

A Cyclic Model for Knowledge Management Capability-A Review Study

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Abstract

Purpose: The purpose of this paper is to review and present that separate capabilities of knowledge management (KM) are identified and classified as sequential capability. These KM capabilities are utilized to affect organizational performance with a KM-cyclic view.

Design/methodology/approach: This paper is a literature review research, through which KM capability and performance are identified, synthesized, from related books, literature and other research studies. Using key-word search in electronic databases, we generated a fairly exhaustive list of the articles dealing with the topic of KM capability in the period of 1979 to 2010 as well as various sources were extended from searching results. A total of 60 articles were identified for KM capability and 30 articles for performance measurement.

Findings: The results of the research suggest two main aspects: 1) The KM capabilities were organized as four categories with cyclic view: acquisition/creation, conversion, sharing, and application. 2) The KM performance measurements were classified as two categories: non-financial and financial measurements.

Research limitations/implications: There is a need to undertake empirical research and in-depth case studies of knowledge management practices using a KM cyclic view as a framework with which to interpret findings.

Originality/value: The KM cyclic view is used to make some recommendations on appropriate research approaches to further our understanding of relationship of KM capability and performance in research. This also provides future researchers with useful means to assess the KM performance in different KM capability and to realize the benefits of a knowledge-based economy.

Keywords: Knowledge management; Performance; Knowledge management capability; Review study

Introduction

The growing importance of knowledge has motivated executives to focus on better managing their knowledge assets [1-12]. With the emergence of the knowledge based view (KBV) [13] that extrapolated the insights provided by the resource based view of the firm [14], and the rapid increase after 1995 of the use of Knowledge management (KM) capabilities such as acquisition/creation, conversion, sharing, and application knowledge. Many studies have allocated knowledge resources to create competitive advantage. KM practices with the expectation that KM capability should improve organizational performance. Most explanations provided to account for the inconsistent results have focused on issues associated with KM capability definitions [15] and choice of dependent variables (managerial performance or financial performance).

This paper argues that part of the reason for the confusion that surrounds KM capability is due to a lack of precision in terminology. This has exacerbated the poor understanding of KM practices in the broader business community. Consistent terminology of the building blocks of KM capability is lacking. Therefore, it is necessary to model the KM capability in a more systematic way. Before 2001, most organizations have not taken a conscious process-oriented approach to

KM [16]. After 2001, more literature mentioned process-oriented approach or framework of KM. The limited published research has used multiple competing theoretical frameworks and various measures of constructs. Recently, there have been a number of attempts to integrate KM and process orientation to identify KM capability. Such as, Ahn and Chang [17] think process orientation is a perspective widely accepted in organization science. Holsapple and Joshi [18] develop five capabilities of knowledge chain through the Delphi study methodology. Blumentritt and Johnston [19] propose a cyclic model and Sun [20] proposes a waterfall model for identifying KM capability.

Studies of the existing processes and analysis of the used KM capability are necessary. Therefore, this paper will propose a sequential cyclic view for identifying KM capability in organizations, based on literature review of KM studies. Studies grounded in the knowledge based view (KBV) typically relate KM capability directly to organizational performance providing the basis for most of the research concerning KM capabilities as determinants of organizational performance. It was originally proposed by Bierly and Chakrabarti [21] and has been employed by Becerra-Fernandez and Sabherwal [1] and many other researchers. The model conceives of KM capability as a valuable enabler of the organization for enhancing its performance. It would therefore be interesting and instructive from an academic standpoint to look back in retrospect, and assess the state of the art in our understanding of knowledge related capabilities in literature. With

this end in view, in this study we carried out a review of extant previous studies on KM capability-performance relationship published articles. The specific research questions that I sought to address are as follows:

1. What were the broad definition and classification that academics have focused on while conducting research on KM capability and performance?
2. What performance measurements approaches were adopted to carry out empirical research on KM area?

Therefore, the purpose of this research was to review KM capability and KM performance, focusing in particular on the KM capability-performance based view in an attempt to help improve its application in a KM research context. The remainder of the paper is organized as follows. The next section describes systematic review methodology. The third section presents reviewed results of KM capability, performance measurement and KM capability-performance literature. Conclusion and discussion of findings are in the last section.

Systematic Review Methodology

The research was based on literature review as well as the findings of research on KM capability and performance measurement. In order to fully understand the prior research in this field a systematic literature review was undertaken [22]. Through an extensive literature review, this research could identify some KM capabilities and performance. For the purpose of data acquisition the scientific publications relevant to the topic "KM capability" and "KM performance" were investigated. There are nine keywords used for searching with knowledge management keyword, such as: knowledge capability, life cycle, process, task, rainbow, activity, spiral model, value chain, and waterfall. Using key-word search in four electronic journal databases: ProQuest, EBSCO, Emerald, and Wiley Interscience, we generated a fairly exhaustive list of the articles dealing with the topic of KM capability in the period of 1979 to 2010 as well as various internet sources were accessed. Those represent the basis of the literature review for the KM capability and performance described frameworks. Using these criteria, a total of 60 articles for KM capability and 30 articles for performance measurement were identified.

KM Capabilities and Performances Review

This section will present the reviewed results of the KM/KMS capabilities, KM performance, and relationship of KM capability-performance.

KM/KMS capability – process perspectives

The coordination of KM capabilities is a key for effective organizational KM. Academics and practitioners alike recognize that KM capabilities are becoming a prerequisite for organizational success [23]. Thus the alignment of KM capability is a crucial element to KM initiative success [2]. The different articles improve our understanding of the importance of KM capability-performance.

This section characterized the KM capabilities which are under investigation, and reviewed previous research on KM. KM implies that knowledge can be managed. KM is a set of processes directed at "creating, capturing, storing, sharing, applying, reusing" knowledge [24]. This definition is criticized for making KM to show sequential

process steps. There are also other definitions of KM. For example, KM is the systemic and organizationally specified process for acquiring, organizing, and communicating knowledge of employees so that other employees may make use of it to be more effective and productive in their work [25]. In the other words, KM can be also considered the process of delivering the right knowledge to the right persons at the right time [26]. Therefore, four processes from literature were aggregated as follows.

1) Knowledge acquisition/creation capability: Numerous terms have been applied to describe acquisition capability: creation, seeking, generation, construction, derivation, discovery, collaboration and producing knowledge [2]. The terms "knowledge creation" and "knowledge acquisition" are often used interchangeably. Knowledge acquisition is the first process of KM which emphasizes and gives special importance to individual knowledge capability in the organization [27]. Acquisition also is the creation of new knowledge based on the application of existing knowledge [2]. Knowledge is created inside an organization [28] and organizational knowledge creation involves developing new content or replacing existing content within organization tacit and explicit knowledge [29,30].

Knowledge is acquired from technical source or non-technological source. As a technological example, Web technology can help identify, evaluate, analyse, synthesize, qualify, and accumulate externally created knowledge content [31]. As a non-technological example, employees engage in external training to acquire knowledge [32]. Knowledge discovery also is the nontrivial extraction of implicit, previously unknown, and potentially useful information from data. Usually, employees used structural knowledge learning strategies increased their structural knowledge acquisition. Knowledge discovery identifies information from the knowledge-base to make recommendations to different stakeholders in the organization [33]. Knowledge capture is employed to identify and extract knowledge from knowledge sources [34], or external sources internal or external knowledge sources [28,32]. Consequently, knowledge acquisition capability appears more workable in information systems. Therefore, acquisition capabilities are those oriented toward obtaining knowledge into a representation.

Knowledge acquisition/creation will strong affect business performance. Davenport and Prusak [35] also noted that the only sustainable competitive advantage a firm has comes from what it collectively knows, how efficiently it uses what it knows, and how readily it acquisitions and uses new knowledge. Bassi [36] thought that the fortunes of companies in those industries can rise or fall meteorically, depending on how well they create, capture, and leverage their knowledge. Therefore, firms with stronger acquisition capability will get more sources of knowledge and affect performance.

2) Knowledge conversion capability: Numerous terms can be used to describe conversion capability, namely: storage, retrieval, repository, organize, assemble, integrate, transform, document, and codification. With the growing body codified knowledge in organizational memories, knowledge retrieval is a core component to access knowledge items in knowledge repository [37]. The conversion ability stores and retrieves knowledge into and from knowledge base. The ability to store and retrieve text is an important aspect of a knowledge repository [38]. Knowledge retrieval is a core component to access knowledge items in knowledge repository [37]. A knowledge repository is a collection of both internal and external knowledge. Tacit knowledge requires a high degree of interpretation [39].

Therefore, the fact is conversion capability is a tool for the production and accumulation of knowledge.

In identifying KM capabilities, one of basic approaches called codification [40]. The codification approach focuses on how structured knowledge can be converted, codified, and stored. Knowledge codification means converting tacit knowledge to explicit knowledge [41]. Explicit knowledge can be expressed in words and numbers and shared in the form of data, scientific formula [42]. Knowledge Documents represents a form of codified knowledge. Knowledge can be codified or articulated in manuals, computer programs, training tools, and so on. That is, sharing explicit knowledge would be more easily through visible and embodied procedures or product. Explicit knowledge is organized, categorized, indexed and accessed. Davenport et al. [25] also categorized document knowledge, include; (1) external knowledge: the population statistical data and knowledge of the market competition (2) inside knowledge: data and files; (3) informal information: records discussing in electronic meeting, E-mail. The strategy for Knowledge Documents is to achieve easy identification of relevant sources of knowledge that enhance learning. The codifications strategy was presented by Hansen et al. [41]. Codification must be done in a form/structure which will eventually build the knowledge base. Therefore, the codification strategy converses knowledge as it was created, and stores it either as de-context so that it can be applied to more contexts.

Knowledge conversion will strong affect business performance. Knowledge conversion capability, involving the storage of the large quantities of data required to form a knowledge base, enables firms to increase their overall expertise and efficiency. Cowan and Foray [43] thought knowledge codification will also strongly structure performance assessment. Knowledge codification may facilitate the emergence of new forms of innovation in a learning organization [44]. Since the knowledge that will be stored and retrieved is both tacit knowledge that is kept inside an individual, and the explicit knowledge that is kept in various media, the fact that an organization has knowledgeable and competent experts will help knowledge storage – of both of tacit and explicit knowledge – be more efficient in retrieving and applying the knowledge [45]. Consequently, firms with strong conversion capabilities obtain more knowledge sources, affecting performance. Therefore, benefits from using KM conversion capability seem to depend on codification capabilities to apply knowledge to individual firms.

3) Knowledge sharing capability: Numerous terms have been used to describe sharing capability, including dissemination, distribution, contribution, exchange, and transfer. In identifying KM capabilities, Knowledge transfer can be either informal or formal, as well as either personal or impersonal [46]. Knowledge transfer occurs at various levels: transfer of knowledge between individuals, from individuals to explicit sources, from individuals to groups, between groups, across groups, and from groups to organizations [30]. Knowledge sharing occurs between communication networks. Therefore, individuals connected through a network of practice may never know or meet each other face to face, they are capable of sharing a great deal of knowledge [47]. The problem of identifying the key areas of knowledge dissemination has also been addressed by Hall and Andriani [48] in their knowledge capability framework. Von Krogh et al. [49] argue that knowledge exchange is best achieved formally through clear organizational goals. Therefore, individuals connected through a practice network may never meet each other, yet can share considerable knowledge [47]. Knowledge transfer can be undertaken

in many ways, officially or unofficially, i.e. through various media, conferences, study tours, change of positions or duties, supervising-system, and teamwork [50]. It also includes knowledge transfer, which affects the motivation to implement knowledge to be of value for the organizations [2,45].

Knowledge sharing will strong affect business performance. As literature show that knowledge transfer capability can bring many advantages to organizations [51] and nowadays knowledge transfer capability is part of organizational life. The effectiveness of knowledge transfer within an organization can significantly affect business performance [52]. To be useful, knowledge must be distributed, since only in this way can it enhance firm performance [53].

4) Knowledge application capability: Numerous terms have been employed to describe application capability, including: implementation, use and utilization. The final process of KM is knowledge application [27]. Knowledge application capability is the ability to actually apply knowledge. Notably, the outcomes of the effective application of knowledge have received little attention [2]. Lindvall, et al. [54] thought knowledge application is the process through which knowledge becomes the basis for further learning and innovation. Wong and Radcliffe [55] proposed a knowledge application model which moves from subconscious awareness to conscious awareness. Previous studies appear to believe that knowledge can be applied effectively after being created [56]. The utilization of knowledge for the benefit of value creation and the decision to affect efficiency in organizational practices need sufficient and correct database or information to be used in the analysis and/or the prediction for the decision in problem solving and determining the direction of the organizations [2,57].

Knowledge application will strong affect business performance. Knowledge application-oriented capability indicates those processes that are oriented towards knowledge use. This knowledge then can be applied to adjust strategic direction, solve new problems, and improve efficiency [2]. Knowledge application can be of value to the organizations: it can make the organizations attain the effectiveness of KM [2,50]. The application of efficient knowledge will lead to the development of innovation of the product. Besides, best practices will affect knowledge application by increasing the level of value of the work practices [2]. Furthermore, Claycomb et al. [58] thought that knowledge and performance are positively and significantly related and, that the application of knowledge creates competitive advantages for firms.

A cyclic model of knowledge management capability

Knowledge Cyclic Model (KCM) in this study is defined as the combined effectiveness of the four KM capabilities as Table 1 from systematic literature review. The synopsis of the related KM/KMS capabilities can be aggregated along as the top of Table 1. An examination of these various capabilities enables them to be grouped four broad dimensions, including: (1) acquisition/creation, (2) conversion, (3) sharing, and (4) application. The arrows connecting the processes denote the sequence of KM capabilities.

The KM capability classification of literature review as described in the Knowledge Cyclic Model (KCM, as Figure 1) helps to develop the conceptual framework which will be used in identifying the KM capability for KM performance. Knowledge Cyclic Model is evolves from some researchers' research. Knowledge Cyclic Model evolves concepts of knowledge spiral model, value chain, life cycle, process,

capability, task, rainbow, activity, life-cycle, and waterfall. The first well-known study is that of Nonaka [13]. He proposed four modes of “Spiral of Knowledge,” or a “SECI” model, for the knowledge creation process that consists of knowledge socialization, externalization, combination, and internalization.

KM / KMS Capabilities				Sources
Acquisition/Creation	Conversion	Sharing	Application	[65]
Construction, Organization	Storage	Distribution	Application	
Creating and sourcing	Codification and transformation	Dissemination	Application and value, Realization	[66]
Construction	Organization, Storage	Distribution	Application	[29]
Acquisition, Creation	Storage	Transfer	Utilization	[50]
Identify, Create	Collect, Adapt, Organize	Share	Apply	[67]
Create		Transfer	Use	[62]
Identify, Capture, Select, Create	Store	Share	Apply, Sell	[68]
Discerning	Choosing a container	Dissemination	Use	[53]
Creation	Draw-Up	Dissemination	Apply, Evaluate	[69]
Creation, Capture	Storing,	Sharing	Applying, Reusing	[24]
Creation		Transference	Asset Management	[25]
Generate, Codify		Transfer		
Acquire		Disseminate	Utilize	[70]
Create		Transfer	Use	[71]
Create	Assemble, Integrate	Transfer	Exploit	[72]
Perception, Acquisition	Documentation, Retrieval	Transmission	Decision-making	[73]
Discover, Capture	Transform, Classify, Maintain	Disseminate		[33]
Captured, Evaluated	Cleansed, Stored	Provided	Used	[74]
Create, Map/buddle	Store	Share/transfer	Reuse	[75]
Creation		Sharing	Harvesting and leveraging	[76]
Identify, Capture	Store	Share	Apply, Sell	[77]
Capture, Organize	Formalize	Distribute	Apply	[59]
Learning, Generate		Disseminate		[78]

Acquisition, Refinement	Storage/ Retrieval	Distribution	Presentation	[79]
Creation	Organization, Formalization	Distribution	Application, Evolution	[59]
Generation	Integration	Sharing		[80]
Acquisition,	Protection, Integration	Dissemination	Innovation	[81]
Creation (Construction)	Storage/ retrieval	Transfer	Application	[30]
Acquisition	Conversion, Protection		Application	[2]
Create	Store	Distribute	Apply	[82]
Acquisition, Generation	Selection	Assimilation	Emission	[32]
Acquisition, Generation	Organization, Integration	Distribution	Decision support applications, Refinement and Refreshment	[83]
Creation	Storage	Distribution	Application	[84]
Acquire Relate/ Value	Organize	Transfer	Use, Enable, reuse	[85]
Acquisition		Dissemination	Responsiveness	[86]
Identification and Capture, Creation		Sharing	Application	[87]
Creation/ acquisition	Organization/ storage	Distribution	Application/ reuse	[54]
Generation, Codification	Mapping, Storing	Sharing, Transfer	Application	[88]
Assess, Refine		Share, Distribute		[89]
Creation/adoption, Adaption	Embodiment		Evaluation	[90]
Capture	Document, Organize	Sharing	Apply, Reuse, Evolve, Feedback	[91]
Creation, Acquisition	Integration, Reconfiguration			[92]
Discovery, Capture		Sharing	Application	[93]
Selection, Creation		Sharing,	Preservation and Retention, and knowledge Update	[94]
Obtaining, Refining	Storing	Sharing		[11]
Discovery	Publication		Collaboration, Learning	[95]
Acquiring	Organizing	Sharing	Applying	[96]
Acquisition	Conversion		Application	[6]

Creation, Retrieval	Validation, Codification	Distribution, Tracking	Application, Personalization	[97]
Creation	Integrate	Transfer	Leverage	[12]
Create	Store	Share	apply	[98]
Acquisition	Conversion		Application, Protection	[9]
Acquisition, Creation,	Storing,	Sharing		[10]
Acquisition, Generation	Selection	Assimilation	Emission	[99]
Creation	Codification	Transfer	Personalization	[100]
Creation		Transfer	Adoption	[101]
Selection, Obtainment	Establishment, Storage	Expansion		[102]
Generation and Development	Codification and Storing	Sharing and Distribution		[15]
Generation		Sharing	Implementation	[103]
Create, Capture	Organize, Store	Search, Transfer		[104]
Acquisition, Creation		Sharing	Utilization	[20]

Table 1: KM/KMS Capabilities as a process.

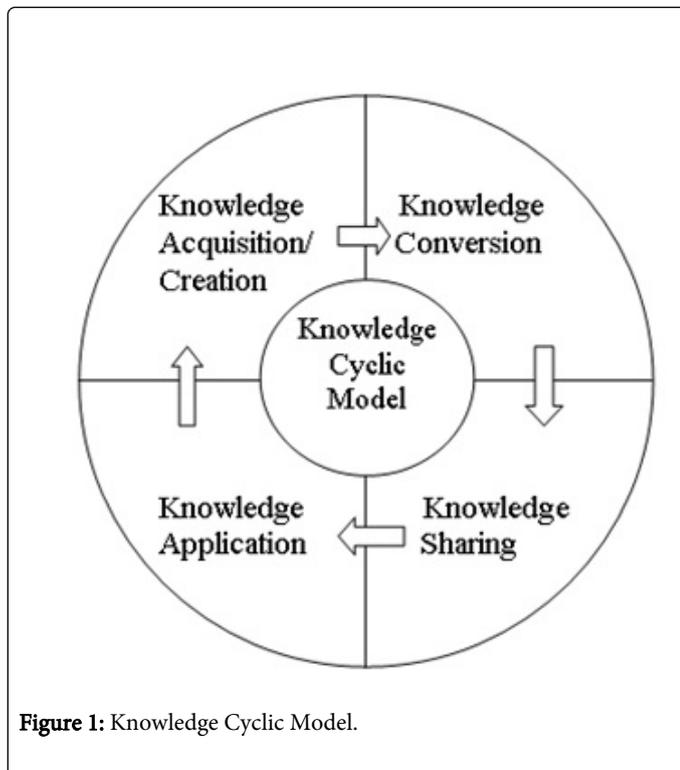


Figure 1: Knowledge Cyclic Model.

The second is Holsapple and Joshi [18] research. They developed knowledge chain through the Delphi study with participant panelists to introduce five activities of the knowledge chain: knowledge acquisition, generation, selection, assimilation, and emission. Thirdly, Nissen, et al. [59] has developed life cycle model which describes a continuous cycle with six phases of knowledge flowing through the organization: knowledge creation, organization, formalization, distribution, application, and evolution. According to literature, I proposed a knowledge cyclic model for KM. The model shows the knowledge is managed as a cycle with sequence.

Performance measurements of knowledge management

Another aspect of research is targeted at measuring the performance of KM. In general, KM performance can be measured in two categories: finance-based and non-finance-based measurement [60].

Finance-based assessments can be further divided into market-based and accounting measurements. Tobin's Q is a market-based measure of performance. The return on assets (ROA), return on sales (ROS), return on investment (ROI), and return on equity (ROE) are accounting-based performance measures. The most widely used measurements for measuring financial performance include revenue, Economic Value Added (EVA), profit, and so on. For knowledge performance, it may be difficult to use financial measurement because most of the benefits from knowledge enhancement are intangible. However, sometimes financial performance is still considered essential given that real financial improvement must demonstrated before KM capabilities are adopted in regular business activities [17].

The alternative measurement is to use non-financial measures, including operating performance outcomes and direct measures of learning. The operating performance measures include accuracy, quality improvement, productivity, quality, reliability, effectiveness, efficiency, process performance, and customer satisfaction growth. Meanwhile, learning measures include items such as the hours of learning and the number of employees trained. Non-financial measures should reflect the core competence of an organization. Non-finance-based measurement is more suitable for evaluating intellectual capital [61].

Management performance or individual user performance is generally defined as non-financial measurement. However, these performances can be measured such as the number of patents, innovation, and job satisfaction level. The contribution of KM capability to organization performance is difficult to be translated into tangible benefits. The measurement of non-financial performance is as important as financial performance because the organizational quality would indirectly influence financial performance serving as a moderating factor [17].

Table 2 shows various performance measurements that have been used in previous KM research. Due to the value of knowledge is difficult to weigh with the traditional financial index, most studies applied non-financial measurement indicators to measure performance.

Non-financial measurement	Financial measurement	References
Satisfaction		[105]
	ROA, ROS	[21]

Effectiveness		[106]
Intangible benefits	Tangible benefits (ROI, ROA)	[107]
Growth of relevant resources of the plan, including the staff; Knowledge content and utilization ratio grow up; The staff's common understanding degree; Whether the staff can accept the concept of information management	Budget grow up, Possibility that the financial affairs retrieve, etc.	
KM satisfaction		[1]
Organizational effectiveness		[2]
Improvement		[108]
Market share, Growth rate, Innovativeness, Business size compared with key competitors	profitability	[109]
Project Success, Expected impact		[110]
Market share, Growth rate, Innovativeness, Successfulness, The size of business in comparison with key competitors	Profitability	[4]
Competitive advantage, innovativeness, market position, mass customization,		[5]
Competitiveness		[11]
Learning, quality of Decision		[111]
Efficiency, Quality		[17]
Speed, Reliability, Accuracy		[112]
Effective of knowledge sharing		[113]
	Tobin's q, ROA	[12]
Organizational value outcome		[114]
Usage of Electronic knowledge repositories (EKR) system		[7]
Process Performance, Outcome Performance		[8]
Innovation, Competence upgrading,		[9]
Organizational effectiveness		
Customer satisfaction growth, Product quality improvement, Better production technology capacity, Long-term advantage resource	Sale profit	[10]
Effectiveness (Building organizational capability, Allocating organizational resources, Stimulating motivation and commitment, Putting forth strategic leadership)		[99]
Production and Organizational performance		[15]

Administrative innovation, Technical innovation		[102]
Comparative advantage, Employee productivity, organizational structure innovation	Financial index in last 3 years	[115]
Product leadership(innovation, quality), Customer intimacy(customer satisfaction, retention)	ROA/ROE, Profitability, Operating costs	[116]
Market and Customer performances	Financial performances (investments in developing and acquiring marketing assets)	[117]

Table 2: Performance Measurement in KM Research.

KM capability–performance relationship

A number of studies have addressed KM capabilities (Table 1) and they be treated as an enabler to improve performance (Table 2). Previous empirical studies have investigated the relationships depending on how they identify the relationships: Relationship is between KM capability and performance. It is defined as Knowledge-Based View (KBV). It was originally proposed by Bierly and Chakrabarti [21]. The KBV conceives of KM capability as a valuable enabler of the organization for enhancing its performance.

The emergence of the “knowledge-based view” as a preeminent school of strategic management [62] has provided a new lens with which to view issues and implications associated with knowledge resource and performance. Grant [63] also developed the fundamentals of a knowledge-based theory of the firm. From another perspective, the KBV of the firm is a special case of the resource-based view (RBV) with a focus on knowledge as an organizational resource. KBV contributes to the RBV of corporate strategy [62]. From a KBV of organizations, the focus is on managing knowledge resources, and the associated aspects of human and material resources having capabilities for governing, operating on, and otherwise deploying knowledge [64]. The Figure 2 shows the reviewed results.

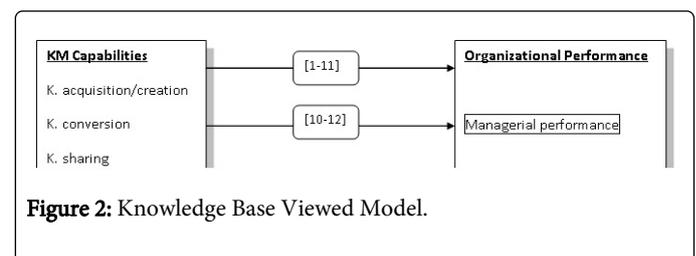


Figure 2: Knowledge Base Viewed Model.

Conclusions

The synthesis of KM literature encompasses the concept about the KM capability and measuring KM performances. Besides, this research has aggregated the knowledge cyclic model as identified as the main component of KM comprising four aspects: knowledge acquisition/creation, conversion, storage, and application. The results also show the relationship of KM capability and performance, knowledge-based view which will make the organizations attain the KM performances. Therefore, several general conclusions may be drawn from this work.

• The literature review revealed the multi-taxonomy of KM capability and performance. Different taxonomies were reviewed and discussed. Furthermore, a variety of KM capabilities can be treated as knowledge resources from knowledge based view. The KM capabilities also need to be employed in organizations to affect performance.

• KM capability involves distinct by interdependent capability of knowledge acquisition/creation, conversion, sharing, and application and finally ends up in creation/acquisition again as Knowledge Cyclic Model. KM capability may start from creation or acquisition; it can refer to an original knowledge, or acquire knowledge from other person or database.

• KM performances, by drawing on financial/non-financial measurements, can play a variety of roles in evaluation of organizational KM capability. It is important to note the KM performance can lead to evaluate from non-financial perspective.

• Research findings supply an alignment for academics and practitioners to reference. The direction of future research resides in the separate KM capability and exploring the potential causal links the impact on firm/individual performance. That is, more empirical research and in-depth case studies are needed to help organizations to identify how their KM capability to improve organizational performance.

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