Contextualizing The Framework For Knowledge Management System At The Organizational Level

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Abstract. Formulation of knowledge management system (KMS) is significance to support knowledge management activities within organizations; moreover, information technology has become the driving factors for business strategies and directions. In the past studies, the focus of KMS establishment are diverse; ranging from its successful adoption, perceived usefulness of the users or on its supporting roles in organization strategy to improve their performance and smooth operations. Despite its benefits to the organization, however, gap has been identified on the lack of existence and definition of KMS framework at the organizational level studied by other researchers. Thus, the objective of this study is to formulate the KMS framework at the organizational level known as OKMS (organization-based knowledge management system). This study is performed by methodologically conducting a review and analysis of the past literature and related areas of concern on establishment of KMS. Outcome of this study will not only help to motivate for other future empirical and theoretical research for KMS at the organization level, but, it also provide a departing point for other KMS researches establishment for organizations.

1. Introduction
Knowledge is defined as an intellectual asset to organization [1]–[3] that drives the competitiveness of organization within robust environment. Knowledge can be defined as an information that are consolidated together with past background, experience, set of thinking and reflection [4]. During the age of knowledge economy (K-economy), the needs for acquiring, managing, transferring, sharing and conserving knowledge for organizations are more realized. Organizations have become more knowledge intensified whereby their sustainability in businesses relies heavily on their abilities to manage knowledge in and out of the organization. On that context, KMS is an information technology (IT) system that are meant to support management of knowledge activities in organization. Establishment of such system is imperative for organization to be more competitive [5] by systematically managing the knowledge. However, previous studies also found that different interpretation has been defined on the concept and definition of KMS at the organization level such as it is a system that produces, compile and reuse knowledge, approaches in organizing information or even managing resources and information discovery [6]. For instance, from the concept of system theories, systems can be categorized into several definitions as shown in Table 1.

Besides, an earlier case study conducted shows that one of the many factors resulting to the failure of KMS implementation in the organization is due to improper planning [8]. Thus, it is important to define a clear framework for the establishment of KMS at the organizational level precisely for knowledge intensive organization.
2. Literature review

Although many studies have been conducted in the past on the establishment of KMS, however, there are still dearth of literature discussing on its development [9], [10]. Thus, indicates requirement for more studies especially in guiding for the establishment of KMS. As stated earlier, apart from various definition of KMS, but it is also concluded that many past KMS studies were more focuses on the adoption or receptance of KMS for individual. However, it is to note that the implementation of KMS are commonly relies on the direction as well as utilization at the organizational level, therefore the needs to emphasize a focus on the establishment of KMS at the organizational level. Moreover, since adoption of KMS in organization relies heavily on the adoption of its frameworks/model [11]–[17], therefore it is imperative for the establishment of KMS at the organizational level or known as OKMS framework. In addition to that, it is an emerging needs for organization to ensure a solid foundation have been developed for the establishment of any IT system because failure in implementing the system may occur to the increasing costs of implementation [18], [19] and resistance of users from using the system [20]. In-depth research have also suggested for the investigation on the roles of KMS in supporting organization to strategize their decision making process as well as implementing good governance in robust environments [21] in the future.

2.1 Generic idea of KMS framework

In studying the generic elements of KMS architecture model (KSAM), seven elements of KMS have been outlined comprises of people, strategy, source of knowledge, delivery interface, functionality, infrastructure and continual improvement [22]. Alongside with defining the elements for the model of KMS architecture, the same study also suggested external driving factors for the model. For instance, number of factors need to be considered for the source of knowledge such as experiences, network, information and events. This is due to the fact that, one of the reason for the failure of knowledge management (KM) implementation in organization is due to the non-existence of capacity to absorb external elements [23] Thus, capabilities of organization in acquiring and assimilate external knowledge into organizations drives them to be more competitive [24], [25].

KMS has also introduced as a concept of socio technical KMS (STKMS) that combines socio and technical approach as suggested in several studies by [26]–[29]. The basis of STKMS model comprises of five elements such as strategic leadership, organizational learning, organizational infrastructure, knowledge culture and technological infrastructure [29]. In addition to that, the roles of stakeholders of the system (actors) offer some improvement that are significant for effective KMS in organization [22]. Besides, the model had the details emphasizing on what are needed by a KMS; which is the needs to derive the instances of delivery interface which does not highlighted earlier; nonetheless the STKMS model developed by [29] has provided a departing point for other studies in developing KMS model in various areas and field.

Alongside with the above, other studies have also defined KMS into several types of characteristics such as fragmented, content, process and capability based KMS [30], context wise, performance-led, enabler-savvy and supporting sustainability[31] and process based KMS [32]–[34]. Review of past

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**Table 1: Concept of System Theories. Source: [7]**

| Concept Theories          | System Description                                                                 |
|---------------------------|----------------------------------------------------------------------------------|
| General system theories   | System can be classified into three types that are open system, closed system and isolated systems. Ensuring its operation ability, system needs to involve with a lot of interactions. |
| Cybernetics               | Define the capability of a system to adapt to robust challenges in the real environment as a single entity. |
| Organization              | Organization can be known as open system and closed system that comprises of two major elements (can be defined as system) that are social component (human) and technical components (technology, equipment) or known as socio-technical systems. |
| Biology & Sociology       | Entails the system capabilities in differentiating itself with the environment by emphasizes on the self-regulated system aspects. |
| System Dynamics and Smart Systems | Describe the capability of a system to stand and operate on its own that support self and independence learning process that require input and feedback from the user. |
studies conducted on KMS discovered that the emerging of KMS capabilities and features are one of the factors contributing to the issues and challenges of KMS implementation [35]. Hence, the differences in term of concepts and applied use of the system posits the needs for the establishment of the KMS framework at the organizational level. Therefore, this study posits that there is an emergent need to look at a standardized understanding on the foundation of KMS at the organizational level to address the scarcity of IT adoption studies conducted at the organization level; at the same time reducing the potential issues from happening that may arises from the diversities of features and capabilities.

2.2 Organization-based KMS
Objective of this study is to provide a framework and clear description of KMS framework known as OKMS; derives from the review of past studies to conceptualize the elements of KMS at the organizational level. However, it is discovered that there are still lack of studies focuses on the establishment of KMS at the organizational level. The only study discovered focuses on KMS at the organizational level has defined five components of OKMS [36] as shown in Figure 1. The model developed depicts the importance of combining technical approach with social approach in establishing KMS framework. In fact, framework of KMS cannot only relies on technical approach but also social approach [29], [36]. It is holds true because KMS is an IT system with the purpose to manage knowledge which involves interactions between two different types of knowledge; knowledge that are written (explicit) and knowledge that are known (tacit). As it being said, the process of knowledge in organization involves the conversion from tacit to explicit and vice versa [37]. Furthermore, capability of organization to absorb external knowledge (acquire, assimilate and transform) able to enhance the competitiveness of the organization [24], [25]. Thus, combination of social and technical approach justifies the KMS framework in the past studies and future.

In scoping the development of KMS, the main purpose of its development needs to be put in consideration. For instance, in ensuring a comprehensive development of KM model for banking sector, seven variables were suggested inclusive of (1) environment (2) people (3) technology (4) knowledge process (5) creation of knowledge(6) knowledge sharing and (7) knowledge retention [38]. In this study the researcher addressed on the importance of environment and people in making up the KM model for the banking sector. Environment refers to the surrounding or situation where all parties with the same interest and objective work together; which is also addressed previously on its importance in making up the elements of KMS framework [26], [29], [36], [39]. Meanwhile, elements related to knowledge activities implies on the importance of KM process in the framework. Moreover, the elements of knowledge process is also suggested in other areas/industries such as development of KMS in higher education [40]–[42] and South Korean based companies [43]. This study has addressed significance elements to be considered for KMS frameworks which are the needs for KM process, environment and people. Of which, these three elements has been highlighted in a later study [22]. In addition to that, it was highlighted that one of the significance factors to the adoption of KMS in organization is the knowledge sharing [44], which is one of the activities of knowledge.

From implementation aspects, it is suggested that the development of KMS in acquiring the knowledge from senior employee or known as master in their studied industry is by segregating into two stages which collecting and analysing data in the first stage and constructing the KMS based on manufacturing process [45]. As a result, the system does not only improve the skill and problem-solving capabilities of the junior level employee but also improving the quality of product in a whole. Although this study offer a golden rules on the implementation of KMS, but, since it will not be covered in this study, thus it will be a good points to ponder for other future researches emphasizes on the approach or effectiveness of KMS implementation.
3. Methodology
In formulating KMS framework at the organizational level, there are three strategies adopted in this study. Firstly, past studies on KMS establishment of related concept were reviewed and analysed adopting the pragmatic approach. The concept of pragmatic approach combines and includes all possible elements that comprises of both social and technical aspect [46]. There is solid foundation in using and adopting the approach, since the similar approach were also performed in the past for integrating two models (TAM and TTF) by examining both underlying theories and analyse their similarities and differences in providing the integrated model [47]. Furthermore, earlier review on empirical studies of IT adoption models conducted at the organization level suggested that combining more than one theoretical models in future would be able to support a more complex adoption of new IT system [48].

Secondly, the use of related theories such as systems theory is adopted in formulating the framework for KMS. From the past studies, the use of systems theory is yet to be seen in the development of KMS, but, since organization can be referred as one system that are supported by interrelated parts to achieve efficiency and effectivity [49], therefore this study decided to use systems theory in guiding the formulation of the OKMS framework. In fact, a review study discovered that systems itself can be segregated into five concepts which is one of them is cybernetics [7]. The concepts of cybernetics defined as capability of a system to adapt to robust challenges in the real environment as a single entity which resemble the implementation of KMS as an IT platform in managing knowledge in organization to support the challenges faced by organization. On the other hand, KM has been regarded as a process that has an input that will be processed and produced an output, whereby organization will be able to feed in their influence into the cycle to improve the strength of KM activities subsequently improve the performance of HEI [50]. Of which, the process as derived in that study carries the four elements of a system theory which are input, process, output and feedback.

Thirdly, this study adopts the previous KMS framework/model developed in a study by [22], [29], [36] that offer more clearer overview of KMS framework architecture. Those three studies offer great contribution in providing the landscape of what architecture for KMS framework should be. Findings from the studies posits the same direction on the needs for combinations of social and technical approach in KMS framework.

4. Discussion and findings
Establishment of OKMS is essential to ensure effective operational framework in supporting the organizations’ objective to remain competitive in a robust and competitive market. KMS is seen plays significance roles in enhancing and stimulating the innovation process in organization. Thus, motivation of this study is to provide a platform and reference for future studies interested in the application, adoption, implementation or development of KMS at the organizational level. One of the pertinent findings of this study is the future potential extent of its coverage for KMS establishment for organizations. Although many studies on KMS have been established in the past, however, there is still huge potential for the establishment of KMS and improvement especially at the organizational level.
Based on review of past studies on KMS development, various focus of studies has been indicated. As discussed earlier, the purpose of KMS establishment is to support and enable the management and implementation of KM effectively by using an IT platform. Thus, there are several areas that is significant to be addressed by the new OKMS framework that are not highlighted in the past study as follows:

4.1 Strategy
The roles of top management and leadership is important in ensuring the success and effectiveness of KM implementation. Thus, the elements of strategy leadership are essential in the proposed KMS framework for organization. One of the failure of KMS implementation in organization is due to the lack of top management commitment [51]–[54]. Besides, establishment of KMS in organization needs to be aligned with the vision and objective of the organization. Thus, the element of strategy does not only essential but also crucial. Since this component was not introduced in the earlier model, thus, it provides a great contribution of this study to fill up the gap for new KMS framework at the organizational level.

4.2 Knowledge management process
Knowledge processes involves the capturing, organizing, filtering and safekeeping of the knowledge [38], [42]. Past studies shows that the development of KMS in an organization of their industry emphasized on the elements of knowledge processes [55]. Each organization has its own processes that the implementation of any IT system needs to consider process elements in a system. Furthermore, the nature of knowledge activities in the organization is by allowing it to transfer and flow among and within people and system. For instance, in analysing the capabilities of KMS frameworks in supporting organizations’ competitiveness, two elements are known as important - knowledge infrastructure and knowledge process capabilities [43] In fact, in facilitating the transformation process between human and systems, it is a concern to identify the knowledge required before adopting technology such as artificial intelligence [56].

4.3 Knowledge management (KM) tools
The purposes of KM tools are to allow easier contextualisation of information, allows easier transfer of information, facilitate the communication and networking as well as provide a human-computer interface between the systems and the user [57]. It also assists to facilitate the process of KM for interaction between internal and external. In the development and improving the design of knowledge database (KB) for KMS, it is suggested that organization to include content management [58] and document management [40]in the system. Content and document management are example of KM tools available for KMS. The use of KM tools can be segregated and defined by the different types of knowledge as shown in Table 2.

| Explicit knowledge | Know how | Know who | Tacit knowledge |
|--------------------|----------|----------|-----------------|
| System tools       | Collaboration tools | CRM tools | Video conferencing |
| DBMS               | E-mail   | Social network analysis | Face-to-face facilitation |
| Data warehousing   | Groupware| Knowledge portals   | Other technologies |

4.4 Delivery interface
Delivery interface is a functionality of KMS to provide an interface between the system and human (user of the system. The mode of interface can be in the form of push, pull or interactive mode [22]. As discussed in the same study, the mode of interface shall be determined by the needs of the culture and the user of the systems itself. For instance, the requirements for users with limited capabilities on visibility and hearing might be different with users with normal capabilities. Similarly, if the systems will be adopted in a critical environment, the notifications and alerts system might be useful to be considered.
4.5 Technical functions
In the earlier model developed in a study by [36], functions in the technical approach refers to the functions of operating and managing the knowledge such as using, finding, creating and packaging knowledge. However, in the new framework proposed, related knowledge activities are grouped within the KM process of social approach. In relation to that, this study posits the importance of adding technical functions such as security features, systems searching capabilities, decision support system and to some extent an intelligent agents functionality such as data mining. The needs for technical functions in KMS is not new as it has been highlighted earlier in a study by [40], [41], [59], [60].

5. Proposed framework

![Figure 2: Proposed OKMS conceptual framework. Source: Drawn by researcher](image)

Based on the intense and comprehensive discussion in Discussion and findings section, the proposed conceptual framework of OKMS is drawn as shown in Figure 2. As highlighted earlier, the conceptual framework is adopted from the earlier OKMS framework developed in a study by [36]. In referring to the newly proposed conceptual framework, there are five components of KMS proposed as a result of review of the past studies and KMS development in organization that are two components of social approach (KM process and Strategy) and three components for technical approach (technical functions, delivery interface and KM tools).

6. Conclusion
OKMS framework proposed in this study shall be able to provide a generic overview and architecture of what KMS framework for organization such as higher education institutions, training organization or organizations that emphasize on the importance of managing knowledge such as especially for knowledge intensive organization (KIO). Although previous studies on organizational KMS framework has successfully developed the framework at the organization level, but majority of the studies did not address the type of organization that might benefit from the implementation of KMS framework. However, as discussed earlier, the objective of KMS establishment is to ensure proper and systematic management of knowledge in organizations that relies on knowledge for sustainability or known as knowledge intensive organization (KIO). KIO is an organization that relies heavily on knowledge activities such as producing and reusing of knowledge [47].

Although earlier study has successfully offer broad overview of basic KMS architecture for organization which also adopted in this study, however, the previous framework studies conducted has failed to address on other technical needs of the systems such as technologies and tools needed to ensure the operability of the systems. At the same time, previous framework has also failed to emphasize in
detailed the elements of KM process which should be the major focus of any establishment of KMS framework/system. In future, it is suggested that the framework be validated and tested empirically and scientifically. To ensure its practicality and usability, empirical and quantitative analysis will help to identify the applicability of the proposed elements. Prior to that, expert analysis is also needed in ensuring its operability from the perspectives of the experts and real situation implementation.

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