An Epistemological Taxonomy for Knowledge Management Systems Analysis

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Abstract

Knowledge Management Systems (KMS) play increasingly important roles in organizations due to the realization of the value of knowledge and capabilities of computerized systems to support knowledge management activities. Earlier researchers have explained the activities and processes important for knowledge management, which is useful for the development of systems to support knowledge management. The wide variety of knowledge domains and interactions among them in organizations makes it necessary to understand the broad epistemological spectrum that can enable effective utilization of computerized systems for knowledge management. Although, previous research had considered the processes required for dissemination of knowledge in organization, more fundamental epistemological consideration, along objective and subjective dimensions will enhance analysis of systems requirements. This paper attempts to conceptually develop taxonomy useful for analysis of knowledge requirements and for implementation of systems. Furthermore, the paper illustrates the classification using exploratory cases.

1. Introduction

Companies are seeking benefits by managing the knowledge just like any other asset, as evidenced by increased use of computerized systems for knowledge management activities as well as the rise in human resources allocated to this function [8]. While firms' investments in knowledge management expand, IT researchers have started to examine the phenomena to identify more effective practices [1, 11, 18]. Researchers have conceptualized different classifications of knowledge and related processes [1, 20, 24, 27] in their attempts to understand effective knowledge management. These classifications are based on different assumptions such as the ability to explicate [21, 23], and the differences in focus [7]. While the current knowledge management research mostly considers the explicit/tacit dimension of knowledge, they do not adequately reflect the above phenomena using the subjective-objective dimension. The authors intend to contribute by applying this (subjective-objective) dimension to current knowledge management trend that will also help decrease the gaps between concepts in academia and the practice in industry

The next section reviews past knowledge management research and develops a conceptual framework for further analysis. The third and fourth sections present the exploratory research method and the case studies that further substantiated our claims. Finally, we discuss the emergent concepts, and the implications of the research.

2. Conceptual frameworks

Although researchers have been studying and reporting on knowledge management extensively for just a decade, various knowledge management techniques have been in use in workplaces for a long time. In ancient times, a person intending to practice a craft, skill or a trade had to work as an apprentice prior to venturing on her own. In the modern times, as seen from the medical profession (and many others), class room or laboratory learning is inadequate for a person to be pronounced as a full physician and a novice practices under strict guidance and supervision of senior physicians preparing her to practice solo. A new person joining a workplace may undergo training before being considered as a regular employee. These examples show that the knowledge management activities were inherent in certain work practices whether these were formal or informal work practices [5, 16]. These training practices in professions show the emphasis placed on tacit knowledge, which is also investigated by the modern researchers.

Before we discuss the conceptual frameworks in the past literature, the imperative is to elucidate our definition of knowledge. That will help us clarify the role

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of Information Technologies (IT) in producing systems that can facilitate knowledge management (e.g., what we can or cannot do with existing technologies, how to make best use of the technology or how to improve the technologies). Alavi & Leidner [1] defines knowledge as 'justified belief that increases an entity's capacity for effective action'. Nonaka, Toyama and Konno [20] begin with the traditional definition of knowledge as 'justified true belief' and focus only on the 'justified belief' aspect of it. Linguistically, dictionaries define the term 'belief' as 'conviction or acceptance that certain things are true or real'. Therefore, the socially accepted notion of 'belief' is not necessarily associated with a knowledge gained through the cognitive processes. For example, a trusted friend tells a small child *'A'* that there is a huge monster '*M'* in the ocean that creates the waves. Due to the trust, '*A'* believes that there is such a monster creating the waves. In this case, '*A'* does not know about the existence of '*M'* but claims to know that '*M'* exists. On the other hand, we can consider a different scenario for learning from experiences: child '*A'* tries to touch a candle flame and his finger burns. As a result, *A* infers that touching a candle flame or hot object will burn. In the case of the monster *M*, the knowledge claim is merely a belief based on the trust while in the latter case (candle flame), the knowledge emanates from a cognitive process based on experience and inferences.

In an organizational context, the efficacy of 'justified belief' as knowledge is questionable. Based on market research, a company may not justify entering a given market. On the other hand, there may be a 'belief' based on another factor such as hearsay or unconfirmed believable sources that the firm can enter the market profitably. Therefore, the emphasis in organizational decision-making is on gathering proper information and making inferences through deductions and other rationalizations. Although there are other irrational factors that influence organizational decisions and rationality is limited [15,17,25], effective decisions are guided by a process of knowing as well. When evaluating the criteria during decision-making, a rational decision maker will emphasize or seek rational processes of knowing. Furthermore, in the case of limited knowledge or bounded rationality, we prefer to use probabilities as estimations of occurrences of events. Although we cannot assign a quantitative probability for all events, we may assess the factors and assign degrees of probabilities to certain events. Therefore, in organizational contexts, it is more likely that the organizational decision makers will attempt to look at the process of knowing rather than assuming that certain things are true. From an IT perspective also, the process of knowing is important; Grover and Davenport [11] discuss a process framework in knowledge management research. From earlier conceptualizations, Polanyi [23] further emphasizes the process of knowing:

> "Knowledge is an activity which would be better described as a process of knowing" [23: page 132]

From the perspective of utilizing IT for knowledge management activities, a focus on the process of knowing imparts key understandings about the assumptions made during knowledge creation. Understanding these assumptions will help define attributes of knowledge that need to be considered in the implementation of knowledge management systems using IT. Nonaka et al. [20] differentiates between explicit and tacit knowledge. Explicit knowledge can be communicated to others easily through available media and tacit knowledge is transferred to others through the process of socializing. They [20] explain the role of context of knowledge and the context is not just the physical context. Beyond the purely physical context, knowledge is created through shared context (referred to as 'ba' [22]); four different contexts – originating, dialoging, systemizing and exercising are identified by Nonaka et al. [20].

Based on the past research, a context associated with knowledge management is important for its effectiveness. The context differentiates knowledge from information, where information may not provide any significance for the process of 'knowing'. For example, a manager may receive reports generated through information systems (IS), which may be textual or other processed information. However, for managers to use any of the received information, they must make sense of the information and apply those to their context. At another level, unprocessed data may be obtained from different sources and these become information when a frame for interpretation is also provided. However, in this view of information and knowledge, processed information cannot occur without a priori knowledge of the needs. This need for knowledge and assumptions of reality in processing information is evident, for example, in the approaches taken by the systems developers when finding requirements for systems [12]. IS developers may assume that the knowledge as either objective or subjective and they may assume that the reality exists or not.

Epistemologically objective and subjective knowledge are explained sometimes as two distinct types of knowledge [14, 6]; the purpose here is to distinguish between the roles of knower and the known (subject and

the object – more philosophical arguments about the reality are beyond the scope of this paper). Specifically, more 'knower centric' (or subject centric) knowledge is treated as subjective while more 'known centric' (or object centric) knowledge is treated as objective. This perspective of objective and subjective knowledge also allow us to compare relevance of the degree of interpretation. Furthermore, this subjective-objective dimension is not an antithesis to the tacit-explicit dimension. Nonaka and Takeuchi [21] parenthetically refer to tacit and explicit knowledge as subjective and objective respectively [21: page 61].

Depending on the method of generation and use of knowledge, different types of knowledge can be identified. Nonaka et al. [20] and Polanyi [23] viewed knowledge as tacit and explicit based on the ability to express or communicate (explicate). Knowledge creation occurs through interactions with the context and four different methods of transfer occur. While explicit knowledge can be shared easily in an organization, tacit knowledge transfer occurs through socialization processes. Organizational members share tacit form of knowledge through socialization, and the receiver of the knowledge receives tacit knowledge, until the recipient explicates it (tacit → tacit). On the other hand, more implicit knowledge is transferred through externalization and that knowledge becomes explicit knowledge. (Tacit → explicit). A person may receive explicit knowledge and may create knowledge that cannot be transferred by the person. Nonaka et al. [20] call the process of this transfer of knowledge as internalization. Finally, more explicit knowledge can be integrated to create new knowledge, which is a process of combination (explicit → explicit).

Context is important in this knowledge creation and transfer processes. The knowledge creation may occur because of a social or a group activity, or through individual effort within a given context. When we categorize knowledge as individual or social, it may be either tacit or explicit. A group may create or transfer knowledge through explicit means or in a tacit dimension, just as in a socialization process. Similarly, knowledge of an individual may be explicit or tacit. Based on the previous research, Alavi and Leidner [1] categorize knowledge as declarative, procedural, causal, conditional, and relational. These types of knowledge are categories that can describe or explain events or things, where declarative knowledge is 'know-about' knowledge. Procedural knowledge describes how certain activities can be done or we call it 'know-how' knowledge. Causal knowledge describes reasons for certain happenings. Conditional knowledge describes when certain activities or phenomena may occur and relational knowledge describes the relationships between occurrences of events or activities. Each of these four categories of knowledge (declarative, procedural, causal, conditional, and relational) may be explicit or tacit.

Rather than categorizing the different types of knowledge along explicit or tacit dimensions, we consider explicitness of knowledge as dependent on the individual. Knowledge that a person transfers to another through socialization has a certain degree of explicitness. If a degree of explicitness does not exist in that knowledge, the person may not be able to communicate that knowledge to the other through any means. Some knowledge that is tacit to one person may be explicit to another. For example, a small child B having a fever may not be able to verbally express the feelings of feverishness to an adult X. However, X may know about the illness through the child's behavior. The child may show more signs of irritation, uneasiness, sluggishness, lack of energy or weakness through her non-verbal behavior that the adult may understand. The adult X's understanding of B's condition may occur due to the knowledge X has gained through socializing with B. On the other hand, if the person having the fever is an adult Y, she will be able to verbally express the feverishness to X. Therefore, the knowledge that is tacit in the X-B context is more explicit in the X-Y context. The example shown above is a simple one however in complex situations also there is knowledge that may be tacit to one person or context that may be more explicit to another person or context. In general, the objective of researchers and experts in certain fields is to express and explain this tacit knowledge. For example, an anthropologist may study a certain culture and make some parts of the tacit knowledge in that culture more explicit.

If knowledge is absolutely or invariably tacit then it will be impossible to transfer knowledge through socialization, internalization, and externalization processes. Logically, then any knowledge must have a certain degree of explicitness and this degree of explicitness depends on an individual. Berger and Luckmann [3] show these varying degrees of explicitness of knowledge that depend on an individual by explaining the 'subjectification' and objectification process in the social construction of reality.

In summary, all knowledge - procedural, declarative, relational, conditional and causal - has certain degrees of explicitness. However, as argued earlier, the degree of explicitness depends on the person attempting to explicate the knowledge. Due to the dependency of some knowledge on the individuals, it is possible to map or represent the different classifications of knowledge in a subjective or objective dimension. The objective-subjective dimension considered here is complementary to the explicit-tacit dimension discussed in earlier research [23, 20] as shown in figure 1. The objective-subjective dimension is helpful in explaining the relationship between an individual ('knower') and the 'known' (or object/phenomenon) while the explicit-tacit dimension is more useful in explaining the relationship between an individual and community or larger society. In a subjective/objective classification, context becomes a critical factor. The triad of 'knower' (individual), 'known', and community is essential for proper knowledge management. Earlier, IT researchers had studied the assumptions made in data modeling and systems development [12]. Hirschheim et al. [12] categorized different approaches to systems development based on the ontological and epistemological assumptions. Following similar logical arguments, we can expect that the assumption that knowledge is objective or subjective can influence the attributes of the KMS. As found from the following case studies, the objective and subjective dimensions can provide a categorization of systems that can lead to identification of certain attributes of the required systems.

3. Method and case narratives

While the objectivity and subjectivity of knowledge that needs to be managed provides a framework for further investigation of the phenomena, we do not propose a formal theory at this stage. Instead, we present the results of an exploratory study, based on the different categorizations of knowledge and assumptions. Such a study sets the stage for further research in this area and will help develop more effective systems for knowledge management. In comparison to functionalist approaches, we do not test our concepts and their relationships using statistical procedures. Interpretive research does not predefine dependent and independent variables and relationships among them. Rather than having such a priori hypotheses, interpretive research attempts to explain the sense making that occurs in a given context [13]. In this study, our examination of the rich contextual data highlighted the differences in

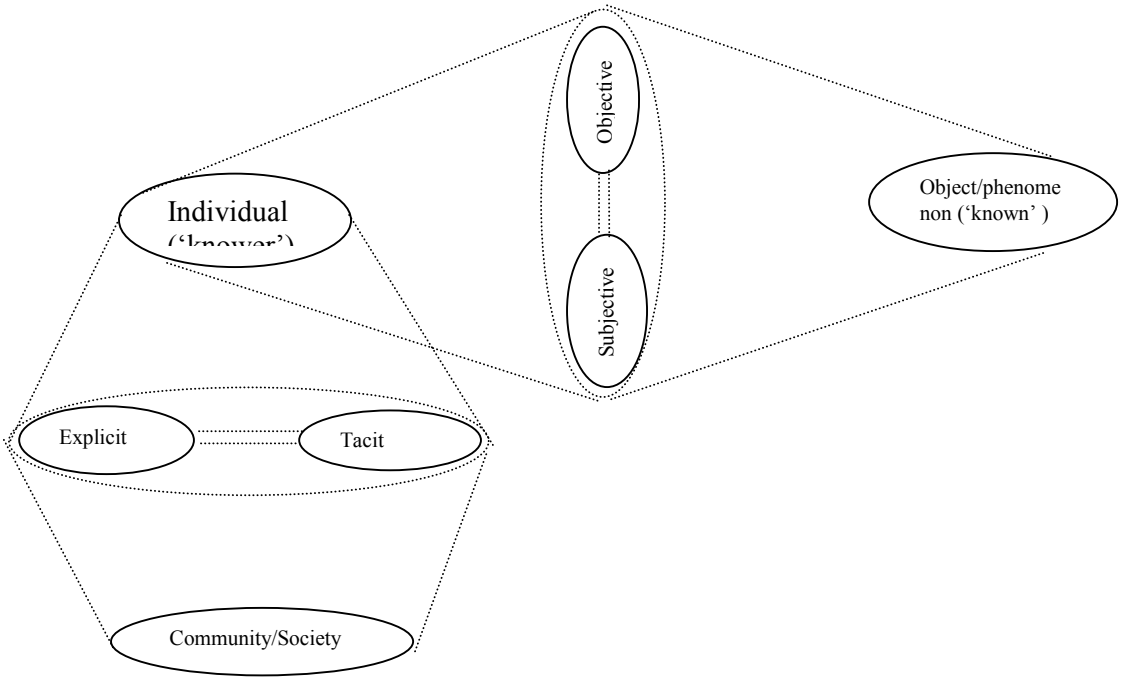

Figure 1 – Relationship between knowledge perspectives

contexts making it possible to arrive at reasonable conclusions [4].

Researchers have taken three approaches to use of theory in interpretive studies [26] (i) grounded theory approach, where researchers make no a priori assumptions and theory is developed as data collection progresses (ii) use of theory as a 'guiding framework' that helps the data collection, and (iii) development of theory as the final outcome of data collection. While the previously discussed framework guided us in identifying the phenomena, these assumptions did not tightly prefigure the data collection. We took an interpretive approach to the data collection and analysis with an objective of theory development [9] because we have no a priori formal theory. The conclusions emerged from the data through an iterative process of interpretation rather than from application of any previous theory.

In order to explore the categories of systems requirements and the attributes of systems, we performed qualitative studies at three divisions in two large companies. These divisions were selected based on variety in the knowledge creation process and the type of organizational activities. Table 1 shows the summary of the sources of data reported in the paper, the names of the companies are fictitious (to protect confidentiality). The authors assumed that such an approach provides richer data that will allow across case comparisons providing richer explanations about the knowledge and the systems in use. One of the authors conducted semi-structured interviews (and recorded them) with the respondents shown in table 1. Further, extensive notes were taken and narratives were constructed from the interviews. The following section presents summaries of the case narratives. The whole process of data collection and analysis is based on the concept of comparative study [9]. It is an iterative process of data collection and analysis. Since it is a comparative study, theoretical sampling [10] is adopted for interviews with the three respondents. Formal interviews were conducted with each respondent, and the interviews were followed by frequent informal contacts when the researchers were not clear about the organizational activities related to the knowledge management systems. It took about 3 months for each case to reach the point of saturation where there was no more inquiry from researchers [10]. As we clearly stated, this is an exploratory study, we did not intend to increase the number of respondents for this study. Rather, we focused only on how the new dimension of knowledge management emerged from currently explained three cases, and we intend to further study it thoroughly in the future.

Table 1 – Summary of sources of data

Firm Name	Industry	Respondent – title
Alpha	Engineering	Research Engineer
Beta	Chemical	Senior Marketing Manager
Beta	Chemical	Knowledge Manager

4. Case Summaries

In the following three subsections (4.1, 4.2 and 4.3) we present the case narratives for Alpha and Beta. The process of sense making and the explanations derived from the data are presented in the following section.

4.1. Alpha Engineering

Alpha is a large engineering company with international operations; it designs different equipment and machinery required by the energy industry. Alpha's engineers design most of its machinery and equipment due to the uniqueness of their applications. Alpha uses many different control mechanisms requiring extensive use of electronics integrated with mechanical features. Alpha has several research scientists and engineers who design the necessary equipment and machines using state of the art technologies and methods. In the division we examined, research scientists and engineers create knowledge and receive support from various computerized tools as well as from other technical people. The research and development 'community' considers the end product of their work mostly as objective. Due to the extent of activities in Alpha, often the design knowledge gained in one area can be applied in other areas. Therefore, Alpha started a bulletin board to share the knowledge within the company. Later, Alpha enhanced the system with a more organized database and network technologies that allowed extensive browsing.

During the early days of the bulletin board, there was reluctance to share the knowledge in the company. When we inquired about the use of the bulletin board, Alpha's research engineer stated

> "We have a bulletin board to share design problems and solutions but people do not like to put the information in there. I think one major reason was they do not want others to see their work. We have been working within our own divisions and the concept of

sharing the knowledge is something new to us."

By the time the new system was put in place, the reluctance to use the system subsided, and the engineers and technicians, started to use the system more willingly. The following statement by the engineer reflects this:

> "The system we have now is really useful. There is no reluctance to use it now."

The present system uses a search engine with a knowledge repository, which was referred to by the engineer as a 'database'. The knowledge repository is generated by the entries made by the engineers who have knowledge to share with others. The knowledge to be shared can be new designs or solutions to engineering problems. When others need to find out about a solution to a problem, they can use the search engine to determine the availability of a solution or others' attempts at finding a solution. The search engine provides the capabilities to limit the searches so the hits obtained are not overwhelming. Making entries into the knowledge repository does not pose a problem. The entries in the knowledge repository can be entries made on-line in the given fields, that have limited lengths, or to other documents and diagrams. For example, a MS Word document or a diagram from a CAD system can be placed in the knowledge repository. A person accessing the different types of files needs a compatible application. For example, in order to access a MS Word diagram a person must have MS Word in her system. Research engineers do not need to make entries by themselves. Instead, they can delegate the entry to a technician.

There are no explicit mechanisms for controlling erroneous entries in the system. The research/engineering community itself is responsible for placing 'right' knowledge in the system. When inquired about the method used for ensuring the correctness of knowledge, the research engineer stated:

> "No one wants to make a mistake or make a wrong entry in there. It is sort of community controlled. In one way, no one wants to make a mistake and make it known to others. On the other hand, if there are errors in an entry someone in the community will point that out."

In summary, at Alpha, the technical community controls the contents without any formal procedures or explicit responsibilities and shares the knowledge in the repository. The knowledge entries can be made by a person other than the person who created the knowledge due to the assumed objectivity of knowledge.

4.2. Beta Marketing

Beta is a large chemical company with international marketing and sales operations. It serves an industrial customer base, and the marketing division carries out the company's marketing efforts at a more personal level where the marketing managers or representatives from Beta maintain relationships with client personnel in the companies. Once a contact is established with a client company manager, Beta marketing personnel will pursue the contacts to establish an account for the client company and complete a sale. The relationships with the clients remain intact after the first sales activity; Beta attempts to continue the relationship with the clients for future sales as well. Therefore, Beta uses a knowledge storage and sharing system to maintain the necessary knowledge about the client companies, their needs, and the contact persons.

Knowledge about client companies and their needs are easily shared and learned by the people using the system because they are represented using norms in the company. For example, the needs are represented as the products produced by Beta, which is known to all the marketing representatives in a similar manner. The company information is also 'standard' indicating the industry etc. The knowledge about the contact person includes personal characteristics, preferences etc. For example, a representative may make an entry about the golf playing abilities and preferences of a client contact person. Showing how the marketing division uses the system, the senior marketing manager stated the following:

> "It is a very useful system. Once we come to know about a client and their needs, we make entries about their needs and preferences. We log everything from their purchases to their leisure time activities so when we sit down with them we know what to discuss, what to talk about and what to avoid…"

The marketing representatives are free to make the entries that they deem suitable and no central authority is responsible for maintaining control over the contents. No single person is delegated with the responsibility for checking the errors, and the marketing personnel interpret the contents as required. For example, if the marketing representative X is planning to meet

manager A from company B, X will access the knowledge repository and search for the needs of B and preferences of A. X is free to use the knowledge about B and A as she finds necessary. Therefore, the interpretations of X will determine the value and correctness of knowledge about B and A.

Beta's senior marketing manager showed the researcher conducting the interview some of the entries made in the system by marketing representatives. The entries were quite extensive and detailed when providing the client contact preferences. The entries for company purchases were in list forms often because they were specific items. Access to the knowledge repository is through a login screen where a user must enter the user name and password. Because it is internal to the marketing division, only persons responsible for marketing knowledge have authority to access the system.

According to the senior marketing manager, the system is highly satisfactory. The marketing division finds it very effective because now they spend less time researching clients. In addition, it provides the flexibility in using the knowledge entries. The entries are in a loosely structured format. Therefore, the descriptions of clients can be entered easily without much coding. The structure is effective only when categorizing the type of information such as company information, needs and information about the client contact persons. Primarily the marketing division uses the marketing knowledge repository, and managers access the system in order to learn about the effectiveness of the marketing efforts. While the marketing system is for a specific division allowing mostly horizontal knowledge creation and sharing, Beta had started performing further knowledge management activities in order to provide vertical creation and sharing of knowledge.

4.3. Beta Knowledge Management

Beta's company wide knowledge management activities are performed under the direction of a designated knowledge manager. The knowledge manager is an expert in the field of chemical engineering. He attempts to set up and maintain systems that allow transfer of knowledge from the operational levels of the company to top management. The interviewer inquired about the knowledge management activities performed by the knowledge manager. According to the knowledge manager, Beta has several plants where production of chemicals takes place. At the senior management levels, the decision makers need to know about the production, performance, and problems occurring at these operational levels but not in detail form. The managers should be able to make decisions based on their knowledge about the relevant operational activities. For example, regarding senior managers would like to know about the production performance, wastage, and certain qualities of a new chemical M. With the knowledge about the production and product quality, the senior managers at Beta would be able to direct the marketing division properly so that they can carry out the marketing campaigns more effectively. Previously, only operational personnel used the production data that was collected at the plants, and once used at the operational level the data was discarded or not used. Explaining his responsibilities, the knowledge manager stated:

> "Earlier, we had this data at plants that was laid to waste. No one used them. We wanted to make use of them so that managers can learn more about the company's activities and make good decisions. My responsibility is to ensure that this knowledge sharing occurs and we create useful knowledge out of this data…"

When entering data to the system no extra effort is needed because the existing data can be converted to necessary knowledge. However, the conversion of the data to necessary knowledge requires some expertise, which is supplied by the knowledge manage. The knowledge manager is responsible for identifying the knowledge requirements and examining available data, and specifying the systems requirements for transferring the knowledge. Overall, Beta's knowledge manager obtained the services of the IT division and implemented the knowledge management system successfully.

5. Sense making from the cases

Several conceptual explanations emerged from the cases. Specifically, from the case narratives the concepts related to phenomena of knowledge creation, coding, entering, sharing and error control and correction emerged. Comparison of these phenomena across the cases shows that the attributes of knowledge differ and the phenomena of entering, coding requirements, and error handling also differ based on the attributes of the knowledge.

In Alpha, the engineering knowledge is regarded as standard and easily identifiable and corrected by the community of researchers/engineers. Therefore, the knowledge in the system is assumed objective within the context of the firm's engineering activities. Knowledge creation occurs through research and design activities and

the documents produced during these activities can be easily shared with others in the company. Therefore, the requirements for codification are fairly low or non-existent. As mentioned by the research engineer at Alpha, the knowledge creators can actually delegate the knowledge entries to the technicians. This shows the assumptions the users make about the objectivity of the knowledge. It is not necessary for knowledge creators to re-interpret, and code the knowledge before sharing it with others. When a person needs a solution to a problem, she can search the repository based on her own interpretations. The search key words depend on the problem solver who is seeking the knowledge. The low number of 'hits' received per search shows the ease of performing an algorithmic search on the knowledge. If the system needed a more heuristic search it would have given the users more knowledge 'hits'. Due to the assumptions about the objective nature of the shared knowledge, the user community can act as the error controlling mechanism. Everyone in the community can ensure the correctness of the contents, and everyone is aware of the others' abilities in judging the correctness of the contents. Therefore, the error control and corrections are also related to the assumption about the objective nature of the knowledge.

In comparison to Alpha, Beta's marketing division uses knowledge that is assumed to be more subjective in their system. Entries about the client contacts in the system are subjective interpretations of the marketing representatives. The contents are not all subjective; some of the entries are more objective because they are specified using the accepted norms (such as item specifications and company descriptions). The codification applies only for these objective aspects where everyone makes entries according to the accepted norms. When entering the knowledge about client contacts, such codification is not necessary. The narratives entered by the marketing representatives are interpretations, and the people accessing these descriptions are free to interpret them and arrive at their own inferences. Error control and correction are not critical issues because everyone is aware of the subjective nature of the knowledge. The system itself does not impose any constraints or checking and validating mechanisms. Knowledge entries are not delegated to other people, or third parties, and representatives and managers who create or discover the knowledge make entries by themselves.

Beta's activities in the knowledge management division differ from both its marketing division's and Alpha's activities. In this case, the knowledge manager is responsible for converting the objective data collected at plants to more subjective and contextual data. The contexts of the plants where the data came from are usually ignored. The knowledge manager acts as an expert intermediary in creating the knowledge required by the managers. The technology is used for collecting and sharing data. Further, the technology is used as a tool for converting the data to the necessary knowledge. The knowledge manager provides the heuristics for knowledge conversion and the specification provided by him is essential for knowledge sharing. The error correction is partly done by the system and the subjective nature of the outcome leaves it up to the managers to interpret. Data are already codified and entries do not need any effort because they are already collected through automation in the plants. Knowledge manager specifies some filtering and combination processes. Table 2 summarizes the system specification and the knowledge characteristics in the three cases.

Table 2 – System specification and knowledge characteristics

Case	Knowledge Attribute at		Entry	Extra Codification	Error Control	Expert Intermediary
	Origin	Destination				
Alpha	Objective	Objective	Often delegated	Not necessary	Community	Not required
Beta – marketing	Mostly subjective	Mostly subjective	Not delegated	Not necessary	Not a concern	Not required
Beta – KM	Objective	Subjective	Automated	Somewhat automated	Performed	Required

The above findings can be used for further identifying the relationships between the degree of objectivity/subjectivity of knowledge and systems needs and attributes – codification, knowledge entry, error control and role of intermediary. An overview of these relationships is shown in figure 2. In one type of system conversion from more objective knowledge to more subjective knowledge occurs while in others such conversions do not occur. Therefore, it is possible to categorize the system as non-converting, as in Beta KM, and converting, as in Alpha and in Beta marketing. Based on this categorization, relationships can be identified between the converting/non-converting systems and other attributes such as codification and role of intermediary. This relationship is shown in figure 3.

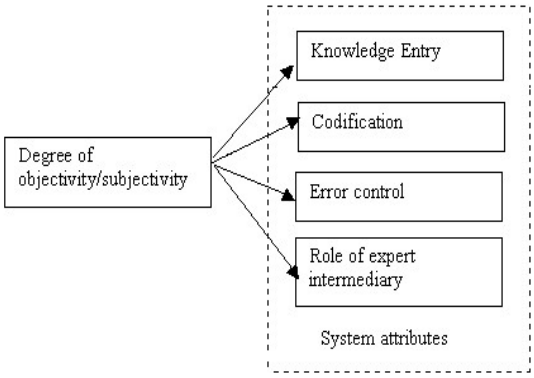

Figure 2 – System attributes

6. Conclusion and implications

As found in this research and as discussed by other researchers [19] consideration of context is very important for knowledge management activities. Becerra-Fernandez and Sabherwal [2] show the moderating effect of task characteristics on the success of KMS. Base on the findings it is possible to categorize the knowledge management systems as: 1. Non-converting knowledge systems (Alpha and Beta-marketing) (i) with objective knowledge (ii) subjective knowledge and 2.Converting knowledge systems (Beta-KM) (iii) converting objective data to more subjective knowledge. The characteristics and functionalities of the systems depend on the assumptions about the nature of knowledge. Depending on the characteristics of the knowledge, the contextual considerations may also become important. Evaluation of the objectivity/subjectivity of the knowledge may provide better guidelines for identification of the system specifications. Not only the technologies but also the social roles, managerial arrangements and organizational structures can be specified to a certain extent using the degrees of objectivity/subjectivity of knowledge.

Identification of the relationships between the tasks processes of knowledge creation and re-use, and the system attributes can help development of more effective approaches to knowledge management using IT. Furthermore, our research focused on the processes that occur during knowledge management, and presented inferences and deductions based on different assumptions of knowledge. These knowledge management processes create different structures that need to be examined in future research [11]. Improved understanding of the structures and proper analysis of assumptions about the nature of knowledge in use would provide better foundations for development of more effective and efficient KMS.

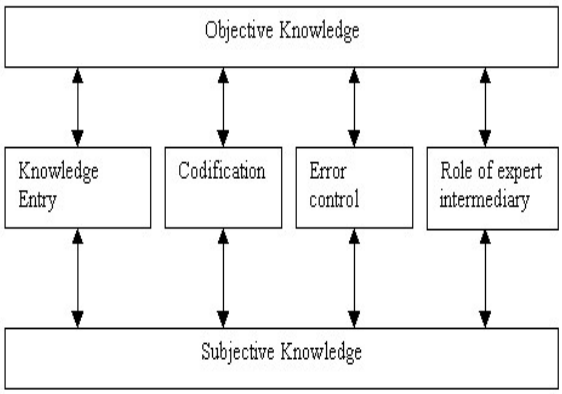

Figure 3 – Conversion needs vs. system attributes

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