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Innovation and Knowledge Management: Implications for Total Quality Management Practices: An exploratory study

Bouchra EL AMRANI1[a] , Mohamed-Larbi ARIBOU2[b]

[a] Abdelmalek Essaâdi University, Tangier, Morocco
[b] Abdelmalek Essaâdi University, Tangier, Morocco

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ABSTRACT

The objective of this research is to analyze the influence of total quality management practices on the knowledge management process and to examine the relationship between knowledge management and innovation in the Moroccan automotive sector. More specifically, we aim to propose a model that examines how the implementation of the total quality approach improves the innovation process through knowledge management. This model is developed following a review of the literature on knowledge management, total quality management, innovation, and the results of empirical studies in the Moroccan automotive sector.
From a methodological point of view, we chose an exploratory study, based on semi-directive interviews, in order to analyze in depth the studied problem. The field analysis allowed us to discuss the factors identified in the previous studies, but also to discover other emerging factors that positively influence the knowledge management process and innovation in the automotive industry.

INTRODUCTION

With the industrialization of new vehicle models in Morocco, including electrified vehicles, the Moroccan automotive sector is entering a new era in its history marked by the rise of skills, technology and decarbonization[1] Currently, the automotive industry must meet a high level of requirements in terms of safety, compliance with environmental standards, price and brand image, but also be able to respond very precisely to customer expectations, anticipate and adapt continuously to new environmental rules (Maciej J, Grodzicki Jurand Skrzypek, 2020). Despite the context related to the pandemic in 2020, the automotive export was able to generate a turnover of 75.08 billion dirhams (MMDH) in November 2021[2] , or a value added of 31.7 billion dirhams. And during the year 2021, Morocco has positioned itself as the second largest exporter of cars to the European Union. Note that for the 7th consecutive year, the automotive industry in Morocco remains to date the first industrial export sector of the country. Because of its importance, it is essential to ensure the continuous improvement of these automotive companies, in order to remain competitive in the market, and to reach a higher level of innovation capacity. Therefore, knowledge management and total quality management, play a central role in understanding the improvement activities of the organization (Manfredi Latilla V., Frattini F., Messeni Petruzzelli A., and Berner M., 2018), on the one hand, total quality is considered an important lever of competitiveness, because it acts on production costs, and contributes significantly to satisfying customer needs, (Justine Roy Balinado et al., 2021), and on the other hand, knowledge management appears, more than ever, as a strategic way to develop and share tacit knowledge, and a very valuable asset for organizations facing the challenges posed by technological advances (Gunasekera, V.S and Chong,

[1] The Minister of Industry and Trade, Ryad Mezzour. Said **Dec. 25 2021 at the** ceremony of the launch of the "Press XL High Speed".
[2] Office de change - Kingdom of Morocco 2022

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S.C., 2018). Indeed, the literature shows that total quality management brings increased knowledge management and organizational learning efforts (Cengiz Durana et al., 2014) which, in turn, provide a favorable climate that encourages innovation (Miković, Petrović, Mihić, Obradović & Todorović, 2020). Total quality management and knowledge are now both important issues in the business world. Yet, a link between these two dimensions is not clearly established, it is true that many researches have been proposed to study the relationship of TQM (Total quality management) hereafter TQM, with knowledge codification (Kim, D.-Y., Kumar, V., & Kumar, U., 2012 ; Zhang, Linderman, Schroeder, 2012), knowledge creation (Linderman et al, 2004), or organizational learning (Noufou Ouédraogo, 2007), but empirical results of the relationship between total quality and the whole knowledge management process, as well as the link between knowledge management and innovation are scarce, and the association between these three variables has not been fully established in a concrete way, especially in Morocco, a developing country. This observation leads us to formulate the main research questions as follows:

How do total quality management practices impact the knowledge management process in Moroccan automotive companies? and How does this knowledge process foster innovation?

To try to answer these research questions, we will first present a theoretical framework on the link between TQM and the knowledge management process, and between knowledge management and innovation. Secondly, we will present our methodology based on a qualitative approach of an exploratory nature. The results of our study carried out on the Moroccan automotive sector will be the subject of the third section, before finally presenting our model aimed at understanding the link between TQM, knowledge management and innovation in the automotive sector.

1. LITERATURE REVIEW

In this section we present a literature review of the influence of total quality management on the knowledge management process and its influence on innovation.

1.1 THE INFLUENCE OF TQM PRACTICES ON THE KNOWLEDGE MANAGEMENT PROCESS: PROPOSAL FOR AN ANALYSIS GRID

In the last decades, Total Quality Management (TQM) has been an important topic in management and business research because of its potential role in the growth of management practices (Prajogo & Sohal, 2003). Knowledge management has also attracted the attention of companies and the academic community (Ju et al., 2006). Indeed, organizations consider knowledge management as a critical success factor in a dynamic environment. According to Honarpour et al. (2012), total quality management and knowledge management are synergistically related to each other, which can create collaboration for sustainable development. Also Hsu and Shen in 2005, indicate that total quality management and knowledge management are related and they share some common elements such as result orientation, people-based management, leadership, customer satisfaction. These similarities form an interactive relationship between the two practices (Leonard & Mcadam, 2001). At the same time, a large number of academic studies have examined the relation between TQM and the knowledge management process. Indeed, Cengiz Durana, Aysel Çetindereb , Özcan Şahan (2014), argue that companies with TQM and ISO 9000 certificates are better in the areas of the degree of knowledge obtained from the customer, employee participation in knowledge dissemination, quality process, quality culture, and quality performance than those without the mentioned certificates. However, Siew-Phaik Loke, et al. (2011), argued that higher levels of total quality management practices lead to higher levels of knowledge management practices and greater learning among supply chain partners. On the other hand, Linderman et al (2004) provide insight into the effective deployment of quality management practices to create knowledge. According to the authors, effective deployment of quality management means providing a set of quality management practices in organizations that support the knowledge creation process. Quality management practices, such as management commitment, customer focus, and employee involvement, create an infrastructure for learning to create new knowledge and continuous improvement inspires creative minds and learning (Zhang et al. 2012). Among other publications dealing with the relationship between total quality management and knowledge creation, we find; Muhammad Asif , Henk J. de Vries & Niaz Ahmad, (2015). These authors have shown that total quality management practices can create heterogeneous knowledge, according to them knowledge creation occurs through interactions between tacit and explicit knowledge. These interactions give rise to four processes of knowledge creation: socialization, internalization, externalization, and combination. Indeed, according to these authors, quality management practices can go far beyond the pitfalls of rigidity and bureaucracy, and can stimulate innovation rather than hinder it. This study is consistent with the

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research of Linderman et al. Other studies focused on investigating the relationship between TQM and knowledge transfer: Keng-Boon Ooi and al. (2010), Keng Boon Ooi (2012). According to these studies TQM has a significantly positive relationship with knowledge sharing, they delineated TQM into certain variables (customer focus, leadership, training and development, teamwork, organizational culture, adoption philosophy, quality measurement, benchmarking, process management, product design, employee empowerment, supplier quality management), to investigate the impact of these TQM variables on knowledge transfer. The results indicate that there is a strong tension between these variables and knowledge transfer. While, other researches were interested in studying the relationship between TQM and all KM activities (knowledge creation, knowledge storage, knowledge distribution, and knowledge application). Teresa L.JU et al in 2006 showed that the critical factors of TQM can serve as practical guidelines for the implementation of knowledge management, and the activities of the KM value chain, can be treated as an action program for the critical factors of TQM. Thus there are multiple positive effects between TQM and KM activities. According to the study conducted by O'Dell and Grayson (1998), shows that organizations that successfully implement TQM practices, can easily develop cultures that promote knowledge sharing and are suitable for cross-functional team knowledge transfer. This study is also consistent with Conner and Prahalad's (1996) statement that the primary function of TQM is to generate an organizational culture of trust and sharing. This culture encourages employee involvement and promotes the identification of individual goals. It also contributes to the improvement of the organizational process, leading to the promotion of quality, knowledge creation and knowledge transfer/integration that further stimulates innovation.In conclusion, two observations were made in the literature studied: on the one hand, the TQMis divided into two dimensions, Soft and Hard. Indeed, the soft side of TQM refers to social factors, while the hard side refers to technical factors (Black and Porter, 1996; Bou-Llusar **et** al**.**, 2009). Specifically, the Soft factors include organizational culture, leadership styles, employee commitment, and human resource practices. While, Hard factors include quality planning, supplier management, process control and management, and product and service design (Prajogo and Mcdermott, 2005).And on the other hand, only the Soft factors of TQM are positively related to the entire knowledge management process, and lead to innovation performance (Prajogo and Sohal. 2004; Zeng et al. 2015)**.** Following the logic of the line of conclusions, drawn from the literature, total quality management practices will necessarily lead to a higher level of knowledge management.

Table 1: Analysis grid of TQM practices influencing knowledge management.

The critical factors of TQM	The reason for their inclusion	Measurement indicators	Key authors
Leadership	Senior management commitment is a critical requirement for organizational success in many TQM implementations. Leaders play an important role in ensuring that knowledge sharing takes place within the organization and that relevant knowledge is effectively transferred to everyone in the organization. They are seen as facilitators who foster a culture of knowledge transfer and creation. In this regard, workers are encouraged to use and share their tacit and explicit knowledge to solve various problems, which results in improved expertise and skills, and ultimately to the effective success of the TQM implementation.	-Favourable social climate for the implementation of the total quality program. -Staff participation in decision-making. -Clear and transparent communication of quality objectives.	Da Rosa et al (2003); Calvo -Mora et al (2005); Sakthivel (2007);
Teamwork	Teamwork is one of the basic ideologies of TQM, and a potential place for knowledge acquisition and development. Teamwork in quality management is about achieving quality objectives in a timely manner, and strengthening relationships within and between the team and the rest of the organization, which facilitates the creation of a shared work image, which in turn facilitates the transfer and integration of knowledge in the organization. Also, teamwork allows the organization to access and use the knowledge of individuals lower in the organization.	-Exchange of information between team members. -Ability to solve problems through cross-functional teams.	Molina et al (2007) Mehta et al. (2014); Sadeh and Garkaz (2015);
Training	Training has been recognized as one of the fundamental elements of TQM. It is possible to maintain or even increase performance within an organization only through continuous improvement of knowledge through	-Supporting the cultivation of a Knowledge dissemination Environment .	Ooi et al, 2010; Zwain A.A.A. et al, (2011) Kanji & Sa,

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	training programs. Furthermore, training programs are important because they can help the organization to solve problems. In this case, training plays a key role in creating a healthy environment that supports each employee to share and use their knowledge within the organization.	-Participation in problem solving	(2003)
Customer orientation	Customer orientation is a fundamental principle of TQM, which is to satisfy customer needs on an ongoing basis. To identify and recognize customer requirements, it is necessary to include suggestions made by customers, and to involve people from production, engineering, finance, R&D, sales and marketing. This is in line with Liao (2006), who found that sharing knowledge about customer expectations is necessary for the entire company and should be distributed among the staff, as it provides the information necessary for the company to deliver the desired products.	-Meeting of customers with the company's staff. -Involvement of - customers in the design and development of products and services. -Cooperative atmosphere with customers to determine their tastes and preferences	Zhang.(2015) Liao (2006) Ooi et al (2010)
QM process control	QM process control is a critical quality management practice that aims to make processes easy to understand by employees, and to help companies identify and reduce the occurrence of errors, as it provides valuable information on key aspects of operations within the organization. The systematic use of process control has a clear influence on the research, transfer and integration of knowledge, as it provides reliable data on processes, which helps the company to easily identify problems and make optimal, evidence-based decisions. Process management aims to improve process performance for economic, environmental and social benefits. Since process improvement requires advanced knowledge, it is a knowledge-based function.	-The degree to which statistical methods are implemented to control quality. -The degree of familiarity of employees with statistical control. - Ability to reduce the occurrence of errors	Molina, L.M., et al. 2007, Choo et al (2002), Calvo-mora et al (2005);

Source: elaborated by the authors

1.2 KNOWLEDGE MANAGEMENT PROCESS AND INNOVATION

Knowledge management and innovation have received particular attention in the literature (Alcorta **et al.**, 2009, Alavi and Leidner, 2001; Anderson **et al**., 2016; Donate and Guadamillas, 2011). Indeed the process of knowledge management is frequently cited as an antecedent of innovation (Nilsson-Witell **et al.** , 2005; Kim **et al.** , 2012). In this regard, Wang **et al.** (2013) argue that R&D is essential for the survival of organizations and the improvement of innovative practices. The basic assumption is that learning plays a primary role in enabling firms to achieve speed and flexibility in the innovation process (Brown and Eisenhardt, 1995; Weerd-Nederhof **et al.,** 2002; Un and Asakawa, 2015). In addition, continuous innovation requires a well-planned knowledge management system that enables the firm to excel in the creation of technological, business, and administrative knowledge. Therefore, the effective deployment of the knowledge management process enables firms to be creative and gain competitive advantages (Grant, 1996; Nonaka and Takeuchi, 1995). Knowledge is considered the most important strategic resource for ensuring the longterm survival and success of an organization (Grant, 1996; Spender and Grant, 1996). To better understand the link between corporate knowledge and innovation, the knowledge-based view of the firm can provide a relevant framework (Martin-de Castro **et al**., 2011; Galende, 2006). Drucker (1993) highlights the importance of knowledge in production processes insofar as he considers that the basic economic resources - the means of production - are no longer capital, nor natural resources, nor labor, but knowledge. Davenport and Prusak (1998) have pointed out that knowledge is a fluid mix of experiences, values, contextual information and expert views that provides a framework for evaluating and integrating new experiences and knowledge. Therefore, knowledge appears to be an asset that enables an organization to innovate and remain competitive in the marketplace (Lundvall, 2010; Grant, 1996). Indeed, knowledge represents an important resource: it allows firms to develop many capabilities that can lead to distinctive competencies (Fidel **et al.,** 2015; Wang **et al**., 2013). For Nonaka **et al.** (1994), the innovation process is seen as a continuous dialogue between tacit and explicit knowledge. Tacit knowledge exists in the mind of the individual and is related to their experience. This subjective and intuitive characteristic of knowledge makes it difficult to codify and transfer. This is even more true when it comes to tacit knowledge, which represents a resource and gives the company a competitive advantage. Therefore, the processes of knowledge creation and sharing are

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considered crucial because they influence creativity, innovation and performance within the company. The authors consider that innovation requires the acquisition of knowledge, its ransformation and its exploitation. Indeed, Knowledge acquisition improves knowledge assets within the organization that contribute to knowledge change and ultimately lead to innovation (Andreeva and Kianto, 2011; Chang and Lee, 2008; Chen and Huang, 2009; Hung, et. al., 2010). By acquiring knowledge from outside the organizations, firms are able to make changes to the operating principle in an efficient manner (Chang and Tzeng, 2010). Knowledge diffusion leads to learning and knowledge modification, which consequently increases innovation (Chen and Huang, 2009; Hung, et. al., 2010; Liao and Wu, 2010). Similarly, knowledge integration is directly related to innovation (Chen and Huang, 2009). In this sense, innovation seems to rely on the firm's ability to learn, which allows for the development, dissemination and use of new knowledge (Alegre and Chiva, 2008). Also, the application of new knowledge through problem solving and the incorporation of knowledge into new products is directly related to innovation (Chen and Huang, 2009).

2. RESEARCH METHODOLOGY

Before presenting the empirical framework of the research, the sampling, and the manner of data collection and analysis, it is important to specify the background of our research and the reasons for our methodological choices. The main objective of this research is to better understand the influence of total quality management practices on the knowledge management process and the influence of the latter on innovation. To this end, a qualitative methodological approach of an exploratory nature is used. This choice is motivated by the fact that the exploration in an interpretative perspective of a phenomenon poorly known, or even totally unknown in the literature, the adoption of a qualitative methodology seems appropriate (Thiétart, 2014). Moreover, the case study strategy seems particularly well suited to our research object (Yin, 2003), insofar as the phenomenon under study is little known to research and/or the existing theories are unsatisfactory (Eisenhardt, 1989).

The case study consists, in fact, in revealing a rich picture of what really happens in the implementation of total quality management practices, in order to find explanations, of their influence on the knowledge management process, and also to analyze the iinfluence of knowledge management on the innovation of automotive companies. Indeed, the field analysis focused on the study of three companies in the Moroccan automotive sector. And for confidentiality reasons, we cannot mention their names. The main characteristics of these multinational firms are shown in the following table (see Table 2):

Table 2: Company characteristics

	Company X	Company Y	Company Z
Location	Tangier Morocco	Salé Morocco	Tangier Morocco
Main products	The vehicles	Automotive equipment	Automotive parts and equipment
Main markets or customers	Export +Local market	Export +Local market	Export +Local market
Workforce	6652 employees	1578 employees	1223 employees

In order to respect the theoretical sampling logic, respondents were selected with the objective of having a wide range of perspectives. In addition, the sample size corresponds to a progressive construction in order to know at what point the researcher should stop (Assabane I and Mssassi S., 2019). According to Strauss and Corbin (1990), the adequate sample size is reached when there is saturation. This saturation, known as semantic, is reached when the data collected only repeats what has already been said, and no longer provides sufficiently new information.

This saturation criterion inspired us to stop pursuing interviews, and so we were satisfied with a sample of 27.

Table 3 shows the composition of our sample (see Table 3) :

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Table 3: Qualitative study sample

Company	Code[3]	Quality of interviewees	Experience
Company X	AA	Quality Manager	11 years old
	AB	Quality auditor	7 years old
	AC	egional Sales & Quality Manager	15 years old
	AD	Quality customer manager	9 years old
	AE	Quality & Production Manager	6 years old
	AF	Director of Information Systems	5 years
	AG	Process Manager	5 years
	AH	Production Manager	2 years
	AI	Supplier Quality General Manager	8 years old
	AJ	QMS Quality Auditor	4 years old
	AK	Assembly quality manager	3 years
Company Y	AL	Quality Manager	7 years old
	AM	Quality & Customer Service Manager	16 years old
	AN	Quality and supplier manager	9 years old
	AO	Quality Auditor	3 years
	AP	Progress manager & QMS correspondent	6 years old
	AQ	QHSE Manager	9 years old
Company Z	AR	Plant Quality Manager	4 years old
	AS	Project Manager	2 years
	AT	Quality auditor	11 years
	AU	Quality Engineer	6 years
	AV	Planner	4 years
	AW	Quality and supplier manager	8 years
	AX	Continuous Improvement Manager	5 years
	AR	uality & Customer Service Manager	13 years old
	AZ	Process Manager	7years old
	AZA	Project Manager	10 years old

Source: elaborated by the authors

Information was collected mainly through in-depth semi-directive interviews (Evrard et al., 1992) based on an interview guide, lasting an average of 1.5 hours with people of different status (see Table 3). Our interview guide was established in relation to our problematic, where we determined the main themes that we wished to address with our interlocutors. It is made up of open-ended questions on the following three aspects Soft practices of total quality management, knowledge management process, the influence of TQM on the knowledge management process and the influence of the knowledge management process on innovation. In addition, the methodology adopted to analyze the qualitative data collected consists of content analysis. To do this, the interviews were recorded and transcribed in their entirety in order to limit bias in the interpretation of the data. The respondents were informed of the confidentiality of what they said and the interviews were recorded only with their consent.

In addition, following Marshall and Rossman's (1995) recommendations, we expanded the sources of data through a variety of sources: activity reports, files and articles in the specialized press, but also internal documents, such as the minutes of technical meetings. This additional data collection allowed us to triangulate the data and thus increase the validity of the study (Lincoln & Guba, 1985). In addition, each transcribed interview was processed and structured independently, according to the themes raised in the interviews and the elements sought in our study.

3. RESULTS AND DISCUSSION

3.1 RESULTS OF THE INTERVIEWS

In this paragraph, we aim to present extracts from interviews conducted as part of the exploratory study with 27 managers of different status. This qualitative approach allowed us to interpret the TQM practices that promote the

[3] In the interest of confidentialityAN, we have undertaken not to mention the identity of the interviewees, and a code has been assigned to each person.

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knowledge management process and to analyze the influence of knowledge management on innovation (see Table 4).

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Table 4: Interview excerpts

TQM practices	Items
Leadership	"*We promote knowledge transfer through creating a positive atmosphere, increasing trust, and fostering a culture of information exchange among employees, to combat resistance to sharing experiences with each other... . So, we hold monthly meetings with department heads and team leaders to share improvements, discuss the strengths and weaknesses of each department, and share new projects." [AF]* *"The key to successful knowledge transfer in the quality process is leadership. The commitment of the management facilitates the work for the whole plant and at this level the workers are encouraged to use and share their knowledge to solve various problems." [AG]* *"The leaders of our company play a role of facilitator of the transfer and diffusion of knowledge, through the principle of autonomy in order to benefit from the knowledge and intelligence of all. [AO]* *"To succeed in each new project, we must first involve, train, and sensitize our staff, which is our motto for improvement [....]. We also encourage our employees to take part in the decision-making process and therefore we organize meetings during which we discuss the ideas and suggestions of our operators. These meetings help us a lot in planning corrective and preventive actions afterwards." [AZ]*
Teamwork	"*....On gives a lot of importance to group work, each department is divided into several teams, because we are aware that the establishment of work teams is necessary for the acquisition and development of skills. Each member of the group is expected to share the information they know, strengthen their relationships within the team, and use their creativity to achieve the goals set. [AI]* ***"**The teamwork has helped us a lot in developing a strong information system to identify key knowledge, codify it, share it and use it at the right time. [AP]* *"If there is no teamwork there is no improvement, because through the regular meetings we have with the team leaders, we manage to collect the ideas of our operators to improve the processes, we manage to quickly detect the source of the problems in case of malfunctioning, and we manage to propose solutions and implement them...."[AX].* *"We consider the work teams to be the black box of our information system, in that each team member has enough knowledge about vehicle manufacturing, since he is in direct contact with the product, and therefore the one who first detects the problem and the one who gives us all the information to react correctly [AS].* *"The exchange of ideas during discussions, and formal and informal meetings organized by the work group, helps each team member to acquire new knowledge and deploy it to improve his or her work [AU].*
Training	"*We work through the matrix of versatility and skills where each job position must be mastered by three employees, and each employee must master three job positions. Our company places great importance on versatility, on the one hand, well-trained employees are employees who are very involved in their work, and who have the ability to solve problems related to the positions they master, and also they have a high sense of sharing and exchanging information, which will ultimately pave the way for progress, and on the other hand we seek through training programs to minimize the departure of key skills, and therefore we start from the idea that everything must be codified and transmitted to several people." [AC].* *"Training is necessary to ensure survival in this ever-changing world, as it allows employees to express, share and improve their knowledge, which helps the company to continuously adapt to new rules in the environment. To do this, we use TEO: Table of Operational Requirements. This allows us to determine the level of skills and knowledge required for each position, compared to the current level of each operator, which then allows us to more easily identify training topics, to improve the level of each staff." [AA]* *"Through training programs, employees' job skills improve, participation in problem solving increases, and therefore job effectiveness also increases." [AQ]*

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Customer orientation	*''Our customers are our success in the market, therefore we always seek to establish long term relationships with our customers, and to satisfy their needs and expectations in a continuous manner. To this end, we hold annual meetings to capture the expressed and unexpressed needs of our customers, and then we transfer the information and knowledge gained from customers to the design and manufacturing department to use their valuable information to improve our product'' [AD].* *''Involving customers in the design and development of products is an opportunity for us to sharpen our knowledge and deepen the relationship'' [AM].* *"The only strategy to gain a sustainable competitive advantage is to take customer feedback as a priority. This not only serves as a basis for problem identification and diagnosis, but also reinforces the knowledge gained." [AY]* *"... To achieve excellence in terms of quality, it is essential to know what customers want and to provide them with products that meet their requirements, for this reason, we work with the tool "LUP: unique list of problems", it is a system to codify customer complaints and proposed solutions. This system is used to divide the complaints into two types: either complaints for improvement and therefore at this level it is rather suggestions, and then in this case we organize quarterly meetings, to discuss and exchange the tastes and preferences of the customer, and integrate them thereafter, or complaints following nonconformities, and in this case we organize urgent meetings to propose solutions. This direct contact with customers, allows us to have a stock of information and knowledge and use it to improve our performance." [AC]*
QM process control	*" [....] Of course our quality system relies heavily on the process approach. Thanks to the SPC (Statistical Process Control) software, we have been able to facilitate the understanding of the processes for our personnel, which has allowed us to reduce the rate of rejects. [AL]* *"We are working with the planning and engineering department to further improve process performance by storing all the data from the different processes, to make it easier to access the necessary information, compare and evaluate the processes. [AV]* *"The use of QM process control has increased the transfer of knowledge between groups because it is a language that is understandable and has the same meaning throughout the company, which has allowed us to quickly identify sources of unintentional errors and reduce risk. [AZ]* *"Since the integration of the process approach, the quality of our products has greatly improved, and we have seen a significant decrease in the number of complaints from our customers, thanks to a more fluid, orderly and efficient process**.** [AU]* *"Process control allows us to identify problems, and to propose the appropriate solutions thanks to the reliable information codified on the processes." [AK]* *"Since the implementation of the process approach, our information system has evolved a lot, because this control strongly helps to codify the tacit knowledge that is most relevant to the proper functioning of the processes." [AR]*

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3.2 DISCUSSION

Through this exploratory abductive study, we were able to explore a number of important TQM factors that have proven to be key determinants of the success of the knowledge management process in the Moroccan automotive sector, as well as other factors specific to the Moroccan context, and also to explore the link between knowledge management and innovation

3.2.1 The influence of TQM practices on knowledge management

The explanations obtained from the respondents give great importance to the **leadership** factor as an element that can positively influence knowledge management and innovation. Company leaders create a knowledge-sharing atmosphere where employees are encouraged to use their clear and tacit knowledge to help solve various problems, by mobilizing various media platforms, teleconferences, weekly meetings, as well as through formal and informal discussions. These practices, fostered by senior managers, give confidence and space to middle managers, operators, to participate and share their ideas more freely, which in turn stimulates the desire to share and transfer knowledge [AF]. This is consistent with Ellinger & Bostrom (1999), who confirmed that leaders play a critical role in ensuring that knowledge sharing occurs within the firm and that relevant knowledge is effectively transferred throughout the organization.

In the context of the Moroccan automotive industry, tacit knowledge is the key to survival and improvement in the market, hence the leadership role of minimizing the departure of key skills and encouraging workers to use and share their tacit knowledge, in order to expand the information system, and improve expertise and skills in automotive equipment and vehicles. [QA]

In addition, when employees leave the company, the company suffers from the loss of strategic knowledge of these staff members, so our leadership implements preventive measures in this regard, influencing and coaching employees to continue the transfer of knowledge through group activities, training programs, open houses... [AR]. Also, a leader is the driving force that directs, accompanies and controls the comings and goings of knowledge, he/she must ensure that the knowledge disseminated is reliable, and therefore, knowledge sharing does not happen automatically and leaders play an important role in its development (Wong, 2005).

Proposition 1 : Leadership is particularly necessary for effective knowledge management

Furthermore, the results of the analysis illustrate the high importance respondents place on **teamwork.** The structuring of the company in work teams is necessary to develop the sharing and integration of knowledge among the personnel. Indeed, the work of the group is considered as an information network where the company improves its processes of selection of problems, and search for relevant solutions [AZA]. As a result, tacit knowledge is managed indirectly during group discussions, which improves business performance (Sparkes &Miyake, 2000). Similarly, the transfer of knowledge has been greatly improved through teamwork, due, among other things, to the decentralization of power, and the relative absence of hierarchy, as engineers, production managers, and logistics managers work as a team with the operators and the whole team is responsible for successes and failures [AJ]. Furthermore, performance improvement in the automotive industry, relies heavily on the relevance and credibility of data to make good decisions [AX], hence the importance of teamwork that allows the organization to access and use the knowledge of individuals lower down the organizational chart, in order to improve products (Grant, 1996). But again, Dougherty (2001) argues that the use of teamwork facilitates the creation of a common work picture, which leads to timely achievement of goals and strengthens team relationships, which in turn facilitates knowledge transfer within the organization.

Proposition 2: Teamwork has a positive and significant association with the knowledge management process

Other elements that could be qualified as a critical factor in total quality management are **training**. The majority of respondents supported the role that training can play in the knowledge management process. Automotive companies are always looking for new knowledge to ensure their survival, and for this reason they are looking for the most relevant training methods to successfully address the issue of efficiency [AP]. Moreover, the implementation of training programs plays an important role in creating an environment that encourages each employee to share, express, and improve his or her knowledge within the organization, which leads to the development of new knowledge and skills (Goetsch and Davis, 2000).

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In addition, training increases staff motivation, as a well-trained and informed employee has the ability to solve problems, and correct work processes, and therefore formal and informal training encourages the employee to have the sense to codify, share and integrate the knowledge acquired [AH]. In order to establish an effective knowledge management system that supports knowledge transfer, automotive companies rely heavily on training as it reduces the cost of information retrieval, reduces risk in the workplace, and improves the speed of finding solutions [AL].

Proposition 3 : Training is positively linked to knowledge management

The results of the analysis also show that **Customer Orientation** is well involved in the knowledge management process among employees in the automotive sector.

The company has to take into account the transfer of knowledge about customer needs (feedback, comments, complaints and suggestions, ..) in its decision processes. This knowledge is important for the whole company and should be distributed among the staff in order to deliver the desired products [AM] and [AY]. This confirms Liao's (2006) finding that the implementation of a sophisticated customer feedback system and the sharing and dissemination of this information provides the company with the opportunity to gain a sustainable competitive advantage.

In addition, the automotive sector has become in recent years, increasingly demanding, which requires improvements to survive [AI]. While the customer focus is a key driver of organizational innovation, given that it presents valuable data that allow the development and innovation of new (Li, S. and Jiang, Y., 2011). However, including customer suggestions in improvement activities, would build trust with customers, which would facilitate effective communication and foster a transparent working relationship, which in turn would promote knowledge transfer [AB].

Proposition 4 : Customer orientation has a positive influence on the knowledge management process.

The testimonials also highlighted the role that QM process control can play in the knowledge management process within the automotive sector.

In order to reduce costs, shorten the cycle time of motor vehicles, and increase efficiency, it is essential to implement the process approach, as it ensures that process information is distributed among operators, easily identifies problems and even reduces the occurrence of errors, as well as proposing solutions thanks to the codified information on each process [AR]. By using process control in the company, research and knowledge transfer would be facilitated (Molina et al., 2007).

On the other hand, the process approach allows the company to encode the tacit knowledge of its employees, which subsequently helps to strengthen the information system. The use of this relevant tacit knowledge about the company's processes helps the company to identify errors and problems, and reduce risk, and consequently performance improvement [AZ]. Through the effort of continuous process improvement, companies will be better able to identify and use the knowledge necessary for business success (Dean & Bowen, 1994).

Proposition 5 : *QM process control plays a major role in improving the knowledge management process***.**

3.2.2 New explanatory factors of TQM influencing the knowledge management process

The empirical material allowed us to identify, from the testimonies of the interviewees, other factors that can play an important role in the improvement of knowledge management processes.

Recognition and reward

Promoting a recognition and reward system appears in the respondents' statements as an essential dimension of the TQM that promotes the knowledge management process. The director of the information system [AF], says: "*We are convinced that the reward system, whether intrinsic or extrinsic, has a very positive influence on internal knowledge dissemination behavior. In our company we give rewards to employees who exceed the set objectives, and those who propose new ideas for improving vehicles and processes. At this level an employee who takes a reward on his contribution to the resolution of problems, and to the improvement of processes, he will be motivated to share his information and to give more effort [.....]. Our reward system is generally organized in three points: firstly; each operator who exceeds the set objectives should receive a bonus, secondly; after each month we share in a table the excellent of each department, it is a kind of recognition for our staff, and lastly: we organize an annual competition for our employees. The latter is organized by a jury, and then the interested must propose a detailed project of the innovative idea that improves the performance of the company, and once the file is validated by the jury, the winner will receive an award. These three modes of rewards allow both to improve the information system and the*

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performance". This is in line with theory, which states that; increased salary, bonuses, stock options or increased security, access to information and knowledge shared by other contributors(Cohen D, 1998; Dyer JH, Nobeoka K., 2000; H. Hall, 2001, career advancement when storage and dissemination behaviors are evaluated and valued, reputation development(S. L. Jarvenpaa and D. S. Staples, 2000; C. O'Dell and C. J. Grayson, 1998, the acquisition of an expert image in the organization and the existence of reciprocal benefits, are extrinsic rewards in terms of knowledge management, which encourage the sharing of information within the organization (Isabelle Bourdon, Maryline Bourdil, 2007). While, other previous studies, have focused on intrinsic rewards (personal satisfaction and selfesteem), and their positive impact on the process of valuing knowledge dissemination (Wasko. M, 1998).

In addition, through the reward system, employees are motivated to seek new knowledge, which will subsequently lead to increased knowledge transfer [AL], [AZA]. This finding allows us to present the following proposal**:**

Proposition 6 : *recognition and reward are positively linked to the knowledge management process*

Internal benchmarking

The interviewees also point out that internal benchmarking is currently a crucial ingredient for improving automotive performance. It is a question of the company delimiting, determining, defining and formalizing good practices held internally, in the form of a "Good Practices" table, with the objective of communicating them and deploying them in other departments [AR] and [AL]. In this sense, respondent AE confirms that "In order to acquire an increasingly effective and efficient information system that satisfies the needs of the entire plant, our company has been implementing internal benchmarking practices for the last three years, through which we carry out comparative performance analyses between production units, between departments, and even between groups. This allows us to improve old knowledge, benefit from new knowledge, and apply it to improve work efficiency. Nevertheless, Hahn (2000) and Fuller (2000) mention that the performance of a process is not exclusively linked to the quality of execution of activities, but also the way in which these activities are organized can have a strong impact on the effectiveness, efficiency and excellence of the process. This effectiveness of a process is generally evaluated using the three usual criteria that are: Cost, Quality, and Time (Vincent Bronet, Jean-Luc Maire, Maurice Pillet; 2003). This makes it possible to improve learning and increase employee knowledge [AP]. However, according to the testimonies collected, the Moroccan automotive sector is currently facing an obligation to improve its processes in a continuous way to fight against the global competition. For this reason, automotive companies have set up benchmarking activities in order to establish good practices and to improve the transfer of knowledge throughout the company, and consequently the improvement of performance.

Summarizing the opinions offered by the interviewees, we therefore submit the following proposal:

Proposition 7 : *internal benchmarking positively influences knowledge management.*

3.2.3 The influence of knowledge management on innovation

Regarding the influence of knowledge management on innovation performance, this study provided empirical evidence that knowledge management processes have a positive and significant effect on innovation. Such a result is supported by Darroch (2005) who considers knowledge management as necessary processes to achieve the desired innovation performance.

Further analysis conducted by this study determined that two knowledge management processes (i.e., knowledge application and knowledge dissemination) are associated with innovation, while knowledge identification fails to influence innovation. This result obtained is logical insofar as possessing knowledge without taking the necessary steps to provide all the facilities to apply it will not improve the capacity for innovation [AF]. Moreover, the ability to use knowledge is a key factor in stimulating the intended innovation. This conclusion, moreover, is consistent with Hung et al.'s (2010) argument that the main outcome of knowledge management processes is knowledge, and that this outcome is not the intended purpose; rather, it is a tool to achieve the intended purpose of improving the overall performance of the firm. Therefore, providing this knowledge to the right person at the right time to make the right decisions is the main reason for the vital role of knowledge management in innovation. The following proposition is therefore made:

Proposition 8 : *The knowledge management process positively influences innovation*

Based on the emerging factors as well as the updated indicators for measuring the other factors, we propose this conceptual model (see Figure 1):

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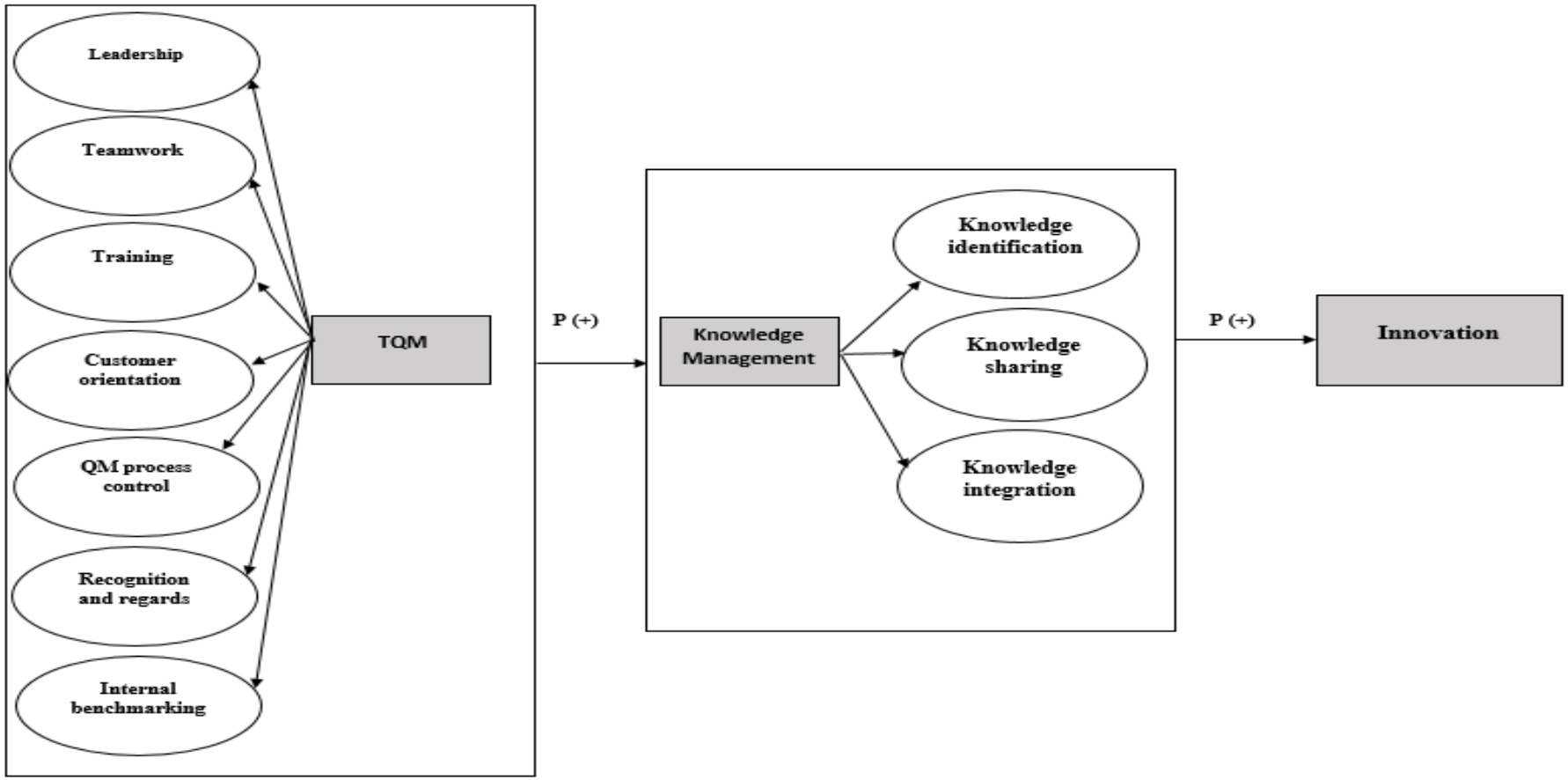
Figure 1: Conceptual Research Model



Source: authors

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CONCLUSION

The objective of this research was to study the influence of total quality management practices on the knowledge management process and innovation in the three cases of the automotive sector. Total quality provides a context for the study of knowledge management systems and innovation, and illustrates specific practices that can be put in place to improve knowledge management in the automotive industry.

The data collected in this study showed that total quality management practices reinforce each other to exert a positive and significant influence on knowledge management and innovation. These results can be associated with the work of some researches, such as (HeshamMagd et al., 2021;Daniel Jiménez-Jiménez et al., 2019; Mauro Sciarelli et al., 2020). Nevertheless, our results are part of an exploratory research, which aims to have as exhaustive a perception of the phenomenon as possible. Based on the literature review we have chosen five critical factors of TQM (Leadership, teamwork, training, customer orientation, and QM process control) to explore and understand in a deeper lever the things that are related to the phenomenon to be explained which is knowledge management, but during the interviews, we have made emerge other factors in the framework of total quality that favor very positively the process of knowledge management and innovation, which are internal benchmarking and recognition and reward. Indeed, we have observed from the practical study that the reward system mobilized in the three cases studied, is perceived as an essential practice for the success of the total quality approach, as well as being closely linked in a positive way with the knowledge management and innovation process. Similarly, internal benchmarking was found to be a strong factor in the success of total quality improvement in the automotive industry, which in turn improves the level of the knowledge management process and the innovation capacity.

The contribution of this study is to propose a model to better understand the reciprocal relationship between the specificities of total quality management and knowledge management, and to show the influence of this process on innovation in the Moroccan automotive sector. This model combines factors from the literature and those emerging from the field. However, there is still a long way to go until the model is well refined. For this reason, we propose the refinement and testing of the proposed model in the Moroccan automotive industry, by mobilizing a hybrid approach between the qualitative method, aiming to understand how the proposed TQM factors can influence the knowledge management process, and the quantitative method, which has as main goal the measurement of the impact of these factors.

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