

Impact of ICTs on knowledge transfer in Moroccan organizations: the case of the energy sector

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Abstract. In a short space of time, intangible capital has become the decisive driver of economic growth ^[1]. Indeed, sustainable competitive advantage is now linked to the capacity to innovate, based on the production of knowledge, the enrichment of knowledge, and the enhancement of skills. This is measured by three main indicators: research and development (R&D) expenditure, training, and the intensity of use of new information and communication technologies (ICTs). Aware of the importance of preserving and valorizing knowledge, and concerned about their competitiveness in a constantly changing environment, companies are increasingly opting to manage their intangible capital and invest in ICTs. The way the companies use these technologies facilitates the acquisition, conservation, and sharing of both explicit and tacit knowledge. Indeed, the results of the study carried out for this article, using a dual qualitative/quantitative approach, lead us to the following conclusion: because of the quasi-immediacy of their effects, organizations have a definite interest in adopting ICTs to benefit from their use in a knowledge management dynamic.

Index Terms— Energy, Information and Communication Technologies, information, impact, knowledge, knowledge transfer, organization.

1 Introduction

Today's world is under the influence of the rapid changes caused by globalization, the rise of the knowledge economy, and the accelerated development of information and communication technologies (ICTs). The evolution of ICTs is closely linked, on the one hand, to their use and appropriation by the people involved, and, on the other, to the range of functions they cover and the performance they enable within an organization. In addition, with the advent of ICTs, we've seen an upheaval in the way we perceive information. Indeed, technologies have made it possible to communicate and work in communities, without the need to physically interact with one another, reducing the temporal and spatial dimensions of the economy. As a result, these environmental changes are modifying organizational behavior and generating real-time knowledge sharing and transfer processes that would have been inconceivable under previous circumstances ^[2].

In the same way, the advent of the knowledge economy has transformed the classic industrial configuration of the business model of companies, based essentially on their productive capacity. It also placed knowledge at the heart of the most important strategic assets available to these same companies ^[3].

In Morocco, ICTs use has intensified since the onset of the Covid-19 health crisis in 2020. This was reported by an annual survey of ICTs usage among households and individuals, carried out by the National Telecommunications Regulatory Agency, which targeted a sample of 3,840 households over the period 08/03/2021 to 04/04/2021. In the urban environment, over 84% of individuals believe that the changes caused by the pandemic in terms of accelerated ICTs usage will be maintained. Indeed, "the context of the pandemic and what it has brought about in terms of teleworking, distance learning, and e-commerce has expanded the pool of Internet users", according to the same source.

Particularly in the energy sector, the unavailability of reliable information represents a major constraint for political decision-makers, investors, and project promoters, making rational knowledge management an undeniable necessity.

To this end, and through this study, our aim is to investigate the impact of ICTs on the knowledge transfer process within the Moroccan energy sector organization. What is knowledge transfer? What are the main factors determining its success? And how do ICTs facilitate knowledge sharing within the organization?

In order to provide some answers to these questions, this article is structured as follows (**Fig. 1**): first, we will present the methodology used to answer our main research question. We will then discuss the main findings of our study, which is based on a field survey using an interview guide and completed by a questionnaire conducted with Knowledge Management professionals and practitioners within the target organizations. Finally, we conclude the article by outlining directions for future research.

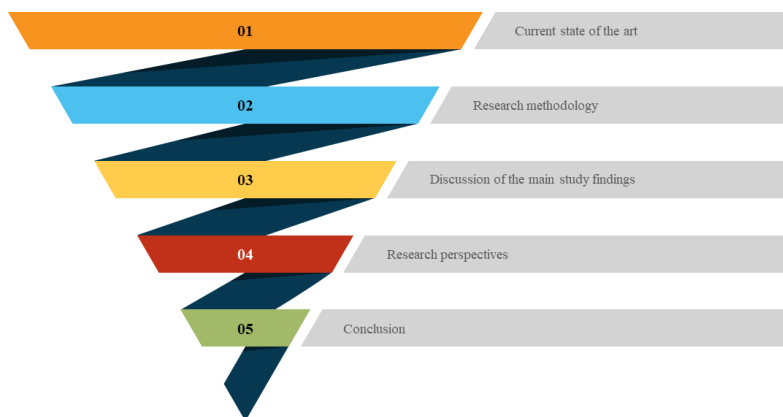


Fig. 1: Article Maps.

We'd like to highlight that we're going to use the two concepts of knowledge transfer and knowledge sharing interchangeably.

2 Methodology

With the aim of understanding the nature of the impact between ICTs and knowledge transfer within the organization, a qualitative data collection and analysis methodology was applied, and the interview was chosen as the first main data collection tool. Indeed, interviews enable us to analyze the meaning actors give to their practices and the events they encounter [4].

During the exploratory phase, information was gathered through semi-directive face-to-face interviews with managers. This step was essential to understand the way information

circulates within the various entities, and the nature of the relationship between individuals and the technologies at their disposal. Then, in the light of these interviews, a questionnaire was drawn up and administered online via a web-based survey tool, which has become a common instrument for data collection in today's context, in order to complete the analysis and confirm the points raised during the various interviews.

The study took place between Casablanca and Rabat and data were collected between 01/02 and 27/04/2023.

2.1 Target population

Our study sample was drawn from entity managers, knowledge management practitioners or "knowledge facilitators", and employees from various specialties, with age ranging from 25 to 60.

Fig. 2 below shows the gender breakdown of our target group for the purposes of the quantitative study:

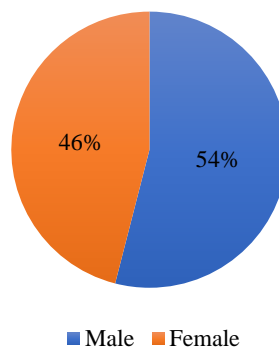


Fig. 2: Breakdown of sample by gender.

2.2 Data collection instruments

In this study, 13 individual semi-directive interviews were conducted "face-to-face", enabling us to gather information for a series of guiding questions and to offer our various interlocutors a framework in which they could express themselves freely, from a qualitative perspective. These interviews also enabled us to construct our quantitative questionnaire, in order to better define the subject of our research and to provide greater clarity to the elements of the answers returned on a larger scale.

2.3 Data analysis

To analyze the data collected, the 13 interviews were entirely transcribed, and the data were categorized according to the similarities and differences identified in the main themes covered. The aim was to summarize the data using frequencies, measures of central tendency, and measures of dispersion. As for the online questionnaire, the results of the analysis were automatically generated from an online survey tool.

The results of the quantitative study will be presented and discussed along 3 main lines. The first axis revolves around the perception of the importance of knowledge management within the organization. The second axis focuses on organizational practices in terms of

knowledge sharing. The third axis examines the determining factors that encourage knowledge transfer within the organization.

Table 1 groups all the questions by axis of analysis:

Table 1. Quantitative questionnaire by axis of analysis.

| Axis | Questions |
|---|--|
| Axis 1: the perception of the importance of knowledge management within the organization | (Q1). In your opinion, what does knowledge represent within a company? |
| | (Q2). Is there a structure, process, or person responsible for knowledge management within your company? |
| Axis 2: organizational practices in terms of knowledge sharing | (Q3). What are the channels used for knowledge sharing within your organization/ department/ entity? |
| | (Q4). What technological tools do you use for knowledge sharing within your organization/ department/ entity? |
| | (Q5). Have you designated within your organization/department/entity people in charge of helping knowledge creators in the sharing process (called “facilitators”, “Knowledge Intermediaries” or “Knowledge Brokers”)? |
| Axis 3: The determining factors that encourage knowledge transfer within the organization | (Q6). Are there any malfunctions in the current information system? Are there organizational, technical, cultural, other? |
| | (Q7). In your opinion, what are the factors likely to influence the effectiveness of knowledge sharing within your organization? |
| | (Q8). Why is technological support important in the process of knowledge transfer within an organization? (Yours for example, cite concrete examples according to the different types of knowledge). |

For the first question, we have chosen to group most of the answers in the table below, according to their frequency of repetition:

Table 2. Summary of responses to Q1.

| Sample Responses |
|---|
| A capital |
| Cognitive capital |
| It is all the information relating to knowledge and know-how, stored within the company for all useful purposes. |
| The raw material of the company's decision-making system |
| It is a heritage accumulated through the generations |
| A source of legitimacy |
| A strategic asset |
| Intangible capital |
| The employee experience |
| It is all the achievements and experiences carried out with the various stakeholders (customers, suppliers, partners, government, etc.) that allow the company to develop its know-how following generations change |
| It is an essential capital of the company |

Next, responses to Q2 concerning the structure and process of knowledge management within the company were divided as follows (**Fig. 3**):

- 82% of respondents claim to have a knowledge management structure within their respective organizations;
- 18% claim not to have a dedicated knowledge management structure within their organization.

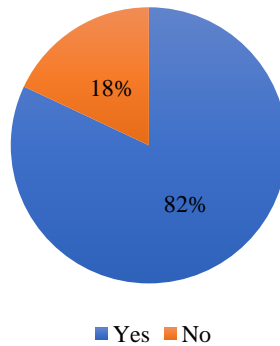


Fig. 3: Percentage of responses concerning the organization's knowledge management structure.

On another axis of analysis, the results for Q3 (a multiple-choice question), referring to the knowledge-sharing channels mobilized within the organization (**Fig. 4**), are as follows:

- 95% of respondents chose the information system/ERP/... as the main channel for sharing knowledge within the organization;
- 81% of respondents also remarkably chose regular meetings/ REX/ ... as a means of sharing knowledge;
- 43% of respondents believe that training is also a means of sharing knowledge within the organization;
- 28% see the suggestion box as a knowledge-sharing tool. This is a communication technique designed to gather feedback and/or suggestions for improvement, using a bottom-up approach.

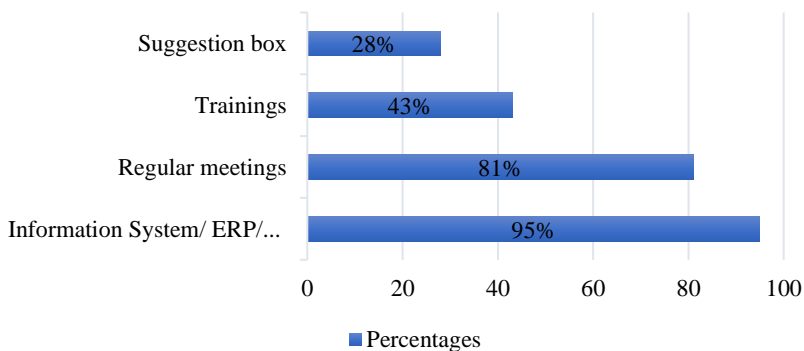


Fig. 4: Percentage of responses concerning the knowledge-sharing channels used within the organization.

In addition, responses to Q4 (a multiple-choice question), about the technological tools used for knowledge sharing within the organization (**Fig. 5**), are structured as follows:

- 92% of respondents identified Mailbox as a technological tool for sharing knowledge within the organization;
- Videoconferencing is also a means of interactive sharing and exchange. Indeed, 86% of respondents see it this way;
- The corporate social network, meanwhile, has a significant response rate of around 68%;
- Presentation programs such as MS PowerPoint, Prezi, etc. are the most common means of sharing used by employees, accounting for 98% of responses.

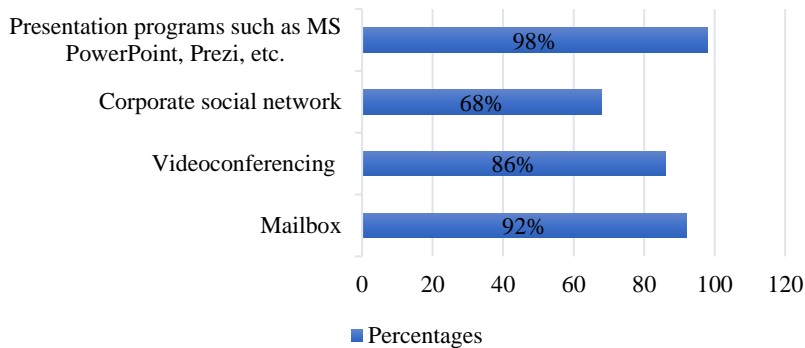


Fig. 5: Percentage of responses concerning the technological tools used to share knowledge within the organization

In addition, the third axis highlights the impact factors favoring knowledge transfer within the organization. Through this axis, our aim is to identify and prioritize the factors likely to influence the effectiveness of knowledge sharing within the organization.

Q6 is in fact an introduction to the analysis of the influence of certain environmental factors on the organization's information system. The 34% of positive responses to this question are mainly linked to the organization's technological maturity and internal knowledge-sharing culture. In fact, the level of maturity of the technological base in place has a direct impact on the ability of participants to circulate information. Similarly, the corporate culture is an important determinant in the sharing of knowledge between employees.

Respondents also ranked the factors likely to influence the effectiveness of knowledge sharing within the organization in order of importance in answer to Q7 (a multiple-choice question). This is reflected in the following percentages (**Fig. 6**):

- Organizational culture;
- Organizational structure;
- HR practices;
- Technology;
- Strategy and leadership;
- Trust.

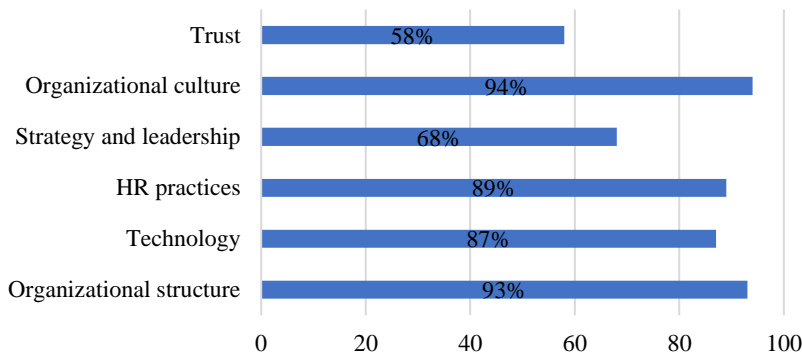


Fig. 6: Percentage of responses concerning factors likely to influence the effectiveness of knowledge sharing within the organization

Finally, the answers to Q8, which deals with the importance of technological support in the process of transferring knowledge within the organization, were returned as follows (**Table 3**):

Table 3. Summary of responses to Q8.

| Sample Responses |
|--|
| The technological tools made available to employees within the organization enable a large volume of knowledge to be shared in record time. |
| Technology facilitates the transfer and use of knowledge. |
| The use of technology for knowledge-sharing purposes makes it possible to save a large volume of knowledge and transfer it later, reducing the risk of losing it. It is also a means of consolidating sensitive knowledge, particularly in the energy sector. |
| We believe that technological support has become essential in the collection, use, and sharing of knowledge within the organization. Take the example of the Covid-19 pandemic; it was thanks to technology that companies were able to cope with health restrictions (ban on gatherings, forced teleworking, etc.). |

3 Results

The aim of this study is to analyze the impact of ICTs on the knowledge transfer process within organizations in the energy sector.

Responses from individual interviews showed that knowledge is a strategic asset for the organization^[5], and that knowledge management practices have been significantly impacted by the introduction of ICTs into organizational work routines. Indeed, the use of ICTs was unanimously judged to facilitate the transfer of knowledge within organizations, through tools and means such as intranets and collaborative tools in the form of information exchange spaces that promote collaboration.

On another hand, the quantitative study enabled us to collect structured answers to closed questions, leading us to identify 2 major findings: firstly, ICTs can be seen as facilitators of knowledge sharing and dissemination practices within the organization. Nevertheless, it should be noted that organizational structure is the primary factor influencing these practices. This could encourage the generation of new knowledge to maintain a competitive advantage over time. This conclusion leads organizations to create structures and systems likely to promote the flow of knowledge, so that they are capable of creating, accumulating, integrating, and transferring knowledge based on concrete knowledge management projects.

4 Discussion

This study highlights the important role of information and communication technologies in supporting business activities, and in facilitating the acquisition, retention, and sharing of both explicit and tacit knowledge [6]. On the other hand, it asserts that success depends largely on understanding the influencing factors that can prove to be sources of blockages, and on establishing strategies linked to each. Indeed, all knowledge management projects must consider these influencing factors, which are defined as "the foundations of Knowledge Management" [7-9].

The results of the study also show that organizations are increasingly aware of the need to set up a Knowledge Management system on the basis of which knowledge is internally stored, shared, and reused [10-11].

The emergence of the strategic role of ICTs can be explained by the convergence of two factors: the technological push and the increasingly competitive environment in which companies seek to remain competitive and differentiate themselves from one another.

ICTs have become not only enablers of organizational activity, but also key factors in decision-making and major contributors to strategic organizational choices [12]. Indeed, research into Knowledge Management suggests that ICTs are a fundamental factor in fostering knowledge management practices. Today, technologies exert a major influence on organizations, acting as both operational tools and strategic factors.

This work has enabled us to analyze the impact of technologies on the knowledge transfer process, but it could be completed by a global study of knowledge management processes, from knowledge creation to reuse, with the aim of carrying out a comparative analysis according to the process concerned.

5 Conclusion

In conclusion, the results of this study have enabled us to gain a better understanding of the significant role played by ICTs in various knowledge management processes, including that of knowledge transfer studied in the context of organizations in the energy sector.

In fact, the conservation and enhancement of intangible capital through ICTs is a subject of reflection to which researchers attribute a great deal of interest due to the uses of these technologies in different organizational contexts [13-14].

The present study on the impact of ICTs on the knowledge transfer process has led us to the conclusion that companies are increasingly choosing to adopt these technologies in their working practices and habits. Nevertheless, this adoption is conditioned by certain influencing factors likely to impact the effectiveness of the implementation of these tools, including organizational structure, HR practices, technology, organizational culture, strategy and leadership, and finally the trust within the organization [15-18].

In the light of this work, we might be interested in an in-depth study of the impact of ICTs on knowledge management processes in different business sectors, and the sustainable competitive advantage they provide to organizations [19-20].

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