# Applying DeLone and McLean IS success model on socio-techno Knowledge Management System

**Alia Sabri**
**Computer Networks Systems, Applied Science University**
**Amman, Jordan**

**Abstract**

Knowledge Management System (KMS) is information and communication tool that increases the consumption of Knowledge Management (KM). There are different approaches to KMS: Social approach, technological approach, and socio-technical approach. In this paper we develop a theoretical framework by linking the main components of KM System (KMS) from soico-techno perspectives to DeLone and McLean successes model to develop a success framework of KMS. By assessing to which degree these components are present/absent in an organization, the practitioners will be able to identify their weakness and strength points, and then build a preparing plan that can help them to achieve the willingness required toward a successful implementation of the soico- techno KMS.

***Keywords:*** *management information systems, knowledge management systems success, socio-technical knowledge management systems, IS success model.*

## 1. Introduction

Knowledge is a collection of information, concepts, skills, or experiences reside in persons' minds [1]. According to Nonaka and Takeuichi [1] knowledge can be classified into *tacit knowledge* which is difficult to be shared, managed, or documented since it is located in the head of people; and *explicit knowledge* which could be expressed, stored, and managed. It is considered as the most vital asset contributes in organization competitive and should be managed effectively to take advantage of it [2].

Knowledge Management (KM) is about managing behaviors, activities, and processes to improve the utilization of creating new knowledge within an organization [3]. To increase the consumption of KM a system called knowledge management system (KMS) is needed to improve the organizational efficiency and outcomes [3],[4].

KMS is recognized in different perspectives. It could be considered as applying Information Technology (IT) such as databases and networks to support diverse KM processes [5]. Grant, and Shahsavarani [6] stated that the main focus of technological approaches is on storing, encoding, and manipulating knowledge through e-mail, databases, groupware, intranet, etc.. On the other hand, KMS is considered as social and cultural aspects that deliver tacit knowledge [7]. Yang and Chen [8] claimed that the main focus of human approach is on the social process through trust, shared relationship, and skilled people. Other perspective is considering both of IT and social system contribution in KM. It is the organization's strategy to complement KM activities and technological drivers to reach business objectives [8].

Many studies in the field of a Socio-technical KMS have been conducted. Assegaff, and Hussin [9] developed a framework consists of: *info structur* (organizational structure), *Info culture* (organizational culture), and *Infrastructure* (technology). In this paper we develop a framework based on updated DeLone and McLean IS success model and socio-technical KMS classification.

The updated DeLone and McLean IS success [10] have gathered six IS success dimensions (System Quality, Information Quality, IS Use, User Satisfaction, and Net benefits), so the main objective of this paper is to adapt the six IS success dimensions to fit KMS objectives. The main result is a socio-technical KMS framework that defines KMS success components. The proposed framework could be used by practitioners to concern on critical components that lead towards KMS success from socio-technical perspective.

This paper will be organized as the following: first, overview of KM process and KMS major elements are presented. Second, the updated DeLone and McLean IS success model is defined then we discuss how to apply the model on KMS environment. Third, we present our proposed framework with the major socio-technical KMS success component. Finally, a conclusion is drawn.

## 2. Knowledge Management

Knowledge is considered as one of the most important asset that achieves competitive advantage in the organization. It includes all vital knowledge and intellectual skills possessed in employees' minds. To be competitive, knowledge should be efficiently and effectively managed by organizations through identifying, creating and sharing knowledge resources and use it to develop opportunities or solving problems in timely manner [2]. Knowledge transformation between individuals

and organizations is accomplished by process of knowledge management (KM).

## 2.1 Knowledge Management Process

Alavi and Leidner [4] initiated four KM processes: knowledge creation, knowledge storage, knowledge transfer, and knowledge application. According to [11] KM process consists of six processes: Knowledge identification, Knowledge acquisition, Knowledge creation, Valuable knowledge storing, Knowledge dissemination, and Knowledge application. Nissen et. al [12] defined six KM processes: create, formalize, organize, distribute, use, and evolve. With the reference to the previous discussion, the author summarizes the KM process as the following:

1. Knowledge discovery means discover vital knowledge that is possessed in individuals' minds in the organization.
2. Knowledge achievement means understanding the regeneration of individuals' knowledge by achieving new experience.
3. Knowledge creation means creating new knowledge in terms of new concepts, products, and services; replacing, or developing an existing knowledge.
4. Knowledge Repositories means codifying, structuring, and storing tacit and explicit knowledge, and make it more formalized to be retrieved.
5. Knowledge application means utilizing the knowledge through solving problems, making decisions in timely manner, and developing new products and services for the competitive of the organization.
6. Knowledge distribution means the distribution of knowledge, information, practice, and experience between individuals and groups in the organization.

## 2.2 Knowledge Management System

Knowledge management needs a system to allow people to work together at any time, place and, platform. [13]. This could be accomplished by applying IT system that store, retrieves, and manages knowledge to improve collaboration and share between people. Using IS within an organization to effectively and efficiently manage knowledge leads to the definition of the Knowledge Management System (KMS) as stated in [4].

Maier and Hädrich [14] proposed characteristics for KMS: *goals*: improving organizational effectiveness by using past knowledge to bear on present actions, *Processes*: support knowledge process to support knowledge work, *Comprehensive Platform*: user centric platform to focus on processes and IT centric platform to store and distribute knowledge, *Advanced Knowledge Services*: are integrated services for sharing, collaborating, searching, and clustering to retrieve. *Specifics of Knowledge*: increase the accessibility to the source of knowledge. *Participants*: users are involved to be participants in the knowledge network.

Gopal and Joy [15] suggest four subcomponents of KMS

1. *Repositories*: is the storage media associated with other repositories that hold formal and informal knowledge, and rules for accumulating, managing, distributing, maintaining, validating, and refining the contents.
2. *Collaborative platforms:* are integrated platforms of databases, distributed work, and intelligent search engines designed to provide a close customized presentation of knowledge to meet the user's expectation.
3. *Networks*: are useful for low expert people to communicate with high expert people to gain knowledge. It consists of *i)* Digital networks (intranets, extranets, shared spaces and supply chain networks).*ii)* Social networks (trade associations, industry wide coalitions, and communities of practice).
4. *Culture*: is the support towards the collaboration to enhance KM performance through sharing and using network and collaborative platforms. It is the essential point in the entire process where individuals and top managers are willing to share the knowledge and eager in implementing it.

## 2.3 Socio-technical Knowledge Management System

At this point of view, it is obvious that there are many tools in knowledge management are correlated to IS. However, there is a perspective to distinct between human approaches, and technological approaches.

The authors in [6] stated that the main focus of technological approaches is on storing, encoding, and manipulating knowledge through e-mail, databases, groupware, intranet, etc. while [8] claimed that the main focus of human approach is on the social process through trust, shared relationship, and skilled people.

It is inconvenient to think about KMS as one perspective (human approaches or technological approaches). However, KMS should be considered as a complex socio-technical system that combines between the different approaches. It is the organization's strategy to complement KM activities and technological drivers to reach business objectives [8].

The authors in [9] developed a guidance framework to implement KMS as Socio-technical system which consists of: *info structure:* formal rules to create opportunities for employees to interact. *Info culture:* the organization values and practices in term of trust, innovation, creativity, and management intervention will link with implementation of itranet-based KMS, and knowledge sharing between individuals and organizations. *Infrastructure*: is about tools (hardware or software) for managing information, and enable communication and collaboration between users. The figure 1 below shows the main approaches of KMS.

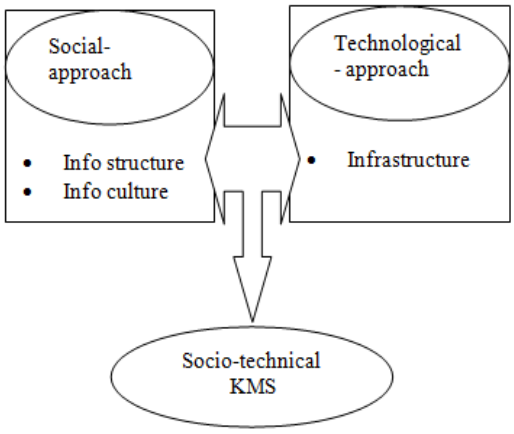


Fig. 1. The main approaches of KMS

Sajeva [11] summarized the major elements of socio-technical KMS as:

1. *Strategic leadership:* it is about knowledge management and its support by the head officers and leaders in the organization.
2. *Organizational infrastructure*: it is the official and informal rules, structures and social networks where knowledge flows in the organization.
3. *Technological infrastructure:* mainly based on communication technology tools and information that are used to aid the process of knowledge management.
4. *Organizational learning:* Are the processes that guarantee the creation of new knowledge which improve the organization's knowledge base, and this could be achieved by individual and group learning.
5. *Knowledge culture:* it is about the beliefs and values established and supported by all employees in the organization

## 3. DeLone and McLean IS Success Model

DeLone & McLean[10] has an original and updated success model that provides a comprehensive framework for measuring IS success that covers different evaluation perspectives. Those IS success is classified into six major dimensions: Information quality, System quality, Service quality, Use, User satisfaction, and Net benefits as shown in figure 2.
The importance of this model lies in the practical framework for developing IS in different fields such as e-commerce, e-learning, meta-analysis, and knowledge transfer and other fields [16]. The model has been used by IS researchers for measuring and understanding the categories of IS success.

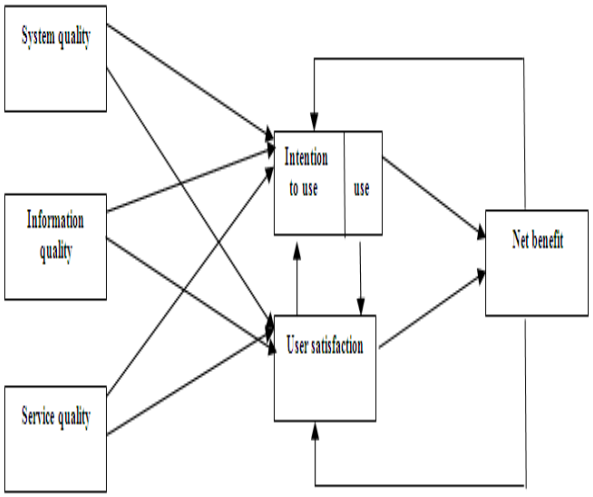


Fig. 2. Updated DeLone and McLean IS Success Model [10]

The updated dimensions of DeLone and McLean IS Success Model summarized as the following [17]:

1. System quality: is the desirable feature of an IS such as system flexibility, reliability, fast response, ease of use, and ease of learning. It measures the technical success
2. Information quality: is the desirable feature of the system outcomes in terms of contents and reports. This could be measured through understandability, accuracy, usability, completeness, and timeliness. It measures the semantic success.
3. Service quality: is the quality of services gained to users from IS department and IT people. It could be measured through technical competence, accuracy, responsiveness, reliability, and cooperation between stuff.
4. System use: the amount and the way of how much people gain and utilize the capabilities of an IS. It could be measured through appropriateness of use, extent of use, amount of use, frequency of use, nature of use, and purpose of use.
5. User satisfaction: the degree of user effectiveness and satisfaction with the results. For example, Attitudes toward technology, users expectations, and involvement. It could be measured through semantic scale, multi attribute scale, and single item to measure user satisfaction.

6. Net benefits: the contribution of the IS to the success of individuals, groups, organizations, industries, and nations. For example by measuring decision making, and productivity improvement, sales increment, cost reductions, enhanced profits, market competence, user welfare, creation of jobs, and financial development.

### 3.1 The Delone and Maclean Success Model for Knowledge Management System Measurement

The authors in [18] developed and tested a Knowledge Management (KM) success model derived from the IS success model of DeLone and McLean. This paper develops a theoretical framework by linking the main components of KM System (KMS) from soico- techno perspectives to DeLone and McLean successes model to develop a success framework of KMS.
The six success dimensions of the DeLone and McLean IS Success Model can be applied to the KMS environment as follows:

1. *System quality* measures the desired characteristics of a KMS. Examples of qualities that are respected by users from KMS are: accessibility any time, place and, platform; ease of search and retrieve; flexible input and output; and documentation.
2. *Information quality* captures the KMS content issue. It is about the richness and the diversity of knowledge that is represented with proper presentation formats such as text, graphs, audio, and video. Another measurement in the term of KMS is the usefulness and the easy to understand of the content to the user.
3. *Service quality*, the overall support delivered by KMS such as the quality of knowledge in terms of timeliness, accuracy, applicability, and availability of experts
4. Usage measures everything from accessing a knowledge and navigation between integrated platforms of databases to knowledge retrieval.
5. *User satisfaction* is an important means of measuring individuals' opinions of a KMS and should cover the assessment of the various outcomes of knowledge sharing/retrieval capabilities offered within the organization, as well as ease of getting the needed information/knowledge, sufficiency of the information/knowledge to meet one's expectation, and agreement with the access to knowledge.
6. *Net benefits* are the most vital success measures, because they confine the balance of the positive and negative impacts of KMS on individuals, groups, and organizations. Successful KM outcomes will result in better firm performance outcomes. This may lead to measurable improvements in work, productivity, and job effectiveness, consequently result in higher income

## 4. An Improved Framework for socio-techno KMS success

According to the previous discussion and analysis we propose a socio-technical framework based on DeLone and McLean success model. Because the main objective of KMS is to provide a mechanism for discovering and creating new knowledge using social communication or technology, the author tried to update and keep the elements of the updated DeLone, and McLean success model as figure 3 shown below.

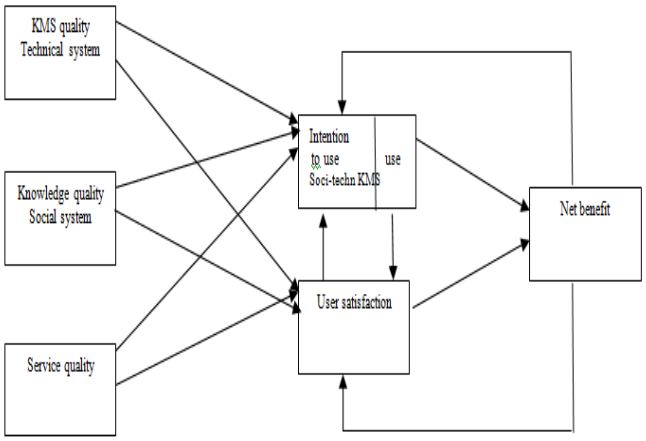


Fig. 3. An Improved Framework for socio-techno KMS success

The major component of socio-technical KMS success framework as proposed by the author could be identified and summarized in Table 1. We classify KMS success metrics into *Infrastructure, info structure,* and *Info culture*. The major elements of socio technical KMS discussed in [11] are considered as success metrics in the proposed frame work. *Strategic leadership:* since its main mission is to support collaboration between employees in the organization through sharing and enhancing trust in turn improving the performance of KMS, we consider this element to be under info culture approach and matches to service quality or as we call it social quality. *Organizational infrastructure:* this element lies under info structure approach since it keeps all the rules and structures formally and informally to create social network. The structuring facilitates content understandability which fits to knowledge quality component. *Technological infrastructure:* obviously the element belongs to the infrastructure approach since it considers the technological products to improve the KM process such as ease of use, retrieval, accessibility etc.

Table1. Summary of socio-technical KMS success components

| **Classification** / **Success dimension** | **infrastructure** | **Info culture** | **Info structure** |
|---|---|---|---|
| **KMS quality** | *Technological infrastructure*<br>• Ease of use<br>• Clustering<br>• Knowledge retrieval<br>• Flexibility<br>• Accessibility | | |
| **knowledge quality** | | *Organizational learning*<br>• Knowledge richness<br>• Knowledge diversity | *Organizational infrastructure*<br>• Proper presentation<br>• Usefulness<br>• Easy to understand |
| **Social quality** | | *Strategic leadership*<br>• KM support<br>• Timeliness<br>• Accuracy<br>• Availability of experts | |
| **knowledge use** | *Knowledge Repositories*<br>• Accessing<br>• Codifying/Structuring<br>• Storing<br>*Knowledge application*<br>• Solving problems<br>• Making decisions<br>• Developing new products<br>*Knowledge distribution*<br>• Knowledge distribution<br>• Information distribution<br>• Practice distribution<br>• Experience distribution | *Knowledge discovery*<br>• Discover vital knowledge<br>• Discover vital concepts | *Knowledge achievement*<br>• Achieving new experience.<br><br>*Knowledge creation*<br>• Replacing/developing new concepts<br>• Replacing/developing new products<br>• Replacing/developing new services |
| **Social satisfaction** | | *Knowledge culture*<br>• Employees belief on knowledge sharing<br>• Employees agreement with the access to knowledge | |

| | |
|---|---|
| **Net benefits Of socio-techno KMS** | • Work improvement<br>• Productivity improvement<br>• Job effectiveness<br>• Higher income |

*Organizational learning:* are the processes to guarantee the creation and regeneration of new knowledge, so we assume it is an info culture approach that increase knowledge richness and diversity which could be considered as knowledge quality measurement. Finally, *Knowledge culture:* this element considers the culture in terms of values and beliefs, in terms of trust and sharing which will encourage employees progressing towards using the system. Definitely this element is an info culture approach that measures employees' social satisfaction.

We also use the KM process summarized previously in determining the success components for knowledge use dimension because it contains all the activities and practices for initializing the organization from accessing the system, navigating, and retrieving. *Knowledge Repositories, Knowledge application, and Knowledge distribution* are all about using hardware or software technologies to improve the performance, so we put it under the infrastructure approach. *Knowledge discovery* is an info culture component, because it discovers the critical knowledge resides in employees' minds. *Knowledge achievement and Knowledge creation* are info structure components since it requires structuring for regenerating and creating new knowledge.

## Conclusion and Future Scope

This study uses the updated DeLone and McLean IS success model to measure the success components of Knowledge Management System (KMS) in socio-technical perspective.

The six dimensions in the IS success model were adapted to fit the main objectives of KMS in terms of improving business competitive, presenting better knowledge practices and decision making by providing a method for discovering and creating new knowledge, using: social communication, organizational formal rules for creating interactive relationship between employees, technological tools for managing, and enabling communication and collaboration. Therefore, we classified the KMS success components into: info culture, info structure, and infrastructure.

We enriched our framework by research in knowledge management (KM) process [4] and [12], KM approaches [9], and socio technical KMS major elements [11], and others to develop the MKS success metrics.

Finally, our proposed framework could be used by practitioners to concern on critical components by identifying the weakness and strength points of the components, and then build a preparing plan that can help them to achieve the willingness required towards KMS success from socio-technical perspective.

**Acknowledgments**

The author(s) is/are grateful to the Applied Science Private University, Amman, Jordan, for the financial support granted to cover the publication fee of this research article.

## References

[2] G. D. Bhatt, "Knowledge management in organizations: examining the interaction between technologies, techniques, and people," Journal of Knowledge Management, vol. Vol. 5 pp. pp.68 - 75, 2001

[3] Michel Grundstein. "Assessing Enterprise's Knowledge Management Maturity Level" Springer-Verlag Berlin Heidelberg 2008, CCIS 19, pp. 380–387, 2008

[4] M. Alavi and D. E. Leidner, "Review: Knowledge Management and Knowledge Management Systems Conceptual Foundations and Research Issues," MIS Quarterly vol. 25, Issue 1, pp. 107-136, 2001.

[5] S. Raub and C.-C. Rüling, "The knowledge management tussle – speech communities and rhetorical strategies in the development of knowledge management," Journal of Information Technology, vol. 16, pp. 113-130, 2001.

[6] Grant G., & Shahsavarani N. "A Socio-Technical View of Knowledge Creation and Storage in Organizations," Proceedings, 4th International Management Conference, Tehran, December 20-21, 2006

[7] Y. Malhotra, "Why knowledge management systems fail? Enablers and constraints of knowledge management in human enterprises. ," I. C. W. H. (Ed.), Ed., ed: Heidelberg: Springer-Verlag., pp. 577-599, 2004

[8] Yang C., & Chen L.-C." On Using Organizational Knowledge Capabilities to Assist. In Knowledge Management and Organizational Learning," W.R. King, editor. Springer Science and Business Media, ISBN 978-1- 4419-0007-4. p. 301-321, 2009.

[9] Setiawan Assegaff, Ab Razak Che Hussin. " Review of Knowledge Management Systems As Socio-Technical System," IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 5, No 3, September 2012

[10] William H. DeLone and Ephraim R. McLean, "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update," *Journal of Management Information Systems.* Vol. 19, No. 4, pp. 9–30, Spring 2003.

[11] Svetlana Šajeva. "The Analysis Of Key Elements Of Socio-Technical Knowledge Management System". Economics And Management: 2010. 15. ISSN 1822-6515 M. E.

[12] Nissen, M. N. Kamel, K. C. Sengupta, Toward integrating knowledge management, processes and systems: a position paper, in: Proceedings of the AAAI Symposium on Bringing Knowledge to Business Processes, Stanford, CA, 2000.

[13] Abdullah R.H., Sahibuddin S., Alias R.A., & Selamat M.H., "Knowledge Management System Architecture For Organizational Learning With Collaborative Environment, " Proceedings of the Postgraduate Annual Research Seminar. Online. Available from: http://eprints.utm.my/3224/1/Rose_Alinda_-_Knowledge_Management_System_Architecture_For_Organizational.pdf, 2005

[14] R. Maier and T. Hädrich, "Centralized versus peer-to-peer knowledge management systems," *Knowledge and Process Management*, vol. 13, pp. 47-61, 2006.

[15] Ramani Gopal C.S. and Joy P.A. Creation of Knowledge Management System. Advances In Management. Vol. 4 Issue 11, November 2011

[16] Halonen, Raija. " Reflecting With The Delone & Mclean Model," International Workshop on Practice Research in Helsinki, June 8, 2011

[17] Stacie Petter, William DeLone, and Ephraim R. McLean. "Information Systems Success: The Quest for the Independent Variables" *Journal of Management Information Systems* Vol. 29, No. 4, pp. 7–61, Spring 2013.

[18] Uday R. Kulkarni, Sury Ravindran, and Ronald Freeze.A "Knowledge Management Success Model: Theoretical Development and Empirical Validation," *Journal of Management Information Systems* 7, Vol. 23, No. 3, pp. 309–347, Winter 2006.

**Alia Sabri** is an assistant professor in the Department of Computer Networks Systems at Applied Sciences University (Jordan) since 2010. She received her PhD and M.Sc in Computer Information Systems from the Arab Academy for Banking & Financial Sciences (Jordan). She received her B.Sc degree in Computer Science from The University of Jordan (Jordan). Her special fields of interests included e-Government and Information System.