

A review of knowledge management about theoretical conception and designing approaches

Tingwei Gao, Yueting Chai and Yi Liu
Tsinghua University, Beijing, China

Abstract

Purpose – The main purpose of this paper is to conduct an in-depth theoretical review and analysis for the fields of knowledge management (KM) and investigate the future research trend about KM.

Design/methodology/approach – At first, few theoretical basis about KM which include definitions and stages about KM have been summarized and analyzed. Then a comprehensive review about the major approaches for designing the KM system from different perspectives including knowledge representation and organization, knowledge sharing and performance measure for KM has been conducted.

Findings – The contributions of this paper will be useful for both academics and practitioners for the study of KM.

Originality/value – For this research, the focus is on conducting an in-depth theoretical review and analysis of KM.

Keywords Knowledge management, Literature review, Design approaches

Paper type Literature review

1. Introduction

In recent years, knowledge has been widely recognized the most crucial competitive asset (Palacios and Garrigos, 2006). Knowledge refers to a theoretical or practical understanding of a subject. Knowledge management (KM) has become a very common term in the twenty-first century, as it has been applied to a wide spectrum of activities and areas with the purpose of managing, creating and enhancing intellectual assets (Shannak, 2009). And it has become enriched with a huge wealth of contributions from many scholars and an extensive accumulation of experiences. From a deeper point of view, KM should be a kind of working method and philosophy. KM is a part of the field of management studies, but it is also closely integrated with information and communication technologies (Mihalca *et al.*, 2008). In fact, KM can be observed from several perspectives, as there are a number of fields that contribute to it. Prominent among them are the fields of philosophy, cognitive science, social science, management science, information science, knowledge engineering, artificial intelligence and economics (Kakabadse *et al.*, 2003).



Why the need to manage knowledge? Nowadays we are in the era of knowledge. The reason of increased importance of knowledge lies in the fact that effective management of knowledge brings many positive outcomes to improve learning efficiency. And we implement KM initiatives with the expectation that it will result in increased competitive advantage. KM is used to capture, document, retrieve and reuse knowledge, as well as to create, transfer and exchange it (Dayan and Evans, 2006). There is no limit to where KM can be applied, ranging from individual learning, small enterprises to large multinational corporations: KM has become increasingly more important for individuals to understand what information is essential, how to administer this essential information and how to transform essential information into permanent knowledge (Tseng *et al.*, 2012); KM plays a fundamental role in the success of an organization's activities and strategies (Castrogiovanni *et al.*, 2016). Therefore managing and using knowledge effectively is vital for both individuals and organizations to take full advantage of the value of knowledge.

During the past decade, numerous publications dealing with KM reviews from different perspectives have been published. Ragab and Arisha (2013) categorized different branches of KM research. Serenko (2013) analyzed the stock of KM publications and identified citation classics in KM field. Makhsousi *et al.* (2013) reviewed recent advances on the implementation of KM in different areas and discussed why some of KM implementations fail and how they could turn into a successful one. Arisha and Ragab (2013) provided a literature review and categorized the analysis of the rapidly growing number of KM publications, and they offered a comprehensive reference for newcomers embarking on research in the field. Matayong and Mahmood (2013) reviewed the current literature of KM systems studies in organizations. Chiliban *et al.* (2014) reviewed different KM models based on their strengths and weaknesses. Tzortzaki and Mihiotis (2014) studied how the theory revolving around KM has developed over the years. Omotayo (2015) reviewed the literature in the area of KM to bring out the importance of KM in an organization. Asrar-ul-Haq and Anwar (2016) reviewed the attempts to provide the evidence base concerning knowledge sharing and KM in organizational settings.

Based on the above-described scenario, in this research, we aim to provide a systemic overview of KM. And we accomplish this task by a series analysis approaches, such as literature bibliometric, theoretical basic analysis and designing approaches' re-view. At last, our main contributions can be related to the Streams (A) and (B) as follows: (A) we summarize and analyze some major theoretical conceptions about KM and (B) we give a comprehensive review about the approaches for designing the KM system. The remainder of this paper is organized as follows. In Section 2, we review the major conception of KM. Section 3 shows and analyzes the approaches to design KM system. Finally, conclusions are presented in Section 4.

2. Theoretical conception of knowledge management

2.1 Definition of knowledge management

There are a number of approaches to the conception about knowledge, as it is both a complex and abstract term. Actually, the definition of knowledge is a matter of ongoing debate among philosophers in the field of epistemology. One of the most accepted definitions about knowledge is that knowledge is a dynamic human resource of justification of the personal beliefs to obtain the truth (Nonaka, 1994). It can then be stated that knowledge is an invisible or intangible asset, in which its acquisition involves complex cognitive processes of perception, learning, communication, association and reasoning (Epetimehin and Ekundayo, 2011). Knowledge is the concept, skill, experience and vision that provides a framework for creating, evaluating and using the information (Soltani and Navimipour, 2016). Generally,

knowledge can be divided into two types, tacit and explicit (Hubert, 1996). Tacit knowledge is the personal and context-specific knowledge of a person that resides in the human mind, behavior and perception (Duffy, 2000). Koenig (2012) suggested that explicit knowledge means information or knowledge that is set out in tangible form.

Also there are many definitions and descriptions about KM written by different scholars from various fields. These definitions are somewhat unclear and have different meanings depending on the authors' views. To have a deep understanding of KM, we should re-visit some fundamentals of KM, such as the theoretical understanding of the concept of knowledge despite the abundance of theoretical and conceptual work. We have reviewed some major conceptions of KM and summarized them in Table I. When reviewing the definitions about KM, there are some terms that seem more central and fundamental than others, such as organization and information. In summary, despite the various versions of the definition and descriptions about KM, their essence is to help individuals improve learning efficiency and integrate different information resources to improve competitiveness advantages. And KM is capable of providing the individual with the tools and techniques they need to surmount the overwhelming information they encounter and to enable them to improve learning efficacy and increase competitive advantage.

2.2 Process and stages of knowledge management

KM is viewed as a process, where many related activities are formed to carry out key elements of strategy and operations for KM. During the past two decades, a vast number of KM processes have been introduced by researchers from different perspectives. And we reviewed and summarized some major descriptions about KM process. Table II shows this result. Although there are various descriptions about KM process, some words seem more central and fundamental than others, such as creation, storage, transfer and application.

Knowledge creation refers to how new knowledge is created. This stage involves the developing of new content or the replacing of existing content within the tacit and explicit knowledge (Ajmal and Koskinen, 2008). Knowledge storage refers to the process of recording knowledge and storing it in the repositories such as archives, databases and filing systems. And it aims to transfer the knowledge to the individual, groups or units that need to apply it (Johannsen, 2000). Knowledge transfer is an important process of KM and refers to the transfer of knowledge to locations where it is needed and can be used (Pirkkalainen and Pawlowski, 2013). This phase is critical for the success of the KM process, as the transfer must produce changes in the knowledge base (Argote and Ingram, 2000). Knowledge application refers to the actualizing of knowledge. This process can be used to adjust strategic direction, solve new problems, improve efficiency and reduce costs (Newell et al., 2004). And this stage is used to make good use of the created knowledge such as implementing a best practice.

3. Designing approaches for knowledge management

3.1 Knowledge representation and organization

Knowledge representation and organization is a technique that increasing efficiency of an explaining associations of knowledge bodies with the purpose of managing knowledge by creating similar content associations. During the past decade, the semantic link network (SLN) has been widely used in the field of KM. SLN is a network that represents semantic relations between concepts. And it is always used as a form of knowledge representation. It consists of vertices, which represent concepts, and edges, which represent semantic relations between concepts (Hai, 2011).

Authors	Year	Description
Horwitch & Armacost	2002	The creation, extraction, transformation and storage of the correct knowledge and information in order to design better policy, modify action and deliver results
Skyrme	2003	The explicit and systematic management of vital knowledge and its associated processes of creating, gathering, organizing, diffusion, use and exploitation
April & Izadi	2004	The philosophy of knowledge management is made up of both the collect function (data and information dimensions) and the connect function (knowledge and wisdom function)
Pearce-Moses	2005	The administration and oversight of an organization's intellectual capital by managing information and its use in order to maximize its value
Wang	2007	Knowledge transfers, between explicit and tacit, between individual and collective
Serrat	2009	Explicit and systematic management of processes enabling vital individual and collective knowledge resources to be identified, created, stored, shared, and used for benefit. Its practical expression is the fusion of information management and organizational learning
Ramsin & Paige	2010	A framework for applying KM development practices and, like all methodologies, consists of two parts: process and modeling language
Becerra-Fernandez & Sabherwal	2010	Performing the activities involved in discovering, capturing, sharing, and applying knowledge so as to enhance, in a cost effective fashion, the impact of knowledge on the unit's goal achievement
Pauleen & Gorman	2011	The application of knowledge management through individual strategies, based on experience and skills, to create maximum value for individuals
Groff & Jones	2012	A set of organizational activities to achieving organizational objectives by making the best use of knowledge
Clobridge	2013	The process of systematically capturing, describing, organizing, and sharing knowledge – making it useful, usable, adaptable, and re-useable
Rouse	2013	An enterprise consciously and comprehensively gathers, organizes, shares, and analyzes its knowledge in terms of resources, documents, and people skills
Chang & Lin	2015	A process of capturing, storing, sharing and using knowledge
Navimipour & Charband	2016	The process of capturing, sharing, developing, and using the knowledge efficiently
Liu, Wang <i>et al.</i>	2017	Not only managing tangible content from the literature but also extracting information from the raw data available on organization and systematization

Table I.
Major definitions
about KM

[Kravchenko et al. \(2017\)](#) designed a new approach for semantic similarity estimation to solve some problems about KM. They developed the genetic algorithm for semantic similarity estimation in accordance with the knowledge graph model. [Xiao et al. \(2016\)](#) proposed a new model for knowledge semantic representation (KSR) to produce semantic interpretable representations, which is used for explicitly representing knowledge. [Che Cob et al. \(2016\)](#) proposed a KM model based on semantic to support collaborative learning environment. [Cob et al. \(2015\)](#) discussed the application of SLN to enhance the KM and proposed a semantic KM model to support collaborative learning environment. [Liu et al. \(2014\)](#)

Authors	Year	Description
Alavi & Leidner	2001	1. Storage or retention 2. Transfer or diffusion 3. Application or use
Argote, McEvily & Reagans	2003	1. Creation 2. Retention 3. Transfer
Arostegui	2004	1. Capture 2. Elaborate 3. Transfer 4. Storing 5. Share
Lee <i>et al.</i>	2005	1. Creation 2. Accumulation 3. Sharing 4. Utilization 5. Internalization
Chong & Choi	2005	1. Creating 2. Gathering 3. Organizing 4. Storing 5. Diffusing 6. Using 7. Exploitation
Tikhomirova <i>et al.</i>	2008	1. Identification and capture 2. Creation 3. Classification and storage 4. Circulation and distribution 5. Application
Huang & Shih	2009	1. Creation 2. Storage 3. Distribution 4. Utilization
Turner, Zimmerman & Allen	2012	1. Creation or acquisition: 2. Storage 3. Dissemination or transfer 4. Application
Clobridge	2013	1. Capturing 2. Describing 3. Organizing 4. Sharing
Kanat & Atilgan	2014	1. Creation 2. Storage 3. Transfer
Chang & Lin	2015	1. Capture 2. Store 3. Share 4. Use
Hamoud <i>et al.</i>	2016	1. Creation 2. Internalizations 3. Acquisition 4. Refinement 5. Utilization
Navimipour & Charband	2016	1. Capture 2. Share 3. Develop 4. Use

Table II.
Different
descriptions about
KM process

described the development of a semantic-based KM platform for Web-enabled environments featuring intelligence and insight capabilities.

Among the applications of SLN in KM, the most widely used method is ontology. Ontology was taken from philosophy, where it means a systematic explanation of being. An ontology is a catalog of existing concepts in a field, which contains predicates, semantics of concepts and terms and how they relate to one another (Natalya *et al.*, 2001). Ontology has wide application potential in the classification of information, the construction of information and knowledge database, as well as the research and development of intelligent search engine. As shown in [Table III](#), the applications of ontology to the field of KM have aroused the concern of many researchers during the past decade.

3.2 Knowledge sharing

One of the major challenges in KM is how to promote to share knowledge with others. In fact, effective KM relies on successful knowledge sharing (Swacha, 2015). Knowledge sharing can be defined as “the exchange of knowledge between and among individuals.” And it aims at bringing knowledge sources together and manipulating into new knowledge structures or routines. Knowledge sharing and knowledge transfer are sometimes used synonymously or are considered to have overlapping content (Dan and Sunesson, 2012). Following the bulk of literature, we shall consider knowledge sharing to be semantically the same as knowledge transfer (Paulin and Suneson, 2012). The success of knowledge sharing relied on the degree to which the knowledge is recreated in the recipient.

Swacha (2015) defined a system of appropriate gamification rules which makes use of a number of purposely selected gamification components, and aimed at motivating individuals for various activities related to knowledge sharing. Yong (2013) provided new findings of the respective impacts of organizational rewards, reciprocity, enjoyment and

Authors	Year	Description
Arman, Hodgson & Gindy	2010	A framework of an ontology-based KM system including design and application at a real case which is developed in the Protégé environment and a generic system
Hayette, Khaled, Tahar <i>et al.</i>	2011	Designing a knowledge map ontology architecture that allows an efficient representation of knowledge to guide the users in the extraction of knowledge
ZHENG <i>et al.</i>	2012	Proposing a new method for the construction of ontology-based agricultural KM system
Loia, Fenza, Maio <i>et al.</i>	2013	Defining a KM platform based on ontology that integrates methodologies aimed at supporting the life cycle of large and heterogeneous enterprise's knowledge bases
Pujara, Miao <i>et al.</i>	2013	An ontological information based method used for scaling knowledge graph identification, jointly inferring a knowledge graph from the noisy output of an information extraction system
Zhong, Fu, Xia <i>et al.</i>	2015	Ontology knowledge map is constructed to describe declarative knowledge and procedural knowledge
Houhamdi & Athamena	2015	A knowledge description method using ontology and its application in multi agent systems
Samwald, Giménez & Boyce	2015	An ontology-based framework that is capable to represent, organize and reason over the growing wealth of pharmacogenomic knowledge
Socaciu & Pascu	2016	A knowledge graph platform based on ontology using web ontology language and resource description framework to support KM

Table III.
Ontology for
knowledge
representation

social capital on individuals' knowledge sharing intentions, which prior research has ignored so far. Their new findings will be very useful to deepening and widening our understanding of the respective role of individual motivations and social capital in individuals' knowledge-sharing intentions. [Ma and Yuen \(2011\)](#) proposed an online knowledge-sharing model and tested among undergraduate students using an online learning environment. And this model introduces two new constructs – perceived online attachment motivation and perceived online relationship commitment. [Hung et al. \(2011\)](#) investigated the effects of intrinsic motivation and extrinsic motivation on knowledge sharing in a group meeting. Results of their experiment showed that the KM system with built-in reputation feedback is crucial to support successful knowledge sharing. [Tohidinia and Mosakhani \(2010\)](#) evaluated the influence of a series of potential factors on knowledge-sharing behavior and suggested a systematic effort to improve knowledge-sharing behavior in organizations, an effort in which relevant factors from different perspectives are considered.

3.3 Performance measure for knowledge management

Performance measurement is a crucial part in KM ([Wang et al., 2015](#)). By this process of measure, we can assess the effectiveness of KM practices and judge whether the current knowledge process can meet the our learning needs and whether it can provide feedback of information on KM to carry out continuous improvement on KM. KM performance evaluation includes the design of KM performance evaluation criteria and the selection of the evaluation methods ([Wang and Zheng, 2010](#)). This process consists of qualitative analysis and quantitative analysis. The common qualitative approaches for KM evaluation include open-ended questionnaires ([Changchit et al., 2001](#)), expert interviews ([Booker et al., 2008](#)), case studies and surveys ([Darroch and McNaughton, 2002](#)). While, the quantitative analysis is always used to measure the explicit knowledge with a series of indicators which include both financial and non-financial ([Chen and Chen, 2005](#)).

[Wang et al. \(2016\)](#) proposed an index system of KM, which includes four components: the KM process, the organizational knowledge structure, the economic benefits and the efficiency. [Wang et al. \(2015\)](#) categorized the performance measures into three categories: knowledge resources, KM processes, and the factors that affect KM. [Zhang \(2010\)](#) applied the Balanced Scorecard into the performance assessment of KM on the basis of the analysis of the Balanced Scorecard and KM and carried out the detailed analysis to measure the performance of KM tools from four aspects – financial, customer, internal processes and learning and growth. [Wang and Zheng \(2010\)](#) proposed a KM performance evaluation method that includes knowledge system, structure capital, human capital, mental capital and market capital. [Wu et al. \(2009\)](#) developed an evaluation method of KM performance based on the principal component analysis. And the measure index consists of knowledge stocks, maturity degree of the learning organizations, information management and marketing capability. [Tseng \(2008\)](#) proposed a categorization matrix that classifies the performance indicators for potential use in KM performance measurements. And the evaluation criteria of this method include process, human and IT.

4. Conclusions

For this research, we focus on providing a deep theoretical review and analysis of KM. First, we summarized and analyzed the theoretical conceptions of KM, which include conception and stages. Then we reviewed some major approaches for designing the KM system from different perspectives including knowledge representation and organization, knowledge sharing and performance measure for KM.

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Corresponding author

Yueting Chai can be contacted at: thucyt@yeah.net

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