An Approach of Business Decision Making based on E-Learning and Knowledge Management

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Abstract—Today's, companies have increasingly been faced with many pressures related to competition and competitiveness. Understanding and influencing these changes requires effective management of human knowledge, including decision-making. This paper examines an experience of implementing knowledge management within organizations. We propose an approach based on E-Learning and its components to establish an organizational memory of documents, processes and Decision-making knowledge. We have been particularly interested in training in decision-making and we have accompanied the entity studied in a process of explicitation of knowledge and conduct of the change.

Keywords:Knowledge management, Collaborative tools, E-Learning, Portal, Decision

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1. Introduction

In today's increasingly competitive environments, often called the "age of knowledge", employees become knowledge actors whose decision depends heavily on their productions. Decision making becomes one of the most common mental activities and one of the most crucial processes of any business. Decision making has been widely studied in the literature and has given rise to many different theoretical frameworks [1,2].

In this context, decision support tools need to be adapted to respond to the timeliness and usefulness of the decision information required by these actors at all levels of the organization. Organizational and technological support tools for knowledge workers have become widespread in companies and are now taking various forms: knowledge base, discussion forum, blog, intranet platform, collaborative work, etc.Decision-making thus becomes a knowledge-intensive activity, the knowledge of which is the raw material [16]. According to Wiig [3], "lack of knowledge is a major gap in important business decisions".Business Intelligence uses a variety of Knowledge Management (KM) techniques to represent and process knowledge relevant to decision making, including declarative knowledge (data,information), procedural knowledge (algorithms) and reasoning knowledge Rules).

Acquiring skills in the area of KM becomes very important for the competitiveness of decision makers who must be reactive, opportunistic and

able to integrate quickly and easily into the global knowledge society.

The work we present in this paper is part of a general problem of the development of decision-making skills, through the use of knowledge and its management.The main objective is to propose a methodology for the construction of a corporate memory,thanks to a knowledge-based approachand E-Learning. Corporate memory is supposed to store knowledge, especially those related to decision-making processes[11]. It also aims to develop new skills among the various employees of the company involved in an E-Learning-based KM project[18].

This issue reflects the problems raised by the practices of organizations confronted with innovation in an increasingly competitive context.

Such a characteristic leads organizations to develop by managing their human capital to the best of their ability through an approach known as knowledge management through explicitation and learning. The challenge of this approach is to capitalize the knowledge possessed by organizations using information and communication technologies. The knowledge announced here is complex and is distributed in all the components of the informal information system. As pointed out by Nonaka [4], the difficulty lies in **the nature of the usedknowledge**, the **actors** who hold it and the processes of their**extraction** as well as their **representation**.

From a scientific point of view, this raises several issues relating to disciplinary fields which are closely linked. In order to better address this issue, we propose an interrogative approach. Thus several questions can be asked: What is knowledge? How to extract it and how to represent it and exploit it? What are the steps, methodologies and tools adopted by the scientific community? What is the specificity of decisional knowledge? How to teach and acquire them?

In order to answer or to approach the answers to these questions, often posed by the scientific community emanating from the domain of management and engineering of knowledge in general, we adopt as the main objective the proposal of methodological aids and Software for the construction of a corporate memory, thanks to a knowledge-centric approach[10]. We propose a model of KM based on E-Learning to develop decision-making skills within a company [22,23, 24].

We will study in particular a main application: the construction of an organizational memory for hotel companies. The purpose of this article is then to show how E-Learning can improve the development ofdecision-makingskills within organizationsand consequently to acquire knowledge.

To achieve this objective, we start with a real case that we exploited by carrying out a survey on the levels of practice of the KM with the hotel units of the cities of Agadir and Marrakech. The results of the survey in question show us, as will be shown below, that although there are tools; knowledge management approaches are not

explicit. In addition, the learning and practical dimension is almost absent.

The first part of the paper will address the concept of KM as well as the underlying processes with an attempt to link knowledge management, E-Learning and decision making. The second part proposes some decision models based on KM. Part 4 is concerned with KM's technological tools. The following section shows a real case of development of decision-making skills based on E-Learning. Finally, the conclusion allows us to present perspectives of this work.

2. Knowledge Management: Concepts and Processes

Before considering the aspects of modeling, it seems important to us to try first to situate what we mean by knowledge and what relationship it has with the notion of information. The second step of this section is devoted to the presentation of the different activities related knowledge management by trying to answer the following questions: How to acquire and represent knowledge? And what technological tools make it operational, accessible, manageable and useful? What is the link between E-Learning, knowledge management and decision-making?

2.1 Knowledge and Information

The concept of KM raises the delicate problem of the exact meaning of the term knowledge. It usually leads to confusion between data, information and knowledge. It would be absurd to try to define these terms in a few lines, knowing that a profound debate on the origins of these terms has been fed by philosophers for several centuries, and very recently by knowledge engineers. We use a hierarchy composed of the terms data, information and knowledge [5]. Wewillsaythat:

• *The data* is a raw element outside of any context, so for example it is 37 ° C is a given;

• *Information*is contextualized. This is what is available and can be stored. From a technical point of view, information usually circulates in information systems [6]. The

information would therefore rhyme with an interpretation (mechanical or human) of the raw information. For example, it is 37 ° C in Marrakech is information;

• *Knowledge*would correspond to assimilated information in order to carry out an action. According to knowledge resides in individuals and represents the sum of the accumulated experiences used to find solutions to the problems posed[6]. Knowledge therefore appeals to questions of meaning borne in particular by notions such as language, semantics, beliefs, consciousness, and so on. As an example of knowledge, we will say that if it is hot, then I would put on a short-sleeved shirt.
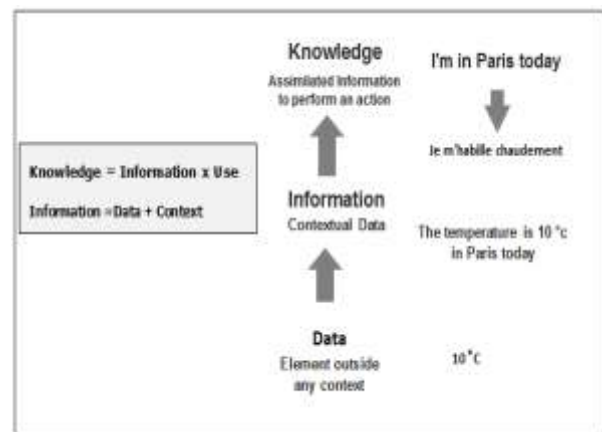

Fig1:Hierarchical model of knowledge [5.

This hierarchical model of knowledge (Figure1) allows us to make a clear distinction betweeninformation and knowledge. Finally, we will say that information is not knowledge, but it can become so if it is understood and assimilated by an individual. To be more precise and to better understand the concept of knowledge, some authors [7], [4] make an important distinction between **tacit** and **explicit** knowledge:

• *Tacit knowledge*is rooted in action, in routines, in a specific context; we also speak of mental objects or representations (which can give personal productivity at the individual level and the competitive advantage at the collective level of 'business).

• *Explicitknowledge*is codified knowledge, transmissible into a formal and systematic language (documents, information systems,

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etc.). This knowledge is not fixed, but a dynamic process enriches and transforms them continually.

2.2 The Knowledge Management Concept

Every company, as a system, manages daily flows of information and knowledge that are more or less structured. This knowledge and information is of different types and stored in different media.

Regardless of the nature of the media and the typology considered, stored knowledge becomes the main driver of the company's development and its management is now in line with the reality of the company which goes beyond the capitalization stage of knowledge where l The challenge is to explain, through a process of knowledge engineering [8], the knowledge rooted in the culture, routines, documents and practices of individuals.

Knowledge management, as previously reported [9], is a broader concept whereby an organization*identifies, unites, organizes, shares, diffuses, finds, analyzes and improves* its knowledge globally, in terms of Resources, documents and skills to achieve strategic goals, while trying to integrate everything through different approaches to knowledge management.

Existing approaches include, but are not limited to, classical approaches based on the design of knowledge-based systems (KBS) [12], the Anglo-Saxon approach with a strong tool-oriented approach, Communities of practice and / or distance learning, or corporate memory. All these approaches are important, complementary and use more or less tools.

Thus, the first experiments in KM were focused on the implementation of technological tools. These projects ignore the content and its use. Because of this, they have treated knowledge as a static object that can be stored, see a fixed entity. Knowledge is constantly challenged [6]. Moreover, the company finds a permanent renewal of its performance only in its capacity to learn. Projects that do not take into account the deeply dynamic nature of knowledge are for the most part doomed to failure.

2.3 E-Learning and KnowledgeManagement

The question of the links between E-Learning and KM has been widely discussed in the literature. The first observation, according to Bruillard [17], is the convergence between these two domains, supported by recent approaches

in the field of human resources.

Indeed, E-Learning can develop new skills (E-Skills), whether in knowledge management or in other disciplines, thanks in particular to Web 2.0 tools. The second convergence is to help employees learn, manage and work in ways that contribute to the generation of new knowledge. In this sense, collaborative work becomes important. E-Learning platforms today emphasize collaboration and sharing, offering a set of pedagogically organized activities. Finally, E-Learning is supposed to allow an organization to learn continuously, to manage its human capital and its knowledge, to change the behavior of employees in the face of new situations.

3. Decision models based on the KM

According to Petrash, Managing Knowledge Assets [21], the CG is about providing the right person with the right knowledge at the right time so that it can make the best decision. The CG therefore has a close connection with the decision.

In the literature, different models have been proposed in this direction. We can highlight the model of knowledge mapping. This is a knowledge management system capable of sorting and fine-tuning and advanced analysis to determine, what knowledge to sustain, develop, abandon, etc. In this sense, mapping becomes a decision-making tool for optimal management of the firm's knowledge [19]. The DIC (Data, Information, and Knowledge) model [20] shows that knowledge is created from the information that is designed, in turn, from the data.

In all these models, the idea of capitalization consists in determining the data, information and knowledge with the vision to consider them as components that lead to the decision-making, and the action.

4. Technological tools and their impact

The technological tools are likely to contribute to the support and the management of the knowledge of the company. Their common point is to focus on broader access, dissemination, and information sharing [13].

Several taxonomies of these tools have been proposed in the literature. A first classification presents a typology consisting of five main categories: traditional information systems, documentary informatics, decisional computing (data warehouses, datamarts or data warehouses), and cooperative and / or collaborative work [13]. The second

taxonomy is more exhaustive and presents these tools as tools of the market while distinguishing the tools of access to the information, the tools of visualization of the information, the tools of text mining, the tools of management of the processes, the tools of localization of expertise, the tools of collaborative work, and the tools of collaborative publication [12]. It is possible to summarize these two conceptions according to the five major problems they are trying to solve: the portal, collaborative work, information retrieval, document management and expertise.

The portal represents the interface between the user and the various tools. It represents a common point, a set of information from sources external to or internal to the organization and access to tools. A portal can be more or less sophisticated: it can be a simple Web site, or a site integrating the profiling functionality (user profile), that is to say it is able to adapt to its user whether on the font or the form of the presented content. It can integrate more or less sophisticated information visualization tools such as cognitive maps or semantic maps.

Collaborative work tools: These tools allow the creation of exchange environments enabling employees to communicate with each other and to formalize protocols for the sharing of knowledge. Collaborative work is generally embodied in various tools such as: messaging, forums, calendar, videoconferencing, and workflow. It is these tools that make it possible to manipulate evolutionary, dynamic, explicit or implicit knowledge.

The search for information is one of the main steps in the appropriation of new knowledge by the various users. At this level, three main categories of tools can be distinguished: search engines with expanded access to content, monitoring that allows real-time monitoring of information developments and mapping that facilitates access to documents Thanks to classification and synthesis.

The document management is to manage all the documents available to the organization by following different stages of publishing: acquisition, creation, dissemination and archiving

The expertise or location of expertise is intended to identify skills on the one hand the internal skills, to manage them and to improve them through training devices. It also aims to facilitate the search for external experts who can help an individual by passing on their knowledge. Beyond the search for experts, these tools manage the linking of individuals in order to capitalize exchanges.

5. Proposal of a Learning Knowledge ManagementModel for Decision

In this section, we propose a technological model to capture an organization's decision-making knowledge, in the form of a KM project.

The objective of this project is to select for a company a set of methods, techniques and tools in order to make it accessible all the knowledge, internal and external, especially the one disseminated in the memory of the experts and which corresponds to tacit knowledge. Among the existing KM tools, we chose a model based on E-Learning.

The idea is to train the employees of a company in the techniques, tools and methods of KM. This training will in particular sensitize the employee-learners to explain the different knowledge of decision-making and to put them into practice. As a technological solution, E-Learning is materialized by the MOODLE platform and therefore a portal of content, assignments, QCM, forum, decision situations, etc.

5.1 Capitalization context

The aim of this section is to show briefly what KM practices can be in Moroccan companies, but also how to accompany them in setting up a KM platform. We will draw on two studies we have carried out: first a survey to determine the nature of these practices, but also an experience to accompany a company in a first step of explaining some decision-making knowledge, based on E-Learning

5.2 Investigation

We conducted a survey of 50 hotel units in 2016 to determine the level of use of KM in these companies. The results of the survey provide a clearer picture of the state of such an implementation. Knowing that Morocco has an average connectivity rate, this survey shows that all the companies visited were connected to the Internet.

But despite the high connectivity rate, hotel companies do not use advanced Internet applications, except web browsing (for 5 *, over 50%), and email (100% for 5 *). Although the majority of businesses use e-mail, as shown in Table 1 only 46% (on average) own a website. Of these websites, very few are interactive.

Table1. Technology use and knowledge management practice, by size of hotel unit, in 2016 (%)

Usage des technologies de l'information dans la gestion courante

Taille de l'unité hôtelière	Utilisation ordinateurs	Utilisation d'Internet	Intranet	Courriel	Site Web	Base de données
5*	100	80	50	100	80	100
4*	100	80	30	100	50	100
3*	100	40	10	50	10	100

Technologie d'information et Pratique de Gestion de connaissances

Taille de l'unité hôtelière	Stratégie de Connaissances clients	Bases de données décisionnelles	Mesure de succès de relation client
5*	100	80	50
4*	100	80	30
3*	100	40	10

As for the KM practices observed, we can postulate that 100% of the units manipulate customer knowledge. In addition, on average 30% use knowledge to assess the impact on customer relations. Despite this great enthusiasm, the integration of knowledge management still faces significant obstacles, notably the lack of explicit objectives and the non-use of tools. To improve the use of KM in these units, we have tried with one of them a KM experience based on distance learning and the single portal.

5.3 Choice of contents

Three modules were followed by employees as learners and creators of knowledge. The first module is to introduce first the importance of the use of information technology in the various daily tasks of these actors and to deepen their basic knowledge in computer science. This module includes courses on Internet use, as well as Microsoft Office tools (Word, Excel, FrontPage, and PowerPoint). The second module focused on knowledge management techniques. Part of the production and archiving of documents has also been the subject of collaborative work. The third module, as presented below, concerned the development of decision-making competencies.

5.4 The Knowledge Portal

In order to increase the awareness of hotel units of the importance of knowledge management, we have carried out with one of these units an experience proposing a portal which aims to acquire new knowledge and skills, explicit knowledge of the company's explicit and tacit knowledge [14].

This experience has materialized through the implementation of a knowledge management portal based on open and distance learning (LMS). The proposed portal provides an interface that allows employees to locate internal or external content (Figure 2.a), to assess their progress against learning objectives, and to perform a variety of other functions, Discussion, messaging with a tutor, a teacher or an executive of the company. Several modules have been offered online, we can cite courses of office, on the Internet, but also on the representation of the procedures related to the different tasks of the employees. On return, employees should perform a set of activities (or duties), individually or in groups. Most of these activities focused on the knowledge of the organization.
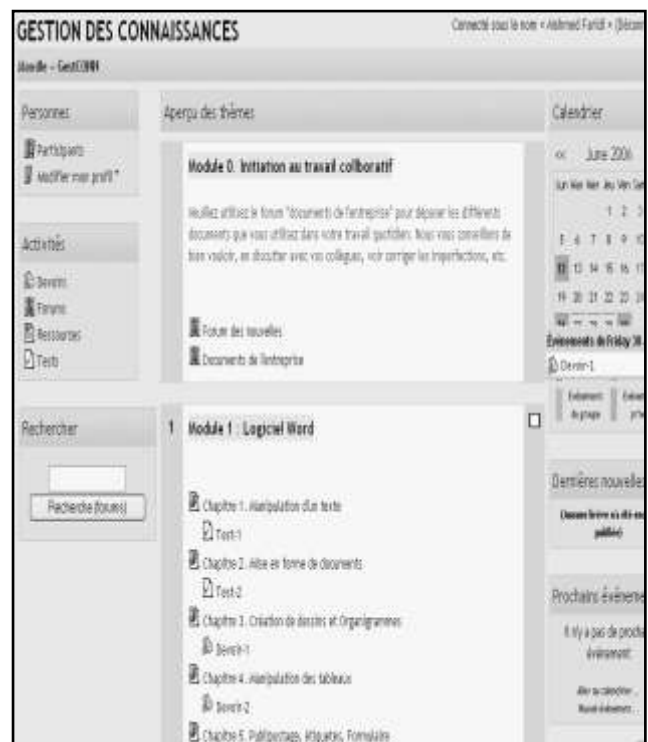

Fig2. Welcome screen of the portal

The Moodle platform (Figure 2) is the main entry point to the company's knowledge, but also to the information that is on the Web. In the developed distance learning system, different types of teaching resources have been set up in

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order to meet the different objectives set out at the outset. Three main sections with different pedagogical aims have been proposed.

■ The course and its annexes

In order to compensate for the classical face-to-face training, complete courses, accompanied by a synthesis, have been put online. In addition, there is a glossary to access the course by keyword. In addition, a series of exercises is available for each chapter of the course and correspond to exercises that normally should be done in tutorial or tutored work. Access to the forums is possible in order to allow the trainees to communicate with the different tutors at their disposal as well as with their peers, in order to provide them with relevant information [15].

■ Knowledge tests

Each chapter of a course is accompanied by one or more MCQs to help trainees better understand the courses and concepts presented. These MCQs automatically refer to the trainee his grade, the answer key and a justification of the correct answer with hyperlinks to the corresponding part of the course, but also to external links to deepen the knowledge. This allows the trainee to evaluate himself and improve his performance.

■ The agenda

The objective of the agenda is to encourage trainees to better organize their work to prepare them for thefinal exams. The first proposed organization concerns first the management of personal working time. By connecting to the distance learning system in question, the trainees are welcomed in a page giving access to the course schedule, to identify in time the different grouping sessions as well as the different work to be done. Moreover, from this page, the trainees can at any time determine the trainees connected and to dialogue on a forum animated by teachers; this forum is very used by the trainees to ask questions about the course, the exercises but also the files to be made for each training module.

■ Working papers and projects

As stated above, knowledge of the company must be capitalizable, shareable and scalable. In the proposed scheme, we first left free access to the various trainees to propose all types of internal documents (forms, letters, invoices, regulations, procedures, ...) or external documents (web documents, digitized documents, ...) at their disposal. This was done through forums called "company documents". In

this part, trainees can file new documents, consult existing documents or even download them or propose modifications. From this opening, we were able to collect all types of documents that we analyzed in the presence of the managers of the company. Several groups have been formed to allow standardization, but also to think about possibilities of indexation to facilitate the research.
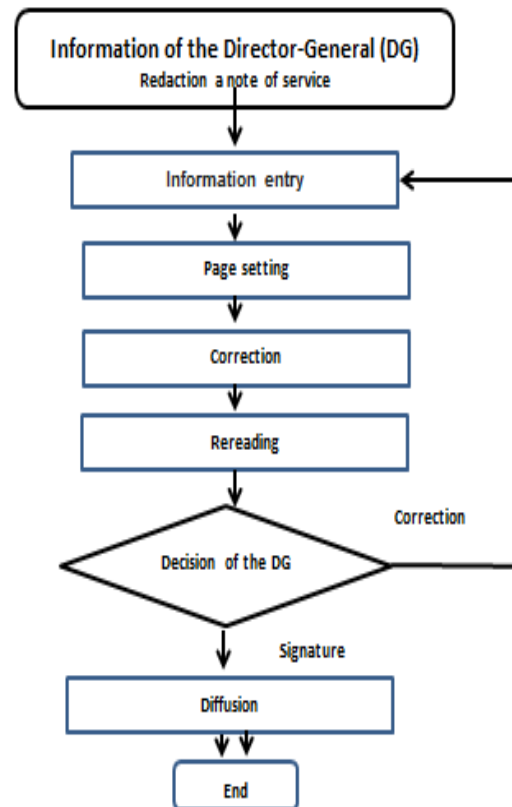

Fig 3: Example of a procedure diagram

For the different routines and procedures used by the trainees in their daily tasks, we used the process description diagrams [6]. These diagrams use flow diagrams (Figure 3), which have gained momentum with the generalization of ISO 9000 standards in companies, as well as with re-egineering operations.

This tool allowed us a graphical representation of the processes, thus facilitating understanding and improvement by the trainees of the processes in question. To do this, we first trained the various trainees in the techniques of creating process description diagrams, using both face-to-face and on-line courses, as well as exercises and MCQs to assess the different knowledge acquired.

End-of-study projects were proposed to allow the trainees to finally explain the various tacit knowledge used in their work, using the knowledge acquired in the ICT module, but also the module of diagrams of representation of procedures. Finally, in order to allow socialization, the various reports of corrected projects of the trainees were put online

5.5 Development of decision-making skills

Module 3 involved content related to the notion of decision. Thus, five chapters were presented to employees (Introduction, Concept of decision-making, Phases of the decision-making process, Complexity of decision-making, Decision-making process). On the last chapter, the contents distinguished: *strategic, administrative and operationaldecisions.*

Each chapter is accompanied by a set of resources in the form of readings, but also videos. Multiple-choice questionnaires are used to assess the understanding of concepts. Employees should also work on projects enabling them to clarify the company's decision-making knowledge. Similarly, a number of real-life exercises have been selected and a Forum activity allows employees to make collaborative group decisions. Learners should respond according to four steps: the position of the problem, the proposal of a repertoire of solutions, the choice of a negotiated solution according to a consensus, and the implementation of a solution action plan detention.

Examples of exercises :

(1) *Imagine a piracy of the site E-commerce of company Y, it is using data, information and knowledge; To decide the possible solutions with a lesser blow and a high efficiency in terms of reactivity.*

(2) *Imagine stopping one of the four productionmachines with constraints related to customer orders decide what to do to avoid critical situations.*

In order to allow employees to be involved in their learning and autonomous, a space has been created to propose situations of critical decisions encountered in their daily work. It is also a question of proposing the chosen solution and of trying to convince the collaborators.

5.6 Knowledge representation and exploitation

The knowledge acquired through the methodology presented above is a resource devoted to the representation of ontological knowledge. Ontologyisused to index documents and different knowledge extracted from forums and homework, to facilitate their search and navigation between related concepts.

By adding metadata to documents and decision-making processes capitalized via the E-Learning platform, we add semantic descriptors to organizational memory. In this case, it is possible to make complex queries and find documents according to their authors (name, function, etc.).

Finally, another semantic level is developed by the semantic relations between the terms (to work with, is connected to, is a component of, is a partner, interacts with, has for equipment, has for product decision, diagnosis, etc.). These types of relationships are used to suggest new searches to the user or to automatically extend the search. For example, if an employee is looking for a device-related diagnosis, he / she is generally happy to know that this diagnosis has already been the work of the collaborators, this can help him determine the symptoms and reasons for stopping the equipment to avoid this in the future.

Conclusion

To conclude, we want to return to the objective of this communication, namely, to propose a model of KM based on E-Learning to develop decision-making skills within a company. Indeed, as we have been able to show, there are various technological tools supporting KM. But no complete solution exists on the market. Moreover, the tool alone is not sufficient to enable knowledge to be managed if it is not possible to use it. The use of the tool must also be studied in a methodical and disciplined manner, and for this reason we have used organizational learning activities with real decision-making situations in order to build confidence among employees.

This creative trust made it possible to deposit more knowledge at the level of the duties and forums. We will no doubt pursue this type of approach on the basis of an iterative and participative approach that has produced these results, as we have shown in this paper. The aim of the next step is to develop a stable knowledge management model adapted to the constraints and specificities of the local culture and the region, using other tools such as Social networks.

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