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Determinants of knowledge management systems success in the banking industry

Tat Huei Cham and Yet Mee Lim
Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman (UTAR), Selangor, Malaysia
Boon Liat Cheng
Department of Marketing, Sunway University, Selangor, Malaysia, and
Teck Heang Lee
Faculty of Business, Economics and Accounting, HELP University, Malaysia

Abstract

Purpose – This study aims to examine the impact from technical and social aspects on knowledge management system (KMS) success. Moreover, this study also attempts to examine the interrelationships between KMS success and user satisfaction.

Design/methodology/approach – A questionnaire survey was used to collect data from the commercial bank officers to test the proposed KMS success model. All the measurement scales adopted in this study were adopted from the existing literature. The data collected in this study were analysed using both SPSS and structural equation modelling approach via AMOS.

Findings – The research results indicate that both technical (knowledge quality, system quality and service quality) and social factors (user trust and management support) play a significant and positive role in system user satisfaction. The results also show that user satisfaction have a direct influence on the success of KMS and vice versa.

Originality/value – This study is one of the few studies on KMS which include both the technical and social perspectives in examining KMS success. This research study raises the importance of social factors, which have been earlier neglected by many studies on KMS success models. Moreover, the interrelationships relationship between KMS success and user satisfaction also been examined in this study.

Keywords Applied knowledge management, Knowledge management success factors, KM

Paper type Research paper

1. Introduction

In the highly competitive business world, the success of one's organization depends on how well the top management utilizes its corporate assets to achieve business goals. These assets can be categorized into tangible (e.g. financial capital, buildings and employees) and intangible form (e.g. knowledge, corporate image and branding). Conventionally, most of the firms have prioritized on the tangible aspects in their day-to-day operations. However, this trend seems to have taken a change where majority of the business entities have begun to emphasize on the intangible aspect especially the management of the organization's "knowledge" (Vorbeck *et al.*, 2003). Knowledge itself has become a critical resource. It is an imperative element for

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businesses to solve operational problems and to make decisions to support business strategies (McFayden and Canella, 2004). The importance of KMS is gradually recognized in line with the increasing need of firms to achieve sustainable competitive advantages (Turban *et al.*, 2008). As a result, knowledge has been treated systematically much like other tangible resources, and many organizations are exploring the field of knowledge management (KM) to sustain their competitiveness.

In today's business environment, knowledge-based technologies such as micro-electronics, computers, telecommunications, man-made gadgets and robotics have been deployed to cater for knowledge management initiatives by forming a system known as knowledge management system (KMS).KMS makes internal knowledge available to the employees and provides information for organizational learning (Damodaran and Olphert, 2000). Moreover, Galandere-Zile and Vinogradova (2005) explained that knowledge in the business context was considered a form of actionable information and KMS is a form of information system (IS). Hence, IS and KMS have often been used interchangeably by various authorities in the field (Halawi *et al.*, 2007; Nattapol *et al.*, 2010; Tsai and Chen, 2007; Wilson, 2002). Thus, the concepts and discussion of IS are equally applicable to KMS.

Since the inception of KMS, many firms have engaged actively in KMS to obtain benefits from the use of the system. The use of KMS is especially needed in financial institutes such as banks, which rely heavily on information (knowledge) to develop their products and services. The effective use and management of knowledge has been recognized as the most significant aspect for understanding the market conditions, investment strategies, customers' requirements and their expectations. Knowledge has been seen as the determinant of quality service performance especially when banking products are virtually perceived as identical to one another (Silver and Berggren, 2010). Although knowledge management-related issues have received fairly extensive attention in previous research (Akhvan, 2008; Halawi *et al.*, 2007; Wasko and Faraj, 2005) and huge resources have been invested in developing and introducing KMS to employees, little effort has been given on finding out what factors contribute to the success of KMS. These factors could be significant indicators for banks and any other high-calibre industries to adopt KMS in their business operations.

With regards to the models on the success of KMS, the past studies have looked into the success in relation to users' satisfaction and their intention to use the system (DeLone and McLean, 2004; Halawi *et al.*, 2007; Kulkarni *et al.*, 2007). However, these models may not be applicable to the banking industry. According to Lucas (1978) and DeLone and McLean (1992, 2002), the intention to use should only be considered as a predictor of KMS success when the adoption of the system is on a voluntary basis. When KMS users are made compulsory to utilize the system as part of their job requirements, user's intention to use KMS is no longer appropriate in addressing the success of KMS. In the banking industry, most of the bank employees are not given a choice by their employers whether to use or not to use KMS. The bank employees have to use the system, as it is an essential tool for them to execute their jobs and to fulfill their job descriptions. Therefore, the intention to use the system as an antecedent for the success of KMS seems to be inappropriate in this case.

In addition, previous research studies have emphasized on the technical aspects of the system in examining their success (Agourram and Ingham, 2007; DeLone and McLean, 2003; Jennex and Olfman, 2003; Halawi *et al.*, 2007; Nattapol *et al.*, 2010). The

three technical aspects commonly studied are knowledge quality, system quality and service quality. Studies on KMS that consider the impact from the social aspects such as user trust and management support in relation to the success of KMS are still scarce and have little empirical evidence (Tsai and Chen, 2007). The social aspects of trust and support are part of the organizational culture to facilitate the utilization and implementation of knowledge (Inkpen, 1996). Trust is needed to operate a knowledge-based system effectively and a trusting culture may enhance the exchange of knowledge (Roberts, 2000). Therefore, the inclusion of social aspects is vital in predicting the success of KMS.

The objective for this study is to understand the importance of both technical and social factors that can lead to the success of KMS implementation via users' satisfaction with the system in the context of Malaysian banking industry. The technical aspects considered in this study were adopted from the Delone and McLean's IS success model (2002), namely, knowledge quality, system quality and service quality. The social aspects are trust with the system and management support. The present study attempts to deal with the scarcity of previous research with respect to the social aspects of KMS, specifically in the Malaysian banking industry. This empirically integrated model developed for this study will be useful to researchers in further developing and testing KMS success model for the industry where KMS is a must to the employees. This paper includes a literature review on KMS and its success models, a methodology section and a discussion section on the implications of the research findings.

2. Literature review

2.1 Knowledge management systems

In view of the importance of knowledge in creating sustainable competitive edge, many business organizations have adopted a systematic approach in managing organizational knowledge. Although the concept of KM has been defined in different ways, KM principally refers to how organizations create, retain and share the organizational knowledge that they have possessed (Huber 1991). The value of knowledge would upsurge when it is shared effectively among the users (Cabrera and Cabrera, 2002). Wiig *et al.* (1997) pointed out that KM in business organizations does not carry its name accidentally because the term management itself usually signifies "something" has to be managed. And this process of managing knowledge enables the organization to deal with changes and to interact with the external environment effectively (Alavi and Leidner, 2001).

To facilitate the process, information and communication technology tools have been deployed to form an inclusive system of managing organizational knowledge known as KMS. This KMS is an IT-based system developed to support the organizational KM behaviour and to deliver the best outcomes for knowledge diffusion, learning enhancement, product and service innovation and environmental responsiveness (Agourram and Ingham, 2007; Alavi and Leidner, 2001; Jennex and Olfman, 2003; Tseng, 2008). Thus, KMS serves as the platform for sharing crucial information, decision-making, strategy crafting and increased intellectual capability of the organization.

The advantages of KMS as part of organizational practice have been observed in various multinational companies such as Texas Instrument, Chevron and Ford. These companies have successfully saved millions of dollars via the usage of KMS in their

day-to-day operations (Bose, 2004). Although it has been reported that some of the KMS efforts fall short in delivering the expected benefits for the practitioner (Hickins, 1999; KPMG, 2000), KMS is still considered an important business tool. Furthermore, the number of adoption of KMS in business operations is still increasing till today (Agourram and Ingham, 2007; Tsai and Chen, 2007). The above scenario reveals that KMS has become an organizational trend nowadays due to the benefits of the system. Chua *et al.* (2007) contended that companies gain competitive advantage not only directly from the amount of knowledge they gather but also from the capability of KMS to perform at its utmost capacity and to stay relevant to the users' needs. However, as organizations continue to operate in a dynamic environment where changes are constant and rapid, examining the factors in relation to the success of KMS becomes critical to ensure its contributions to the success of the organization (Halawi *et al.*, 2007).

2.2 Knowledge management success models

As seen from the literature, the models used to examine the success of KMS have been developed based on DeLone and McLean's IS Success Model (Agourram and Ingham, 2007; Jennex and Olfman, 2003; Halawi *et al.*, 2007; Nattapol *et al.*, 2010). According to DeLone and McLean (2003), the IS success model consists of six interrelated constructs: service quality, information quality, system quality, user satisfaction, use and net benefits. This model has then been adopted by Jennex and Olfman (2003) in their study of KMS success. Since then, the KMS success model was further evolved by Halawi *et al.* (2007) when they conducted an empirical study to address the success of KMS. The KMS success model developed by Halawi *et al.* (2007) consisted of five constructs, namely, knowledge quality, system quality, service quality, intention to use, user satisfaction and knowledge management success. So far the social factors have been largely left out in these models. Thus, Nattapol *et al.* (2010) included the trust factor in their study of the success of KMS. But the inclusion of management support as the other social aspect in the KMS success model is still limited. The present research study, therefore, has included management support in the research model in examining the success of KMS in the banking industry. In addition, the present research model excludes users' intention to use, as this factor deems to be inappropriate in the context of banking industry where the use of KMS is compulsory. The research model developed for this study is shown in the next section along with the research hypotheses.

2.3 Hypotheses development and research model

The following sections present the literature on the relationships between the technical aspects (knowledge quality, system quality and service quality), social aspects (user trust and management support), user satisfaction and KMS success, as well as their respective hypotheses. The hypotheses developed for this study were also shown graphically in the research model at the end of the section.

2.3.1 Technical aspects

2.3.1.1 Knowledge quality. For the purpose of this study, knowledge quality is defined as the extent to which knowledge object successfully serves the purposes of users (Kahn *et al.*, 2002). According to Kahn *et al.* (2002), it is reported that knowledge quality has become a critical issue in creating competitive advantage and in dealing with the rapidly changing business environments. When quality knowledge is up-to-date, reliable, accurate and easily used, it is capable to facilitate decision-making process in the

business platforms (DeLone and McLean, 2003). Moreover, knowledge quality has been suggested in the previous literature as an antecedent and integral part of the user's satisfaction (DeLone and McLean, 2003; Jennex and Olfman, 2003; Kulkarni *et al.*, 2007). The quality of content contribution is essential for KMS's success. It ultimately enables the users to perceive the KMS to be more beneficial and to experience a higher level of satisfaction (Jennex and Olfman, 2003). Halawi (2005) claimed that the richness of knowledge quality is essential to encourage knowledge sharing among the users and directly enhance the knowledge utilization among the users in an organization. When users expect to receive more benefits such as quality knowledge from KMS, they are more likely to satisfy with it (Jennex and Olfman, 2003; Halawi *et al.*, 2007). These arguments imply that quality knowledge plays an important role in determining user satisfaction (Nattapol *et al.*, 2010). Therefore, it was hypothesized that:

H1. Knowledge quality has a positive influence on user satisfaction with knowledge management system.

2.3.1.2 System quality. In accordance with Wu and Wang (2006), system quality is defined as how well the KMS performs in the context of its operational aspects. The importance of system quality in the aspect of KMS has facilitated all the processes that have taken place in the system. As for knowledge sharing and codification in KMS, it is important to have a system structure that enables faster and easier codification of knowledge (Alavi and Leidner, 2001; Davenport and Prusak, 1998). Advanced storage and retrieval tools can effectively enhance organizational memory and repository of KMS (Alavi and Leidner, 2001). Moreover, Goodman and Darr (1998) claimed that the ease of storage and retrieval of knowledge could encourage people to contribute knowledge into the system. Likewise, Al-Busaidi *et al.* (2010) found that system quality in terms of ease of use, speed and integrated functions is critical for knowledge sharing behaviour. The benefits of knowledge sharing have been seen to play an important role in helping business to make speed decisions and to respond optimally to the market changes. A system that is perceived to be easy to use may also be perceived to be high in quality. Wu and Wang (2006) mentioned that KMS with a high system quality would help reduce users' "negative mood" such as impatience while using the system. Therefore, system quality provides the means to effective facilitation of knowledge respiratory in KMS and has a significant influence on users' satisfaction (Wu and Wang, 2006). In addition, studies that found a positive relationship between high system quality and users' satisfaction include Jennex and Olfman (2003), Halawi *et al.* (2007) and Nattapol *et al.* (2010). Therefore, the following hypothesis was formulated:

H2. System quality has a positive influence on user satisfaction with knowledge management system.

2.3.1.3 Service quality. Service quality refers to the fulfilment of delivered service in meeting customers' requirements, expectations and satisfactions (Parasuraman *et al.*, 1985). In the context of KMS, service quality means how well the subject-matter experts and KMS managers support the KMS activities (Jennex and Olfman, 2005; Al-Busaidi *et al.*, 2010). This support consists of providing guidance and training to the users on how to query and use knowledge and making knowledge capture and reuse as part of the business process routines. Delone and McLean (2003) have also proposed that service quality has to be included in KMS success conceptual framework to

acknowledge its significance. Moreover, service quality has been found to be the most significant variable in contributing to users satisfaction with the system and the overall success of the KMS initiative (Al-Busaidi *et al.*, 2010; Delone and McLean, 2004; Halawi *et al.*, 2007; Kettinger and Lee, 2005; Nattapol *et al.*, 2010; Tsai and Chen, 2007). In addition, Brady *et al.* (2002) found that service quality was an important factor in creating good attitude and user satisfaction in their study of information technology. In sum, various past studies have found a positive relationship between service quality and the level of user satisfaction. It was then hypothesized that:

H3. Service quality has a positive influence on user satisfaction with knowledge management system.

2.3.2 Social aspects

2.3.2.1 User trust. According to Thatcher *et al.* (2007), trust in the context of information technology refers to trusting beliefs for a particular system. It was documented that that lacking of trust in the usage for a particular system may cause users to believed that the system they used have limitation in terms of predictability or functionality which may lead them to stop it (Thatcher *et al.*, 2007). As for KMS, trust in KMS is synonymous to trust in IS where reliable, dependable and quality system performance are the key indicators for confidence building (Malhotra, 2004). User trust in KMS has been viewed as a key factor that enhances effective knowledge exchanges and provides a context for cooperation (Adler, 2001; Tsai and Ghoshal 1998). Levin and Cross (2004) have found that user trust predicts the perceived usefulness an individual feels about the system. It has also been found that KMS users will feel more certain and comfortable to use the system in performing their jobs when they trust the functionality of the KMS (He *et al.*, 2009). This means that when KMS users trust the system to do them good, they are more likely to think that the system is useful and beneficial to them. In view of that, trust was considered a determinant of user satisfaction (Al-Busaidi *et al.*, 2010; Nattapol *et al.*, 2010). Trust must exist between the users and the system so that the latter can be used to achieve the desired purpose and eventually satisfaction among the users. Based on the past literature, the following hypothesis was postulated:

H4. User trust has a positive influence on user satisfaction with knowledge management system.

2.3.2.2 Management support. Management support in this study refers to the activities performed by the higher management in clarifying the goal and vision of KMS to the users and in encouraging them to get involved with the system directly (Gold *et al.*, 2001). A number of research studies have discussed the importance of management support or leadership in KM initiatives (Massey *et al.*, 2002; Pan *et al.*, 2001). Venkatesh and Bala (2008) argued that when users hold a strong belief regarding the availability of organization resources, technical and managerial support, they will undoubtedly adopt that technology. Moreover, there are many researchers in the IS context who agreed that the support from top management play an important role in determining the success of IS implementation (Masrek *et al.*, 2007). Top management support was reported to have a significant impact on the success of executive ISs by creating a supportive environment for the parties involved directly with the system (Ragu-Nathan *et al.*, 2004). Furthermore, past research studies have also shown a significant correlation between management support and user satisfaction on a particular system or technology

(Al-Busaidi *et al.*, 2010; Jennex and Olfman, 2005). In line with the existing literature with regards to the relationship between management support and IS initiatives, the following hypothesis was proposed in this study:

H5. Management support has a positive influence on user satisfaction with knowledge management system.

2.3.3 The relationships between user satisfaction and knowledge management system success. For this study, user satisfaction with KMS refers to an overall evaluation of KMS (McGill *et al.*, 2003), whereas KMS success is referred to as the valuation of the benefits of the KMS by the users (Halawi *et al.*, 2007). Previous research studies had found that the user satisfaction on KMS will directly influence the success rate of KMS (Alavi and Leidner, 2001; Jennex, 2005). In other words, those users who satisfied with the KMS that they used, they will recognized the success of KMS in terms of overall benefits delivered. The benefits that are associated with the success of KMS include efficiency in managing and storing knowledge, helping users in acquiring new knowledge, the ability to accomplish users' tasks, improving decision-making process and improvement in users' quality of working life (Halawi *et al.*, 2007; Jennex, 2005). Other studies which have recognized a positive relationship between user satisfaction and KM success include Halawi *et al.* (2007), Kwahk and Oh (2009) and Ragab and Arisha (2013). Hence, it can be inferred that user satisfaction is associated with the success of KMS.

However, previous studies have also found a reverse relationship whereby the success of KMS could determine the satisfaction level of the users (Alavi and Leidner, 2001; Jennex, 2005). In other words, the users who recognize the benefits delivered by KMS will be satisfied with the system as a whole (Wu and Wang, 2006). Based on the two-way relationship between user satisfaction and success of KMS, two hypotheses were developed as follows:

H6. User satisfaction has a positive impact on the success of KMS.

H7. The success of KMS has a positive impact on user satisfaction.

Figure 1 below shows the research model of this study.

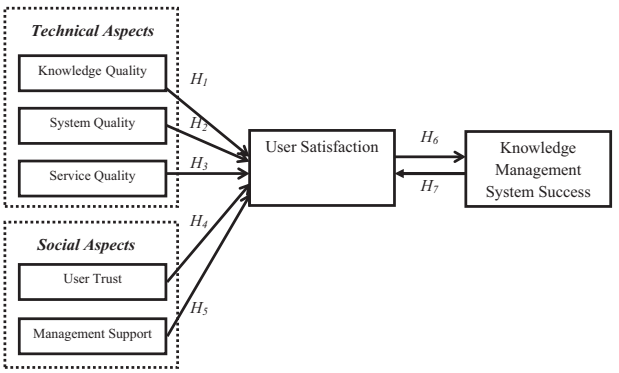

Figure 1.
Research model

3. Methodology

3.1 Sampling method

The target respondents of this study were the bank employees situated in the Klang Valley region of Malaysia with a high density of commercial banks. A quota sampling was used to collect data to empirically test the proposed research model in this study. To ensure reliable and justifiable responses, the researchers have imposed two screening criteria before the questionnaires were distributed to the respondents. The two screening criteria were:

(1) the respondents must have had worked for at least six months with the bank; and

(2) their jobs must have involved with any KMS (e.g. company intranet, company database, Malaysia Central Credit Reference Information System and Malaysia Dishonoured Cheque Information System).

The respondents who fulfilled these two requirements were then qualified as the target respondents in this study. A total of 250 questionnaires were distributed evenly to the target respondents from five commercial banks. A total of 217 questionnaires were received with a response rate of 87 per cent. However, 13 of them were discarded due to incompleteness, yielding a sample size of 204. A sample size of 204 was considered adequate for data analysis for the purpose of this study. Based on the approach by Hair *et al.* (2006), the appropriate sample size for the study can be determined based on the statistical formula of multiplying the number of measurement items in the questionnaire by five. As the measurement scales used in this research have 34 items in total, the sample size should therefore be 170 and above. Furthermore, prior studies also consistently reported that a "critical sample size" of above 200 is adequate to provide sufficient statistical power for data analysis (Comrey and Lee, 1992; Hair *et al.*, 2006; Schmidt and Hollensen, 2006). Hence, the sample size of 204 obtained from this study is considered large enough for data analysis.

3.2 Measurement

All items used to measure the variables in this study were based on the existing measurement scales in the KMS literature and the inputs of KMS experts. All of the items were measured based on a seven-point Likert scale ranging from (1) "strongly disagree" to (7) "strongly agree". The items used to measured knowledge quality were adapted from DeLone and McLean's (2003) study; which covers relevance, timeliness and completeness of information/knowledge provided by the KMS. The system quality scale in this study was adapted from Wu and Wang (2006) and was operationalized by four items:

(1) acceptable response time;

(2) system stability;

(3) ease of use; and

(4) a user-friendly interface.

Based on the study by Nattapol *et al.* (2010), service quality was measured using five items in the areas of adequate support, response rate, understanding user specific need,

having sufficient knowledge to users' need and imposing empathy when users have problems with the system.

Similarly, user trust was measured using four items adapted from the trust scale by Nattapol *et al.* (2010). The measurement items for user trust include confidence in the system's knowledge, beliefs in the system, and truth and reliable knowledge for the system. Management support for this study was adopted from the study by Al-Busaidi *et al.* (2010) and was measured using four items that relates to the role of senior management in assisting KMS users with supports, ensuring the objectives of the KMS are achieved, encouraging knowledge exchange and emphasis on the importance of KMS. User satisfaction refers to the sum of one's feelings of pleasure or displeasure regarding the use of KMS, and was measured by four items adapted from a satisfaction scale developed by Wu and Wang (2006). KMSs success is about the valuation of the benefits of the KMS by the users and was measured with five-item KMS success scale developed by Halawi *et al.* (2007). The scale consists of the benefits of KMS in helping users to new knowledge acquisition, managing knowledge, decision-making, improve quality of work life and task accomplishment.

A pilot test was carried out before the actual data collection to ascertain the reliability of the survey instruments and to test for the clarity of items. The pretest of the questionnaire was conducted using five IS experts and a group of ten finance officers. They were asked to provide comments on the questionnaire content and structure to assess item adequacy, question relevancy and wording clarity. The pretest respondents indicated that the questions of the survey were adequate in terms of construct coverage and relevant. Hence, the face validity of the scales was established.

4. Data analysis and result

Data collected were statistically analysed using SEM according to the objectives of the research. First, descriptive statistics were used to describe respondents' demographic (Table I). Second, data were checked for its reliability and validity. Third, the fit of the research model was conducted with the use of analysis of moment structures (AMOS). Finally, the results of hypotheses were presented.

4.1 Sample characteristics

As shown in Table I, the respondents consisted of 58.33 per cent female and 41.67 per cent male bank employees. Almost all of them were local Malaysians (96.00 per cent) and two-third of them possessed 1-6 years of experience in using KMS. Majority of the respondents owned a bachelor degree (60 per cent) and two-third of them used KMS one to six hours per day in performing their jobs.

4.2 Convergent and discriminant validity of the constructs

Confirmatory factor analysis (CFA) is used to test the validity and reliability of the constructs by examining the fit of the measurement model. Examining the model fit involves testing whether the observed variables are significantly related to their respective latent variables. The relationships between the observed and latent variables are postulated based on the existing measurement scales adopted from the literature. According to Hair *et al.* (2006), the criteria used in the evaluation of model fit included the justification of absolute fit measures, incremental fit measures and parsimonious fit indices – Comparative fit index (CFI), root mean square error of approximation (RMSEA), goodness of fit (GFI), Tucker-Lewis index (TLI), normed

Variables	Classifications	(%)
Gender	Male	41.5
	Female	58.5
Nationality	Malaysian	96.0
	Non-Malaysian	4.0
Education level	Certificate/Diploma	24.50
	Degree	60.0
	Master	13.0
	Doctoral	0.5
	Professional certificate	2
Years of experience with KMS	1-3 years	33.5
	4-6 years	35.5
	7-9 years	19.5
	10 years and above	11.5
Average hours of using KMS per day	1-3 hours	37.5
	4-6 hours	33.5
	7-9 hours	23.5
	10 hours and above	5.5

Note: $n = 204$.

Table I. Sample characteristics

chi-square (χ^2/df) and parsimony normed fit index (PNFI). For a model with a good fit, CFI should exceed 0.90, RMSEA should be less than 0.08, GFI and TLI should exceed 0.80, χ^2/df should be less than 3.0 and PNFI should be less than 0.50 (Hair *et al.*, 2006). Table II shows the results of the convergent and discriminant validity tests. Based on the data collected in this study, the results of the CFA indicated that the model was fit with the value of GFI was 0.898, RMSEA was 0.053, TLI was 0.913, CFI was 0.923, Normed chi-square (χ^2/df) was 1.580 ($\chi^2 = 644.771$; df = 408) and PNFI was 0.718.

To assess convergent validity, each item of the latent constructs should have an estimate factor loading of at least 0.60, the average variance extracted should be

Variables	ITEMS	CR	AVE	FL	UT	SVQ	KQ	KMSS	SQ	US	MS
UT	4	0.956	0.844	0.88-0.95	**0.918**						
SVQ	5	0.848	0.530	0.61-0.86	*0.005*	**0.728**					
KQ	5	0.874	0.581	0.71-0.83	*0.117*	*0.397*	**0.762**				
KMSS	5	0.920	0.696	0.80-0.87	*0.169*	*0.147*	*0.201*	**0.835**			
SQ	5	0.835	0.562	0.67-0.85	*0.006*	*0.196*	*0.005*	*0.125*	**0.749**		
US	4	0.884	0.656	0.77-0.86	*0.264*	*0.502*	*0.636*	*0.445*	*0.212*	**0.810**	
MS	4	0.829	0.549	0.71-0.81	*0.133*	*0.382*	*0.218*	*0.007*	*0.173*	*0.460*	**0.741**

Notes: CR = Composite reliability; AVE = average variance extracted; FL = factor loading; UT = user trust; SVQ = service quality; KQ = knowledge quality; KMSS = knowledge management system success; SQ = system quality; US = user satisfaction; MS = management support; *the diagonal entries (in bold) represent the squared root average variance extracted by the construct*; the off-diagonal entries (in italics) represent the variance shared between constructs

Table II. Test results of convergent validity and discriminant validity

larger than 0.50 and composite reliability should be greater than 0.70 (Hair *et al.*, 2006). Moreover, the factor loadings of all the construct items were ranged from 0.60 to 0.87; thus, none of the items of the constructs were removed. Besides, the average variance extracted of each construct exceeds the cut-off point of 0.50, and each construct has a composite reliability of more than 0.70. Likewise, the Cronbach's alpha value for each construct showed in the table was well above the recommended value of 0.70, which is considered satisfactory for basic research (Hair *et al.* 2006). These reliability coefficients indicate that all measures in the study have achieved a good internal reliability.

In addition, discriminant validity of the measurement scales was assessed using the guideline suggested by Fornell and Larcker (1981) where the squared root of average variance extracted for each of the constructs should exceed the variance shared between any other constructs. As shown in Table II, the squared root of average variance extracted in the diagonal entries all exceed the shared variance between constructs (the off diagonal entries); hence, the discriminant validity of the measures was established. In sum, all constructs for this study used in this study have demonstrated adequate convergent validity, discriminant validity and reliability.

4.3 Structural model testing and hypotheses testing

Structural equation modelling (SEM) was used to examine the overall fit of the model and the relative strengths of the individual causal paths. The results of the model fit are shown in Table III. For the current research model, the GFI was 0.832, RMSEA was 0.057, TLI was 0.923, CFI was 0.931, Normed chi-square (χ^2/df) was 1.657 ($\chi^2 = 690.956$; df = 417) and PNFI was 0.756. All the indices shown in the Table III suggest an acceptable model fit. Given an adequate measurement model, the hypotheses can be tested by examining the proposed structural model. Table IV shows that all the hypotheses developed for this study were supported. The standardized path coefficients for hypotheses *H1* and *H5* were significant at 99 per cent confidence level, whereas those of *H2*, *H3*, *H4*, *H6* and *H7* were significant at 95 per cent confidence level. The results show that all the proposed relations in this study are supported. The tests of the structural model showed that all the hypothesized antecedents (knowledge quality, system quality, service quality, management support and user trust) have a positive relationship with user satisfaction with KMS, which in turn relates positively to the success of the system. Likewise, the results also showed that KMS success also positively influences user satisfaction.

Table III.
Overall fit indices of the structural model and its cut-off value

Fit index	Recommended cut-off value	Scores
Goodness of fit (GFI)	> 0.80 (MacCallum and Hong, 1997)	0.832
Root mean square error of approximation (RMSEA)	< 0.08 (Ferdinand, 2006)	0.057
Tucker-Lewis index (TLI)	> 0.80 (Razak and Abduh, 2012)	0.923
Comparative fit index (CFI)	> 0.90 (Hair *et al.*, 2006)	0.931
Normed chi-square (χ^2/df)	< 3 (Hair *et al.*, 2006)	1.657
Parsimony normed fit index (PNFI)	> 0.50 (Hair *et al.*, 2006)	0.756
Chi-square (χ^2)		690.956
Degree of feedom (df)		417

5. Discussion and conclusion

There are several findings in this study are worth noting. First of all, knowledge quality is shown to be significantly associated with user satisfaction. This finding revealed that the quality of knowledge in the banks' KMS has a positive direct influence on the users' satisfaction. Specifically, this means that the quality in knowledge will provide valid and more reliable sources of information for the users of KMS in this study, thus resulting in their usage satisfaction. Moreover, the result of analysis in this study is consistent with evidence from the previous studies (DeLone and McLean, 2003; Jennex and Olfman, 2003; Kulkarni *et al.*, 2007). Therefore, there is a need for the management team of the banks to implement strategies such as knowledge refinement and formal review processes to ensure that the quality of knowledge in their KMS is reliable and useful to their staff.

Second, this study found that quality of the system for the banks' KMS has also positively influence users' satisfaction. This evidence demonstrates that inferior quality for the KMS in the context of outdated technologies, complicated user interface, unreliable functions, etc. will definitely affect the users' satisfaction with the system. Moreover, the findings from this study dovetails with the prior research studies where it can be conceded that system quality seems as a positive contributor to users' satisfaction (Jennex and Olfman, 2003; Halawi *et al.*, 2007; Nattapol *et al.*, 2010). In view of that, therefore, there is a need for banks to emphasize on the improvement of system quality for their KMS by centralizing their database, system integration, latest computers, fast broadband and faster business servers would help reduce errors and improve productivity among the users, which in turn would lead to their satisfaction with the system. This is because reliable system quality has a high impact on the KMS processes in terms of ease of use, response rates,and the accuracy of the codified business information in which will contribute positively to the business performance (King and Marks, 2008).

Third, service quality for the banks' KMS was found to have a significant positive influence on user satisfaction. This significant relationship shows that service quality is an important aspect, as it is what the end users (banks employees) experience with the system. This scenario orchestrated that the end users are like customers and they need a system which would provide adequate technical support and fast response rate in solving problems. It is argued that system which is able to fulfil the users' needs would promote satisfaction among them (Kettinger and Lee, 2005). Moreover, the relationship

Table IV. Hypotheses testing of structural research model

Hypothesized path	Standard estimate	Critical ratio	Hypothesis supported
H1. Knowledge quality → user satisfaction	0.374	6.777***	Yes
H2. System quality → user satisfaction	0.142	2.015**	Yes
H3. Service quality → user satisfaction	0.182	2.615**	Yes
H4. User trust → user satisfaction	0.112	2.868**	Yes
H5. Management support → user satisfaction	0.244	3.741***	Yes
H6. User satisfaction → KMSS	0.317	3.143**	Yes
H7. KMSS → user satisfaction	0.162	2.472**	Yes

Notes: ***p-value < 0.001; **p-value < 0.05; KMSS = knowledge management system success

between KMS's service quality with user satisfaction was also supported in various study pertaining to KMS (Al-Busaidi *et al.*, 2010; Delone and McLean, 2004; Halawi *et al.*, 2007; Nattapol *et al.*, 2010). Based on the importance of service quality for the KMS, it is recommended that the banks need to allocate sufficient resources in forming support team to assist and provide technical supports for the bank employees. By doing so, this will definitely promote the usage of the KMS among the employees in which will allow them to perform better in their works. Moreover, inclusion of "Help" and "Frequently Asked Questions" sections in the systems would also be considered helpful for the employees as a whole.

In addition, the social aspects for this study also share the similar results as the technical aspects where the results above reveal that both users' trusts and management supports have a significant positive influence on users' satisfaction for the banks' KMS in the banking industry. Specifically, it is reveal that the levels of trust among the employees on the banks' KMS have a positive direct influence on their usage satisfaction. This scenario evidently revealed that if the users trust the KMS, this will encourage them to use the KMS which in turn will directly make them satisfied with the system. Similar to this course, it was also reported that the level of trust from the users on the KMS is found to be necessary for KMS implementation and can facilitate the process of utilization of knowledge (Chua and Lam, 2005). This finding therefore reflects the importance of user trusts on the KMS in the banking industry. Referring to this fact, it is important for the management team to create an effective operation of knowledge base to create trust among employees on the system which may enhance their level of satisfaction (Nattapol *et al.*, 2010). With that, knowledge managers will need to put extra effort in influencing or creating perception of trust among the users, as trust is based on individual perception. For example, managers can create user trust for the KMS by emphasizing on reliable and trustworthy aspects in the KMS architecture.

For the context of management support, the finding from this study affirmed that the support given by the banks' management team has shown a positive impact on user satisfaction for the KMS they used. This means that management support would facilitate the utilization of KMS among the banks' employees and able to upsurge the level of satisfaction among users of the system. Moreover, management support in the KMS context is argued to be important because it can create positive experiences and attitude among the users towards the system as a whole (Al-Busaidi and Olfman, 2005; Kulkarni *et al.*, 2007). With that, therefore, there is a need for the management team to provide adequate support both in the context of financial and non-financial supports such as giving advice and guidance, emotional support, promoting strong teamwork and implementing incentives. As for example, the banks' management team is recommended to listen and attend to the user's feedbacks in the consistently to show that they care and valued the inputs from their employees. This approach is also vital, as it can allow the management team in crafting operational strategies and at the same time improving the current KMS to encourage users to use the system which will further drive their level of satisfaction.

On top of that, the findings from this research also indicated that user satisfaction has an influence on the success of KMS and vice versa, as hypothesized by DeLone and McLean (2003) in their study. This evidence support the fact that satisfied users will believed that the KMS they used is successful in terms of its existence (beneficial) for them in performing their job tasks. Besides, the result also revealed

that benefits generated from KMS in the banking sector also have a direct influence on users' satisfaction. Other prior studies found a similar result include Jennex and Olfman (2003), McGill *et al.* (2003), Jennex (2005), Halawi *et al.* (2007) and Nattapol *et al.* (2010). The significant interrelationships imply that user satisfaction is a fundamental factor to which a KM manager should pay attention. Users' satisfaction would enhance their perceptions on the benefits of the system. Conversely, it can be argued that users' satisfaction could be enhanced by focusing on the benefits that a KMS bring to the end users too. A highly beneficial and effective KMS which is able to meet the needs and requirements of the users would improve their perceptions on the use of the system. Therefore, it is crucial for the organization to implement an effective KMS which facilitates users' job tasks and productivity, which would also significantly determine their satisfaction level.

Nevertheless, a notable limitation of this study is the research setting. This research is limited to the commercial banking industry only in Malaysia. It raises the issue of generalization and the findings of the present study might not be applicable to other industries which operate in different environments. Future studies should include other industries where KMS is an essential element in the business operations. Moreover, future research may examine the specific types of KMS and their respective associated success factors.

As the conclusion, there is no doubt that developing a reliable KMS has been a great advantage to enhance users satisfaction and at the same time to sustain competitive advantage for any organizations that adopted the system. Therefore, the process of building and maintaining a successful KMS has become a critical part of the organization strategically. Although the technical aspects play a crucial role in explaining user satisfaction and the success of the system, the social aspect cannot be largely ignored especially both of the factors have a significant impact on the success of the system as a whole. With that, both hard and soft sides of the system must be considered in implementing a KMS in the organization and also in the research context.

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About the authors

Tat Huei Cham is currently a Doctoral Student and Research Assistant at the Faculty of Accountancy and Management, Universiti Tunku Abdul Rahman (UTAR), Malaysia. He received his master's degree in Management Studies from the University of Hertfordshire (UK), Master of Business Administration from INTI International Laureate University (Malaysia) and Bachelor for Business Administration (Hons) Entrepreneurship from Universiti Tunku Abdul Rahman (Malaysia). His research interests focus on information technology, e-commerce, medical tourism, service industry strategy and operations, consumer behaviour, service marketing and organizational behaviour. Tat Huei Cham is the corresponding author and can be contacted at: jaysoncham@gmail.com

Yet Mee Lim is Associate Professor at the Faculty of Accountancy and Management, UTAR, Malaysia. She holds a PhD from the University of Alabama (USA), master's degree (MBA) from the University of New Orleans (USA) and Bachelor of Science (Business Administration) from the University of Southwestern Louisiana (USA). Her research interests focus on organizational behaviour, knowledge management, user acceptance of technology, e-commerce trend, service industry strategy, human resource management and higher education.

Boon Liat Cheng is a Senior Lecturer at Sunway University Business School (SUBS), Sunway University, Malaysia. His educational background includes a PhD. (Management) from Universiti Tun Abdul Razak, a MSc in Marketing from Robert Gordon University, along with a BA (Hons) in Business Administration from Coventry University. His research interests are in the fields of services marketing, consumer behaviour, entrepreneurship and strategic management.

Teck Heang Lee is a Senior Lecturer at HELP University. His research interests are in the fields of accounting, finance and auditing.