The Relationship of Business Innovation Capabilities and Technology Innovation Capabilities on SME Organization Performance:

A Conceptual Framework

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Abstract—Due to the global competitive pressure that is increasing, shortened product life cycles and ease of imitation, firms must continue to innovate to maintain competitiveness. Previous studies have shown that organizational innovation capabilities have significantly impacted company performance. Among the most cited organizational innovation capabilities discussed by past scholars are technological innovation capability (TIC) and business innovation capability (BIC). The importance of both technological and business innovation has only been shown very recently in electronics and automobile high-tech manufacturing industries, but has as yet little advanced our understanding of the connection between them especially in the context of small and medium enterprise (SME). In Malaysia context, SMEs especially in manufacturing sector make a significant contribution to economic growth. To address this gap, the present study contributes to an understanding of the association between TIC and BIC and supports the hypotheses. The proposed conceptual framework of the study can further be used for future research to validate the hypotheses. The study argues that the impact of company performance can be better understood when the BIC and TIC dimensions are taken into account. Additionally, the framework will help the managers in making decisions and better implementation of innovation policies to strengthen the competitiveness of the company.

Keywords—Business Innovation Capability; Technological Innovation Capabilities, Organization Performance

I. INTRODUCTION

In the competitive business environments today, companies must become more innovative in order to compete in the global competition. Organizations that can survive are those who have the ability to innovate and create changes. Organizations that operates at a lower cost [1] and implementing advanced management practices [2] is no longer a sustainable business strategy. Instead, organizations such as Apple and Samsung have shown that innovation is the way to move forward. Hence, study focuses on the ability to innovate has increased. In year 2000 for example, innovation-related studies are more focused on the effects of total quality management (TQM) practices on innovation [3], [4], [5], organizational learning capabilities on innovation [6] and supply chain management [7] on innovation performance., following the example. Some components, such as multi-leveled equations, graphics, and tables are not prescribed, although the various table text styles are provided. The formatter will need to create these components, incorporating the applicable criteria that follow.

Nonetheless, most studies in innovation performance have focused on product innovation especially in manufacturing context, neglecting process innovation [1]. According to [8], only 1% of previous researchers examined process innovation compared to 37% of product innovation. It is important for an organization to pay more attention on both subjects (process and product innovation) for a new market position. The combination of both subjects is also known as technological innovation performance (TIP). Technological innovation is believed improve organization’s competitive advantage, stimulates growth and organizational survival [9],[10]. In addition, TIP is highly influenced by technological innovation capabilities (TICs) [6] and business innovation capabilities [11],[12]. Given that the research on the topics of innovation is increasing, many scholars are now incorporating business element instead of technology adoption (such as IT technologies) as one of determinants of organizational innovation and organizational performance [12],[13]. Business components such as marketing and administrative capabilities began to gain attention among the scholars because the adoption of technology in organization should go hand in hand with business knowledge to ensure business continuity. Although the effects of TIC, BIC and its influence on organizational performances have been discussed by previous scholars, there are limited empirical examinations that investigate the relationship from Malaysian context specifically from food industries. Most previous studies relating to innovation in Malaysia focuses more on manufacturing sector [15],[7],[15] and telecommunication and...
ICT based industries [17]. To bridge the gap in existing literatures, this study aims to examine the relationships of BIC and TIC on organization performance. Furthermore, unlike previous research, this study specifically considered how product and process technological innovation separately affect organizational performance and how they interrelate to achieve a positive effect on organizational performance. The finding of this study is important because it provides a better understanding of how organizations benefit from TIC and BIC to obtain superior performance. Until now, the impact of product and process innovation capabilities on organizational performance has mainly been studied by considering both of them as one construct [18],[19] and this paper tries to shed light on whether they provide the same (or different) results for a firm considering them separately.

A. Innovation Among Malaysian SMEs

World Economic Forum (WEF), Economic Intelligence Unit (EIU) and INSEAD has ranked Malaysia as among the top 20-30 most efficient countries in the world [20]. Malaysia, however, is not yet labeled as innovative country. Yet, this position is expected to decline with increasing innovation capability of China and India. This situation is likely to be least innovative behavior among Malaysian based on the findings of a recent study conducted by [21]. Hence, to increase the innovation index, the government has set up a special committee named known as the Innovation Unit that is monitored by a committee known as the PEMANDU. As an initial step, the government has introduced several policies, initiatives and legislations; for example, Industrial Master Plan 3, Biotechnology Policy, Innovation Act 2010 and innoCERT award for SMEs. In the 10th Malaysia Plan, government has also outlined several policy and plans to further spur innovation. Innovation is important to the success of SMEs because it fuels competitive advantage, stimulates growth and SME sustainability [10]. Based from the 2011 National Innovation Survey Report [20], the top five most innovative companies in Malaysia is dominated by telecommunications companies (e.g. Digi, Maxis, Astro), banking (Public Bank and Malayan Banking) and air lines company (e.g. AirAsia). Meanwhile, a food industry is represented by Nestle.

From the report, clearly indicates that innovative organizations are mostly MNCs and GLCs organization. SMEs were much less interested in following up and marketing innovation ideas that originated from external sources and training for innovation than larger firms [22]. Additionally, innovation in SMEs usually stresses customization, and flexibility, which requires substantial knowledge resources, capabilities, and networks. However it should be understood that the success of large corporations is fully supported by SMEs because their ability to utilize external networks more efficiently [22]. In order to boost innovation capabilities, the government through SME Corp. has introduced a special certification known as the 1-InnoCERT. The Top Most Innovative SME will be awarded a cash prize of RM1 million. The award is expected to provide financial facilities for a successful SME from the Bank Negara Malaysia (BNM) and eligible for Green Lane Policy. This initiative is first introduced in 2010 based from Korean InnoBiz Model, have been utilized by more than 90 SMEs in Malaysia. SMEs with 1-InnoCERT certification have so far won contracts worth RM382.5 million for various projects from GLCs and MNCs [23]. Among the parameters evaluated in the certification are marketing capabilities, innovation management, R&D activities, technology manufacturing capabilities, technology Innovation administration and technology foresight [24].

This study sets out to increase our understanding of innovation capabilities in SMEs facing environmental turbulence by examining the role of technological and business innovation capabilities. All in all, two main research questions lie behind this paper: (1) what relationship do technological innovation capabilities have on SMEs performance? and (2) what relationship do business innovation capabilities have on SMEs performance? Based on these objectives, we expect our research to contribute to the literature especially from Malaysia context. The developed theoretical framework in this paper would be useful for future discussion as well as for policy formulation and entrepreneurial development.

The remainder of the paper is structured as follows. First, we elaborate on technological innovation and business innovation capabilities in SMEs. Following, we build our theoretical arguments on the SMEs performance measurement. Third, we propose our conceptual framework with hypotheses. And finally, we discuss the implications of our study and offer some suggestions for future research.

II. LITERATURE REVIEW

A. Technological Innovation Capabilities

TICs have become the primary basis of market innovation capabilities and consequently increase organizational performance. The relationship of TIC on organization’s performance indicators such as sales growth, product performance and innovation performance has been confirmed by many researchers (e.g. [25],[26],[27]). Accordingly, Zhou and Wu [28] claimed that entrepreneur with a strong technological capabilities tends to engage in more exploitation alliances to gain access to complementary assets such as manufacturing and marketing resources in order to commercialize its new products. Thus, SMEs that have the technological capabilities basically have four advantages; (i) the accumulation of technical expertise, (ii) more competent in assimilating external knowledge in similar field and more efficient in integrating additional skills, (iii) greater exploitation of existing know-how and lastly (iv) engage in search activities that improve efficiency and produce reliable outcome. An organization must develop and evaluate the TICs rapidly and must facilitate the capabilities within its organization to strengthen its competitiveness. However, without any agreement on the fundamentals of what criteria to measure concerning TIC and how to measure these criteria, the management will be awash in a sea of confusing,
contradictory, incomplete, and incomparable information. Hence, the capabilities are relatively important for a firm’s sustainable development.

TIC comprises a comprehensive set of characteristics of an organization that facilitates and supports its technological innovation strategies [29]. TIC is a multi-dimensional concept reflected by a variety of indicators in the key areas, such as technology, production, process, knowledge, experiences and organization [27]. Adler and Shenbar [30] have measured TIC from four aspects: (i) the capacity of developing new products satisfying market needs; (ii) the capacity of applying appropriate process technologies to produce new products; (iii) the capacity of developing and adopting new product and process technologies to satisfy future needs and lastly (iv) the capacity of responding to accidental technology activities and unexpected opportunities created by competitors. Meanwhile, [31] measured technological innovation from multiple criteria such as R&D, innovation decisions, marketing, manufacturing and capital capabilities. Similarly, [29] measures TIC in seven dimensions: (i) Learning capability, (ii) R&D capability, (iii) Resource allocation capability, (iv) Manufacturing capability, (iv) Marketing capability, (v) Organizing capability, and lastly (vi) Strategic planning capability. Lau et al. [29] argued that strong R&D capability could safeguard the innovation rate and product competitiveness in large and medium-sized firms, whereas a resource allocation capability would enhance the sales growth in small firms. Meanwhile, learning and organizing capabilities is needed for sustainability, acquisition, and development of new knowledge from external boundaries. Yet in recent article, [32] measures TICs in four additional dimensions (i) knowledge and skill capabilities, (ii) information and communication capabilities, (iii) external environment capabilities and lastly (iv) operation capabilities. The addition of the 4-dimensional is accordance with the findings conducted by [6], [33]. In sum, previous researchers have developed their own approaches to assessing an organization’s TICs, such as the asset approach, the process approach, and the functional approach. However, among the approaches, the asset and process approaches are somewhat more difficult to comprehend than the functional approach [6]. According to [6], functional approach is more practical in SME context because functional approach is easier to understand and facilitates adoption of the multi-informants approach employed in the survey. Among the seven dimensions of TIC measured by [6], only three capabilities that give positive and significant impact on organization performance. They are organizational capabilities, resource allocation capabilities and manufacturing capabilities. Hence, this study incorporates only three capabilities as suggested by [6] to be incorporated in the framework.

Organizational Capability

Organization capability referred to an ability in securing organizational culture and adopting good management practices [29]. Additionally, the organization should has the ability to manage internal cooperation among departments and external communication with suppliers and customers are also included [29]. Interactions with customers and suppliers are thought to be beneficial to innovation as the activities expose to the acquisition of new knowledge and creative ideas for product development or process improvement. Furthermore, according to [34], organization capabilities to innovate includes the adoption of new methods to organize business routines and procedures, new methods to distribute responsibilities and tools for decision-making among employees for the division of work and finally new ways of organizing relationships with other department and organizations. SMEs with organizing capabilities can transform the innovative ideas into commercial products, leading to excellent organization performance. Previous research has shown that even the company with only 20 employees who were responsible for the development of technologically new or improved products or process (e.g. [26],[35]), has the ability to manage several projects simultaneously. Hence, strong organization capability was especially critical for innovation rate.

Resource Allocation Capability

Resources allocation capability measured how well a firm manages its human and capital investments in supporting innovation activities [26]. Malaysian industries are dominated by SMEs which have limited resources and human capital. Therefore, those firms that exhibit a better resource allocation capability can allocate the limited resources more effectively to transform the innovative ideas into commercial products, leading to competitive products [36]. As argued by [35], technology resources are going to increase its importance as a strategic factor for firm’s performance in near future. Human capital is other crucial issues for innovation performance. Recent research done by [37] found that human capital categorized into education, experience and learning plays a significant role as key determinant of successful entrepreneurship. Santarelli and Tran [37] claimed that professional education has significantly plays an essential role in differentiating the performance of entrepreneurs. They further posit that highly educated entrepreneurs are able to make approximately 34% more profits than low educated ones do. This shows that human capital is an important element of regional science and technology innovation capacity resources, and is the carrier of knowledge. Besides human capital, technological innovation activities cannot be carried out if there is no support of finance. Italian survey found that the major obstacles for introducing technological innovation are of an economic nature (e.g. lack of appropriate sources of finance and cost of innovation is too high). A few studies also found that resource allocation capability enables firm to sustain global competitiveness [27], [38].

Efficient resource allocation is a complex and dynamic task in business process management. Although a wide variety of mechanisms are emerging to support resource allocation in business process execution, these approaches do not consider performance optimization. Resource allocation has been recognized as an important issue in business process execution. In practice, there are several aspects involved in the
need for resource allocation. Resources may be allocated to satisfy different and sometimes contradictory goals, such as sustaining a high utilization of available resource capacity (possibly resulting in bottlenecks); or smooth throughput of business processes cases (possibly resulting in idleness of resource and higher costs). As mentioned by [38], proper resource allocation is a key issue in providing efficient usage of resources in business process execution. It ensures that each work item is performed by the correct resource at the correct time, so as to balance the demand for process execution facilities against the availability of these resources. However, choosing the right resources to perform work items in business process execution is not a simple task. Therefore, there is a need for proper procedure or decision in resource allocation strategy. A company with a good resource allocation capability may help in their company production process.

**Manufacturing Capability**

Manufacturing capability is defined as a firm’s ability to transform R&D results into new products which meet market needs, and to attach importance to overall quality control and continuous improvement of manufacturing systems [26]. Following this definition of innovation, successful innovation involves saleable product. An outstanding and creative R&D output alone cannot lead to good innovation performance. It must be processed by manufacturing in the innovation process. The capacity of manufacturing may not only guarantee the success of the transformation of R&D outcome into product, but also ensure its quality suits customer’s needs. [35] et al. affirmed that most of the manufacturing firms in Italy rely on the investment in manufacturing machinery as the most important innovation source and the improvement of product quality is a key element in Italian manufacturing firm’s innovation strategies, all of which aimed at enhancing innovation performance through advancing manufacturing capability. Besides, other researchers found that the intensity of total quality management is strongly correlated with manufacturing capability. [39].

Other than that, manufacturing capability is defined as the ability of a firm’s production system to compete in the market through increased cost efficiency, flexibility, delivery and quality. Organizations increasingly become skilled in manufacturing products and services which enhance the existing knowledge regarding technologies, procedures, processes and market inputs through manufacturing capabilities [39]. Manufacturing capability which is embedded in the technological systems of firms is often regarded as the ability to convert R&D outcome to commercialized products and services [27]. Manufacturing capability indirectly enhances both internal and external technological learning. We argue that in order for firms to engage in effective technological learning, organization needs to engage in both explorative and exploitative learning in the means that, besides the frequently experimenting R&D functions, firms need to reduce variability, increase efficiency and control in their process management efforts through strengthening manufacturing capabilities [39].

**B. Business Innovation Capabilities**

Business innovation capabilities is based on changes introduced in the organizational structure of the company and the administrative process, aspects that are more related to management than with the organization’s main activities. According to [9], business innovation consists of new organizational structures, administrative systems, management practices, processes, and techniques. Examples of this type of innovation include total quality management (TQM), just-in-time production, quality circle, cost accounting and 360 degree feedback.

**Administration Innovation**

Damanpour [9] defined administration innovation as the introduction of new internal processes and practices to improve productivity/reduce costs. Meanwhile, [40] defined administrative innovation as performance derived from the changes to organizational structure and administrative process, reward and information system, and it encompasses basic work activities within the organization which is directly related to management. From this perspective, administrative innovation is considered as a part of process innovation. In similar vein, Škerlavaj et al. [41] measured administrative innovation in four criteria: the development of new channels for products and services, customer engagement and feedback, computer-based administrative, new employee reward/training schemes and new departments or project teams. Administrative innovation is highly dependent to the top management support and innovation policy.

**Management Practices**

In the study, management practices are measure in terms of the management of innovation, new innovation strategy and management commitment towards innovation. Birkinshaw and Mol [42] defined management of innovation as “a difference in the form, quality, or state over time of the management activities in an organization, where the change is a novel or unprecedented departure from the past”. Management practices can be view in four perspectives; institutional perspective, fashion perspective, cultural perspective and relational perspective. In the context of this study, we intended to look at the role of managers in inventing and implementing new management practices. This perspective build on the stance that an individual puts forward an innovative solution to address a specific problem that the organization is facing, and he or she then champions its implementation and adoption [42]. The relational perspective will later relate with the innovation strategy made by the organization. Innovation strategy is conceptualized as an articulation of the organization’s commitment to the development of products that are new to itself and/or to its markets. In the literature, scholars principally have adapted measures from strategic management research to explore the existence, nature and extent of innovation strategy [43].
Organization Structure

Organizational structure concern the way staff are grouped. There has been considerable work on the situational and psychological factors supportive of innovation in organizations [43]. Indeed, it has been widely demonstrated that the perceived work environment (comprising both structural and cultural elements) does make a difference to the level of innovation in organizations. According to [44], centralization organization structure is more favored when innovative opportunities are richer or the ideas is complex. When instead innovative opportunities are sufficiently rich then decentralization is more likely to be preferred.

C. Organization Performance

According to [45], there are five ways of measuring SME performance; quality, time, finance, customer satisfaction and human resource. Accounting or finance measures such as sales growth, return on sales, return on assets, and return on equity are commonly used performance indicators in a range of fields such as entrepreneurship. Although the firm performance in financial terms is always the best indicator, firms would not easily reveal any confidential financial information and different firms might adopt varied accounting conventions in their inventory valuations, depreciation, and salaries computation. And for some cases the data is obsolete and note properly record. Alternate measures should be used to secure adequate responses [38]. We therefore use three types of performance indicators in this study; sales performance, sales growth and new product performance. Those measures are widely adopted in different innovation studies [26], [46],[47],[48] and appropriate to the context of Malaysian SMEs.

III. HYPOTHESES DEVELOPMENT AND CONCEPTUAL FRAMEWORK

Given the thorough discussion in the literature review section, we develop a theoretical framework that examines TIC and BIC influence on SME’s performance. This research adapted technological capabilities framework proposed by [29], [38] to investigate the TIC and their impacts on organizational performance. Among the seven factors of the TIC, only three factors will be used in the research, namely; learning capability, resource allocation capability and manufacturing capability. For BIC measurement, the study adapted the measurement instrument designed by [49] in order to achieve construct validity. Figure 1 describes the developed conceptual framework. TIC and BIC is the independent variables while organizational performance is the dependent variable.

![Fig. 1. Conceptual Framework](image)

**According to this model, it is suggested that the greater the presence of TIC and BIC in SMEs, the higher the level of organization performance. We develop six hypotheses based from the framework. The hypotheses are as follows;**

- \( H_1 \): Organizational capability is significantly correlated to organizational performance
- \( H_2 \): Resource allocation capability is significantly correlated with product development
- \( H_3 \): Manufacturing capability is significantly correlated to organizational performance
- \( H_4 \): Administrative system are significantly correlated to organizational performance
- \( H_5 \): Management practices are significantly correlated to organizational performance
- \( H_6 \): Organizational structure are significantly correlated to organizational performance

IV. CONCLUSION AND RECOMMENDATION

As a summary, the proposed research framework of this study demonstrates the relationship between the contribution of the technological innovation capabilities and business innovation capabilities and its effect towards SMEs performance. Although empirical research measuring innovation impact towards SMEs performance have been done in various sector; yet, research generates some contradictory results, arguably as a result of the different sectors in which the studies have been conducted. Accordingly, this study is significant and could help models development in particular model of innovation among SMEs.

In addition to that, other constructs related to knowledge management practices, such as the model developed by [1] and testing intermediary factors as listed by [22] may be considered for future model development as those constructs have never been tested in the context of Malaysian SMEs. From past literature, the effectual use of technological innovation capabilities and business innovation capabilities are the key that unlocks the innovativeness in a firm. The suggested model is deemed valuable to both practitioners as well as managers as it will prepare them towards improving the firms’ innovation performance and consequently organization’s performance. It is proposed that this framework
is to be tested with empirical data to find out which factor is the most dominant and highly correlated to organizational performance. Possible instruments that can be used to operationalize the constructs may be obtained from [27], [29], [50] and [29] for TIC and BIC. Such findings are expected to provide us with more insights and deepen our understanding on the relationship between TIC and BIC dimensions. Essentially, such findings can further be used to gauge the relative importance of TIC and BIC in enhancing a firm’s performance.

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