

Service Innovations, Knowledge Management, Advance Technology and Organizational Performances

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Abstract

The purpose of this paper is to examine the impacts of knowledge management and advance technology on organization performance through service innovation. A survey of 268 SMEs in the service industry was conducted. Partial least squares of structural equation modelling (PLS-SEM) was used to test the mediation role of the service innovation on the relationships between knowledge management, advance technology and the organizational performance. The results showed there were links between knowledge management and organizational performance. In addition, it was discovered that service innovation mediated the relationship between the knowledge management and cost and financial performance, and between advance technology and cost and financial performance. The paper shows a way forward of how to measures organisational performance in such a way that they are led from the development of innovation capability generated through knowledge management and the advance technology in the service industry.

Keywords: Service Industries, Service Innovation, Knowledge Management, Advance Technology, Organisational Performance

Introduction

In today's changing world, innovation is the key for organizations to grow and sustain in business. Organizations must innovate to stay competitive. Through innovation organization can develop new strategies to enter new markets, to increase the market share and to gain competitive position as well as to enhance the organizational performance.

Innovations have been discussed from different perspectives. For example, Garcia et al., (2022) studied innovation and quality management in a systematic literature. The word "innovation", though, has many definitions. It also means a different thing to different persons. Types of innovation are also one of the main interests of researchers. Innovations can occur at different level of organizational; individuals, groups, departments, and organization. According to Feeny and Rogers (2003), innovation is perceived as "an interrelated bundle of new ideas" The adoption of one idea may trigger the adoption of others. According to Thomas Edison, one of the greatest innovators in history, "innovation is more than simply coming up with a good idea; it is the process of growing that idea into

practical use” (Tidd and Bessant, 1997). Recently, Du Plessis (2007) has defined innovation as “the creation of new knowledge and ideas to facilitate new business outcomes, aimed at improving internal business processes and structures and to create market driven products and services”. Innovation has become a major focal point of interest for business throughout the world and is known as a key factor of a firm’s success and growth. Innovation is a complex process, not many organizations can able to achieve it. So the important thing is to become success in innovation, the organization must develop the capabilities through various sources and to become success in innovation.

Innovative capability, in contrast, is the ability to innovate. Saunila (2020) conducted a literature review on innovative capability for the SMEs. According to resource based view (RBV) of the firm which states that resources lead to capabilities which lead to performance. A firm should identify potential markets and trends and fully utilize their capabilities to develop innovative services, along with senior executives’ awareness and acceptance of risk. According to Neely et al. (2001), “an organisation's innovation capability can be described as its potential to generate innovative outputs”. Similarly, Lawson and Samson (2001) define innovation capability as “the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders”. In an organization, innovative ability is to identify the needs and issues and to produce or develop idea or product to satisfy the needs and issues of the organization and disseminate the new knowledge to all stakeholders. Innovative capabilities facilitate to achieve sustained long term benefits and competitive advantage. As long as the organization retains the innovative capabilities it will hold the leading market share for the product or service developed by the organization. Innovative capabilities are critical to achieve a superior innovation performance.

There have been on-going quest to know why certain companies are more successful that the crowd in terms of development of innovative capability and eventually innovations outcomes. What are the recipes behind their success? What mechanism is available to blend these resources into becoming distinctive sustainable capability? Is it contextual and industry specific?

Although the scholarly literature has analysed the innovation and innovative capabilities, there is a growing need for simultaneous analysis of the relationship between innovation sources and innovative capabilities and ultimately of the relationships between these two variables and the firm’s performance.

The current research is attempted with the objectives

- to analyse the innovative capabilities within the services sectors as few researches have been done on innovative capabilities particular to service sector. In sum, there is a lacking in the understandings of innovation sources of innovative capabilities.
- Specifically, to address the relationship of innovative sources and capabilities and their effect organization performance.

The distinction of the current study is to focus on developing a framework which consists of the major source of innovation such as knowledge management and advance technology and examining their impacts on service innovation in order to enhance the organizational performance.

Theoretical Background and Hypotheses Development

Resource-based View (RBV) of Innovation

The theoretical framework provided by the resource based view (RBV) facilitates clear analysis of innovation and its association with performance (Damanpour et al., 2009; Galende and de la Fuente, 2003; Mol and Birkinshaw, 2009; Yang et al., 2009). RBV uses the internal features of firms to explain their heterogeneity in strategy and performance. According to the main theory of RBV, only firms with certain resources and capabilities with special characteristics will gain competitive advantages and, therefore, achieve superior firm performance. Organization can foster innovation, only through if they have the ability to constantly upgrade their products and resources and to use the full potential of their capabilities.

The fundamental principles of the RBV are that resources must be valuable, uncommon, movable, imperfectly imitable and non-substitutable. Barney (1991) defines “firm resources as assets, capabilities, organizational processes, firm attributes, information, knowledge, etc, that are controlled by a firm that enable the firm to conceive of and implement strategies to improve efficiency and effectiveness. By possessing resources that are valuable (V), rare (R), inimitable (I) and which the firm is organized (O) to exploit (or the VRIO framework, cf. Barney, 2001), the firm is able to earn above-normal profits in the industry based on the inelasticity of supply. A firm's greater performance develops from its own resource based advantages compare to its competitors. When firms possess a unique combination of resources, it can lead to the development of specific capabilities. Capabilities are also defined as “unique bundle of resources resulting from the way in which a firm assembles, integrates, and deploys the resources” (Clifford Defee and Fugate, 2010). Each organization capabilities are different, the strength of the capability is depends on the company resource, management focus and resource influence. Capabilities stand for the methods firms employ to influence performance. Creating greater capabilities can result in greater performance. RBV links resources to capabilities and capabilities to performance. Firms which successfully make use of resources to build up capabilities have the latent to produce competitive benefit follow-on in superior performance than if the resource-capability linkage was deficient.

Furthermore, despite the numerous research studies have discussed about innovation capabilities and firm performance, there have been related studies done recently such as the ones by Haldma et al (2012); Camisón and Villar-López (2014); Lin and Wu (2014) who discussed the innovation capabilities and firm performance. However, Haldma et al (2012) focus their study on how the linkage between innovation capability and performance measurement can be formed. The paper describes the concept of innovation capability and presents a performance measurement framework for the measurement of innovation capability and its effects. As a result, a conceptual framework with five perspectives for measuring the relationship between innovation capability and business performance is presented. Also, the link between innovation capability and an organization's business performance is disclosed. Another study by Camisón and Villar-López (2014), assesses the relationship between organizational innovation and technological innovation capabilities, and analyses their effect on firm performance using a resource-based view theoretical framework. The article presents empirical evidence from a survey of 144 Spanish firms and modelling of a system of structural equations using partial least squares. The results confirm that organizational innovation favours the development of technological innovation capabilities and that both organizational innovation and technological capabilities for products and processes can lead to superior firm performance used in the context of current literature

review, Resource-based view (RBV) of innovation. Meanwhile, Lin and Wu (2014), conducted their study investigate the role of dynamic capabilities in the resource-based view framework, and also explores the relationships among different resources, different dynamic capabilities and firm performance. Employing samples of top 1000 Taiwanese companies, the findings show that dynamic capabilities can mediate the firm's valuable, rare, inimitable and non-substitutable (VRIN) resources to improve performance. On the contrary, non-VRIN resources have an insignificant mediating effect. Among three types of dynamic capabilities, dynamic learning capability most effectively mediates the influence of VRIN resources on performance. Furthermore, the important role of VRIN resources is addressed because of their direct effects on performance based on RBV, as well as their indirect effect via the mediation of dynamic capabilities.

Service Innovation

Gustafan et al (2020) proposed a new conceptualization for service innovation addressing three fundamental questions about what we know and steps to advance the knowledge. Ostrom et al (2010) define Service innovation as “creating value for customers, employees, business owners, alliance partners, and communities through new and/or improved service offerings, service processes, and service business models”. A service innovation can also be a technology-based modification in the service product or in the service process (Sillanpää and Junnonen, 2012). Service innovation shapes value creation for the customer and increase product/ market performance, efficiency, and significance. The previous research shows that there is a significantly positive relationship between customer orientation and incremental service innovation, which, in turn, leads to new service innovation. Product and/or service innovations like developing high tech products or value-added services. Firms should develop the dynamic capabilities that can facilitate service innovation. Service innovation often involves development of new procedures and concepts rather than new core technology, organization need to be deliberative in resource allocation so the innovation effort aligns with their strategic focus on service innovation. Service innovations are intangible methods of serving users with a new level of performance. They include new service concepts, a new way to interact with customers or a new way of service delivery.

As for the relationship between innovation and organizational performance, a number of studies have agreed that innovation has a positive effect on performance (Akgün et al., 2009; Carmen and José, 2008). The success of Apple Inc in the past several years demonstrates that innovation is central to organizational performance. The balanced scorecard (Kaplan and Norton, 2005) also indicates that an organization's ability to innovate, improve, and learn ties directly to its performance. Innovation is economically profitable and creates competitive advantage and can have a positive impact on business performance (Fallah and Lechler, 2008, Talke et al., 2011). “Organization performance is related to the overall firm achievements as a result of new and/or better efforts made to gain profit and growth” (Gunday et al., 2011; Hult et al., 2004). “Both financial and non-financial measures should be used to enable a firm to make efficient strategic decisions and to measure long term success”(Avci et al., 2011). “The innovation capability of a firm can impact on its business performance” (Talke et al., 2011). Zahra et al (1999) argue that successful innovation is increasingly seen as a contributory factor to higher business performance in a number of industries and sectors, and can strengthen the competitive advantage of a firm and help a firm survive in the marketplace (Gunasekaran et al., 2000, Jiménez-Jiménez and Sanz-Valle, 2011).

Studies have shown that there is a strong relationship between determinants of innovation (such as knowledge management, human resource management, information technology, leadership, organizational learning, organizational strategy, organizational structure and organizational culture) and organizational performance (Asoh and Belardo, 2007; Hassan and Al-Hakim, 2011). Another study by Zack et al (2009) found that “determinants of innovation (such as knowledge management) practices showed a direct relationship with the intermediate measures of organizational performance, and organizational performance showed a significant and direct relationship to financial performance”. Calantone et al (2002) also argued that innovation capability is closely related to organizational performance. The findings of the study of Yam et al (2010) indicate that R&D, resource allocation, learning, and strategy planning capabilities can significantly improve the innovation sales. R&D and resource allocation capabilities can also significantly improve new product introduction.

In line with many researchers Asoh and Belardo (2007); Hassan and Al-Hakim (2011), Akgün et al (2009); Carmen and José (2008); Kaplan and Norton (2005); Cohen and Levinthal (1990), the present study proposes that innovation plays a significant and positive mediating role in the relationship between determinants of innovation such as knowledge management and advance technology and Organizational Performance in term of cost and financial performance, based on RBV theories’ perspectives that provide a theoretical basis for explaining the influence of determinants of innovation on Organizational Performance through innovation.

Knowledge Management

Mennini et al (2022) assume collective knowledge and empirical information enable decision makers to manage the potential effects of economic forecasting in COVID vaccination program. Knowledge management (KM) is “a process used to create, store, retrieve, transfer, and apply knowledge” (Alavi and Leidner, 2001). As knowledge is the key quality of support organizations, creating, managing, integrating, and maintaining knowledge is considered to be significant to the endurance and accomplishment of support organizations. Guilló and García-Fernández (2013) point out that companies that have a higher degree of knowledge management through teamwork, increased empowerment, flexibility in decision-making and a general view of the company, including practices obtain better results regarding operation, but also financial and innovation results. As the ability to assimilate and use knowledge is dependent on both the receiving and diffusing units - and in particular on successful relationships between them (Lane and Lubatkin, 1998; Schulze et al., 2014).

Firms consider the acquisition of external knowledge an important element to increase their internal capabilities in order to enable them to become more innovative in the globally competitive market place (Al-Kwif, 2012; Fontana et al., 2006). Most innovation research now explicitly acknowledge that firms need to be able to identify, assimilate and use knowledge possessed by external actors in order to enrich firm internal competencies and resources (Enkel et al., 2009; Gassmann, 2006; Hsieh and Tidd, 2012; Huizingh, 2011). At the industry level, competition between service providers creates the urge to innovate. Therefore, for service firms, customer demand and competition are important determinant of innovation. Intensely competitive situation may push a firm to be innovative and compete through continuous development of new and improved products and services (Hurmelinna-Laukkanen and Olander, 2014). High levels of competition increase service innovation (Lee et al., 2009). Competition enhances the organization to compete to develop the innovative

capabilities and to produce innovative products / services. It creates the benefit for the society from the competitive business environment. In service firms, customer demand and competition are important determinant of innovation. If the customer demand is known, then the company can initiate the innovation activities to find the service or solutions for the required customer demand. "In order to sustain service innovation initiatives over time and maintain appropriate value in the face of changing markets, technologies, and customer demands, firms must have in place processes and competencies that will allow them to transform and reconfigure their resource base" (Normann, 2001). Moreover, knowledge management also plays a significant role to the benefit of the innovation by applying the integration of knowledge internally and externally to the organization, and make knowledge available and accessible. Thus, knowledge management tools and processes must therefore facilitate the organizational innovation. This involves linking and adaptation dynamic business information and knowledge. Without effective information and knowledge management that drives knowledge integration, which in turn underpins innovation, organizations could be underutilizing knowledge as an innovation resource (Chen et al., 2004; Cheng and Krumwiede, 2012; Badii and Sharif, 2003).

Despite, the fact that several empirical results supported the idea of "knowledge management improve organizational performance" (Schulz and Jobe, 2001; Lee et al., 2012; Wu and Chen, 2014; Mills and Smith, 2011), but other researchers argued that this assumption might simplify the nature of the link between knowledge management and organizational performance, and investing in knowledge management not may lead to improve the organizational performance (Holsapple and Singh, 2001; Shahzad et al., 2013; Kamhawi, 2012; Bogner and Bansal, 2007). Hence, previous literature about knowledge management did not proved a clear view and evidences about the direct effect of knowledge management on the organizational performance, or if this impact driven through intermediate factors. We expected that knowledge management has the ability to affect some of the organizational performance aspects such as organizational quality (Wilcox King and Zeithaml, 2003, Mukherjee et al., 1998), innovation output (Darroch, 2005), service innovation Shang et al (2009), productivity (Lapré and Van Wassenhove, 2001). Moreover, few study showed that knowledge management has a direct impact on financial performance ((Ahn and Chang, 2004; Andreeva and Kianto, 2012); but the common approach supported that knowledge management affect the financial performance indirectly or by intermediate factors (Martín-de Castro et al., 2011; Lee and Choi, 2003; Demarest, 1997). Thus, we can argue that knowledge management has unique contributions in the development innovation capability as well development of sustainable competitive advantage through innovation which leads to enhance the organizational performance. Therefore, this study hypothesized the following

H1a, b: knowledge management has an impact on the organizational performance, (a) cost and (b) financial.

H2: Knowledge management has an impact on service innovation.

H3a, b: Service innovation has an impact on the organizational performance, (a) cost and (b) financial.

H4a, b: Service innovation mediates the relationship between knowledge management and organizational performance, (a) cost and (b) financial.

Advance Technology

Technology is considered as a critical component in provision of services. A study conducted using a systematic literature review on advanced technologies and international business (Ahi et al., 2021). In a Delphi study, technology is found to influence on many aspects of service operations (Field et al., 2018). Higher explicitness and amassing of technology can assist the transfer of technological knowledge within the organization and can raise the capability to adopt innovative technologies. Advance technology such as ICT, ERB and SCM can help SMEs to cut cost by improving their internal processes, faster communication with customers and better distributing their products through online, increase productivity, improve inventory controls, increase sales through closer relationships and faster delivery times (Lymer, 1997), increased systems integration and higher levels of product and process innovation (Raymond and Bergeron, 2008), providing collaborative environments (Alba et al., 2005) and improve the overall competitiveness (Bayo-Moriones and Lera-López, 2007). However, other studies shows that the adoption of advance technology in SMEs is low and because most SMEs firms do not have a sufficiency budget to invest in advance technology, as will, advanced technologies are almost designed for large organizations, hence, SMEs need more budget to customize IT solutions to fit with their needs. There is also a hidden cost such as skill building cost and maintenance cost (Bank, 2009) Thus the adoption of advance technology and implementation becomes a real challenge for SMEs (Xie et al., 2014).

As for service industry, IT is the main indicator in technology. Xue et al (2013) identified the effect of IT on innovation. Kleis et al (2012) linked the relationship between IT and intangible output and proposed that the use of IT in innovation and knowledge creation processes is perhaps the most critical factor in a firm's long-term success. IT improves dialogues, information and knowledge sharing and learning, which strengthen the innovation processes. Bharadwaj (2000) also demonstrated that “firms should combine IT-related resources to create unique IT capabilities, and then to create superior firm performance”. During the process of technology development, firms interact and collaborate with support organizations, which permit these firms to learn, and accumulate new capabilities in order to incorporate the new technology into their processes or products (Ramachandran et al., 2012). IT use can make possible innovation when systems are synergistic and supportive. Using IT in internal communications facilitates the innovation activity of SMEs (Kmieciak et al., 2012).

IT capabilities can be considered to be the mediators between IT investment and performance. Learning from imported technologies has lead to higher innovation success. The use of latest information and communication technology helps to improve organization ability to innovate. The role of information and communication technology is perceived important in relation to open innovation practices as for example help desk systems, online complaint systems, supply chain data recording systems can be good systems to get ideas and inspiration for further innovation and improvement. IT play a main role in providing quick and easy access to external sources of knowledge and new and more intense communication channels with partner organizations, can wipe away traditional constraints on SMEs innovation ability, while leveraging their flexibility and openness. Therefore, this research hypothesised that

H5a, b: Advance technology has an impact on the organizational performance, (a) cost and (b) financial.

H6: Advance technology has an impact on service innovation.

H7a, b: Service innovation mediates the relationship between advance technology and organizational performance, (a) cost and (b) financial.

Figure 1 depicts the research model, in which organizational performance is affected by knowledge management, advance technology, and service innovation. In the model, service innovation is modeled as the mediators between, knowledge management, advance technology and organizational performance.

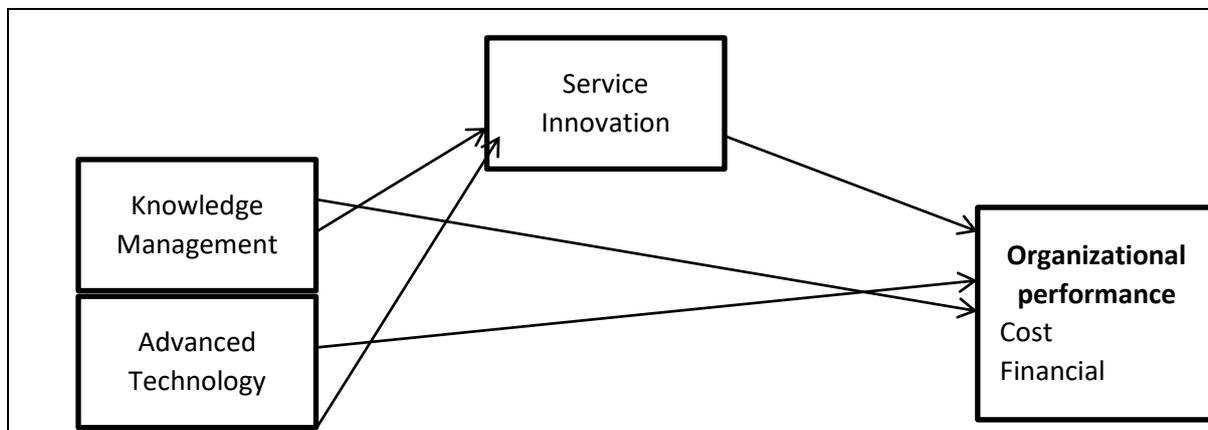


Figure 1: Research Model

Methods

Data

This study focused on SMEs in Malaysian service industry. Survey techniques are used for obtaining relevant information regarding the study variables. We identified nine service industries in Malaysia and questionnaires were distributed to the firms identified in these nine industries. The questionnaires were distributed through personal visits. The researchers distributed 450 questionnaires equally amongst the firms in these nine industries and collected 277 questionnaires (61.5% response rate). However, nine questionnaires were found to be unusable. Hence, the data analysis for this study is based on 268 questionnaires collected from firms operating within nine service industries in Malaysia.

Measures

Having discussed the four important blocks; knowledge management, advance technology, service innovation and performance, we used the flowing instruments to measure them:

Service innovation measures, we adapted 6 items from Thakur and Hale (2013), using seven-point Likert scale ranging from 1 strongly disagree to 7 strongly agree. For performance 7 items within 2 constructs for cost and financial performance were adopted and modified from many studies such as Hotel Malaysia (2009); Idris et al (2003); Idris and Ali (2008); Idris et al (2010), using seven-point Likert scale ranging from 1 lower than the industry average to 7 higher than the industry average.

Based on the 268 samples, the profile of the organizations has been analyzed using descriptive statistics (i.e. Frequency analysis). There were 19% of the organizations within auto repair services participated in this study, and another 12% within fast food sector. Furthermore, 13.5% organizations are operating in the regional markets, while 80.5% in local and national markets and the rest of the organizations in global/ international markets. The operating years of the organizations are varied. Majority of the organizations 39% have operated for 6-10 years, while only 19% have operated for less than 3 years. This indicates the majority of the organizations targeted in this study have considerable experience in the industry. Finally, the responses shows majority of the respondents work as executive, senior

managers and middle managerial position within the organizations, which reflects their responsibility towards the knowledge management strategies, technology systems, and innovation.

Table I

Company Demographic profile for the Study

Demographics Variables		Number of Participants	Percentage (%)
Type of Service	Hotel	9	4.5%
	Fast food	25	12.5%
	Hospital	27	13.5%
	Auto repair	27	13.5%
	Retail store	12	6.0%
	Bank	38	19.0%
	Private college	13	6.5%
	Architect	30	15.0%
	Consultant	19	9.5%
Position in the Firm	Top Manager	6	3.0%
	Senior Manager	42	21%
	Manager	70	35.0%
	Executives	82	41.0%
Firm's Market	Local / National	161	80.5%
	Regional	13	6.5%
	Global / International	26	13.0%
Operational Years of the Firm	1-3 years	9	4.5%
	3-6 years	38	19%
	6-10 years	79	39%
	more than 10 years	74	37%

Analysis Procedures

SEM techniques are generally divided into two main approaches: covariance based SEM (Joreskog, 1970), and the variance-based SEM approach based on PLS developed by Wold (1985). Both are second generation data analysis techniques for modeling the relationships between observed indicators and latent variables, and the causal paths between latent constructs. While the use of PLS is relatively less widespread, in recent years there has been increasing interest in its use in numerous studies.

We also adopted the PLS approach for several reasons. First, PLS does not require assumptions of multivariate normality for the collected data. Also, PLS has been shown to provide higher statistical power than covariance-based SEM when dealing with samples of small or moderate size (Reinartz et al., 2009). The sample size requirement for PLS corresponds to at least ten times the number of indicators for the scale with the largest number of formative (causal) indicators, or ten times the largest number of structural paths leading to an endogenous construct in the structural model (Barclay et al., 1995). In this study, the sample size of (200) was sufficiently high for PLS, since there are no formative indicators and the largest number of structural paths leading to an endogenous construct is three.

Finally, PLS is considered to be particularly well-suited for explaining complex relationships (Fornell et al., 1990).

We employed Smart-PLS software version 3.0 (Ringle et al., 2015). Since PLS does not require any assumptions about the distribution of the observed variables, to assess the statistical significance of the path coefficients, which are standardized β 's, a bootstrap resampling procedure (5000 sub-samples were randomly generated) was performed (Chin, 2010, Chin, 1998). Following Chin (2010) and Hair et al. (2013) we analyzed our model in two steps. First, we assessed the measurement model and evaluated the convergent validity, discriminant validity and reliability of the model constructs. Second, we evaluated the structural model by examining the size and significance of the path coefficients and the R^2 values of the dependent variables.

For the mediation effect, the researchers run the PLS algorithm on the full model to test the mediation effect. If the path coefficient for direct effect and indirect effect is statistically significant, partial mediation is expected. If the direct effect is not significant but the indirect effect is significant, full mediation is expected.

Results

Measurement Model

The reliability and validity of the measurement model were assessed using PLS procedures. Composite reliabilities and the average variance extracted (AVE) were calculated to assess the reliability and convergent validity of our scales. The results in Table II showed that the composite reliabilities and Cronbach's Alpha of all scales were above the 0.70 recommended threshold (with one α coefficient approaching the acceptability level). Also, the average variances extracted by our measures were all above the 0.50 acceptability level, while all factor loadings were above 0.70 threshold, providing support for convergent validity.

Table II

Reliability Results

	loading	Cronbach's Alpha	CR	AVE
KM		0.955	0.961	0.714
KM1: We have effective routines to identify, evaluate, and import new information and knowledge.	0.889			
KM2: We have appropriate routines to assimilate new information and knowledge.	0.852			
KM3: We are effective in transforming existing information into new knowledge.	0.820			
KM4: We are effective in utilizing knowledge in new services.	0.833			
KM5: We are effective in developing new knowledge that has the potential to influence service development.	0.794			
KM6: Our firm develops new services on the collected new idea or knowledge.	0.856			
KM7: Our firm disseminates the new services knowledge to all stakeholders.	0.932			

KM8: Our firm has engagement in collaborative planning with business partners	0.826			
KM9: Our firm has information platforms upon which we share operation-related information with business partners.	0.799			
KM10 Our firm collaborates with business partners and responds rapidly to market change.	0.817			
AT Thakur and Hale (2013)		0.959	0.965	0.732
AT1: Automation (e.g. self-serve kiosk, e-ticketing, online class registration, smartcard payment like Touch n Go).	0.846			
AT2: Computerized information (e.g. customer's database, firm's webpage, E-notes, electronic bulletin).	0.815			
AT3: Service processes enhancement (e.g. queuing scheduling or booking/reservation systems).	0.854			
AT4: Tracking system or process monitoring (e.g. tracking customer record, inventory monitoring using barcode).	0.823			
AT5: Analytical systems (e.g. customer preference analysis, CRM, membership card, online feedback).	0.803			
AT6: Coordination systems (e.g. mobile hand-held PDA, SMS notification, integration with partners or suppliers).	0.884			
AT7: Inter-department systems (e.g. central database, imaging systems for radiology in hospitals).	0.890			
AT8: Intellectual asset system (e.g. document repository, knowledge sharing system)	0.891			
SI		0.828	0.884	0.657
SI1: Our firm is able to replace service as the market demand.	0.880			
SI2: Comparing with our competitors, we have more new services introduced during the past three years.	0.792			
SI3: Comparing with our competitors, we are a pioneer in service introduction.	0.808			
SI4: Our firm is able to improve services design.	0.780			
SI5: Our firm is able to extend the range of services.	0.805			
C Idris and Mohd Ali (2008), and Idris et al. (2010)		0.701	0.821	0.613
C1: Attaining employee productivity.	0.884			
C2: Maintaining high capacity utilization.	0.892			
F Idris and Mohd Ali (2008), and Idris et al. (2010)		0.901	0.930	0.769

F1: Growth of market share.	0.910			
F2: Return on assets.	0.892			
F3: Return on investment.	0.887			
F4: Operating profit.	0.824			

Table III shows, instead, results relevant for discriminant validity. The square root of the AVE for each construct (on the diagonal) was greater than each inter-construct correlation, which provides supports for discriminant validity.

Table III

Discriminant Validity Results

	AT	C	F	KM	SI
AT	0.855				
C	0.357	0.783			
F	0.402	0.361	0.877		
KM	0.677	0.487	0.441	0.845	
SI	0.588	0.440	0.439	0.708	0.810

Notes: n=268. Along the diagonal: the square root of the AVEs

The square root of the AVE for each construct (on the diagonal) was greater than each inter-construct correlation, which provides supports for discriminant validity.

Structural Model Result

Results from our statistical analysis are reported in Table IV and Figure 2. To assess the statistical significance of the path coefficients a bootstrap analysis with 5000 repetitions (Chin, 1998) was performed. By following the recommendations of Zhao et al (2010), the mediating effects were tested. The R^2 of the endogenous constructs were 0.523, 0.238, and 0.256 for service innovation, finance, and cost, respectively. Ston-Geisser's Q^2 for endogenous constructs were 0.319, 0.65, and 0.137 for service innovation, finance, and cost, respectively, which indicates acceptable predictive relevance.

Table IV

Structural Modeling Results

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
H1a=c1/ KM -> C	0.345	0.359	0.127	2.725	0.006
H1b=c2/ KM -> F	0.185	0.173	0.116	1.597	0.110
H2=a1/ KM -> SI	0.572	0.571	0.085	6.735	0.000
H3a=b1/ SI -> C	0.189	0.183	0.108	1.748	0.081
H3b=b2/ SI -> F	0.223	0.228	0.105	2.118	0.034
H5a=c3/ AT -> C	0.013	0.009	0.095	0.134	0.893
H5b=c4/ AT -> F	0.145	0.156	0.101	1.445	0.149
H6=a2/ AT -> SI	0.201	0.205	0.093	2.162	0.031

Our first set of research hypotheses entails the relationship between knowledge management, innovation and organizational performance (cost and financial). The coefficient for knowledge management was found to be significant on both service innovation ($\beta = 0.572$, $p < 0.1$, $t = 6.735$), and cost ($\beta = 0.345$, $p < 0.1$, $t = 2.725$). The significant relationships support our hypotheses of positive impact of knowledge management on cost, and service innovation; thus, hypothesis H1a and hypothesis H2 was supported. In other hand there was no impact of knowledge management on financial performance ($\beta = 0.185$, $p > 0.1$, $t = 1.597$). Thus, hypothesis H1b was rejected. Our results suggest that service innovation has a significant and positive impact on the financial performance ($\beta = 0.223$, $p < 0.1$, $t = 2.118$), and cost ($\beta = 0.185$, $p > 0.1$, $t = 1.748$). Hence, hypothesis H3b and H3a were supported.

Moreover, we found that organizational performance affected by the advance technology. Our results shows that advance technology have no positive and significant effect on cost ($\beta = 0.013$, $p > 0.1$, $t = 0.134$), and ($\beta = 0.145$, $p > 0.1$, $t = 1.445$). Thus, hypothesis H5a and hypothesis H5b were rejected. The relationship between advance technology and service innovation was significant ($\beta = 0.201$, $p < 0.1$, $t = 2.162$), hence, the hypothesis H6 was accepted.

Regarding to the mediation hypotheses (H4a,b and H7a.b), we followed the approach of Zhao et al (2010) to test the mediation relationships by bootstrapping with 5000 sub-sample as they described. For the mediation role of the service innovation between the knowledge management and cost, the direct effects (c1) was significant, and the indirect effect (a1 , b1) was also significant thus hypothesis H4a was accepted, and by considering the positive effect for the direct and indirect effects, service innovation plays a complementary mediation (Zhao et al., 2010). in addition, our result shows an indirect only mediation role of service innovation between the knowledge management and financial performance, while the direct relationship (c2), between the knowledge management and the financial performance was insignificant, the indirect relationship was significant (a2, b2) thus hypothesis H4b was accepted. For the mediation role of the service innovation between the advance technology and organizational performance, the results shows that, service innovation plays an indirect only mediation role between the advance technology and cost, because the direct effect (c3) of advance technology on cost was not significant but the indirect effect (a3, b2) was significant thus H7a was supported. Additionally, service

innovation plays an indirect only mediation role between the advance technology and the financial performance, because the direct effect (c_4) of advance technology on the financial performance was not significant but the indirect effect (a_4, b_4) was significant thus H7b was supported, (see Figure II, and Table IV).

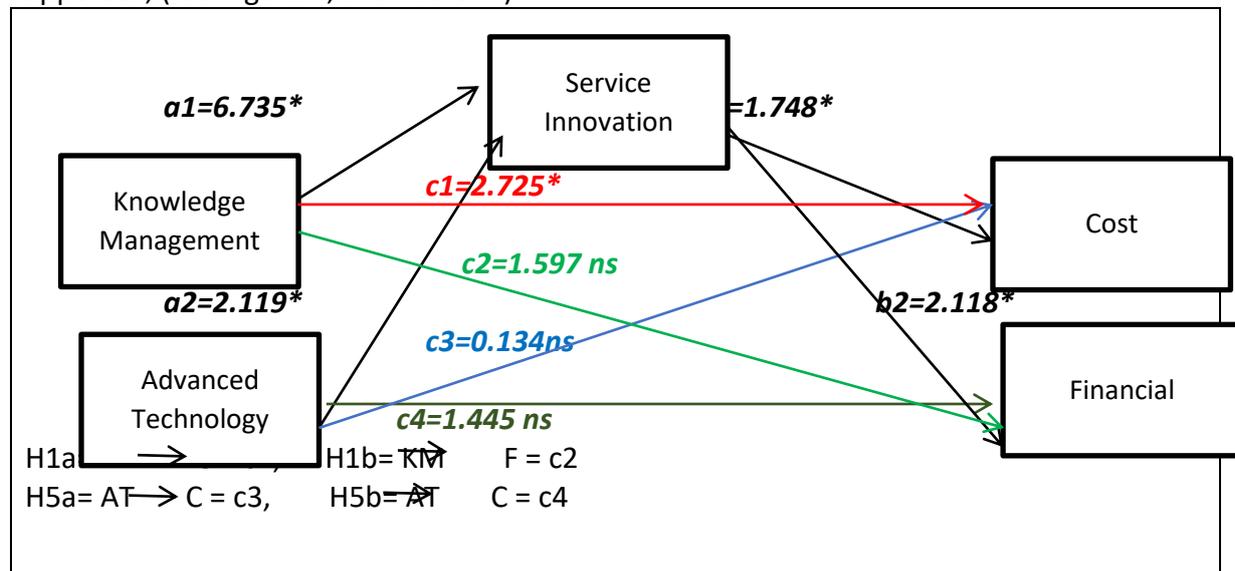


Figure II Results of the modeling analysis

*= significant at $t > 1.96$, ns = not significant

Discussion

To date, little empirical work has been conducted in the area investigated by this study; most of the previous researches have focused on the antecedents of innovation within the manufacturing industry. However, it is clear that there is increasingly attention have been given to service organizations and service innovations (Ashok et al., 2016). The major objective of this study was then to investigate the relationships among the knowledge management, advance technology, service innovation and organizational performance of service organizations, and to clarify the mediating role of service innovation between the study constructs.

The Direct Relationships

In this research two organizational performance construct were considered: cost and financial. The first finding was that knowledge management has a positive impact on the cost. The findings are in line with the idea of “knowledge management improve organizational performance” (Schulz and Jobe, 2001; Lee et al., 2012; Wu and Chen, 2014; Mills and Smith, 2011), which means that utilizing knowledge management activities within the service organizations improves the employees productivity and maintains high capacity utilization in order to reduce customer costs. However, the results showed that knowledge management has no impact on financial performance, which also supported by (Holsapple and Singh, 2001; Shahzad et al., 2013, Kamhawi, 2012; Bogner and Bansal, 2007), which their main arguments are that the assumption of “knowledge management improve the organizational performance” might simplify the nature of the link between knowledge management and organizational performance, and investing in knowledge management not may lead to improve the organizational performance. Moreover, we cannot ignore the fact that building a knowledge management culture within SMEs need a huge investment, which might affect the financial situation for SMEs within the service industry.

The results also showed that advance technology has no positive impact on cost and the financial performance. Regardless the benefits that SEMs within the service industry can gain such as improving their internal processes, faster communication with customers, increase productivity and increase sales through closer relationships and faster delivery times (Lymer, 1997), increased systems integration and higher levels of product and process innovation (Raymond and Bergeron, 2008), providing collaborative environments (Alba et al., 2005) and improve the overall competitiveness (Alberto and Fernando, 2007). Adoption new technology contain a lot of cost and need a huge investments which the SEMs do not have such as sufficiency budget to invest in advance technology, and advanced technologies are almost designed for large organizations, hence, SMEs need more budget to customize IT solutions to fit with their needs. There is also a hidden cost such as skill building cost and maintenance cost (Yesbank, 2009). Thus the adoption of advance technology and implementation becomes a real challenge for SMEs (Ying Xie 2013), thus advance technology have no direct positive impact on the cost and financial performance. Moreover, the results suggest that service innovation has a significant and positive impact on cost and the financial performance. The findings are in line previous researches, which claimed service innovation has an impact on the organization performance (Haldma et al., 2012, Camisón and Villar-López, 2014, Shang et al., 2009). The results strongly suggest that knowledge management has a positive impact on service innovation, which consists with existing researches, which they found a positive relationship between innovation and organization performance (Chen et al., 2004, Cheng and Krumwiede, 2012, Badii and Sharif, 2003). The results also showed that adopting advance technology also has a positive impact on service innovation and that in line with Xue et al (2013); Kleis et al (2012); Kmiecik et al (2012), which they found that advance technology such improve the innovation capabilities.

Mediation Role of Service Innovation

For the mediation role of the service innovation between the knowledge management and cost, the results showed a complimentary mediation role of service innovation between the knowledge management and cost. This means that knowledge management had a two ways direct impact on cost, or indirect impact through service innovation. Thus, knowledge management impact in cost would improve by service innovation. However, it is still possible receive the knowledge management benefits in the absence of the service innovation. The results showed that service innovation has indirect-only mediation role between the knowledge management and financial performance. This means that knowledge management has indirect impact on financial performance through service innovation, which support the arguments that knowledge management affect the financial performance indirectly or by intermediate factors (Martín-de Castro et al., 2011; Lee and Choi, 2003; Demarest, 1997). Thus, the finding validated the argument, that knowledge management has unique contributions in the development innovation capability as well development of sustainable competitive advantage through innovation which leads to enhance the financial performance. Regarding, the mediation role of the service innovation between the advance technology and organizational performance, the results showed that, service innovation plays an indirect-only mediation role between the advance technology and the financial performance, and advance technology also has an indirect-only mediation role between advance technology and cost. This means that advance technology have no direct impact on both cost and financial performance, even so, SMEs still possible to receive the benefits of the advance technology through service innovation. The use of latest technology helps to

improve organization ability to innovate, which well develops competitive advantage leading to enhance the cost financial performance.

Managerial Implication

The results suggested that knowledge management has a positive effect on the cost but no effect on financial performance. Therefore, the idea of utilizing from the knowledge management activates will not have a concrete impact on the organizational performance. Even so, the results showed that service innovation mediated the knowledge management and the organizational performance. In light of this, managers can gain the knowledge management benefits by creating an innovation culture and use the knowledge management activates in order to enhance service innovation which finally will lead to enhance the organizational performance in term of cost and financial performance. Furthermore, the results showed that managers who would be implementing knowledge management strategies should carefully understand the innovation capabilities, in order to reach the improvements they looking for in the organization performance in the financial or operational level.

The findings of this study, also showed that advance technology have no positive direct impact on cost and financial performance. This means that SMEs are very sensitive to the cost of the new technology; hence, managers should have enough awareness for their organization financial situation, the cost of the technology as well as they need to have the ability to make the bargaining between the cost and the benefits of adopting new technology. However, the results showed that service innovation have mediation role between advance technology and cost and financial performance. In light of this, managers can fully utilize the advance technology through service innovation. Thus, managers who responsible for adopting and implementing the new technologies should give a good attention for the service innovation capabilities within the organization, precisely when they choosing the technology tools to fit with their organization and the innovation and knowledge culture within the organization to maximize the benefits of the technological tools and to reach the desired improvements in the organizational performance.

Summary and Conclusion

The impact of knowledge management on the cost of the service organization is evident and is both direct and mediated by service innovation. No direct effect of knowledge management on financial performance is found. However, knowledge management does appear to require services innovation to enhance the financial performance. The finding have shown that service innovation have a direct impact on the cost and financial performance. Moreover, the finding showed that service innovation play indirect-only mediation role between advance technology and cost and financial performed.

In this study we focused and examined the cost and financial performance, leaving aside other performance dimensions, leaving these dimensions to be examined in future research. Moreover, future research can also investigate other determinants of innovation such as culture, management support and internal research and development. This research was conducted on SMEs operating within the service industry in Malaysian; by collecting data form nine deferent services sectors. Thus the generalizability of the results would be limited and might not be extended to other business environment or even on other develop countries. Also future research might focus in one sector such as hotel or consulting firms.

Despite the limitations, this research has made several contributions: first, it provides empirical evidence of the mediation role of the service innovation between knowledge management and cost and financial performance and between advance technology and cost and financial performance. Theoretically, resource based view was used to develop the study framework in innovation research. Moreover, significant and insignificant relationships between the research variables have corroborated with the finding of other researchers previous studies.

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