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THE CONDITIONS OF EMERGENCE OF KNOWLEDGE WORKERS ILLUSTRATED THROUGH THE CASE OF AN OIL COMPANY

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Abstract: *The advent of the knowledge society and the ubiquity of information and communication technologies summarize current developments in the business environment and express the theoretical and organizational challenges. Now, more managerial studies insist on the importance of knowledge management as the new approach for the development of work based knowledge. Precisely, this new discipline in construction can be apprehended by two approaches: a technological approach and a social approach, as it will be presented in the first part of this paper. In the second part, the presentation of the case of an oil company will help us to highlight, on the one hand, the limits of the technological approach to emerging practices of knowledge workers, and on the other hand, the major importance of aspects such as the sharing culture and trust.*

Keywords: *knowledge management, ICT, MASK method, Sharing culture, perception, KM Mix, knowledge workers, oil company*
JEL Classification: *M15, L6*

1. Introduction

The advent of the knowledge society and the ubiquity of information and communication technologies are recurrently the main managerial publications and academic titles. The two expressions summarize indeed current developments in the business environment and express the theoretical and organizational challenges.

Therefore, everything is changing. Information and knowledge to replace capital and energy as a major creative assets of wealth, in the same way that they had replaced agrarian property and labor two centuries earlier (Jean-Paul Pinte, 2006). Furthermore, technological advances of the twentieth century have transformed most of the creative work of wealth to a "less physical" basis "more intellectual" base (Drucker, 1993). Indeed, Foray (2000) has highlighted how the tangible capital/intangible capital report of usfirms that has evolved from 1.72 to 0.87 during the period 1929-1990. These studies all especially the importance now given to non-financial investments, including for the acquisition of new knowledge, learning and ICT.

Now, more managerial studies insist on the importance of knowledge management as the new approach for the development of knowledge work in companies. Precisely, this new discipline in construction phase can be apprehended by two approaches: a technological approach and other managerial, as it will be presented in the first part of this paper. In the second part, the presentation of the case of the oil company will help us to highlight, to one side the limits of the technological approach to emerging practices of knowledge workers, and on the other hand, the major importance of aspects such as the sharing culture and trust.

2. Knowledge Management According to Two Approaches

2.1. Some Definitions of Knowledge Management

On the data collected from the Compendex database, observed that from 2000 to 2004, the number of publications on the topic of KM made that grow from a little more than 200 publications in 2000 to more than 700 publications in 2004. Since 2005 there has been a slight decline in publications. For its part, the Web of Science database indicates in 2006 a 4% increase over 2005 publications (192 publications against 141). ISI Proceeding note it a slight decline (112 publications against 139). Overall it seems that the trend is continued growth of the publications on the KM. However the analysis of the evolution of the treatment of the themes associated with the KM, suggest that the year 2005 marks the passage to a second type of research on the subject, on themes related to the managerial aspects and social km. Nevertheless, the US is the largest producer of articles on the topic with more than 40% of global publications, (Dudezert, 2007).

Knowledge management literature has allowed us to identify a large number of definitions of knowledge management. In the following table, we just present some. The reading of these definitions well clearly identified the existence of two currents of knowledge management, as will be explained below.

Table 1. Some Definitions of Knowledge Management

Author(s)	**Définition**
Tounkara, 2002	"Managing knowledge business is to implement processes of capitalization, learning and creation, interaction to identify critical knowledge for the company, to preserve, develop and to advance."
Prax, 2000	"Knowledge Management is a process of creation, enrichment, capitalization and dissemination of knowledge that involves all stakeholders and the Organization, as consumers and producers."
Rossett, 1999	"Knowledge management involves **recognizing, documenting** and **distributing explicit** and **tacit knowledge** in order to improve organizational performance."
Tissen, Andriessen et Deprez, 1999	"Knowledge management is the process of linking your company's knowledge to your business **strategy**, designing knowledge supportive organizational **structures**, and breeding knowledge professionals."
Massie, 1998	"Knowledge management is a **systematic process of finding, selecting, organizing and presenting** information in a way that improves an employee's comprehension in a specific area of interest."
Ernst & Young, 1997	"Knowledge management is a framework or system designed to help companies **capture, analyse, apply and reuse knowledge** in an effort **to make faster, smarter and better decisions**."
Grundstein, 1995	"Capitalize the knowledge company it is consider **knowledge** used and **produced** by the company as a **set of resources** constituting a capital, and draw interest contributing **to increase the value** of this capital."

Through the reading of these definitions we notice the existence of two approaches to the knowledge management: "managerial" approach and "technological" approach. The first approach focuses on the "personalization of knowledge" and the second one on the "codification of knowledge" European Commission, (2004), Grundstein, (2003), Bayad and Simen, (2003), Fernandes, Raja Hansen (2000), Hansen, Nohria and Tierney, (1999).

The managerial approach was developed by consultants (Davenport, Sveiby, Prax, Stewart) and managers. This approach stresses the existence of a strong link between knowledge and the person that created, or that incorporates. This approach, with an emphasis on the establishment of a corporate culture based on good communication, where everything is designed and made to encourage the sharing of knowledge between individuals of the same community, States that knowledge is primarily shared through personal contacts. For followers of this current thought, it is to strengthen the communication of knowledge between people, and not to store knowledge.

The technological approach developed by practitioners (consultants and computer's managers), focuses on capture, coding and storage of knowledge in databases. Knowledge must be stored in archives and the EDM (electronic data management systems) in a manner accessible to everyone. They consist of an elaboration of knowledge on informational support, followed by a classification to a subsequent operation. This explanation is based on predefined models informed by "bearers of memory" or experts. Remember that only the information here may be stored and that, whatever the approach, the information that will help reactivate and stimulate knowledge.

The following table traces a few differences between the two approaches (European Commission, 2004).

Table 2. Two Approaches of Knowledge Management

The Technological Approach	The Social Approach
Focuses on technology	Focuses on the human and culture
Knowledge is an object	Knowledge is a process
Knowledge can be classified, structured and shared	Knowledge is created through organizational learning and the evolution of the process

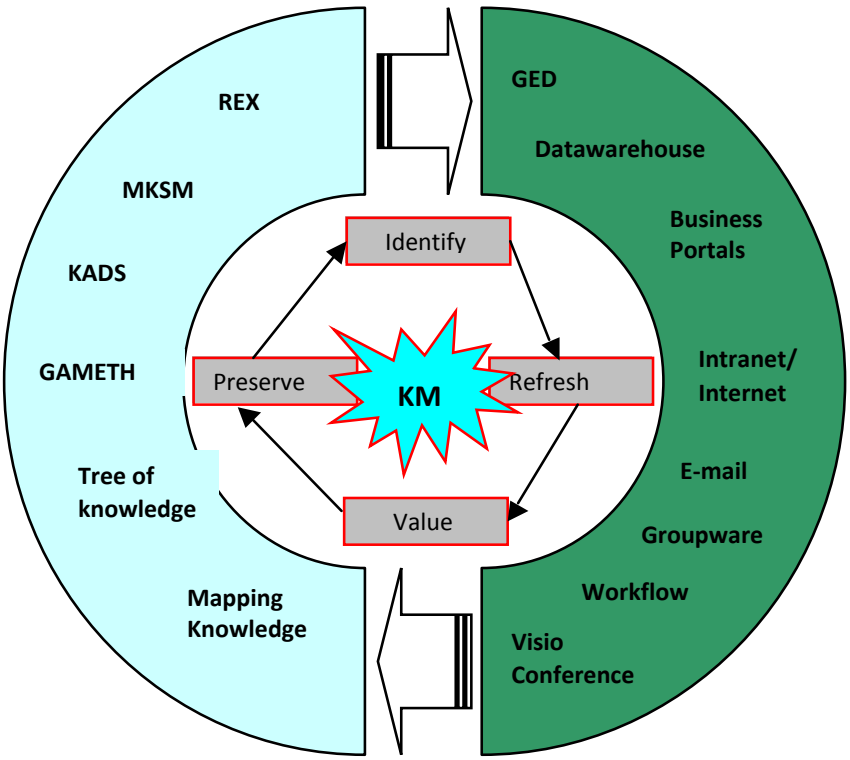
Mathematical description of the information and knowledge	Social construction of information and knowledge
Technological determinism (inevitable impact)	It is the man who uses and controls technology
Knowledge included in formal processes and functions of the Organization	Knowledge included in informal process
Knowledge management as a separate discipline or as a component of information technologies	Knowledge management as essential part of the capacity organizational (but difficult to isolate in terms of players and routines)
Knowledge management initiative and program based on technology standards	Knowledge management as an organic system based on creative relations, constructive activities and social behavior
Knowledge management as a program to monitor and implement by executing	Knowledge management as a whole related to strategy and vision and prospects of top management

2.2. The Technological Approach of Knowledge Management

The mechanisms of creation of new knowledge in the technological approach are materialized through the verbs "acquire", "retrieve", "structure", and "disseminate" knowledge, allowing, on the one hand, methods and tools for the collection or acquisition, knowledge extraction, the structuring of knowledge and the dissemination or sharing of knowledge, and on the other hand, the use of new information and communication technologies.

The capitalization knowledge process implies the prior identification of the knowledge and skills to capitalize. The use of methods of knowledge such as: KADS, MKSM, REX, CYGMA and GAMETH is an indispensable step for the establishment of a knowledge management approach focused on the computer. In fact, the methods perform with computer tools in the process of capitalization of knowledge. Both forge this approach. The following figure illustrates better our words and clearly highlights the two dimensions of KM's technological approach.

Figure 1. Technological Knowledge Management Approach



The reading of this figure gives the impression that the fact of introducing technologies for knowledge management, information shared by default and the sharing of knowledge will gain ground. It would be a real technological determinism. However, be limited to technological considerations cannot suffice. It's also to consider strategic, organizational, and cultural dimensions. This is precisely what is proposed to treat the managerial approach.

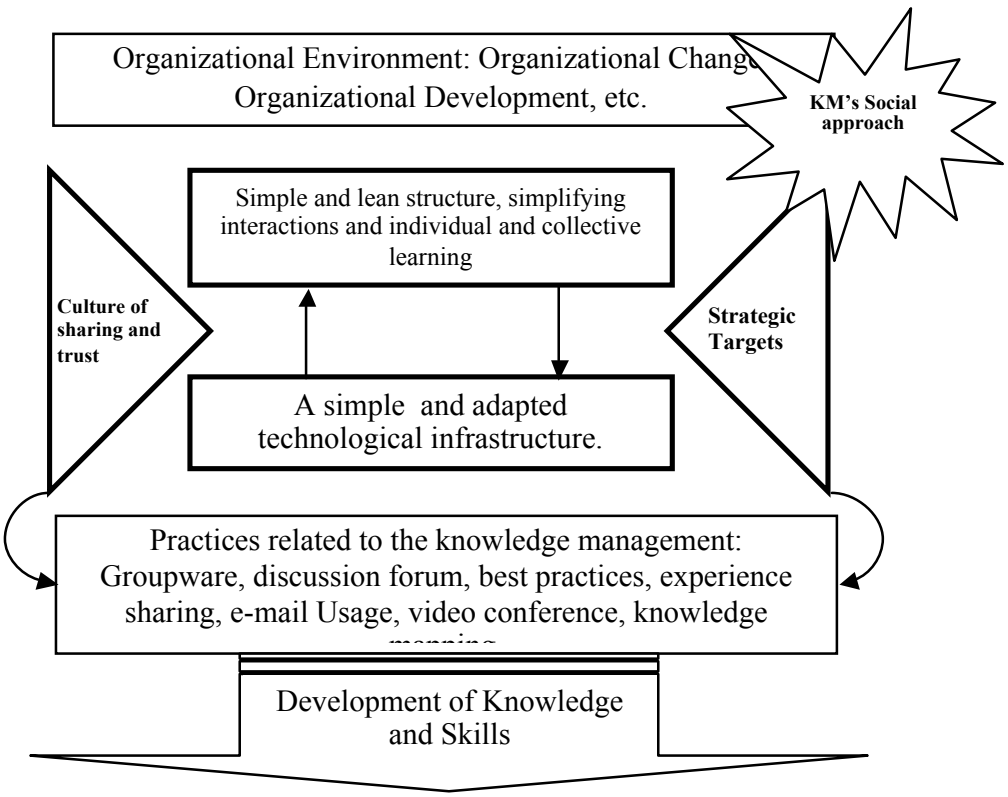
2.3. The Social Approach of Knowledge Management

To meet the challenges of knowledge management, Edvinsson et al (1998), Teece (1998) and Earl (2001) advise companies to define a theoretical framework to structure their approach to knowledge management upstream. For several years, many companies have begun to structure their approach to knowledge management. It is obvious that the effective implementation of these programs raises many problems associated, sometimes with the tacit nature of knowledge (Davenport and Prusak, 1999), or the existence of cultural

barriers (O'dell and Grayson, 1998), sometimes to the adoption of a system of knowledge management((Lancini, 2003). Many authors (Choi and Lee, 2002;) Davenport and Prusak, 1999; (Earl, 2001) argued that knowledge management practices are often not connected and there of many levers influencing the performance of any particular style of knowledge management.

Now, through the managerial approach, emphasis on the importance of the definition of the components of the portfolio of knowledge, the actions of dissemination of a culture of sharing, the establishment of a climate of confidence and the efforts of establishment of a structure dedicated to the knowledge management. Similarly, register all in a vision of organizational change full appears now as essential. The following figure is highlighted all of the aspects to be taken into considerations in projects of knowledge management. The second part of this paper will be reserved for the presentation of the project of knowledge management at the level of the Algerian oil company Sonatrach, through its technological and social aspects.

Figure 2. The Ingredients of the Mix of the Knowledge Management, Benabou and Bendiabdellah (2005)



3. Rise and Limitation of the Knowledge Management in SONATRACH

3.1. Presentation of the Company

Sonatrach is an Algerian company research, exploitation, transportation by pipeline. processing and marketing of hydrocarbons and their derivatives. It occurs also in other sectors such as electricity generation, new and renewable energy and desalination of sea water. It exercises its functions in Algeria and in the world where opportunities arise. Sonatrach is the first company of the African continent. It is ranked 12th among world oil companies, second exporter of LNG and LPG and third exporter of natural gas in the world. Its total production (all products alike) was about around 222 million toe in 2004. Its activities comprise approximately 30% of the GNP of the Algeria. It employs 120,000 people in the whole of the group.

The Sonatrach group around its trade adopted principles of organization and operating logic, with a strength of the capacity of the branch in terms of development strategies, by relying on effective decentralization and simplification of the operation. Operational activities are the trades of the Group and develop its potential business both at local and international level.

3.2. Presentation of the KM Project at the Company

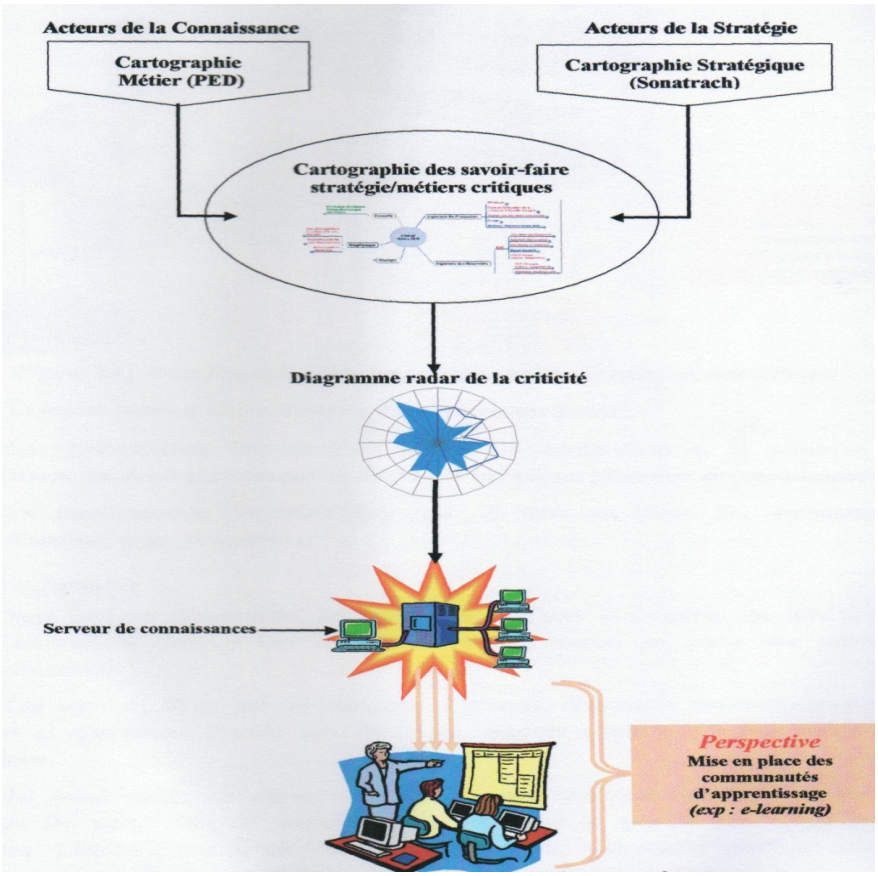
Knowledge management project is considered by the General Directorate of Sonatrach as a strategic project. It is based on an overall vision erected at the level of the company and local, concrete actions and to generate visible benefits in the short term, the objective of preserving the heritage strategic knowledge, developed over the years, is a priority for the group. The issue is more important, when you know that Sonatrach has experienced a great start to retirement and an important recruitment of young people.

Sonatrach, the basic elements of knowledge management are the collaborators (those who create and share knowledge) and information system (that stores, processes and makes available the information). Moreover, the knowledge management is displayed as a tool for the future and powerful Sonatrach Corporate University (SCU). The method chosen is more top down than bottom up. It takes the high starting point. It sets the aim of a mapping of strategic skills and, on the other hand, a mapping of the critical business characteristics.

This mapping consists of trees for a hierarchical view all useful knowledge. Following a cross-analysis of two types of skills, we can identify

both critical and strategic skills that require a capitalization, sharing and transfer. The following figure shows the overall process of management of the knowledge of the company.

Figure 3. The Steps of Sonatrach KM Approach



Such knowledge modeling presented by the method of MASK (Ermine, 2003), and other techniques of knowledge engineering, to identify critical knowledge. The company has opted for the delimitation of the heritage of knowledge, by choosing a structure that is an essential node in the upstream activity and therefore which includes strategic trades skills. Therefore, the PED (Petroleum Engineering & Development) division was chosen as entity pilot to operating this project. The final phase of the project is to design devices (as knowledge servers) and to perform, then a teaching Screenwriting models of knowledge.

This server of knowledge remains a technically securable, accessible and easy to develop by actors trades (knowledge workers) way.

In the first stage of the project, experts have used a representation and modeling tool: mapping, based on the concepts of "Mind Mapping" by using the software Mind Manager which is based on the concepts of mind mapping. It's thus draw, manage and manipulate mental maps to better manage projects, or to communicate ideas to colleagues and partners. Mind Manager adds the concepts of mind mapping by associating with the maps produced a set of powerful features to export maps to the file formats Ms-Word, Ms-PowerPoint, Ms-Project, from web sites and additional information (texts, symbols,... structured information)... these features make it a powerful tool for management of information and preparation of documents. It is designed to facilitate the expression and sharing of ideas and data between the collaborators of the company. It enables teams to synchronize phase through their action plans, making them more clear and shareable.

This tool is used on various occasions: representation of the strategy, strategic skills representation, representation of critical skills, etc. The mapping is a representation for a cognitive navigation using a hierarchical visualization of the heritage of knowledge subject of study.

Field work carried out, took four forms:

- Collective sessions bringing together the persons concerned by the issue to discuss;
- Individual interviews with a sample of persons involved in the various processes;
- Interviews with the managers for elaboration of the elements of the strategy;
- Finally, work on reference material.

Mapping of trades PED and analysis of criticalness. The critical of a domain is an assessment of the risks/opportunities that presents the domain for the company. The approach at Sonatrach followed two approaches:

- Realization of the map of the areas of knowledge,
- Adoption of a grid of criticality of knowledge.

The assessment of the criticality of a domain is to assign a score according to each criterion for each domain. Over the domain is critical, more note is high, more a more particular concern will be reserved. Each area was evaluated independently of others. The return of results for each domain is synthesized graphically in a radar chart. On the basis of this study, a mapping

is made. It determines the most critical areas (red colour indicates maximum criticality). At this point the computer approach of the KM for Sonatrach has a mapping of the critical business skills.

The capitalization of knowledge involves several phases: identification, formalization, dissemination and updating. In the part of the identified as critical and strategic expertise, much remains still implied among players in the trade. For the latter, this tacit character is a determining factor of criticality. To do this, the KM project team has implemented a process of elaboration on the critical and strategic domain identified in the previous phase. This process is based on a knowledge management server.

In technical terms, it is possible, depending on the chosen user type to access the sub - domain corresponding criticality, and functionality required by the appropriate level of expertise. An example of a navigation interface is presented under the appearance of a dynamic website with privileged access. For example, the heading "Documents booth" to file documents considered as crucial for the activity of the DEP division. Unfortunately, so far on recourse to the deposit of documents on the site.

It is clear that this mapping approach, is the identification of knowledge (census of the areas of knowledge, holders of expertise location, etc.), the criticality of the heritage of knowledge (audit) evaluation/analysis and visualization of knowledge critical and aligned to the strategy of Sonatrach. This allowed to identify skills trades affected by this strategy, and therefore the areas of knowledge to support and/or develop by transfer actions through, inter alia, funding and learning. The limited sharing of documents, experiences and good practices by the actors of the company helps explain the relative failure of the computer approach by questioning of the managerial, including organizational culture aspects.

3.3. The Explanation of the Limits of the Project by the Assessing the Social Elements

Despite all the beneficial and positive points that we are going to expose, we blame this approach too technical character and passing under silence of several aspects that we consider more important than the computer approach presented above, without Demystifying of course the great effort provided previously by officials and consultants at Sonatrach. Now many issues arise, notably the ability of employees to share their knowledge, their commitment to the change required to operate, the adaptation of the project organizational features

and existing processes, the system of motivation which must accompany the approach the mechanisms of learning to establish the diagnosis of the atmosphere of trust., .etc. Specifically, a more intangible level of analysis will be targeted in what follows, including by highlighting of perception employees of the important issues of KM.

3.3.1. Perception of the Employees of the Issues of Knowledge Management

We conducted an investigation with Sonatrach, to spot the light on the perception of employees of the importance of knowledge management and actual concerns granted to this issue. We distributed 500 questionnaires directly, through family members or students and by E-mail. Finally, we recovered 180 questionnaires, only 144 were considered to be exploitable, wich represent a rate of 28.8%. Distribution of respondents in main socio-demographic variables are detailed as follows: Women (36%); Age between 21 and 30 years (38.7%), between 31 and 40 years old (38%), more than 40 years (23.3%); Education: College (10.2%) secondary (32.3%), University (57.5%); Experience at work : less than 5 years (20.6%), from 5 to 10 years (27.6%), from 10 to 15 years (24.4%) and more than 15 years (27.4%).

The important areas of knowledge management. The various items discussed in this aspect are presented in the following table:

Table 3. Presentation of the percentages of the benefits covered by the KM

1. Add the knowledge about the customers	29.9 %
2. Promote a dynamic change and improvement	29.9 %
3. Deploy the sharing and the collaboration	29.2 %
4. Develop innovation (products, services).	25 %
5. Improve the quality of products/services	24.3 %
6. Develop Skills	22.9 %
7. Ensure a relevant watch on its environment.	22.2 %
8. Protect the intellectual capital of the company	20.8 %
9. Improve productivity	18.1 %

Knowledge Management appears clearly as an indispensable mean for employees to better manage the company's customer relationships capital and deepen the knowledge on customers. Particular importance is given by the

employees to the sharing, the collaboration and the change. This may reflect a sense of hope for the project of the KM as a means of realization of the collaboration, sharing and the change to a more advanced stage.

The classification of the protection of the intellectual capital to the front last place reflects a lack of awareness on the part of the top management to the major issues of the KM approach. Now, we will examine key factors of of knowledge according to the perception of the employees.

The key Factors of knowledge management. For the majority of respondents, the success of knowledge management is primarily based on trust, sharing and collaboration culture. This item exceeds that of a suitable internal technological climate. Comes in third position the expression of a long-term strategic commitment, attitude which reflects the concern of the employees, to see the direction of the Sonatrach Group consider this revolutionary approach of management, as a mere fad. The following table shows the different percentages for each item.

Table 4. Percentages of the Key Factors in Knowledge Management

1. The Culture of the Company (based on trust, sharing, collaboration)	53.5 %
2. A suitable internal technological climate	36.8 %
3. A strategic commitment on long-term	34.7 %
4.Structure and processes clear and responsive to the management of knowledge	31.3 %
5. a system of reward for each contribution	31.3 %

If a thing is to remember of this study is the less priority given by the responders to the technological tools comparing to the culture . The particular interest granted by collaborators to the concepts of : trust, sharing and collaboration, led us to ask ourselves about the nature of the dominant culture in the Sonatrach. This is what we will see now.

4. Conclusion

In conclusion, the following table resumes the whole aspect developed in the second part of this paper. It reveals the lack of interest displayed by the top management of the Sonatrach for the strategic importance is to integrate the KM project by the use of technological tools taking into account the company managerial aspects. As such, the cultural diagnosis showed a deficit in the future.

Table 9. Level of consideration granted to two approaches of KM in Sonatrach

Technological Approach of Knowledge Management		**Social Approach of Knowledge Management**	
Approach aspects	Degre of Importance	**Approach aspects**	Degre of Importance
Philosophy: knowledge is an object that can be standardized, classified and shared. Focused on technology.	Strong	**Philosophy:** knowledge is created through organizational learning and the evolution of the process. Focused on human and culture.	Low
Methodology of knowledge capitalization	Strong	Managerial and social Dimensions	lesslow
MASK	Strong	Knowledge management as a whole related to strategy and vision and prospects of top management.	Strong
Mapping of the Know-how of the employees	Strong	Knowledge management included in informal process.	Low
Usage of the Criticality Grid to identify the company's strategic knowledge	Strong	Involvement of the employees and their preparation for the change.	Low
Usage of the technology tools	Strong	Knowledge management related work to the diagnosis of the Organization	Low
▪ Intranet	Strong	Knowledge management related to the nature of organizational culture	Low
▪ Mind Manager software	Strong	Knowledge management related to the work climate and the reigning degree of trust.	Low
▪ Document kiosk, directories,... Etc.	Strong	Adapted technology infrastructure.	Strong

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