The Influence of Organizational Learning Capability on Success of Technological Innovation (Product) Implementation with Moderating Effect of Knowledge Complexity

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Abstract

The purpose of this proposed framework paper is to explore the relationship between organizational learning capability, knowledge complexity and their impact on technological innovation (product) implementation success. Research has fairly established that technological innovation implementation is associated with organizational learning. However, few studies have investigated on the roles of knowledge complexity on the established relationship. This paper will focuses at implementation phase of innovation process, where innovation has be fully developed then it must be implemented. Identification of success or failure of innovation can be done through implementation phase. This paper aims to investigate the framework knowledge complexity as moderating effect on the relationship between organizational learning capability and technological innovation (product) implementation.

Key Words: Technological innovation, knowledge complexity, organizational learning capability.

1.0 INTRODUCTION

The introduction of technological innovations must therefore reaps advantages in terms of product quality, intended as the set of performance features, which must translate into a "capacity gap" with respect to competitors that come from applying better technologies (Pratali, 2003). There is a general agreement among practitioners such as industry and government, and academicians on how organization should compete in the global market. Organization must be capable of producing reliable product inexpensive, high quality, quickly and easily (Mitala And Pennathurb, 2004). A success product is a product that is well accepted by the market, thus, a new product should go through product development process, prototype and testing before entering the market so that it will be well accepted. Paladino (2007) defines new product success as the ability of a new product or innovation to avoid failure in the marketplace. According to Weaver et al. (1998), technological superiority is an important measurement of product success and should be investigated. Technology plays a significant role through the ability to innovate and also serves as an important source of new product innovation and competitive advantage (Gunasekaran et al., 1998; Porter, 1990). Importantly, developing and exploiting improved functionality of product provide tangible business benefit through integrating new technologies (Karlsson et al., 2010).

The higher failure rate of new product is a phenomenon in firms. Firms still spend huge amounts of time and money on unsuccessful product development projects (Page 1993). Although intensive attention from operations, research and development, marketing and business strategy to new product development, there is only a minimal improvement of product success rate (Wind and Mahajan, 1997). New product failure rate estimated at 40 to 75 percent (Stevens and Burnley (2003), 75 to 80 percent (Clancy and Shulman, 1991) and Cooper and Kleinschmidt (1991), more than 50 percent (Zirger and Maidique 1990), 60 to 90 percent (Ram, 1989 and Ram and Sheth, 1989). Ram (1989) state that higher new product failure encourage firms to understand why customers reject new products rather than accepting them. However, the present study found that new product success was encouraging.

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A study conducted by Lily Julienti and Hartini (2010) in a study of SME in Malaysia found that the level of success of product innovation was estimated at 70% and Tan and Aizzat (2010) also at 70 percent. Nash et al. (2001) supported that failure is most common than success in the implementation of process innovations. Therefore, a study should be conduct to identify factor that lead to new product success or failure.

Stata (1989) mentioned that organizational learning leads to innovation especially in knowledge-intensive of the industry which individual and organizational learning lead to further innovation and creates sustainable competitive advantage. Lukas (1996) acknowledged "organizational learning is considered by many scholars as a key to future organizational success". Sinkula et al. (2002) highlighted that the important role of organizational learning capabilities in generating innovation. Nonaka and Takeuchi (1995) explained that companies innovate through a constant learning process which they generate new technological knowledge. organizational learning can take effect not only at the initial phase of innovation but also at the implementation phase (Glynn, 1996). Study at organizational level has recommended that a process of individuals concentrating to learn new technologies is the answer to implementation success (Aiman-Smith and Green, 2002). Learning capability helps firms to identify and respond to market changes faster, cheaper, and better even cheaper than competitors (Prieto and Revilla, 2006). In this study, organizational learning is important factor in determining new product success.

2.0 THEORETICAL FRAMEWORK

Goh and Richards (1997) define organizational learning capability (OLC) as the managerial and organizational characteristic or element that facilitate the organizational learning process or encourage an organisation to learn. Organisational learning facilitating factors were grouped through a comprehensive analysis so that a simplified essential set of dimensions for organisational learning was obtained (Gatignon et al., 2002). Chiva et. al, (2007) identify five underlying dimensions of organizational learning capability: experimentation, risk taking, interaction with the external environment, dialogue, and participative decision making. These dimensions were considered as the most underlined facilitating factors in the literature (Chiva, 2007). Figure 1.1 present a conceptual model concerning the relationship between constructs of the proposed conceptual model.

Innovation must go through into several processes of what we called as "innovation process". A clear innovation phases involved three levels namely; generation, development and implementation (Sundbo, 2000). An ultimate innovation impact can be measured through a last innovation process; the implementation phase. Implementation phase starts with application and adoption activities commenced for an innovation through previous phases which innovation is generated and developed, and then the implementation phase takes place involving transferring innovation to the operating locations, establishing the innovation into the market and reaching it to possible users (Angle and Van de Ven, 1989) This study will investigate at implementation phase of innovation process. Critically, one of the most crucial phases in innovation process is the implementation phase (Anderson and King, 1995). Implementation phase is where innovation is correctly operationalized and implemented in an organization (Cozijnsen et al., 2000; Vrakkking, 1995; Zaltman et al., 1973). Evidence showed that most failures occurred at this phase (such as Day, 1999; Beatty, 1992; Galbraith, 1990; Majchrzak, 1988 and Tang, 2000).Instead of high failure rate, innovation implementation remains a main priority to the organization.

Theoretical foundation of this framework is mainly derived from resource-base view (RBV). Newbert (2007) argues that a current review of empirical RBV literature in management relate firm's competitive position depends essentially on its organizing context and on its valuable, rare and inimitable capabilities and core compentencies rather than on its static resources. However, resources are inadequate for gaining a sustained competitive advantage and a high performance, as well (Teece, 2007; Newbert,2007). Being so, firms must be capable to change resources in capabilities, and accordingly in a positive performance (Ferreira and Azevedo, 2008). Combination between RBV and Capability theory provide a clear direction in this framework as transform resources into capability will create a unique resources that hardly to imitate by others firms.

3.0 CONCEPTUAL MODEL AND HYPOTHESES

3.0.1 Participative Decision Making and Technological Innovation (product) Implementation

Participative decision making is where employees have significant of influence in the decision-making process (Cotton et al., 1988). For product innovation processes to succeed, decision making process plays an important role (Kok and Creemers, 2008). Participative decision making increases commitment and involvement and to innovate (Damanpour, 1991).

Importantly, when a firm is experiencing a major technological change, the use of participative decision making is the main priority mechanism (Brown, 1979). To provide a better innovative solution, management needs to involve all related parties and it can be achieved by reducing bureaucratic problem in organization. The increase in participation during decision making will result in less resistance to change and better possibility for adoption of new technology (Wall and Lischeron, 1977). Bahrami and Evans (1987) assert that successful high technology firms practice decentralized decision-making and high degree of participation by line managers in decision-making when dealing with changes in the environment. Furthermore, the ability to participate in decision making is a key process in enhancing innovation (West and Anderson, 1996). Participative decision making was most essential to technological innovation (Ahmed Fadzil, 2001).

H1: Participative Decision Making has a positive effect on Technological Innovation (product) Implementation

3.0.2 Experimentation and Technological Innovation Implementation

Experimentation deals with trying out new ideas, being curious about how things work or carrying out changes in work process (Nevis et al., 1995). Experimentation produces a flow of ideas or proposals that challenge the established order and is regarded as a manifestation of the creative environment (Alegre, 2003). Thomke (2001) asserts that experimentation lies at the heart of every company's ability to innovate. Management needs to encourage and support the freedom to conduct experiment with new work methods and innovative process (Senge, 1990; Garvin, 1993; Mcgill, Slocum and Lei 1993). Organization can learn by analyzing the failure and then proceed with experimentation. A meaningful failure should be used as a learning process in organization. To optimize the learning process, team should "embrace failure" and systematically collect as many 'failures' as quickly as possible (Singer and Edmonson, 2006).

Thomke (1998) argue that to ensure that technological implementation works, it often requires to do experimentation, using trial and error to find solution. Companies that experiment novel technologies are better positioned to have a higher rate of innovation than firms that invest all their efforts in exploiting the existing, familiar technologies (Beerkens, 2004). Precipe (2000) mentions that to understand technological failure and to gain knowledge resulted from failure will be helpful for subsequent technology or product development. New technologies reduce the cost and time of experimentation, allowing companies to be more innovative (Thomke (2001). By experimenting with novel technologies, it permits an organization to evaluate the potential of technology in effective ways (Cohen and Levinthal, 1990).Through experimenting new technology, organization can accelerate its innovation in effective way especially in new technology. For example, Bank of America's setting the expected level for failed experiments at 30 percent provided a signal that the organization valued creative experimentation (Cannon and Edmondson, 2005).

H2: Experimentation has a positive effect on Technological Innovation (product) Implementation

3.0.3 Interaction with External Environment on Technological Innovation (product) Implementation

Firms can learn from their external counterparts and use related information for organizational success. The external environment of an organization consists of those factors that are beyond the direct control of the organization, and include industrial agents such as competitors, the economic system, the social system, the monetary system and the political/legal system, among others (Alegre, 2004). Dependent on other sources of experience is important for firm with new product to successfully explore new way to compete (March, 1991). Cyert and March (1963) argue that an organization needs to deal with external shocks, in turn they must adapt and learn to cope with that situation in their whole life. External environment demands organization to be more cautious. The current trend in innovative firm which previously depended on internal R&D, is highly working with external sources for the purpose of generating new product concept and building technology for product development (Chesbrough 2003). For example, customer participation contributes to achievement of product and services differentiation (Song and Adams, 1993).

In recent years, an escalating number of organizations are forming relationships with other organizations to enhance value through continuous knowledge management (Hagedoorn, 1993; Robertson and Yu, 2001). Varis and Hannu Littunen (2010) showed that external sources of information are positively associated with the introduction of novel product innovations in firms. A study was conducted by Nieminen and Kaukonen (2001) revealed that significant various partners are for firms' innovation related activities. Organization need to establish relationship with external entities including customer, competitor or government agency etc.

Such collaboration will bring benefit to the firm including the latest changes or developments which affect firm competitiveness.

H3: Interaction with External Environment has a positive effect on Technological Innovation (product) Implementation

3.0.4 Risk Taking and Technological Innovation (product) Implementation

Liles (1981) defines risk as the probability of an unconstructive result occurring from various courses of actions. Risk-Taking is the organization's enthusiasm to break away from normal path and venture into unknown territory (Venkatraman, 1989; Wiklund and Shepherd, 2003).

Kouzes and Posner (1987) argue that learning from successes and mistakes resulted from risk taking will lead to increasing business opportunities. When there are growths in new areas, there will be unfamiliarity with new activities and management requires more efforts (Penrose, 1972) to deal with risk. Employees need support and collaboration among themselves to reduce fear and gain openness which encourages new risk taking (Hurley and Hult, 1998). Peter and Waterman (1982) suggest that companies that are able to manage risk taking properly in their industrial context will achieve excellence result. Saleh and Wang (1993) showed that innovative companies are more engaged in risk taking compare to less innovative companies. Rauch et al. (2004), Covin et al. (2006) and Begley and Boyd (1987) found that the risk-taking is positively related to performance. The willingness to take risk will or risk taking open great opportunity to firm in implementing technological innovation.

H4: Risk taking has a positive effect on Technological innovation (product) Implementation

3.0.5 Dialogue and Technological Innovation (product) Implementation

Isaacs (1993) and Schein (1993) state that most scholars and practitioners of organizational learning see the process of dialogue as to provide an avenue for communication and collaborative learning within and between groups and teams. It can be said that dialogue is part of organizational learning which encourages communication and tries to sharing the same conclusion between them. In organisational studies, dialogue has become important as an aspect of understanding the difficulties and possibilities of learning and change (Gear et al, 2003).

Communicative interaction only takes place when the receiver derives some meaning from the message, which of course is less than what the sender intends (Ballantyne, 2004). Importantly, successful technological innovation is positively influenced by individuals communication (Balthasar et al, 2000). The process of inter-functional coordination promotes communication, collaboration, cohesiveness, trust, and commitment among different functional areas (Auh and Menguc, 2005). Process of inter-functional coordination is claimed to promote the extent of product innovation (Zhang and Yanling, 2010). Frederick (2005) stresses that development of new product is a complex process requiring cross-functional involvement from beginning and throughout the process. Integration level is a critical determinant of new product performance (Song and Parry, 1992). Ayers et al. (1997) revealed that integration between marketing and R&D enhances new product success.

The role of dialogue among organizational members can produce better understanding by sharing meaning on related issues. Organizational members also can reach mutual understanding and alleviate the speeding in sharing information.

H5: Dialogue has a positive effect on Technological innovation (product) Implementation

3.1 MODERATING EFFECT OF KNOWLEDGE COMPLEXITY

Knowledge complexity influences the way knowledge is transferred and integrated in organization. The higher levels of knowledge complexity result in more difficulties a company may encounter in the knowledge integration process (Ju et al, 2006). Badi and Shariff (2003) suggest that in an absent of knowledge integration, the firms require more time and resources administering and securing information, therefore, hindering innovation. Complex knowledge mirrors the degree to which knowledge contains many different, unique and interdependent parts, for example, how one element works reveals little about how the different elements work together (McEvily and Chakravarthy, 2002). In this study, knowledge complexity dimension is measured through codification and systems dependence as used by previous researchers (e.g. Hansen (1999; Zandori, 2001). This is based on argument provided by Teece (1977) and Zander and Kogurt (1995) where difficulties happen in transferring non-codified and dependent knowledge.

Simon (1962) also explained that complexity of system consists of many unique and interacting elements.

H6: The relationship between organizational learning capability and Technological Innovation (product) Implementation will influence by Knowledge complexity

3.1.1 Level of Codification

Winter (1987) and Zander and Kogut (1995) explained one of dimension of complex knowledge is its level of codification. Hansen (1999) states codification is a degree to which the knowledge is fully documented or expressed in writing at the time of transfer between a subunit and a receiving subunit. Importantly, knowledge with a low level of codification is related closely to the term of tacit knowledge which is difficult to be communicated or can only be obtained through experience (Polanyi, 1966; Nelson and Winter, 1982; Von Hippel, 1988, 1994). For tacit knowledge, it is difficult to be formalized and communicated to others (Nonaka and Takeuchi, 1995). The difficulty in transferring knowledge depends on its level of codification which is easy to understand or difficult to translate into meaningful meaning. Therefore, codification of knowledge consists of the elements of tacit and explicit knowledge, it depends on whether knowledge is hard or easy to be articulated by organizational members. Tacit knowledge creates difficulty in the process of selecting, moving and applying the knowledge (Grant, 1996; Hansen 1999; Kogurt and Zander, 1992; Simonin, 1999). Tacit and explicit knowledge can be deliberated of as an end-to-end extreme on a range of all knowledge possibilities (Dixon, 2000). It is difficult to identify if knowledge is explicit or tacit in different organization. Every organization has its own experience, process and systems. Therefore, the identification of knowledge either explicit or tacit is complex.

H6a: The relationship between organizational learning capability and Technological Innovation (product) Implementation will influence by level of codification

3.1.2 System Dependence

Another knowledge complexity dimension is dependence, the level of knowledge to be transmitted or a component of a set of interdependent components (Teece, 1986; Winter, 1987). To perform the task better, individuals depend on knowledge from other units or departments. Therefore, when knowledge is more complex, effective internal transfer is more complex and entails strong ties in the form of proper system and regular interaction (Hansen, 1999). If task knowledge is obtained from and dependent on a larger number of people, systems, or processes, then those looking for that knowledge are more possibility to search for knowledge from many diverse sources, more of which are possible to be people, rather than knowledge management system in organization (Bystrom, 2002). Rochford and Rudelius (1992) express that diverse functional areas do not always essentially use information.

The interaction in organization involves people between units or departments. Clark and Wheelwright (1997) states that "effective product and process development requires the integration of specialized capabilities". Dependency to other units in organization might be due to level of knowledge difficulty and how channel influences knowledge integration. Organization experiences a slow information distribution when little network ties exist and impede performance, similarly, too many ties create information overload which subsequently reduces task efficiency (Perry-Smith and Shalley 2003). Thus, in integrating knowledge, the process that is differently interpreted among units needs to be coordinated effectively. Interdependence between units may create divergent understanding. Organizations need to identify the best method in coordinating knowledge that needs to be shared with other units.

H6b: The relationship between organizational learning capability and Technological Innovation (product) Implementation will influence by system dependent

4.0 CONCLUSION

The proposed framework focused on examining the moderating effect of knowledge complexity on organizational learning capability and technological innovation implementation relationship. Organizational learning capability contributes to the way organization learns the internal and external occurrences thus making organization aware of the environment and changes. The role of organizational learning capability is critical for organization to innovate especially in technological innovation (product) implementation. The importance of learning and technological innovation must emphasize by organization especially in knowledge-based industry. Through learning, organization acquires information and transformed into knowledge. Without knowledge application, organizations would not be capable of fully taking advantage of the collective knowledge to achieve superior performance (Alavi and Leidner, 2001).

By implementing latest technology, it will help organization to stay ahead of competitors. Through organizational learning capability firm learn how to improve or to change existing technology which is contribute to organizational competitive advantage. Failure to learn from change can lead to inability to survive (Garvin,1993). This proposed study is to deal with learning capability, manager carefully to consider organizational learning capability will enhance the success of technological innovation. A conceptual framework has been proposed which include attempt to shed some light in the relationship between variables under examination. Provide better understanding through specific mechanism on organizational learning influence success of technological innovation (product) implementation.

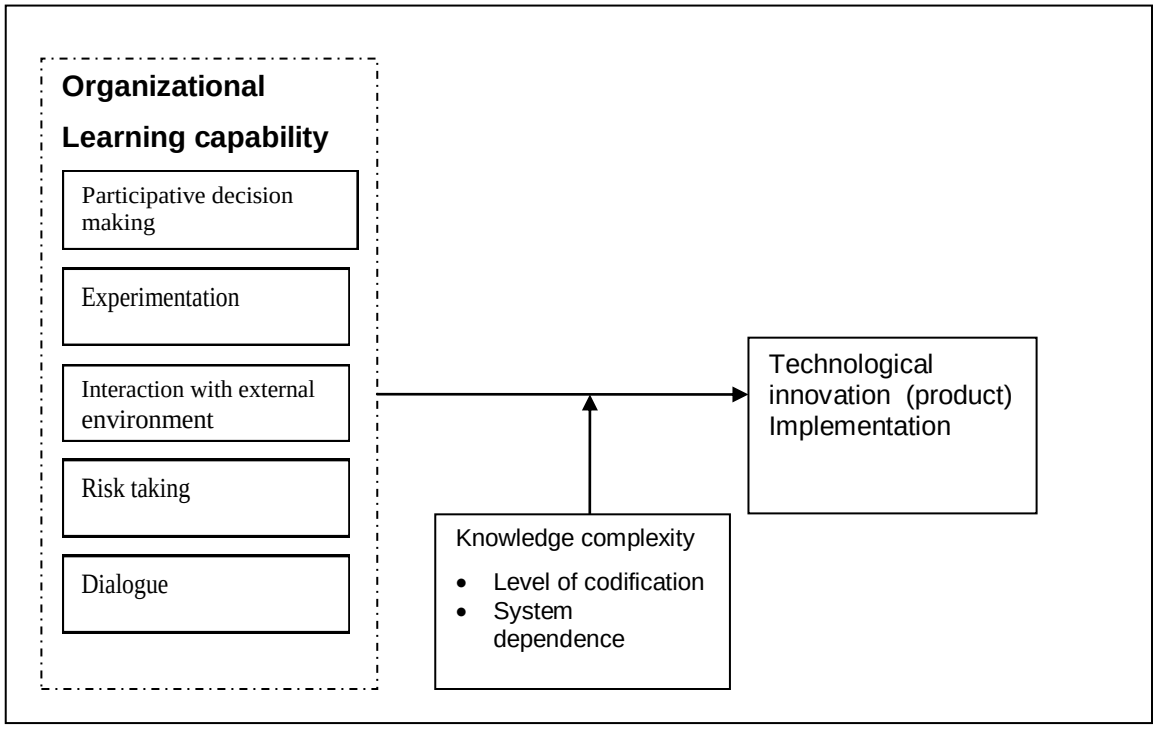

Figure 1.1: A proposed Framework

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