Codification or Personalization? Aid To Choose Your Knowledge Management Strategy

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Abstract

This paper is interested in the process of choosing the most suitable Knowledge Management (KM) strategy for a company. Literature review presents several models and tools that can help companies manage their knowledge. However, any KM initiative should be part of a KM strategy that best meets the business need. Hansen, Nohria and Tierney previously addressed this topic by comparing the two strategies: codification and personalization. In order to help companies, choose the most appropriate strategy, they proposed to address three central questions. The answers to these questions should guide the choice of decision makers. Our study follows up on this work and proposes to help decision makers with a rational method. Our method is based on Hansen's three questions and on Multi-Criteria Decision Analysis (MCDA) tools. This method evaluates codification and personalization strategies in view of six criteria relating to the environment and the company's business. The originality of this study is the use of a mathematical tool to rationalize Hansen's selection aid method, which is one of the most cited works in the KM literature.

Keywords
Knowledge Management Strategy, Codification, Personalization, Multiple-Criteria Decision Analysis.

1. Introduction
In a globalized and increasingly competitive economic environment, companies must frequently adjust and restructure to survive and grow. Knowledge management no longer needs to demonstrate its role as a real performance and sustainability lever for companies. Successful knowledge management (KM) can support businesses in obtaining sustainable competitive advantage (Bibi et al. 2020; Büyüközkan et al. 2016; Zaim et al. 2019). Knowledge is the "accumulated structure of ideas, theories, experiences and practices that provide individuals, organizations and society with understanding or meaning to them and their environment" (Alcorta et al. 2009). Organizational knowledge is frequently discussed in literature as a mechanism for capturing and disseminating the knowledge that exists within the organization (Huang 2013). It represents the ability of members of an organization to integrate individual knowledge into a collective creation process (Tsoukas and Vladimirou 2001).

Heisig reviewed 160 frameworks and summarized the knowledge management process in five common activities which guide the development and the construction of effective knowledge management systems: identification, creation, storage, sharing and application (Heisig 2009). On the other hand, Nonaka, who is among the biggest contributors in the field of KM, distinguished two kinds of knowledge: tacit knowledge that refers to knowledge that resides in human mind, behavior, experience, expertise and perception; and explicit knowledge that can be readily articulated, codified, stored and accessed on manuals, documents, procedures, videos, etc (Nonaka and Takeuchi 1995). Knowledge management approach can only be effective if it takes into account both types of knowledge (Goh 2002). Depending on this distinction, literature offers two strategies to manage knowledge: Codification and Personalization (Woods and Cortada 2013).

Codification is a strategy that focuses heavily on capturing and storing organizational knowledge to control its subsequent dissemination and transfer. Hansen and his colleagues summarize this strategy with "people to documents" strategy (Haas and Hansen 2005). Whereas personalization is a strategy that focuses on the transfer and sharing of knowledge through socialization and human relationships. This is what Hansan and his colleagues call the "person to person" strategy. The two strategies are different and have complementary advantages. But what Hansen and his colleagues and others argue is that, at any given time, a company should have one primary and one secondary strategy. This may change as the business evolves (Haas and Hansen 2005). The following Figure 1, taken from the article by Hansen and colleagues, provides a good illustration of the difference between the two strategies.

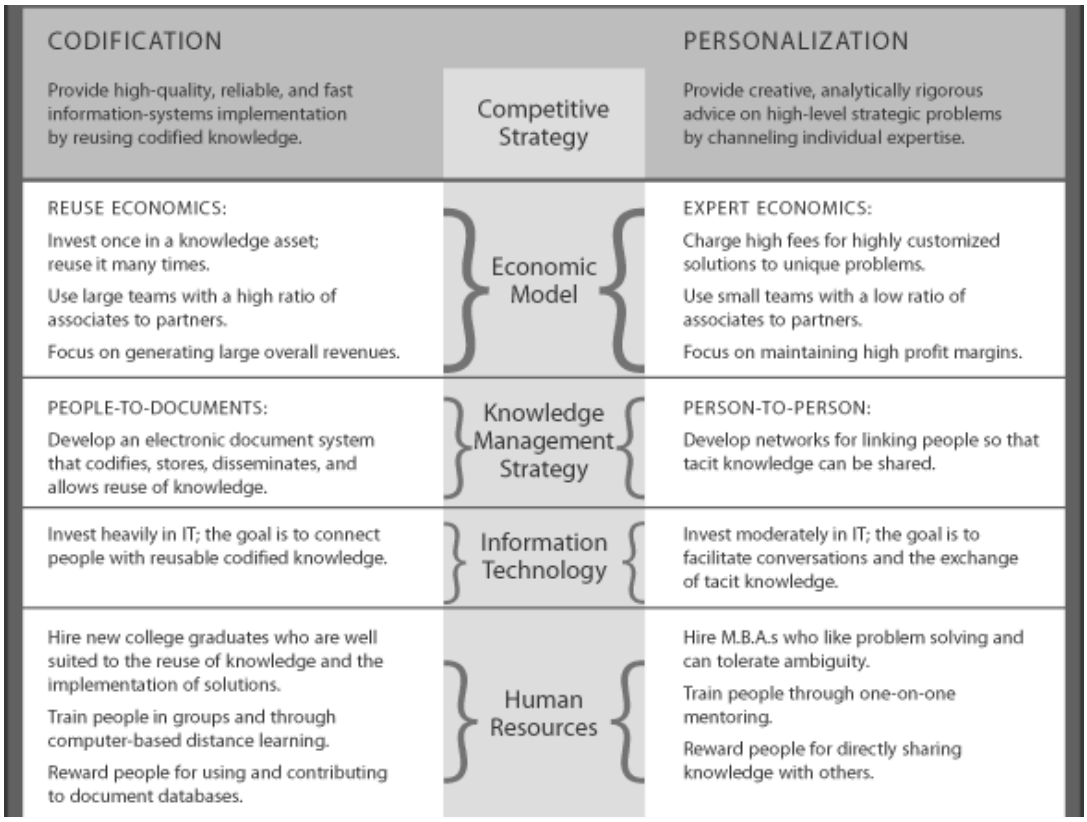

Figure 1 Comparison between codification and personalization strategies (adapted from (Woods and Cortada 2013))

Knowledge Management has been subject to several research interested around Knowledge concept, definition, forms, characteristics, process and tools… Big focus was given to models and frameworks that guides Knowledge Management initiatives. Indeed, 51% of articles proposes a new framework or model (Serenko and Dumay 2015). However, there is few studies that dealt with KM strategies. Indeed, KM initiatives, models and frameworks should be part of a KM strategy that best meets the business need. Hansen, Nohria and Tierney proposed a method to help companies choose the right strategy for their business. It is based on answering three questions that are supposed be crucial for the choice of one strategy (Woods and Cortada 2013 pp. 55, 69).

The questions of Hansen and al. clearly help initiate thinking process but do not offer objective guidance to outrank the strategies. This paper proposes a rational method, based on an MCDA tools, to evaluate both strategies with regards to criteria of decision defined by Hansen and al. MCDA is a sub-discipline of operational research that is concerned with structuring and solving decision making problems explicitly involving many criteria. Generally, there is no unique optimal solution for such problems and it is necessary to use decision-maker's preferences to differentiate between solutions. Some methods formulate the problem in the form of a function and seek its optimum. These are called utility function methods (Roubelat et al. 2000). Other methods are based on the comparison of the actions two by two. These are outranking methods (Fishburn and Lavalle 1999).

Many methods are proposed in the literature (Schärlig 1985) and can be used to support the selection of a KM strategy. The method we propose aims to help companies make the right choice of KM strategy the first time and accurately. The following section provides the theoretical and practical framework which served as the basis for our work. Indeed, we will start with a quick description of selection criteria proposed by Hansen and al. We will then present an overview of the MCDA method chosen to evaluate KM strategies, namely the weighted sum method. Section 4 describes the main contribution of this article, which is a combination of Weighted sum method and the criteria of Hansen and al.

2. Criteria for choosing a KM strategy

KM is a business support process. The KM strategy should then arise from the company's strategy and facilitate its deployment. Many companies make large investments in KM systems that are unnecessary or inappropriate. It is not only a question of modeling and codifying, it is a question of combination between codification and personalization. In knowledge, digitalization cannot replace socialization (Kreiner 1999). But how to find the right mix between the codification and personalization strategies? What should be the primary and secondary strategy? Hansen, Nohria and Tierney have studied the issue and proposed three questions that every company should ask to determine the most appropriate primary strategy for their business (Woods and Cortada 2013 pp. 55, 69):

- Do you offer standardized or customized products?
- Do you have a mature or innovative product?
- Do your people rely on explicit or tacit knowledge to solve problems?

These questions are developed in following subsections.

2.1 Standardized or customized products

According to Hansen and al, the nature of the product being marketed is critical to the choice of knowledge management strategy for that company. For example, Consulting companies that offer quality assurance certification services will use the same approach based on certification requirements, check lists, scoring, audits, etc. These companies will reuse same schemes and will develop very focused knowledge in this area. Thus they should use codification strategy as it will be more efficient to enhance their performance and mater their processes. At the opposite side, a consulting company offering strategy or performance improvement services will need to use much diverse knowledge, rely on different methodologies and create customized frameworks to solve complex client issues. Thus the added value will be generated through problem solving teams' workshops, analysis and customized solutions definition; and less more through previous existing documentation.

2.2 Mature or innovative product

Consulting companies operating in financial auditing and stewardship will use mature methodologies and playbooks to carry on their assignments. Knowledge codification should be then their main choice to capture knowledge. On the other hand, consulting companies delivering assignment related to digitalization, industry 4.0 will have to support their innovative services by a personalization knowledge strategy that should bring the agility they are looking for.

2.3. Problem solving based on explicit or tacit knowledge

Safety consulting companies will solve problems with very detailed processes, legal requirements and engineering related data. This kind of assignments should be supported with highly codified documentation being on the center of their knowledge management strategy. In a different context of problem solving, strategy companies will use the synergy of multiple point of use through teams' workshops with the support of specific data, brainstorming and creativity to solve an assignment of what is the best positioning for a market brand for example. These companies should rely on a personalization KM strategy. For Hansen and al, it is important to make a direct link between KM strategy and business strategy through the three questions explained above. We then propose a synthetic table explaining these implications (see Table 1).

Table 1 How to choose a KM strategy according to the three questions of Hansen, Nohria and Tierney (Adapted from (Woods and Cortada 2013 pp. 55, 69))

Do you offer standardized or customized products?	Do you have a mature or innovative product?	Do your people rely on explicit or tacit knowledge to solve problems?	KM Strategy
Standardized products	Mature products	Problem solving based on explicit knowledge	Codification
Customized products	Innovative products	Problem solving based on tacit knowledge	Personalization

These questions are interesting to initiate thinking process about the appropriate primary KM strategy. However, it seems to be insufficient in all cases. We can imagine that a company offers customized products based on mature technology and their people rely on tacit knowledge to deal with problem solving situations. What should this company choose as a primary KM strategy? We can also take the example of a company that offers both standardized and customized products. In these cases, the choice of a KM strategy becomes less obvious and the answers to the three questions no longer seem sufficient to guide company decision-makers.

Following these conclusions, we propose to complete the method suggested by Hansen, Nohria and Tierney and act on the form of the answers that companies may give to the three questions seen bellow. Indeed, a company may have both standardized and customized products; mature and innovative products; and problem solving based on explicit and tacit knowledge. These characteristics can coexist with different levels. Companies are here faced to multi criteria decision situations. MCDA methods are very suited in such situations.

3. MCDA and Weighted sum method

MCDA is concerned with structuring and solving decision making problems explicitly involving many criteria. Generally, there is no unique optimal solution for such problems and it is necessary to use decision-maker's preferences to differentiate between solutions(Jghamou et al. 2018).

In (Schärlig 1985), four common steps to all MCDA methods are presented:

- Definition of the alternatives: it consists on selecting a subset, as small as possible, of alternatives Ai, i = 1…n. These alternatives or actions will be analyzed and evaluated during the decision process.
- Construction of criteria: this phase is very important and decisive for all multiple criteria methods. Weights are often affected to criteria. To model their relative importance, values between 0 and 1 whose sum equals 1, can be set freely by the decision maker or a decision aid method.
- Performance matrix: each action is judged according to each criterion. All assessments can be presented in a double-entry table, called a performance matrix. Other parameters relate to the criteria are also mentioned in the performance matrix depending on the chosen aggregation method. Such as the weights of the criteria, which are used in almost all the methods, thresholds, vetoes ...
- Aggregation phase: it consists in aggregating the performances to designate the action that has the best evaluation.

In (Guitouni and Martel 1998), the authors rely on 99 references to develop guidelines to choose the adequate MCDA method for each situation. They list 29 methods of multiple-criteria decision analysis methods and compare them regarding the guidelines. In decision theory, the weighted sum model is the simplest and the best known MCDA method. It is probably the most widely used, especially in situations where performance values have the same unit (Hwang and Masud 2012; Louafa and Perret 2008; MacCrimmon 1968).

The utility function representing this method is:

$$U_i(a) = \sum_{j=1}^{m} w_j \, a_{ij}$$

Where w_j denotes the weight of importance of the criterion C_j and a_{ij} is the performance value of action A_i when it is evaluated in terms of criterion C_j. It is also assumed that all the criteria are to maximize, i.e. the higher the values are, the better the action is.

Assigning weights to the criteria is a critical step. Several methods are available. AHP is the most used (Belton and Stewart 2002; Saaty 2008). Delphi can also be used in cases where experts' opinions are necessary (Linstone et al. 1975). In our case, we use a weighting matrix where the criteria are compared two by two to obtain the relative weight of each criterion. It is a square matrix V of size equal to the number of criteria m, where each element v_{jl} is given by:

- v_{jl} = 1 if criterion j is more important than criterion l,
- v_{jl} = 0 otherwise.

The weight of a criterion j is then given by

$$w_j = \frac{\sum_{l=1}^{m} v_{jl}}{\sum_{l=1,k=1}^{m} v_{kl}}$$

To better illustrate these mathematical formulas, we give an example of the application of the weighting matrix in Table 1. Another interesting illustration is available in the work (Jghamou et al. 2021).

Table 2 Weighting matrix example

	C_1	C_2	C_3	C_4	C_5	Weights (w)
C_1	0	1	0	1	1	0,3
C_2	0	0	0	1	1	0,2
C_3	1	1	0	1	1	0,4
C_4	0	0	0	0	1	0,1
C_5	0	0	0	0	0	0

This table shows the relative importance of each criterion. The integration of weights in the utility function of the weighted sum leads to a final performance matrix with all performances of all alternatives to facilitate the comparison as shown in Table 3.

Table 3 Performance matrix of the weighted sum method

	C_1	C_2	..	..	C_m	Performance
A_1	a_{11}	a_{12}			a_{1m}	U_1
A_2	a_{21}	a_{22}			a_{2m}	U_2
..						..
..						..
..						..
A_n	a_{n1}	a_{n2}			a_{nm}	U_n
Weights (w)	w_1	w_2			w_m	--

4. The proposed method to aid choose the best KM strategy

In this paper, we propose to apply an MCDA method, namely the weighted sum method, to help companies choose their primary KM strategy in the basis of the three reflection questions proposed by Hansen, Nohria and Tierney. The process suggested is organized through the four stages of MCDA methods as follows:

1. Definition of the alternatives: Literature offers two main KM strategies: codification and personalization. We will then use following references:
    - A1: codification strategy
    - A2: personalization strategy
2. Construction of the criteria: Our model is based on Hansen and al's work. The three questions proposed by authors are considered as criteria influencing the decision of one KM strategy. In section 2, we discussed the limitation related to these questions. We then propose to split these three questions into six decision support criteria:
    - C1: Level of standardization of products
    - C2: Level of customization of products
    - C3: Level of maturity of products
    - C4: Level of innovation in products
    - C5: Level of use of explicit knowledge in problem solving
    - C6: Level of use of tacit knowledge in problem solving
3. Development of the performance matrix: We assess the alternatives regarding to criteria using decision makers' evaluation a_{ij}. The a_{ij}-values represent achievement levels and are estimated as a percentage. For example, a company may have a commercial offer in which 60% of the products are standard and 40% customized. A company can also consider that its products are 30% mature and that innovation represents

70%. Also, to solve these problems, people in the company usually rely on previous experiences or documentation for only 20% and complete the 80% of their analysis with their expertise or by applying brainstorming and creative thinking methods. As the codification strategy is not efficient in cases of customized and innovative products and tacit problem solving, we do not need to evaluate this alternative regarding these criteria. Same logic concerns the personalization strategy with C_1, C_3 and C_5.
Decision makers may also determine different weights to criteria depending on the particularities of their activity and following the weighting matrix explained in Section 3 (Table 2). All this data is used to obtain a performance matrix as presented in Table 4.

Table 4 Performance matrix of KM strategies

	C_1	C_2	C_3	C_4	C_5	C_6
A_1	a_{11}	0	a_{13}	0	a_{15}	0
A_2	0	a_{22}	0	a_{24}	0	a_{26}
Weights (w)	w_1	w_2	w_3	w_4	w_5	w_6

4. Aggregation phase: Different methods are available, but as explained in Section 3, we choose to apply weighted sum method for its simplicity. The application of the utility function of this method leads to the final performances of the strategies A1 and A2 presented in Table 5.

Table 5 KM strategies performances

	Performance
A_1	$\sum_{j=1}^{6} w_j \, a_{1j}$
A_2	$\sum_{j=1}^{6} w_j \, a_{2j}$

Thus, after calculating all the indices, one alternative will outrank the second one. The company can then decide on its primary and secondary strategy based on the results of this assessment. The primary strategy is the one with the best performance.

5. Conclusion

This paper is concerned with the selection process of the most adapted KM strategy for its company. It focused on codification and personalization strategies developed in literature. This work is based on the method proposed by Hansen, Nohria and Tierney previously to help companies determine which strategy is likely to be the primary one. This article aims to provide more rational guidance to companies in cases where the Hansen model is no longer sufficient. This method is based on the MCDA processes on four stages and uses six decision criteria derived from Hansen and al's three questions. It was decided to use the weighted sum method for the aggregation phase for ease of illustration but other more sophisticated methods can also be considered.

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