledge in a software organization. *Journal of Knowledge Management,* 7(2), 63–80.

[22] Mavondo, F.T.(2000). Marketing as Adaptation: Example from a developing economy. *Marketing Intelligence and Planning*, 18-5, 256-272.

[23] Miller, D. and Friesen, P. H. (1983).Strategy-making and Environment: the Third Link. *Strategic Management Journal*, 4(3),221-235.

[24] Montoya-Weis, M.M. and Calantone, R. (1994). Determinants of new product performance: A review and meta-analysis. *Journal of Product Innovation Management*, 11(5), 397–417.

[25] Nambisan, S (2002). Software firm evolution and innovation orientation. *Journal of Engineering and Technology Management,* 19(2), 141–165.

[26] Narver,J.C.,and Slater,S.F.(1990).The effect of a market orientation on business profitability. *Journal of Marketing*,54(4),20–35.

[27] North, D. and Smallbone, D. (2000). The Innovativeness and Growth of Rural SMEs during the 1990s. *Regional Studies*,34(2),145-157.

[28] OECD (2005), Oslo Manual - Guidelines for Collecting and Interpreting Innovation Data, 3rd ed. OECD Publishing.

[29] Oloyede, B. (2002). Research Method in Finance. Yaba. Forth Right Education.

[30] Olson, E.M., Walker, O.C. and Ruekert, R.W. (1995). Organizing for effective new product development: The moderating role of product innovativeness. *Journal of Marketing,*59, 48–62.

[31] Ritter, T. and Gemünden, H.G. (2002). The impact of a company's business strategy on its technological competence, network competence and innovation success. *Journal of Business Research,* 5728, 1–9.

[32] Schumpeter, J. A. (1934).*The Theory of Economic Development*. Cambridge, Massachusetts: Harvard University Press.

[33] Sethi, R., Smith, D. C. and Park, C. W. (2001). Cross-functional Product Development Teams,Creativity, and the Innovativeness of New Consumer Products. *Journal of Marketing Research,* 38(1), 73-85.

[34] Song, M. and Parry, M. E. (1997). Cross-national Comparative Study of New Product Development Processes: Japan and the United States. *Journal of Marketing*,61(4),1-18.

[35] Subramanian, A. and Nilakanta, S. (1996). Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. *Omega,* 24(6), 631-647.

[36] Utterback, J.M. (1994). Mastering the Dynamics of Innovation: How Companies Can Seize Opportunities in the Face of Technological change. Boston, MA: Harvard Business School Press.

[37] Zaltman, G., Duncan, R., and Holbek, J. (1973). *Innovations and Organisations*, New York: John Wiley and Sons.

[38] Zhan, Q. and Doll, W.J. (2001).The fuzzy front end and succes of new product development causal model. *European Journal of Innovation Management*, 4(2), 95-112.

[39] Zmud, R.W.(1982). Diffusion of modern software practices: Influence of centralization and formalization. *Management Science*, 28, 1421–1431.

ANNEXURE

Table.1 : Details of Factor Analysis

Factor	Items	Factor load	Initial Eigen values	% of variance
Technological Orientation	Our firm Encourage and support the informal R&D, internal technological efforts, and learning activities	0.878	7.718	25.712
	Our organization has strong relationships with the clients who are the leaders in applying cutting edge technology in their industries	0.855		
	Advanced technologies and methods are used to develop new products in our firm	0.849		
	We are often one of the first in our industry to detect technological developments that might potentially affect our business	0.841		
	Our firm tries to Improve capabilities of designing, engineering, prototyping and testing	0.692		
	We periodically review the likely effect of changes in technology on our business	0.665		
	Our organization is considered to be a leader in adopting new technologies	0.591		
Interdepartmental coordination	All departments act together in firm's plans and strategies	0.897	2.646	12.940
	Customer knowledge is shared with all related departments	0.818		
	The inter departmental meetings and coordination fosters innovation	0.664		
Competitors' Orientation	Our firm seeks continually opportunities that provide competitive advantages	0.800	1.606	12.366
	Our firm tries to be initiator against competitors about producing new product and ideas	0.760		
	Our firm gives rapid and efficient response to competitors' actions	0.622		
Customer Orientation	Our firm periodically review our service development efforts to ensure they are in line with what our service users need	0.745	1.543	12.293
	Our firm changes service model based on customer demand	0.620		
	New and effective projects on customers complaint	0.587		
	Emphasis on customer relationship management	0.511		
Innovative Strategies	Managing internal and external as well as tacit and explicit firm's knowledge to generate innovations	.704	1.190	10.202
	Our firm investigate continually for potential products that will provide competitive superiority in the future.	.645		
	Using of joint venturing and other financing methods to commercialize innovations	.627		