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Research paper

Effects of Knowledge Acquisition, Information Capability and Relationship Quality on Product Innovation Flexibility Among Manufacturing Firms in Malaysia

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Abstract

Knowledge management is the process of identifying, creating, assimilating and applying corporate knowledge to take advantage of new opportunities and enhance organizational performance. It involves both internal and external organizational capabilities. This study focuses on information capability, knowledge acquisition and relationship quality as capabilities pertinent to organisations aiming to achieve greater product innovation flexibility. Understanding and improving product innovation flexibility is crucial in the context of Malaysia in order to enable the nation to be at par with other countries enjoying better knowledge capital. Central tenets in building knowledge capital are creativity and innovation. The study is carried out in the manufacturing arena specifically on Electrical and Electronics (E&E) subsector as this subsector has achieved remarkable growth and has significant influence over the Malaysian economy. Quantitative research method using survey instrument was adopted in this study. Interestingly, the findings from this study revealed only knowledge acquisition and relationship quality as having significant relationship with product innovation flexibility. The findings are important to research and practice. Firms setting out to improve product innovation flexibility should pay careful attention to knowledge acquisition and relationship quality.

Keywords: *Knowledge Acquisition, Information Capability, Relationship Quality and Product Innovation Flexibility*

1. Introduction

Businesses today are facing increased uncertainty in outcomes of their actions and high cost of operations especially in Research and Development (R&D) activities amidst tensed competition and increased consumer sophistication and demographic changes [1]. This is more so in firms operating using high technology such as the manufacturing industry. Firms have considered both internal and external capabilities such as 'information and relationship management' and external collaboration such as 'knowledge acquisitions' and sharing to increase their innovativeness [2]. Achieving innovation in product in the most flexible form requires a combination of both internal and external strategic options. In knowledge management literatures, internal factors namely information capability and relationship quality and external network factors such as knowledge acquisition are central tenets in achieving product innovation flexibility [3]. This strategic blend is important in manufacturing firm [4].

Resource-based theory recognizes that the manner by which scarce innovation resources are deployed within organizations have significant influence on organizational decisions [5]. This is because innovation is not exclusive of external network efforts, but strategic and market-driven in which both external and internal administrative activities complementary support each other for optimal flexibility [6, 7, 8].

Knowledge acquisition, information capabilities and relationship quality are complementary. Their effect on product innovation flexibility should thus be examined independently to better understand the factors that influence inter-firm collaborations in technology and innovation development [5].

Results from past studies involving knowledge acquisition (KA), information capabilities (IC), relationship quality (RQ) and product innovation flexibility (PIF) present mixed results probably due to differing approaches, perspectives and perhaps settings [1]. Studies were carried out in numerous developing countries namely Nigeria, Kenya, Mexico, Spain and Jordan spanning across a variety of industries such as software, hospitality, Small Medium Enterprise (SME), construction, trade and service. In addition, empirical studies on the variables of interest tilt more towards knowledge acquisition while in other studies; discussions were implicit and were not directly relating to PIF [9]. Interestingly, there were sparse studies in this area carried out in Malaysia, which is also a developing country.

The Malaysian electrical and electronic manufacturing industry is deemed important for such investigation due to its impact on the Malaysian economy. In addition to creating huge employment and skill enhancement opportunities in Malaysia, this sector recorded a significant number of foreign workers [10]. According to the report, approximately 722,750 foreign workers were employed in the Malaysian manufacturing sector as at end-August 2014 out of which 11,045 were highly skilled expatriates. Reference [11] opined that the presence of foreign workers has an impact on the economy as a whole through technology transfer, knowledge creation, knowledge acquisition and sharing which facilitate product innovation process leading to increase in PIF. This claim needs to be investigated empirically by using KA, IC and RQ as separate constructs in relation to PIF.

As the Government of Malaysia envisage increased production in the manufacturing while attaining greater comparative advantage, the country has invested more in R&D activities to build up its knowledge capital. Some of the initiatives undertaken include promotion of automation, imposition of stringent measures to recruiting low-skilled foreign workers, enhancing industry-led skill training, encouraging competitiveness through export diversification, policy reforms toward green production and environmentally safe products, stimulating innovation-led growth, ramping up internationalization etc. As there is governmental will to move the economy forward in a more positive and competitive direction, this warrants examination of the effects of IC, RQ and KA on PIF in the manufacturing industry, specifically Electrical and Electronic (E&E) in Malaysia. It is against these backdrops that this study is carried out.

2. Literature review

IC, RQ and KA constitute parts of organizational assets and are thus considered as important resources at the disposal of a firm and if combined and used properly together, they can create competitive advantage for the firm. In the resource-based view (RBV), knowledge to which information and relationship are complementary rather than antecedent is considered to be most strategically important resource [12]. When it comes to how these resources or assets are transformed into value or innovation and then turned into competitive advantage for organizations, firms relied on these complementary among other factors. Since the resource-based view of the firm attributes superior performance to organizational resources and capabilities, Reference [13] argues that sustainable competitive advantage (CA) can originate from the resource base of a firm, and this draws attention to the internal workings of an organization [14].

RBV posits that firms develop CA by not only acquiring but also developing, combining, and effectively deploying its physical, human, and organizational resources in ways that add unique value and are difficult for competitors to imitate [15]. Resources can be considered strengths that firms can use to develop and implement strategies. A firm's resources can be classified into three categories namely, physical capital resources, human capital resources, and organizational capital resources. Physical capital resources include physical technology used in a firm, plant and equipment, geographic locations, and access to raw materials. Human capital resources include the training, experience, judgment, intelligence, relationships, and insight of individual managers and workers. Organizational capital resources include a firm's formal reporting structure, formal and informal planning, controlling, and coordinating systems, as well as informal relations among groups within the firm and between the firm and its environment. KA, IC and RQ underpins the various resources emphasized under RBV.

IC, KA and RQ provide competitive advantage as organizational resource. As resources, each derives its origins in the resource-based view (RBV) theory [16]. Most recent researches on operations and supply chain management has come from an RBV perspective by studying knowledge and its complementarities as a basis of core competencies, especially the capability of innovation from investment in knowledge management [17], [18]. For instance, in some studies focusing on knowledge, it is conceptualized that knowledge-based view (KBV) is an extension of the RBV and suggests that knowledge can be a source of competitive advantage [19]. Again, innovation can result from new combinations of knowledge and other resources like information and quality relationship. Reference [20] opined that innovative firms leverage their KA capabilities to update their knowledge capital in order to match new environmental conditions. Because these capabilities are valuable and rare and have imperfect imitability, imperfect substitutability and limited mobility [21], there is need for firms to continuously explore new knowledge and exploit its existing capabilities to create an innovative to drive competitive advantage.

2.1. Information capability (IC) and product innovation flexibility (PIF)

According to Reference [22], IC is an intangible asset of a firm. It includes the tech-know-how, absorption and transmission of intellectual property, each of which has the potential to create wealth and prosperity [23]. Explaining how IC affects innovation, top and senior managers in firms are responsible for commercial success of their company as such it is saddled upon them to make sure that they co-ordinate unique and creative ideas effectively and efficiently to attain successful innovation in the long run. The ability of managers to coordinate ideas uniquely and creatively underscores the manager's' information dissemination abilities vis-à-vis organizational information capability. Reference [22] opine that the greater and extensive these information dissemination abilities are in an organization the better the performance the organizational innovations. Another dimension that is studied in literature to illustrate how IC leads to PIF is concerned with information visibility. According to Reference [24], information visibility allows for quick response to dynamic competition by enabling distribution on the supply chain in diverse ways, and providing the supply chain insights on how to respond to changes that bring innovations. Reference [25] explored information capability and its role in innovation. From their findings, information is important for innovation processes. This is because information enhances and enables a continuous process of understanding customers' needs, questioning previous solutions and exchanging information and knowledge throughout the organization as a whole and this process give birth to innovation.

However, contrary to this finding, some studies have found integrating and collaborating capabilities to be very important for effective and growth of knowledge-intensive organizations, their construct reinforces the dynamic and utility capabilities, which in turn help achieve organizational competitive advantage [26]. Findings from this study at best was inconclusive due to mixed results where some dimensions of IC were significant while others insignificant thus hampering the chance of generalizing that IC as a whole lead towards organizational competitive advantage. Reference [1] suggests future research to be carried out on the role that IC plays on PIF. Moreover, based on the presumption that adequate research and management focus on appropriate capabilities in reaping business success are imperative for organization's competitiveness, this study considers IC as one of the appropriate capabilities that should be investigated with the believe that IC is associated with PIF and proposed that:

H1: There is relationship between information capability and product innovation flexibility.

2.2. Relationship quality (RQ) and product innovation flexibility (PIF)

To achieve innovation in product and maintain a reasonable degree of flexibility, relationships with organizational stakeholders is important. Consequently, studies on flexibility in the supply chain context have become increasingly widespread, examining supply chain flexibility not only from a customer-oriented perspective, but also from a network perspective [24]. Also illustrating the importance of the quality of relationship that a firm has with suppliers in attaining flexibility in product innovation, Reference [27] argued that innovation flexibility requires an improved coordination and utilization of supply base resources, including knowledge-related resources, as such firms must develop quality relationship with suppliers and together study and understand how dynamic engineering, manufacturing and customer value are linked in the process of product development, from concept through market launch along a supply chain.

Past studies on RQ seem to be implicit in supply chain or social network relationship which is different in terms of method of questioning. Reference [28] mentioned that cooperating with suppliers enhanced the building of corporate reputation and reduces costs of operation by means of setting long-term agreements. But on the type and quality of this cooperation is still conjectural if thought in the process. Going by this, having a relationship is not sufficient to understanding the usefulness and potential impact of the relationship, rather the kind and quality of relationship and to whom an organization relates with matters and this deserves further investigation. Pauli's proposition that investment in relationship influences the performance of SMEs implies that the quality of relationship will have a direct positive effect on PIF. Consequently, it is proposed that:

H2: There is relationship between relationship quality and product innovation flexibility.

2.3. Knowledge acquisition (KA) and product innovation flexibility (PIF)

Results from several empirical studies, revealed that KA significantly influences competitive advantage, facilitation of adaptations, new product development, increase in sales and improvements in innovation processes [29]-[32]. Thus, the idea that organizations need to acquire new knowledge externally from their networks of suppliers, customers, associates and even competitors and other stakeholders for product innovation is not new. Reference [33] investigated the effects of three components of knowledge management namely knowledge acquisition, knowledge conversion and knowledge application on product innovation in Nigeria. Their results were consistent with previous findings by Reference [34] but inconsistent with that of Reference [35], who found that in small manufacturing firms, knowledge creation and storage has no impact on their ability to innovate and also with Reference [36] who reported that knowledge management which include KA does not impact product innovation except when moderating for strategic orientation. No specific empirical certainty regarding the degree and the mechanism through which KA influences PIF in the Malaysian manufacturing sector has been reported, as such warrants investigation.

It is common that KA can be internal or external [37, 38]. In this study, focus is given to external knowledge acquisition. Acquiring knowledge externally has been considered one of the most fundamental corporate practices in innovation management. For instance, Reference [39] reminded that external knowledge could come from people, cooperation between sources and recipient, courses, and outsourcing and these are all different sources that care should be exercised when devising a means and designing an instrument for collecting information from these sources bearing in mind the innate and peculiar characteristics. It is thus true that external KA comes from different groups which differ fundamentally in both demographics and characteristics.

This diverse source of external knowledge sometimes makes it difficult to get the right blend of knowledge that will actually capture accurate effect and explanatory power of KA. Reference [33] recognized this difficulty as one of the problems faced in KA and opined that when the right blend of knowledge is not acquired, depending on KA for enhanced efficiency of production through innovativeness may be futile. For this study, the description of KA by Reference [39] is very relevant and has provided the basis for the proposition. On this note, it is proposed that:

H3: There is relationship between knowledge acquisition and product innovation flexibility.

2.4. Joint effect of IC, RQ and KA on PIF

Literature is unclear on the exclusivity of any of the explanatory variables in the attainment of PIF. The question thus is: could one of the factors exclusively drive the desired PIF in an organization or would a combination of all these factors best drive PIF in an organization? The joint effect of IC, RQ, and KA on PIF has not been given adequate empirical investigation thus this study embarks to examine this joint relationship. In view of the need for measuring the degree of each of the KA complementarities in a joint effect model inclusive of KA, the fourth proposition is put forth:

H4: There is relationship between information capability, relationship quality and knowledge acquisition on product innovation flexibility.

3. Research design

This study was carried out in the Malaysian electrical and electronic (E&E) industry using survey method. The survey instrument was divided into three sections. Section A contained respondents' demographics, section B contained company's demographic and section C contained survey questions for all four variables namely IC, RQ, KA and PIF. The measurement items for all four variables (IC, KA, RQ and PIF) were adopted from [1].

The sample for this study was 400 from the population of 760 E&E firms in Malaysia. The data was collected from a list of E&E companies in Malaysia using simple random sampling method. Survey instrument was administered to the personnel working at the Quality Department of the companies targeted mainly at middle management and above. The survey was sent via email to the respondents. The data collection period was carried out over a period of two months. A total of 217 responses were received from the 400 emails sent resulting in a response rate of 54.25%.

4. Data analysis

Based on the data collected, it was observed that 58% of the respondents were females while the remaining 42% were males. This indicates that both genders were fairly covered in this study. The vast majority who participated in this study were degree holders aged 35 years and below (72%) suggesting that most employees in the Quality Department of E&E firms are young educated adults. It was also recorded that the majority belonged to the middle management group. Overall, it can be assumed that this study was conducted with the appropriate group of respondents. With respect to the firms, 80% of the firms have been in establishment for over 15 years in Malaysia with 70% of firms enjoying a total workforce of more than 200 employees. This indicates the maturity of the E&E sub-sector in Malaysia.

Descriptive statistics to derive the mean, standard deviation, skewness and kurtosis was performed on all four variables. Reliability analysis was conducted for each construct to determine if the measurement instruments for all variables do indeed measure what it is supposed to measure based on Cronbach's Alpha (α) coefficient. The value of the α coefficient requires to be greater than 0.7 in order to be deemed as significantly acceptable [40]. All variables reported Cronbach Alpha (α) values greater than 0.8 indicating the measurement instrument as reliable (Cronbach Alpha for IC = 0.875, Cronbach Alpha for RQ = 0.824, Cronbach Alpha for KA = 0.878 and Cronbach Alpha for PIF = 0.836). All variables were normally distributed after fulfilling normality testing based on Kolmogorov-Smirnov test. IC, RQ and KA reported t value = 0.31 with p value = 0.200 while PIF reported t value = 0.076 with p value = 0.051. Therefore, data analysis using parametric techniques could be carried out.

Correlation analysis was performed to test hypotheses H1, H2 and H3. Pearson correlation coefficient (r) of 0.120 with p value = 0.077 was obtained when examining the relationship between IC and PIF. Based on the p value, it can be concluded that this study failed to observe any significant relationship between IC and PIF. Therefore, H1 was not supported. On the other hand, when examining the relationship between RQ and PIF, Pearson correlation coefficient (r) of 0.510 with p value = 0.000 was obtained. Based on this hypothesis testing for H2, it can be concluded that there is significant positive relationship between RQ and PIF. Hence, H2 was supported. Finally, when examining the relationship between

KA and PIF, Pearson correlation coefficient (r) of 0.256 with p value = 0.000 was obtained. Based on this hypothesis testing for H3, it can be concluded that there is significant positive relationship between RQ and PIF. Hence, H3 was supported.

In order to perform hypothesis testing of H4, regression analysis was carried out. Overall, the value of R-square (R2) = 36.90% indicating that 36.9% variance in PIF can be explained by IC, RQ and KA. The regression model fit was good with F value = 41.435 with p value = 0.000. Therefore, it can be concluded that H4 was supported. When examining the individual variables, it was observed that only IC was not significant with t value = -0.104 with p value = 0.917. RQ and KA were significant with t value = 9.550 with p value = 0.000 and t value = 5.925 with p value = 0.000, respectively. The regression equation obtained is as follows:

PIF = 0.287 + 0.493(RQ) + 0.423(KA)

5. Discussions

The analysis of the data collected from 217 respondents from E&E firms in Malaysia revealed that H1 was not supported while H2, H3 and H4 were supported. This study failed to observe significant relationship between IC and PIF. This is opposed to studies by Reference [41] and [25]. However, the findings of this study concur with that of Reference [42] who conducted a similar study among Malaysian multimedia super corridor organizations.

Significant positive relationship was obtained between RQ and PIF. This indicates that a firm's relationship is critical to the attainment of competitive advantage. The findings from this study on H2 is not different from other empirical results which recorded evidence of a first order relationship between RQ under the aegis of supplier or supply chain network and firm performance [43]-[45]. The reason contended in empirical literature for this positive relationship in past studies also holds true for this study.

Significant positive relationship was also obtained between KA and PIF. The findings from this study on H3 concur with Reference [30]-[32], [34], [46], who also found positive significant relationship between KA and PIF.

Finally, in a joint effect investigation combining IC, RQ and KA, a positive and significant relationship was found. This is a case where the effect of a dominant variable can cause an otherwise insignificant variable to be significant. Investigated individually, only RQ and KA were significant in the model, combining them together shows that they jointly explain change in PIF. The implication of this is that, an organizational decision involving PIF must be integral, taking into consideration IC, RQ and KA, if it is desired to succeed.

6. Conclusion

PIF is very important for any organization to grow. RQ and KA are significant determinants of product innovation in the Malaysian E&E sector. Firms in Malaysia should invest on building good relationships alongside enhancing knowledge acquisition such as training and development. Information is very vital to organizational success, no doubt. But as it appears from the results of this study, management should be cautious on the type of IC sought. Thorough analysis on its usefulness and benefits should be assessed before investing on IC. Attaining competitive advantage as well as PIF through IC should be viewed within a broader spectrum of antecedent and complementarities.

This study is limited by design and by application. By design, only questionnaire was used in collecting data and the data collected came from different sources which are a good practice. But the caveat that imposed this limitation is the inability to control or know who actually responded to the survey. In terms of application, this study is limited to and valid within E&E industry in Malaysia.

Based on the findings of this study, there are two areas worthy to be investigated in the future. This study failed to observe significant relationship between IC and PIF. This may suggest that IC could have some antecedents that may well be investigated as a second or higher order construct. Further research on IC in this direction is recommended. Second, KA is highly examined using formative research framework as a second order construct. To understand variables in detail with a view to making a wider generalization as is often the case with KA; variables with antecedents should be investigated using another framework.

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