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RELATIONSHIPS BETWEEN INFORMATION TECHNOLOGY INFRASTRUCTURE AND INNOVATION ON PERFORMANCE OF BANKS IN MALAYSIA

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Abstract: *The current business environment has been characterized as hyper-competitive, especially for innovation sensitive products and services. This business environment forces organizations to be innovative and show fast responses to all the environmental changes. This situation urged banks to develop their competencies that encourage innovation and foresee future business opportunities. More specifically, banks, to keep pace with the new technological advancements and be able to keep in business, have to adopt innovative strategies that results in high levels of customers' satisfaction. This research analyses the relationship between information technology infrastructure and innovation on the performance of the banks. Data for the empirical investigation originates from banks in Malaysia. The study will provide the empirical evidence of the following output: new findings and knowledge that benefited the researchers and managers at banks that emphasize the strategic importance of information technology infrastructure and innovation in the performance within the Malaysian banking institutions. The results of the analyses show that information technology infrastructure has a significant effect towards performance, while innovation showed an insignificant relationship with the performance. Thus, appropriate strategies are important to enhance their performance and ensure their survival, especially in these turbulent economic times.*

Keywords*: Information Technology Infrastructure, Innovation, Performance.*

Introduction

The performance of large organizations, especially the banks, has been a major concern as they are currently facing more challenging environment. In recent years, many banking systems in emerging market experienced a deep transformation under the pressure of internal financial liberalization, increased openness to international capital flows, and technological and financial innovations. The secret to sustainable competitive advantage for large firms in this era is not only simply to lower costs or restructure for efficiency but also the necessity to act in a business manner.

The profitability of the banking institutions is very important to facilitate the transformation of the economy as it has a remarkable influence on economic growth. Malaysia faces numerous challenges in implementing the 11th Malaysia Plan (11MP) due to the instability of global trade, the decline in commodity prices and the huge burden of debt. Despite the challenging macroeconomic situation, the 11MP is targeted to support a sustainable growth, which could boost the productivity, increase investments and exports and consolidated the fiscal position. In this situation, the banking sector is expected to play a critical role in helping to finance the economic activities to be undertaken during the Plan period, thereby, boosting the country's economy. The 11MP toward 2020 might be achieved if fully supported by the efficient and effective performance of the Malaysian banking sector.

Due to many growing challenges in the global business environment, all organizations have to adopt strategies to keep in pace with the speed changes and rapid challenges. Banking has been a prolific industry for innovation concerning information systems and technologies (Shu & Strassmann, 2005). For example, new technologies have enabled new communication channels which were quickly adopted by banks. Also, advanced data analysis techniques are currently used to evaluate risk in the credit approval (Huang, Chen, Hsu, Chen, & Wu, 2004) and fraud detection (Ngai, Hu, Wong, Chen, & Sun, 2011).

Apparently, the current business environment has been characterized as hyper-competitive, especially for innovation sensitive products and services. Therefore, banks have been facing an increasing competition with rapidly changing customers' demand. This situation urged banks to develop their entrepreneurial culture that encourages innovation and foresee future business opportunities. In other words, banks in order to survive and grow have to incorporate all the customers' needs, feedback, and expectations as the basis of any products and services are designing processes (Al-Swidi & Mahmood, 2011). Moreover, they are required, like never before, to ensure that their services and products to be of high quality and satisfactory innovation profile.

Contemporary firms are making significant investments in information technology to align business strategies, enable innovative functional operations, and provide extended enterprise networks. These firms have adopted information technology to foster changes in managing customer relationships, manufacturing, procurement, the supply chain, and all other key activities (Barua & Mukhopadhyay, 2000; Agarwal & Sambamurthy, 2002; Chen & Tsou, 2007), and to enhance their competitive capabilities (Sambamurthy, Bharadwaj, & Grover, 2003).

Good innovation practices help enhance a firm's competitive advantage (Bharadwaj, 2000; Utterback & Afuah, 1998). Nevertheless, there is little theoretical work on the development of neurological relationships among information technology, service innovation, and competitive advantage. Systematic empirical investigations of these relationships are also scarce, and no dominant pattern has emerged (Preissl, 2003). To close these gaps and encourage the understanding of information technology adoption and specific service innovation practices, there is a need to explore information technology adoption as a coordination mechanism (Galbraith, 1973; Dedrick, Gurbaxani, & Kraemer, 2003), which may contribute to changes in innovation-related actions.

These developments have been reinforced by technological advancements which allowed the developments of new and more efficient delivery and processing channels as well

as more innovative products and services (Mahmood & Wahid, 2012). Banks are required to adopt innovative strategies to keep pace with the changing environment and customers' requirements (Al Swidi & Mahmood, 2011). Banks should also direct their strategic efforts toward adopting organizational processes that facilitate entrepreneurial attitudes, thinking, and behaviour (Sebora, Theerapatuong & Lee, 2010). Therefore, the intention of this research is to empirically study the relationship of information technology infrastructure, innovation, performance and to investigate the relationship in this conceptual model within the Malaysian banking institutions.

Literature Review

Performance

The mutually agreed definition of performance is yet to be found (Andersen, 2010) because it is a multidimensional concept (Lumpkin & Dess, 1996), and has been conseptualized from a divergent perspective (Ramayah et. al., 2011). Andersen (2010) categorizes performances in term of what is being measured and how it is being measured. There are many factors that affect firm performance and these factors can be attributed to internal and external factors of the firm (Kotey & Meredith, 1997; Pearce & Robinson, 2002). Performance, which reflects the perspective of strategic management, is considered to be a subset of the broader concept of organizational effectiveness (Venkaratmen & Ramanujam, 1986). Many researchers have identified the importance of congruence or fit between various elements of corporate entrepreneurship in the explanation and prediction of firm performance (Burns & Stalker, 1961; Galbraith, 1977; Nadler & Tushman, 1997; Tosi & Slocum, 1984).

According to Hassan Dridi (2010) examined performance of Islamic banks and conventional banks during global financial crisis. They investigated the consequences of the global financial crisis on the bank's performance in credit growth, assets and profitability of banks. They have found that profitability for both banking systems are affected by the crisis. Islamic banks recorded less negative effect from the crisis than conventional banks because some features in Islamic financial frameworks like diversification, scale economies and more substantial reputation of Islamic banks is much safer than conventional counterparts. Grounded from the analysis, Islamic banks have negative growth in return on assets than conventional banks, but Islamic banks are resilient from huge losses and face bankruptcy situation like conventional banks in the United States and European nations. Moreover, Islamic bank significantly posted higher assets growth than conventional banks for the period of crisis. Liquidity risk is very important for both management and legislators to provide a solid framework to assist banking system during the global financial crisis.

Information Technology Infrastructure

Information technology infrastructure is consistently defined in literature as a set of shared information technology resources that are a foundation for enabling communication across an organization and enabling present and future business applications (Niederman, Brancheau and Wetherbe 1991; Duncan 1995; Byrd & Turner 2004). It not only includes the technological components, but also the human components (Duncan 1995; Chanopas, Krairit, & Khang, 2006). Information technology infrastructure refers to the level to which the firm's information technology resources are malleable (Duncan 1995). The definition of information technology infrastructure by Byrd and Turner (2001) & Byrd (2001) emphasizes information technology's infrastructure's ability to easily and readily support a wide mixture of hardware, software, and communication technologies, to give out information to anywhere inside an organization and

beyond, and to support the design, evolution, and execution of a heterogeneity of business applications.

Four key elements of information technology infrastructure have been distinguished in the literature. Connectivity, compatibility, modularity, and information technology personnel competency were first identified by Duncan (1995) and Byrd &Turner (2001). Mishra & Agarwal (2010) added organizational cognition of information technology technologies (technological frame) as another component of information technology infrastructure flexibility. However, most commonly accepted dimensions of information technology infrastructure flexibility are connectivity, compatibility, and modularity.

Innovation

The literature distinguishes between technical innovations, those that involve new technologies, products and services; and administrative innovations, those that involve procedures or processes, policies and organizational forms (Daft & Becker, 1978; Damanpour 1987; Kimberly & Evanisko, 1981). Business innovation is defined as an idea practice, behaviour or artefact that is perceived as being new by the adopting unit (Zaltman, Duncen & Holbek, 1973; Daft, 1978; Tushman & Nadler, 1986; Damanpour, 1991; Tarafdar & Gordon, 2007).

Innovation is a process that begins with an idea proceeds with the development of an invention, and results in the introduction of a new product, process, or service to the marketplace (Edwards & Gordon, 1984; Thornhill, 2006;). Innovative activity, which can be initiated by individuals or organizations, reflects a firm entrepreneurial orientation (Naman & Slevin, 1993; Lumpkin & Dess, 1996). According to the Miller (2011), "An entrepreneurial firm is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with 'proactive' innovations, beating competitors to the punch".

Two commonly raised categories of innovation are product innovation and process innovation (Gadrey, Gallouj, & Weinstein, 1995; Gallouj & Weinstein 1997; Hertog 2000; Hipp, Tether, & Miles, 2000; Uchupalanan 2000; Avlonitis, Kouremenos & Tzokas., 1994; Crawford & Benedetto 2002; Lyytinen & Rose 2003;). For example, Gadrey, Gallouj, & Weinstein (1995), categorized four types of service innovation, according to service context, namely innovations in service products, architectural innovations that bundle or un-bundle existing service products, innovations that result from the modification of an existing service product and innovations in processes and organization in an existing service product.

Theoretical framework

Based on the primary theories of the studies to empirically examine on how being bank managers accumulate a bundle of resources and capabilities in information technology infrastructure and innovation that may lead to performance in banking institutions. Drawing on the dynamic capability framework and current literature, this study developed a research framework as depicted in Figure 1.

Based on the above literature review, the following hypotheses are anticipated.

Hypothesis 1: There is a significant relationship between information technology infrastructure and performance.

Hypothesis 2: There is a significant relationship between innovation and performance.

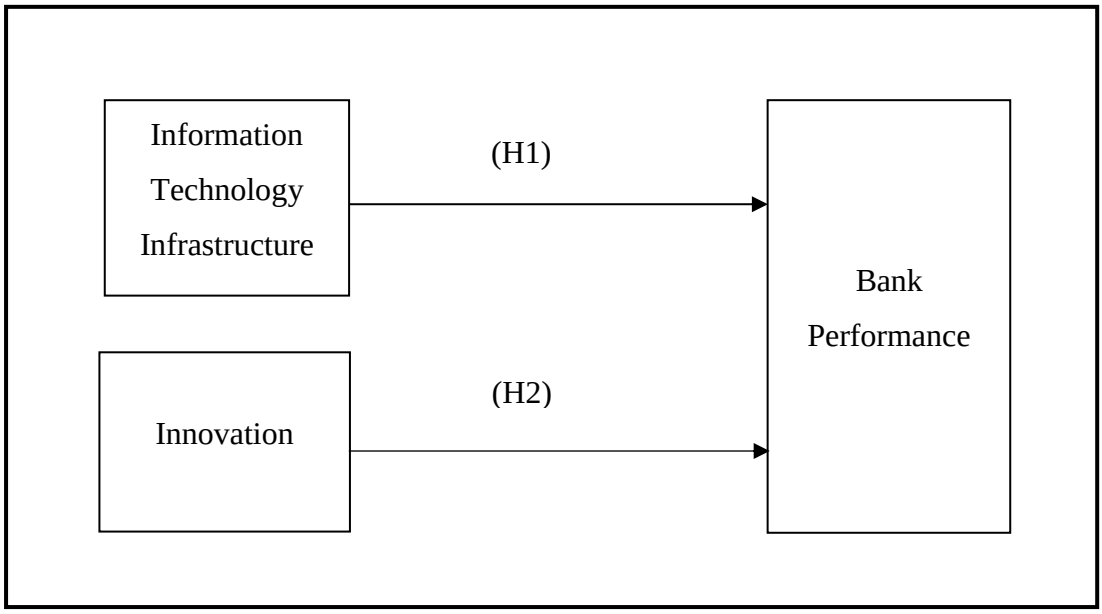

Figure 1: Research Theoretical Framework.

Methodology

Banking institutions were selected since banks have reported ample improvement in cycle time, efficiency and cost (Vuksic, Bach & Popovic, 2013). Increased financial services integration within the community became imperative because of increased internalization of the world financial system and the realization that the creation of a stable and competitive financial arena was a precondition for the achievement of a true internal market (Gibbons, 1992). Banking institutions have the following functions; to permit or facilitate payments, to provide agency functions in changing finance terms (i.e. payment dates, interest rates); to hold or manage financial assets on behalf of third parties.

This study focused on the banks as the unit of analysis was the branch managers of locally incorporated Islamic (16 banks), commercial (27 banks) and development financial institutions (4 banks) in Malaysia. The local and foreign banks were chosen because these banks have extensive branch networks. The sampling frame was obtained from the Bank Negara Malaysia (BNM). The key informants were branch managers and the choice of the banking institutions makes the sample homogeneous. Branch managers were chosen because they are responsible for the strategic business unit level, and therefore they are in the best position to describe the various organizational characteristics of their banks (Dwairi, 2004; Mahmood & Abd Wahid, 2012).

There were 1045 randomly selected respondents as against 346 desired sample sizes as suggested by Krejcie and Morgan (1970). However, only 191 questionnaires were returned showing a response rate of 18.28 percent. This percent response rate is considered as practical for most of the surveys conducted in Malaysia generated a response rate of between 10 to 20 percent (Ramayah, Yan, & Sulaiman, 2005). The completed questionnaires to be returned by the employees were screened to eliminate those forms improperly filled out. There were 177 questionnaires are valid for data analysis.

In order to analyse survey data, this study used two statistical techniques. First, the Statistical Package for Social Sciences (SPSS) version 20 was used in the initial stage. The SPSS 20 was used to generate descriptive analyses for demographic and variables such as means, standard deviations, and frequencies. The missing data were also assessed using SPSS. In other words, SPSS has facilities for the extensive manipulation and transformation of data collected and includes a range of statistical analysis techniques that contribute to a meaningful research result (Coakes & Steed, 2007). Thus, the objective of data analysis is to ensure completeness, consistency, and reliability data (Zikmund, 2000). The second statistical technique used was Partial Least Squares (PLS) approach to Structural Equation Modelling (SEM) using Smart PLS 3.0 software (Ringle, Wende, & Will, 2005).

Analysis and Findings

A reliability test was conducted to examine the internal consistency of the instruments employed in this study on the completed questionnaires obtained during the pilot test. Result of the pilot study from the usable 32 responses revealed that the instrumentation to measure the variables in this study possessed excellent reliability with coefficient alpha of above 0.60, exceeding the acceptable reason as suggested by Hair et at. (2003), Nunnally and Bernstein (1994), and Nunally (1978) as shown in Table 1 below. Since all the Cronbach's alphas of all tested variables exceeded 0.6 (ranging from 0.899 to 0.977), not a single item was dropped, in line with the suggestion by Pallant (2011) and Hair, Black, Babin, & Anderson, (2010).

Table 1: Reliability Coefficients for Variables (n-32)

Variables	Items	Cronbach's Alpha
Information Technology Infrastructure	17	0.946
Innovation	12	0.977
Performance	10	0.899

The assessment of path-coefficient from the PLS analysis is to evaluate the significance of a hypothesized relationship among the constructs. There are three latent constructs in the overall structural model, namely; information technology infrastructure, innovation and performance. A total of two hypotheses was developed to examine the relationship between the constructs.

Table 2 shows the summarized results of the propose structural model with regards to the path coefficients, t-statistics, and p-values. Essentially, the findings also verified whether the hypotheses are supported or not supported. There is one supported hypothesized links whilst the remaining one were not supported.

Table 2: Hypotheses Testing Results

Hypotheses	Relationship	Path Coefficient (β)	T-Statistics	P-Values	Result
H1	Information Technology Infrastructure→ Performance	0.182	1.704	0.045	Supported
H2	Innovation → Performance	0.157	1.429	0.077	Not Supported

The findings show that H1: information technology infrastructure will exert positive influence on performance (β=0.182) of bank branch manager in Malaysia. The research hypotheses of H1 presume that there is a significant relationship between information technology infrastructure and performance of Malaysian banking institutions.

Information technology infrastructure has been extensively studied in information study research. It has been studied as an independent variable (Sambamurthy, Bharadwaj & Grover, 2003; Kumar 2004; Tiwana and Konsynski 2010; Chen, 2012). This finding provides the empirical support for the hypothesis H1 that information technology infrastructure is a key contributing component for organizational performance. This finding lends support to the claim that information technology infrastructure still does matter (Kumar 2004). The information technology infrastructure is a strategic source that can help increase an organization's strategic business value by enhancing its organizational performance.

However, the hypothesis H2, the innovation showed an insignificant relationship with the organizational performance. Previous studies also found that innovation is not necessarily significantly related to firm performance all the time. For example, the study by Kraus, Ringtering, Hughes, & Hosman, (2012) also found that innovation was not significantly related to organizational performance.

Conclusions

This paper will contribute to the literature by examining the relationship with information technology infrastructure, innovation, performance and to investigate the relationship in this proposed conceptual model within the Malaysian banking institutions. The results of the analyses show that information technology infrastructure has a significant effect towards performance. A significant relationship suggests that information technology infrastructure also helps to increase the performance of banking institutions in Malaysia. The innovation showed an insignificant relationship with the organizational performance. The key contribution of this research is the proposal of a model for measuring the performance of banking institutions in Malaysia. Their performance is a major concern due to their vast economic contributions to the nation. Thus, it is imperative that they implement appropriate strategies to enhance their performance and ensure their survival, especially in these turbulent economic times.

This particular study has been conducted only on banking institutions in Malaysia. It is therefore unclear how these results would generalise the finding beyond the firms in the sample. It is possible that firms focused only on banking institutions may be impacted by industry

specific factors that may affect the findings. Thus, it would be useful for future studies to be conducted on other sectors or industries in Malaysia such as servicing, trading, and manufacturing, rather than focusing on one sector such as banking institutions, and to look at the differences between each sectors or industries since the business model is applicable to all types of organisation regardless of their nature of business. It is recommended for future studies to further examine how organisations can leverage a flexible information technology infrastructure and innovation to maximise the values of these information technology and information systems' components to stay ahead of competitions

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