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Effects of Organizational Cooperation on Knowledge Management: a study among researchers.

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Effects of Organizational Cooperation on Knowledge Management: a study among researchers.

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Abstract

Organizational Cooperation (OC) is a current concept that responds to the growing interdependence among individuals and teams. Likewise, Knowledge Management (KM) accompanies specialization in all sectors of human activity. Most KM processes are cooperation-intensive, and the way both constructs relate to each other is relevant in understanding organizations and promoting performance. The aim of this study is to analyze the relationship between the different dimensions of OC (*Principles of Cooperative Relationship*; *Formal Cooperation*; *Cooperation Focused on the Organizational Mission*) and the KM dimensions (*Knowledge-Centered Culture*; *Competitive Orientation*; *Formal Practices of KM*; *Informal Practices of KM*). It is based on a humanized perspective of KM, regarding social interactions as a key for KM. This perspective values the work of the individuals, more than technology, for the development of organizational knowledge. The Organizational Cooperation Questionnaire (ORCOQ) and the Short form of the Knowledge Management Questionnaire (KMQ-SF) were applied to 639 research team members (working in universities and research institutes). Descriptive, correlational, linear multiple regression and multivariate multiple regression analyses were performed. Results showed significant positive relationships between the ORCOQ and all the KMQ-SF dimensions. The prediction of KMQ-SF showed a large effect size (R^2=62%). These findings will impact on how KM and OC are understood and put into practice in organizations, and will be a step forward in the development of this field.

***Keywords*:** organizational cooperation, knowledge management, ORCOQ, KMQ-SF.

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Summary of Contents

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Introduction

We are living in a "knowledge society", term first used by Drucker (1992), meaning that knowledge represents the prime resource for individuals, for organizations and for society (Ahmadi, Selsele, & Ahmadi, 2011).

Recently, in Xu and Bernard's research (2013), it is stated that nowadays' organizational life, with all its complexity and unexpected challenges, demands effective cooperation processes in knowledge management (KM). In this context, the present study, serves the purpose of understanding the relationship between Organizational Cooperation (OC) dimensions and the KM dimensions in an organizational level, specifically in knowledge-workers. This type of workers have knowledge as their main capital, meaning that knowledge is at the same time their main asset and the product they build. For these workers, KM is an essential part in the sustainability of their work. For this reason, we have chosen to study the effects OC can have on the KM dimensions in this group of workers.

It is a highly acclaimed fact that organizations are built and raised by people, thus, human assets, such as knowledge and cooperation, are the main resource of any organization. Schalk and Curseu (2010) state that the quality of cooperation can determine organizations' success, therefore, managers must promote cooperation to guarantee that the organization can effectively adapt to changes in the environment, can be well positioned in inter-organizational networks, and that can be flexible in production or services, to handle with environmental constrains. Also, Gratton (2005) studying the cooperative work in high-performing companies, referred that cooperation must be encouraged, as it constitutes "much of the value-creation opportunities within an organization" (p.151).

In Durst and Edvardsson (2012) literature review of KM in Small and Medium Enterprises (SMEs), they enumerate various authors who reinforce the practical importance of KM as a strategic asset for competitive advantage, which can determine organizations' survival. Moreover, it is asserted that processes such as knowledge identification, creation, storage, dissemination, and application infer directly in the organizations' competence to achieve the desired outcomes (Cardoso, Gomes & Rebelo, 2005). KM has definite implications for organizational life because it deals with the most valuable resource of an organization - the knowledge - that constitutes a "critical

ingredient", as said by Desouza (2004, p.1), which must be hold and set "into routines, processes, and practices" (Desouza, 2004, p.5).

As Serenko (2013) states, the focus of KM research has been tended towards hard topics, regarding technology, however, this is expected to shift to soft issues in the future, that focus on people, groups, and social aspects. The increasing recognition of intangible assets in organizations' development, namely, individual and group action towards KM processes will have a great impact. The present thesis is based on this humanized perspective of KM, which claims that interactions between people and teamwork are a key factor for KM (Ahmadi, Selsele, & Ahmadi, 2011). This perspective tends to approach the KM in terms of evaluation, change and competencies' development (Cardoso, 2007b). Technology will then be a vehicle for knowledge acquisition, transmission and storage, while the knowledge creation will be set in the work of the individuals (Cardoso, 2007b).

In Ahmadi, Selsele, and Ahmadi (2011) review of KM, it is pointed out that some authors demand further research in collaborative networks as determinants of the way knowledge flows (Singh, 2005), referring that interpersonal networks and social ties between workers impact the way knowledge is spread in the organization. This is on account of the fact that employees in organizations in the modern context, invariably work in groups, teams or projects.

Further, it was found a clear and claimed need for KM to affect organizations performance in real and valued outcomes. In response to this, Serenko (2013) states that, researchers should in the future identify and measure the impact of KM on organizational performance, through the use of empirical methods and case studies, and engage practitioners by communicating their findings to non-academic audiences. This author says this is the only way to guarantee practical implications of KM, which contribute to a better work life and organizations' development. Also, some authors were concerned about the existing gap between theoretical foundations of KM and its practical implementations. Desouza (2004) called for a linkage between KM and organizational success and productivity, through empirical studies, in order to obtain a more pragmatic comprehension of the phenomena. Serenko, Bontis, and Moshonsky (2012) say that some effort has already been made in order to approximate research and practice, and that academic KM research has made an impact on the state of KM practice, in the business community. The present thesis serves the purpose of bridging

this gap between theory and practice, by developing theoretical knowledge from existing practices and enlarging the importance of implement evidence-based practices.

Taking all this into account, the present study is expected to contribute for society's development, through the enhancement of people's work life, reinforcing the humanized perspective of KM, which values the work of individuals. Considering the OC as a trigger for the achievement of great outcomes related to KM, it will improve organizations' sustainability by the use of KM processes based on cooperation. Plus, it serves to develop the field of KM research with the incorporation of organizational cooperation as a key factor to these processes. Finally, because the participants of the present paper are researchers - workers who deal with knowledge on a daily basis – this research will overcome the limitations of previous studies done in the field (e.g., Arthur & Kim, 2005; Nahapiet, Gratton & Rocha, 2005; Allarakhia, Walsh & Wensley, 2007; Lin, 2007; Xu & Bernard, 2013) and be a premier in study of this relationship in knowledge-workers. The current thesis will also serve the purpose of developing the research in KM, taking part in the construction of new knowledge in the field.

In the present document the reader can find a synthesis of the literature about the two variables in study: KM and OC, the Relationship between the KM and OC and the study aim and hypothesis in the section Theoretical Background. In the Method section we describe the participants, materials, procedures and data analysis. Further in the section Results appear the analysis conducted: descriptive, correlational, multiple linear regression, multivariate multiple linear regression and moderation. Finally, is presented the Discussion of results, followed by the limitations and further research and conclusion.

Theoretical Background

Knowledge Management (KM)

Knowledge is something humanly and socially constructed, "exists within people, part and parcel of human complexity and unpredictability" (Davenport & Prusak, 1998, p.5). It results from an amount of cognitive, emotional and behavioral elements and, as an unlimited asset, which develops itself by its use, constitutes one of the most important organizational factors to achieve a sustainable competitive advantage (Cardoso, 2007b). Recently, Durst and Edvardsson (2012), reinforce this

idea, affirming that higher levels of KM maturity were positively correlated with long-term sustainable growth. This fact is explained by the exclusive and irreplaceable role knowledge plays in the organizations nowadays, source that enables them to grow independently, and that can be developed, acquired, used effectively, and wisely shared through the KM processes.

KM is a field of study which benefits from contributions of various disciplines such as information systems, accounting, operations management, strategic management, marketing, human resources, and organization design (Holsapple & Wu, 2008), making it truly interdisciplinary, and consequentially not easy to define. Its origins remain from the seminal work of Nonaka and Takeuchi (1995), who focused on knowledge creation in Japanese companies and recognized the importance of tacit knowledge. In the United States of America, Davenport and Prusak (1998), introduced the vision of knowledge as a corporate asset, considering it the greatest competitive advantage of organizations in the changing global economy.

Latterly, Griffiths et al. (2010) and Griffiths and Koukpaki (2010) conjectured the following definition: "KM is about managing the environment to develop value-based solutions that enable the acquisition and storage, use, sharing and creation of knowledge assets for strategic and tactical use within the organization, to meet the end of innovation, adaptive capacity and decision-making" (Griffiths & Evans, 2011, p. 780).

Focusing on the human side of KM conveyed by Cardoso (2007a), Cardoso and Gomes (2011), and Cardoso, Meireles, and Peralta (2012), it is considered that organizational knowledge has a particular social and interactive nature, requiring real involvement and committed participation by people, making it a dynamic process. This perspective is sustained in people, in supporting them to take part in KM strategy, understanding, commitment and goals pursue. These authors considered particular factors that are related with KM implementation in organizations, specifically in the social economy sector, such as organizational commitment, knowledge-centered culture, and training, demonstrating that human factors strongly affect KM processes, and subsequent practices.

As Serenko (2013) states, KM having emerged as a set of professional practices, is recognized as a practitioner-driven concept, and results from the transforming pressure that has impacted organizations in the second half of the last century, to

improve their efficiency and competitiveness. Ribiere and Walter (2013) advance that KM relies strongly on the way the knowledge holders, namely, all the stakeholders of the organizations, are managed and motivated, making this a distinctive strategy for organization to become innovative and competitive.

Furthermore, Pais (2014) views KM as a set of day-to-day activities, related to the creation and development of internal organizational conditions, which catalyze every knowledge-related process, considering knowledge as an indispensable asset to achieve organizational objectives. Therefore, the mentioned knowledge-related actions to reach the previously defined organizational goals imply an internal and external orientation of the organization, in order to achieve certain outcomes. Finally, this author suggests that KM requires an organizational culture which serves the purposes of knowledge creation, sharing and use. This means a knowledge-centered culture, with the adoption of strategies that impact all organizational actors, and the commitment of the whole organization to the KM processes. From this perspective of KM was created an instrument called the KM Questionnaire – Short Form, which assesses it in four dimensions: *Knowledge-Centered Culture, Competitive Orientation, Formal Practices of KM, Informal Practices of KM (*Pais, 2014). The perspective considered in the present thesis is the latter, and the instrument used in the assessment of KM is the KMQ-SF by Pais (2014). It focuses on the role of people in KM processes, and KM purpose to align people and their activities with the organizational goals. This perspective is clearly a humanized view of KM, supporting the importance of cooperation, commitment and participation of all organizational actors.

Organizational Cooperation (OC)

Cooperation is, at a primary level, an evolutionary pattern of behaviors found in all animal species, on which depends our survival, through the achievement of mutual help, and social integration (Argyle & Lu, 1991). Argyle and Lu (1991) consider that there are four main classes of cooperation-joint task activity: "social relationships, coordination over joint activities, communication and interaction" (p.1019). Considering this, cooperation is defined by Argyle (1991) as "acting together, in a coordinated way at work, leisure, or in social relationships, in the pursuit of shared goals, the enjoyment of the joint activity, or simply furthering the relationship" (p. 4).

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Smith, Carroll, and Ashford, (1995) state that cooperation definitions are focused on the interaction within individuals, groups, and organizations and the way they enroll in psychological relationships for mutual gain or benefit. These authors refer that there can occur two types of cooperative relationship: formal or informal, whether it involves contractual obligations and formal structures of control, or adaptable arrangements that define the contributions of the parties. These authors also suggest that coordination, which has cooperation as a prerequisite, and crosses functional, hierarchical, and national boundaries is crucial to promote high performance and organizational effectiveness by creating an efficient and harmonious combination of the parts.

Chen, Chen, and Meindl (1998) count some different approaches of cooperation that have emerged through its development, such as: cooperation as psychological motives, resulting in the collective work towards a common goal; cooperation as social relations and situations that exist between the goals of different people; cooperation as behaviors which refer to any cooperative activities, within two or more people; cooperation as an act of maximizing others' interests, as seen in the social dilemma research; and the dimensional approach which looks at the dimensions of positive interactions within a group. In this last perspective is included the organizational citizenship behavior (OCB), meaning the "contributions to the maintenance and enhancement of the social and psychological context that supports task performance" (Organ, 1997, p.91). The OCBs, were recently connected with cooperation and knowledge sharing (Gravili, 2010), in a study about the role of participation in virtual social networks as a way to manage OCBs and transform cooperation into knowledge. One of the findings of this study by Gravili (2010), considered relevant for the present paper, was the fact that cooperation was found to be a tool for the development of OCBs, and constant exchange of knowledge.

Further, Deutsch (2001), in his theory of Cooperation and Conflict Resolution, has two basic notions: the first concerns the types of interdependence among the goals of the ones involved in a determined situation and the other concerns the types of actions the ones involved make. The author suggests that there are two types of basic goal interdependence: "promotive or positive interdependence", meaning the goals are linked in a positive way - the amount of personal goals someone obtains, or its probability, is positively correlated with the amount of personal goals other obtain, or its

probability; and "contrient or negative interdependence", meaning the goals are negatively linked in a way that the probability of one's goal achievement is negatively correlated with the probability of other's goal achievement. In reference to the actions people embrace, Deutsch (2001) nominates the "effective actions", that augment the actor's chance of attaining his goal, and the "bungling actions", which worsen the actor's chance of attaining his goal. In this theory, Deutsch (2001) concludes that when comparing cooperative groups with competitive groups, the first will differentiate from the other, in some ways:

- The communication within members would be more effective, with better verbalization of ideas, attention to one another and acceptance, resulting in less communication problems and misunderstandings.
- Group discussions would be more friendly, helpful and less obstructive. This way, there would be more satisfaction with the group and its solutions and members would be better impressed with the others members contributions.
- In cooperative groups there would be more effort coordination, more work division, more orientation through task achievement, more order when discussing, and higher productivity, concretely when the tasks demand communication, coordination, division of labor, and sharing.
- A greater feeling of agreement and confidence in each other's ideas and value for the group, and a better sense of similarity in values and beliefs, would appear in cooperative groups.
- Cooperation leads to the perspective of conflict as a problem to be solved mutually and collaboratively, with the acceptance of the legitimacy of each other's interests, and the need to search for a solution of compromise through the different needs.

To sum up, in this study of Deutsch (2001), it is clear and claimed that cooperation in groups and organizations comprise solid advantages comparing with competitive groups. For instance, cooperation in groups is positively related to effective communication, members' satisfaction, productivity, sense of community and compromise.

Gratton (2005), focusing on specific high-performing companies as practical examples of cooperative workplaces, show that executive teams are perceiving cooperation as a key asset for their organizations' success. An interesting contribution

of this study is the Human Resources' implication in the establishment of cooperative networks, that combine the promotion of proximity, time shared with colleagues, shared tasks, and a culture of trust and respect.

Cooperation has also been a research interest of social psychologists who intended to explain people's differences in valuing cooperativeness and their corresponding motives to cooperate (Bogaert, Boone, & Declerck, 2008), while dealing with social dilemmas. Social dilemmas occur when there is interdependence between people as a consequence of an interaction (Pais & dos Santos, 2015). In these situations there can be an individual choice and benefit or a collective choice or cooperation. Concretely in the study of social dilemmas, emerged the theory of the social value orientation (SVO) that establishes the differences in "the weights people assign to their own and others' outcomes in situations of interdependence" (Balliet, Parks, & Joireman, 2009, p.533). Recently, this construct has been presented as a continuous reflecting the "degree to which a decision maker will choose to sacrifice his or her own resources to benefit another" (Murphy & Ackermann, 2013, p.4). Likewise, the SVO can be presented in a framework which weights the value a decision maker gives to joint outcomes, opposing the individual payoff and the other's person payoff (Murphy & Ackermann, 2013). In result, the framework brings along a set of eight directions that represent the different social preferences of people: the *Prosocial* maximizes the joint payoff or minimize the difference between payoffs; the *Individualistic* maximizes the payoff to oneself; the *Competitive* maximizes the positive difference between the payoff for oneself and the payoff for the other; the *Sadistic* minimizes the other's payoff; the *Sadomasochistic* minimizes the joint payoff or the difference between payoffs; the *Masochistic* minimizes the payoff to oneself; the *Martyr* maximizes the negative difference between the other's payoff and the payoff for oneself; and, finally, the *Altruistic* maximizes the other's payoff (Murphy & Ackermann, 2013).

Finally, Marcus and Le (2013) regard cooperation in the behavioral way, defining it as "actual behaviors carried out by a person that are directed towards helping members perform in-role duties or involve working with other workgroup members towards a shared goal" (p.816). In the organizational reality, some examples of these behaviors can be found, for instance when people gather to share information, or when there is mutual help in completing tasks (Marcus & Le, 2013). These authors studied the interactive effects between the levels of individualism-collectivism on cooperation in

the workplace, finding a higher correlation between cooperation and collectivistic societies, as it would be naturally expected.

In the present thesis it is assumed that cooperation involves not only tangible behaviors in a sharing context, but also a will to maximize joint outcomes and make compromise decisions. Thus, organizational cooperation includes principles, practices, strategies and behaviors which result in a cooperative organizational environment. According to this perspective, an instrument was developed to assess the OC - the Organizational Cooperation Questionnaire, ORCOQ (Santos, Figueiredo & Pais, 2013, submitted; Vieira, 2012; Fernandes, 2011) used in the present research.

Relationship between KM and OC

In the present research, given the theoretical background, it is assumed that OC, as a process of social interaction at workplace, has various features which are indispensable to KM, such as effective communication, effort coordination, work towards shared goals, and a helpful attitude within fellow workers (Deutsch, 2001). Like Moss, Kubacki, Hersh, and Gunn (2007) previously asserted, researches done in the field highlight that KM benefits from teamwork, cooperation, and collaboration. Therefore, was made a sum up of the most recent researches that sign some relationship between the social interactions in workplace, such as cooperation, and the various knowledge processes and dimensions, which support and empower the present investigation. Following, there are eight are studies from the last ten years which relate KM and cooperation.

Nahapiet, Gratton and Rocha (2005) when reviewing about knowledge and relationships, saw the future of organizations in the global and knowledge-based economy going towards the establishment of cooperation as the norm. These authors claim that managers are starting to see workers' ability to create value through KM, as a source of competitive advantage for the business. So, they propose that as knowledge is intimately linked with social relationships, cooperation will be a key asset for the knowledge-based view of the organization. In this article, the authors refer that the quality of social interactions, which influences the creation and exploitation of knowledge, has been recognized empirically as an important factor in the knowledge economy, specially highlighting the role of cooperation.

Then, in a study about gainsharing and knowledge sharing, Arthur and Kim (2005), hypothesized that the level of cooperation and trust within employees had an impact in the way people take employment risks, resulting in different patterns of information sharing under gainsharing. For this purpose, it was made a comparison of the content of employee suggestion through time in two organizations, differing in cooperation level and union support for gainsharing. It was thus shown that differences in labor management cooperation can lead to distinctive patterns of information sharing, which would probably occur in a similar way in various employment practices.

In the biomedical field, Allarakhia, Walsh, and Wensley (2007), have come up with the statement that no biologist can work in isolation, focusing on the role of cooperation in KM. In this study, it was concluded that the creation of biological knowledge, with the help of information and communication technologies must be done in collaborative networks. Researchers in the various areas, relate with knowledge on a daily basis, for that reason, knowledge has to be easily accessible so they can manage it to their purpose. These authors asserted that academia, governments and industry have a role in controlling and impacting cooperative knowledge production, and expanding the biological knowledge.

In China, Lin (2007) conducted a research which intended to see if cross-functional cooperation and competition had any effect on new product performance and KM processes. In this research it was used the following definition of cross-functional cooperation: "similar or complementary coordinated actions taken by actors (departments) in interdependent relationships to achieve mutual outcomes or singular outcomes with expected reciprocation over time" by Anderson and Narus (1990), (Lin, 2007, p.10). The results found cross-functional cooperation to have a positive effect on KM processes (knowledge acquisition, knowledge dissemination, knowledge interpretation, and knowledge application), meaning that the characteristics of "collaborative working relationship", "high quality interactions (communication)" and "high level of involvement" had positive effects on the KM processes.

Tseng and Fan (2011), in their research about the influence of organizational ethical climate in KM, came up with the understanding that organizational ethical climate can affect and shape cooperative interactions among people in organizations. Also, this study refers back to the idea of Haslam (2000, p.385) that when members mutually agree that knowledge is a public good, they easily develop an ethical judgment

in the decision of what is wrong and right, which will consequently enable cooperation and increase their notion of "organizational knowledge management attitude and behavior".

Furthermore, Ghobadi and D'Ambra (2011), focused their study on the contrastive processes of cooperation and competition within knowledge sharing, designated as the "coopetitive" knowledge sharing. In this study it was set that people at work can, on one hand, develop positive attitudes towards their tasks and partners and, on the other hand, negative ones, representing the distinctive features of behaviors like cooperation and competition. Also, these authors looked for the effect of organizational and individual factors related to knowledge, and their influence in the prediction of cooperative and competitive knowledge sharing patterns. They concluded that factors related to the organization, the individual, and knowledge predict both cooperation and competition, which will have an impact in the effectiveness of the knowledge-sharing process, one of the processes within KM.

Recently, was carried out a study which integrated KM issues with a cooperation model (Xu & Bernard, 2013), having resulted in advances for teamwork performance. In the aforementioned research, cooperation through teamwork has a crucial role in creating advantages for organizations facing everyday issues. Plus, it is asserted that organizations face the problem of "knowledge explosion" characterized by an exaggerated amount of knowledge which requires an effective knowledge selection. In order to do so, there is a need for organizational members to embrace in models and procedures for knowledge selection, supported in two factors: "receiver's ability of acceptance" and "expressing ability of knowledge". These factors represent the relationship between cooperation partners in this knowledge selection process, and define the ability of the receiver in judging whether the knowledge is to be considered in the processing activities, and the distinctive knowledge's attribute in expressing its information. The model suggested in this research conceptualizes knowledge-sharing and team cooperation processes in a quantitative point of view, including the elements of working time allocation, knowledge management ability, and team size.

The study of knowledge-sharing has been approached by some authors as a cooperation process in the framework of a social dilemma, meaning that there are competing motives for people to decide whether or not to share knowledge (Pais & dos Santos, 2015). These authors have reviewed 20 articles and come up with some

conclusions like the notion that knowledge-sharing is recommended to be implemented in order to develop the organizational knowledge and the organization overall performance, as a result. Although the framework of the present thesis differ from the one of social dilemmas, this perspective highlights that knowledge-sharing is a cooperative process, as a choice, dependent on individual motivations (Pais & dos Santos, 2015).

From our literature review we can notice that various studies point to an existing connection between the OC and the KM, making us move forward confidently with this research. Studies point out that the future of organizations in the knowledge society look for cooperation (Nahapiet, Gratton & Rocha, 2005), the information technologies must be used in collaborative networks (Allarakhia, Walsh & Wensley, 2007), cross-functional cooperation impacts positively KM processes (Lin, 2007) and that knowledge-sharing is a cooperative process (Pais & dos Santos, 2015).

These previous studies support ours, nevertheless, they lack in a coherent and consistent overview of the different OC and KM dimensions. Also, the present study provides new insights about this relationship in the work of researchers, workers of the knowledge market.

Study Aim & Hypothesis

The purpose of this study is to explore the relationship between the different dimensions of organizational cooperation (OC) and the knowledge management (KM) dimensions. Concretely, throughout this research we intend to verify the possible predictive effects of individuals' OC on their perception of the KM dimensions, in their workplace. The following hypothesis will be verified, exploring the way the ORCOQ factors predict the KMQ-SF factors:

Hypothesis 1 (H1): *Individuals' perception of Organizational Cooperation predicts positively their perception of Knowledge Management dimensions.*

Hypothesis 2 (H2): *The Principles of Cooperative Relationship have a positive effect on the levels of the Knowledge Management dimensions.*

- ***Hypothesis 2a (H2a):*** *The Principles of Cooperative Relationship have a positive effect on Knowledge-Centered Culture.*

- ***Hypothesis 2b (H2b):*** *The Principles of Cooperative Relationship have a positive effect on Competitive Orientation.*
- ***Hypothesis 2c (H2c):*** *The Principles of Cooperative Relationship have a positive effect on Formal Practices of Knowledge Management.*
- ***Hypothesis 2d (H2d):*** *The Principles of Cooperative Relationship have a positive effect on Informal Practices of Knowledge Management.*

Hypothesis 3 (H3): *The Formal Cooperation has a positive effect on the levels of the Knowledge Management dimensions.*

- ***Hypothesis 3a (H3a):*** *The Formal Cooperation has a positive effect on Knowledge-Centered Culture.*
- ***Hypothesis 3b (H3b):*** *The Formal Cooperation has a positive effect on Competitive Orientation.*
- ***Hypothesis 3c (H3c):*** *The Formal Cooperation has a positive effect on Formal Practices of Knowledge Management.*
- ***Hypothesis 3d (H3d):*** *The Formal Cooperation has a positive effect on Informal Practices of Knowledge Management.*

Hypothesis 4 (H4): *The Cooperation focused on the organizational mission has a positive effect on the levels of the Knowledge Management dimensions.*

- ***Hypothesis 4a (H4a):*** *The Cooperation focused on the organizational mission has a positive effect on Knowledge-Centered Culture.*
- ***Hypothesis 4b (H4b):*** *The Cooperation focused on the organizational mission has a positive effect on Competitive Orientation.*
- ***Hypothesis 4c (H4c):*** *The Cooperation focused on the organizational mission has a positive effect on Formal Practices of Knowledge Management.*
- ***Hypothesis 4d (H4d):*** *The Cooperation focused on the organizational mission has a positive effect on Informal Practices of Knowledge Management.*

Because in some organizational and social variables are found moderation effects (e.g., Van Lange, Otten, De Bruin, & Joireman, 1997, Van Lange, 1999, Tsai, 2002), and lacking in empirical evidence about the relationship between the two constructs in study, the present research has an exploratory aim of searching for

possible interactions between the ORCOQ factors in the prediction of the KMQ-SF factors.

Method

Participants

The sample is made up of 639 participants, all researchers from research institutions in Portugal, of both genders, being 58.3% female. The ages are dispersed in 7.5% of the respondents being between 18 to 24 years, 42.5% between 25 to 34 years, 38.4% between 35 to 49 years, 10.4% between 50 to 64 years, and 1.3% ageing more than 65 years old. The descriptive synthesis of the sample shows that 9.4% of the respondents work in the organization for less than one year, 38.7% for one year to five years, 21.2% work for five years to ten years, and 30.7% for more than ten years. Considering the function of the employee, 52.9% are researchers, 13.5% are professors, 12.8% are scholarship researchers, 11.2% are PhD students, 3.2% have leadership functions, 1.4% are students, 1.1% are PhD researchers, 1.1% are trainees, 0.9% are superior technicians, 0.5% are laboratory technicians, 0.5% are programming technicians, 0.4% are doctors, 0.4% are administratives, and finally, 0.2% are monitors. Concerning academic qualifications, 632 answered about it, 52.1% were PhDs, 33.4% had a master degree, 14.2% had a college degree, 0.2% were bachelors, and 0.2% had high school qualification.

Materials

Short form of Knowledge Management Questionnaire (KMQ-SF, Pais, 2014)

For this research it was used KMQ-SF, constituted by 22 items (Pais, 2014), which identify and evaluate employees' perception of the different KM dimensions. The items are presented in a Likert five-point scale, in which 1 is "almost not applicable", 2 is "a bit applicable", 3 is "moderately applicable", 4 is "very applicable" and 5 is "almost always applicable".

The factorial validity of the questionnaires was evaluated by a confirmatory factor analysis with software AMOS (Arbucklhe, 2008; 2009). The composite reliability and the medium extracted variance for each factor were evaluated as described in

Fornell and Larcker (1981). The existence of outliers was evaluated by the square distance of Mahalanobis (Tabachnick & Fidell, 2007) and the normality of the variables was evaluated by the coefficients of asymmetry (Sk) and kurtosis (Ku) univariate and multivariate. None of the presented variables indicated violations to the normal distribution, considering |Sk| < 3 e |Ku| < 10 (Maroco, 2010). The quality of the global adjustment of the factorial models was made by the Chi-square (X^2), Comparative Fit Index (CFI), Normed-fit Index (NFI), Tucker Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA) indexes, attending at the respective reference values (Bentler, 1999; Schumacker & Lomax, 1996; Brown, 2006; Kline, 2011; Hu & Bentler, 1999). The adjustment of the model was made by modification indexes p < 0.001 that made us correlate the residual variability between the variables 7 and 12, 15 and 16, and 19 and 20 (Arbucle, 2008). This covariation reveals systematic measure errors, which can result, in this case, from similarities in terms of the content of the item (e.g., Aish & Jöreskog, 1990). Despite this, the option of maintaining those items is due to the choice of using the theoretical model by Pais (2014) and to the fact that the items are correlated with the respective dimensions (α >.30, Hair et al., 2008).

The final Tetra-factorial Model of KMQ-SF reveal an acceptable quality of adjustment, $X^2(200) = 549.5$, $p < .001$, NFI = 0.893; CFI = .929, TLI = 0.918 and RMSEA = 0.054. The internal consistency was estimated by the *Cronbach's Alpha* coefficient. The global scale presented a high reliability (Nunally, 1978), α = .911. The first factor (Knowledge-Centered Culture; 7 items) presents a coefficient of .829. The second factor (Competitive Orientation; 4 items) and the third one (Formal Practices of Knowledge Management; 6 items) have a coefficient of .620 and .829 respectively. The last factor (Informal Practices of Knowledge Management; 5 items) has a coefficient of .757 (Nunally, 1978).

In Figure 1 (annex) it is shown the Tetra-Factorial Model of the factorial validation of the Knowledge Management Questionnaire – Short Form. The dimensions are described as following:

- The first factor, *Knowledge-Centered Culture*, represents a common interpretative framework that guides the rules, norms, practices and procedures of the organization, revealing the orientation followed by every member. It addresses a culture oriented through knowledge, where this concept acquires value in productivity, quality, and organizational performance.

- The second factor, *Competitive Orientation*, is focused on the way the organization looks at its external environment, including clients and competitors. This orientation requires a strategic KM, controlling both the internal knowledge and the demands of the different stakeholders, in order to reply and adapt effectively to the environment, creating a sustainable competitive advantage.
- The third factor, *Formal Practices of KM* includes the established processes related in majority with the explicit knowledge. This factor reveals the notion that there is a need to engage in practices that enable the creation, acquisition, preservation, sharing and use of knowledge, based on products and services.
- Finally, the fourth factor, *Informal Practices of KM*, assesses the interactions that contribute for a social construction of knowledge, brought by the creation of a common, collective and symbolic language. The type of knowledge in question is the tacit, which calls for face-to-face contact and sense attribution in the construction of a collective understanding of organizational events.

Organizational Cooperation Questionnaire (ORCOQ, dos Santos, Figueiredo & Pais, 2013, submitted; Pais, dos Santos, Monico, Fernandes, Rebelo & Figueiredo, 2014)

The Organizational Cooperation Questionnaire (ORCOQ) was created in order to assess organizational cooperation in several dimensions (dos Santos, Figueiredo & Pais, 2013, submitted). It was firstly applied to local government sector and showed a 3-factor structure shaped with the aim of addressing the different characteristics of cooperation in the workplace. Therefore, it has been assessed with different and general samples of workers, in order to understand its factorial structure. This questionnaire is formed of 31 items for response on a 5-point Likert scale: 1 “very rarely applies”, 2 “applies a bit”, 3 “moderately applies”, 4 “applies a lot” and 5 “very frequently applies”.

As this questionnaire is recent and does not have a solid enough ground, Exploratory Factor Analysis (EFA) was carried with the aim of exploring its dimensionality in the present specific sample of research team members. With this purpose, factor analysis of principal components was performed (PCA - Principal Component Analysis) with VARIMAX rotation (Kaiser’s normalization).

Before starting with the EFA, we checked whether the requirements necessary for a reliable interpretation of PCA were assumed. According to the criteria of Gorsuch

(1983) there is a need for a minimum of 5 subjects per item. Since the questionnaire had 31 items, the ratio found was 603/31 items = 19.45 subjects/item, which enables, a priori, a reliable use of PCA. The *Kaiser-Meyer-Olkin test (KMO)* and the *Bartlett's Test of Sphericity* were performed. The KMO measure was higher than .70 (KMO=.947) showing sampling adequacy. The *Barltlett's test* presented a X^2 (465)=10854.25, $p<.001$, showing that the correlation matrix differs from the identity matrix (Gorsuch, 1983).

In the previous EFA of the ORCOQ (dos Santos, Figueiredo & Pais, 2013, submitted), 5 factors were identified eigenvalue, in which the explained variability was approximately 60.94%. In this analysis, the items 20, 21, 22, 28, 30 and 31 were found to be problematic and were excluded. Items 20, 22 and 28 have loadings lower than the cut point .45. Items 21 and 30 were not discriminative, loading in more than one factor above .45 and with a difference lower than .10 between factors. Item 31 showed negative loading on factor 5, being, together with item 27, the only significant loading in this factor. Therefore, in the next PCA, only four factors emerged with an eigenvalue over than one. This second analysis resulted in an explained variance of 62.88%, and item 27 were found to be problematic, with factor loadings of .387 and .422 in factors 1 and 4, respectively. It was excluded. New PCA as performed without items 20, 21, 22, 27, 28, 20 and 31, explaining 64.0% of the total variance (four factors with eigenvalue over that one). On this third PCA we found that the only two items (10 and 24) that loaded in factor 4 were not different in terms of meaning from items that loaded on factor 1. Due to this interpretation, we performed a new PCA with 3 factors and the remaining 24 items. The variance explained with three factors was 59.53% (26.28% for factor 1; 18.92% for factor 2, and 14.33% for factor 3).

Table 1 presents the factor loadings (s), communalities (h^2), descriptive statistics for each item, as well as the reliability coefficients (Cronbach's alpha). Items' loadings for the first factor were between .485 and .810 (13 items), for the second factor between .589 and .878 (7 items), and for the third factor between .690 and .831 (4 items). Considering .45 as the cut-off point (all items should have loadings of at least .45 on the factor as suggested by Tabachinick and Fidell (2001) we can assume they are good indicators of the latent variables (Table 1). The Cronbach's Alpha values are good indicators, revealing a very good reliability in each factor (Nunnally, 1978). The items'

constellation in each factor, as can be seen bellow, is very similar to the three factors defined by dos Santos, Figueiredo, and Pais (2013, submitted) described above:

- The first factor, *Principles of Cooperative Relationship*, measures to what extent there are cooperating principles which guide the relationships between individuals within the organization.
- The second factor, *Formal Cooperation*, measures to what extent the existing cooperation is formally regulated by rules, norms and established procedures.
- The third factor, *Cooperation Focused on the Organizational Mission*, measures to what extent the existing cooperation has an underlying intention of fulfilling the organizational mission in society emphasizing the individual's contribution to that. Therefore, this factor shows an underlying intention that goes beyond the specific interests of the group or the individual interests of the cooperating members.

When comparing the results here presented with the results obtained with the sample of dos Santos, Figueiredo and Pais (2013, submitted), some changes have to be highlighted. The first factor includes 6 items which were not included in the former research (dos Santos, Figueiredo & Pais, 2013, submitted): item 3, 5, 6, 10, 13 and 24. On the other hand, item 21 (…while recognizing the unique contribution of each individual) is not included in the present sample, but was included in the first factor of the previous sample. None of those changes caused noticeable changes in the content of the factor. The second factor in the present research does not include item 20 (…by staying true to the philosophy of the organization). Also in this case, the factor content remains the same. Finally, the third factor in the research presented does not include items 3 (…by fulfilling the organization's mission (on a daily basis)) and 6 (…by bearing in mind the general principles that guide the work). This change in the third does not bring important changes to the core meaning of the factor.

Procedures

The data used in the present research was collected taking into account participants' anonymity and confidentiality so that the answers were not biased. It was used an online version of ORCOQ and KMQ-SF, that enabled the contact with the organizations via email, through which it was sent a letter explaining the objectives of

the research, and the guarantee of confidentiality. The average time of response was 15 minutes, to read the instructions and answer the self-reported questionnaires.

Data Analysis

The first step of the data analysis was to conduct a descriptive and correlational analysis of each of the global scales (ORCOQ and KMQ-SF), and of the factors of each scale. Further, in order to test our hypothesis that individuals' perception of OC can predict the perception of KM dimensions, it was conducted a multiple regression analysis. Plus, a multivariate multiple regression analysis was run to support the effect of each of the three ORCOQ factors in the four factors of KMQ-SF. Finally, there were explored the moderations between the ORCOQ factors in the prediction of the KMQ-SF factors.

Results

Descriptive and Correlational Analysis

Both questionnaires were analyzed concerning the descriptive statistics, and the correlations between the ORCOQ and the KMQ-SF were assessed. The table 2 presents the results of these analyzes, enabling an overall view of the respondents' perception of OC and KM.

The scales of both questionnaires were from 1 to 5 so it is easy to observe that the mean value (M) of the global scale of ORCOQ was 3.09 with a SD (Standard Deviation) of 0.65, being lower than the mean value (M) of the KMQ-SF global scale, 3.55, with a SD of 0.57. Concerning the ORCOQ factors, the Cooperation Focused on Organizational Mission (ORCOQ_F3) had the highest punctuation (M=3.23), whereas the Formal Cooperation (ORCOQ_F2) had the lowest (M=2.93). From the KMQ-SF factors, the Knowledge-Centered Culture (KM_F1) was the one with highest values (M=3.71), and the Informal Practices (KM_F4) was the one with lowest (M=3.41).

Concerning the correlations, all the coefficients were significant at the level $p<.001$, positive and medium-high, in general. The correlation between the two global scales, ORCOQ and KMQ-SF is strong and positive, of $r = .77$. The Formal Practices (KM_F3) was the factor more correlated with the Principles of Cooperative Relationship (ORCOQ_F1, $r = .73$). The Knowledge-Centered Culture (KM_F1), was

the more correlated with the Formal Cooperation (ORCOQ_F2, r =.49), and also with the Cooperation Focused on Organizational Mission (ORCOQ_F3, r =.57).

Table 2: Descriptive statistics and correlations' matrix between Organizational Cooperation and Knowledge Management

	Min	Max	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ORCOQ_G	1.00	5.00	3.09	0.65	1								
(2) ORCOQ _F1	1.00	5.00	3.13	0.76	---	1							
(3) ORCOQ _F2	1.00	5.00	2.93	0.79	---	.44**	1						
(4) ORCOQ_F3	1.00	5.00	3.23	0.84	---	.59**	.46**	1					
(5) KM_G	1.18	5.00	3.55	0.57	.77**	.77**	.45**	.57**	1				
(6) KM_F1	1.00	5.00	3.71	0.64	.74**	.70**	.49**	.57**	---	1			
(7) KM_F2	1.25	5.00	3.59	0.64	.43**	.43**	.20**	.40**	---	.57**	1		
(8) KM_F3	1.00	5.00	3.45	0.77	.73**	.73**	.37**	.51**	---	.73**	.51**	1	
(9) KM_F4	1.00	5.00	3.41	0.68	.55**	.54**	.37**	.38**	---	.55**	.40**	.64**	1

**p< .001

Legend: (1) ORCOQ_G: Global scale of Organizational Cooperation Questionnaire; (2) ORCOQ_F1: Principles of Cooperative Relationship; (3) ORCOQ_F2: Formal cooperation; (4) ORCOQ_F3: Cooperation focused on organizational mission; (5) KM_G: Global scale of Knowledge Management Questionnaire; (6) KM_F1: Knowledge-Centered Culture; (7) KM_F2: Competitive Orientation; (8) KM_F3: Formal Practices of Knowledge Management; (9) KM_F4: Informal Practices of Knowledge Management.

Multiple Linear Regression Analysis: KM forecast from OC

In order to analyze the prediction of the workers' perception of the KM by the OC in their workplace, there was made a multiple linear regression analysis. The analysis was made considering the three factors of the ORCOQ as predictor variables and the global scale of the KMQ-SF, and each of its four factors as criteria variables, in accordance with the previously established hypothesis of study.

Previously, there were checked the assumptions of the model, such as the normal distribution, the homogeneity and the errors' independence. The normal distribution and the homogeneity were checked graphically whereas the independence assumption was checked by the Durbin-Watson test. The values of this test for all the regression analysis were between 1.9 and 2.2, which are not problematic. The VIF (variance inflation

factor) was used to check the multicollinearity and all the variables appeared to be non-collinear (VIF< 10). All the analysis were made using the SPSS Statistics (V. 20, IBM SPSS; Chicago, IL). A probability of .05 for the Type I error of was considered for all the analysis. The outliers existence was assessed by the results of the mean of the std. residual being all equal .000.

Table 3 presents the non-standardized (b) and standardized (β) regression coefficients, the standard error (SE) and the t-test of statistical significance, for the global scale of Knowledge Management Questionnaire - SF and its four factors.

Starting with the analysis of the multiple regression carried out with the three factors of OC, Principles of Cooperative Relationship (ORCOQ_F1), Formal cooperation (ORCOQ_F2) and Cooperation focused on organizational mission (ORCOQ_F3), impacting on the KMQ-SF global scale, together, the three factors of OC are responsible for 62% (R^2) of the variability on the KMQ-SF global scale.

Accounting for the Knowledge-Centered Culture (KM_F1), the three ORCOQ factors explain 55% (R^2) of the variability in the 1st factor of KMQ-SF. Also, when looking at the standardized regression coefficient *β*, in *Table 2*, it shows that the three factors of OC predict positively the Knowledge-Centered Culture (KM_F1), meaning that when there are higher values of Principles of Cooperative Relationship (ORCOQ_F1), Formal Cooperation (ORCOQ_F2) and Cooperation Focused on the Organizational Mission (ORCOQ_F3), they will predict higher values of Knowledge-Centered Culture (KM_F1). Despite the fact that the three ORCOQ factors predict positively and significantly the Knowledge-Centered Culture (KM_F1), the Principles of Cooperative Relationship (ORCOQ_F1) predict much more strongly than the other two ORCOQ factors.

Table 3 – Multiple linear regression analysis of Knowledge Management forecast from the three factors of the Organizational Cooperation Questionnaire

Organizational Cooperation (ORCOQ)	Knowledge Management (KM)					
	Criterion: Global scale					
Predictors:	*b*	*SE*	*β*	*T*	*F* (3, 599)	*R*
ORCOQ_F1	.47	.02	.63	19.67**	324.80**	$r_{multiple}$=.787 R^2 =.619, R^2_{adj}=.617 *SE* =.35
ORCOQ_F2	.08	.02	.11	3.61**		
ORCOQ_F3	.11	.02	.15	4.72**		
	Criterion: KM_F1 - Knowledge-Centered Culture					
Predictors:	*b*	*SE*	*β*	*T*	*F* (3, 599)	*R*
ORCOQ _F1	.42	.03	.51	14.53**	243.88**	$r_{multiple}$ =.742 R^2 =.550, R^2_{aj}=.548, *SE*=.43
ORCOQ_F2	.15	.03	.18	5.71**		
ORCOQ_F3	.14	.03	.19	5.35**		
	Criterion: KM_F2 - Competitive Orientation					
Predictors:	*b*	*SE*	*β*	*T*	*F* (3, 599)	*R*
ORCOQ _F1	.26	.04	.31	6.64**	55.60**	$r_{multiple=}$ .467 R^2 =.218 R^2_{aj}=.214 *SE* = .57
ORCOQ _F2	-.03	.03	-.04	-.94		
ORCOQ_F3	.18	.04	.24	5.11**		
	Criterion: KM_F3 – Formal Practices					
Predictors:	*b*	*SE*	*β*	*T*	*F* (3, 599)	*R*
ORCOQ _F1	.73	.03	.72	22.27**	311.55**	$r_{multiple=}$.781 R^2 =.609 R^2_{aj}=.607 *SE* = .48
ORCOQ _F2	.02	.03	.02	.74		
ORCOQ_F3	.07	.03	.08	2.33**		
	Criterion: KM_F4 - Informal Practices					
Predictors:	*b*	*SE*	*β*	*T*	*F* (3, 599)	*R*
ORCOQ _F1	.409	.039	.456	10.623**	93.15**	$r_{multiple}$.564 R^2 =.318 R^2_{aj}=.315 *SE* =.57
ORCOQ _F2	.133	.034	.152	3.896**		
ORCOQ_F3	.031	.035	.038	.862		

**p<.001

Legend: ORCOQ_G: Global scale of Organizational Cooperation Questionnaire; ORCOQ_F1: Principles of Cooperative Relationship; ORCOQ_F2: Formal cooperation; ORCOQ_F3: Cooperation focused on organizational mission; KM_G: Global scale of Knowledge Management Questionnaire; KM_F1: Knowledge-Centered Culture; KM_F2: Competitive Orientation; KM_F3: Formal Practices of Knowledge Management; KM_F4: Informal Practices of Knowledge Management.

Regarding the Competitive Orientation (KM_F2), the ORCOQ factors can only explain 22% (R^2) of the variability in this KM factor. Taking into account the standardized regression coefficients *β*, it is seen that the Principles of Cooperative Relationship (ORCOQ_F1) and the Cooperation Focused on the Organizational Mission (ORCOQ_F3), predict positively and significantly the Competitive Orientation

(KM_F2), although, the Formal Cooperation (ORCOQ_F2) predicts negatively the Competitive Orientation (KM_F2), but this value is not statistically significant. There can be concluded that higher levels of Principles of Cooperative Relationship (ORCOQ_F1), and Cooperation Focused on the Organizational Mission (ORCOQ_F3), perceived by the workers, predicts higher values in the perception of the Competitive Orientation (KM_F2).

Concerning the Formal practices (KM_F3), the three ORCOQ factors explain 61% (R^2) of the variability in the perception of this factor. Looking at the standardized regression coefficients β and its significance, it is showed that the Principles of Cooperative Relationship (ORCOQ_F1) and the Cooperation Focused on the Organizational Mission (ORCOQ_F3) predict positively the Formal practices (KM_F3), however, the effect of Formal Cooperation (ORCOQ_F2) is not statistically significant. Concerning the other ORCOQ factors, the Principles of Cooperative Relationship (ORCOQ_F1) influences more strongly the Formal practices (KM_F3) than the Cooperation Focused on the Organizational Mission (ORCOQ_F3), with a β value of .72 and .08, respectively.

Finally, in what concerns the Informal Practices (KM_F4), the three ORCOQ factors explain 32% (R^2) of the variability in the perception of this KMQ-SF factor. By looking at *Table 2*, it can be seen that the Principles of Cooperative Relationship (ORCOQ_F1) and the Formal Cooperation (ORCOQ_F2) predict positively the Informal Practices (KM_F4), however, the Cooperation Focused on the Organizational Mission (ORCOQ_F3) has not got a statistically significant result. As with the prediction of the Formal Practices (KM_F3), also, in the Informal Practices (KM_F4), the Principles of Cooperative Relationship (ORCOQ_F1) is the one who predicts more strongly the perception of the Informal Practices (KM_F4).

To sum up, the results of the multiple regression analysis show that for all the four factors of the KMQ-SF and the global scale, the ORCOQ factor that has a higher effect size for all the criterions, is the Principles of Cooperative Relationship. This means that, in what concerns the perception of OC, the notion of the Principles of Cooperative Relationship in the organization is the one that affects more strongly the perception of the KM. In contrast, the Formal Cooperation and the Cooperation Focused on the Organizational Mission predict much lesser the KM, and its factors.

Multivariate Multiple Linear Regression Analysis

There was established a model of Multivariate Multiple Linear Regression between the four KMQ-SF Factors: Knowledge-Centered Culture, Competitive Orientation, Formal Practices and Informal Practices (dependent variables) and the three ORCOQ Factors: Principles of Cooperative Relationship, Formal Cooperation and Cooperation focused on organizational mission. The significance of the regression coefficients was assessed after the parameters estimation through the maximum likelihood method implemented with software AMOS (Arbucklhe, 2008; 2009). The outliers existence was assessed by the square distance of Mahalanobis (D^2) and the variables' normality was assessed by the assimetry coefficient (Sk) and kurtosis (Ku) uni- and multivariate. No variable had Sk and Ku values indicating severe violations of the Normal Distribution (|Sk| <3 and |Ku|<10, Maroco, 2010). There were not found values of DM^2 which indicate the existence of outliers, neither were found sufficiently strong correlations between the exogenous variables which could indicate possible multicollinearity problems. The Variance Inflation Factor (VIF) was calculated with SPSS Statistics (V. 20, IBM SPSS; Chicago, IL) and no variable showed VIF indicators of multicollinearity. A probability of .05 for the Type I error of was considered for all the analysis.

Having conducted the Multivariate Multiple Regression Analysis, the adjusted model explained 55%, 22%, 61%, and 32% of the variability in the variables Knowledge-Centered Culture (KM_F1), Competitive Orientation (KM_F2), Formal Practices (KM_F3), and Informal Practices (KM_F4), respectively, (see Figure 1). From the eight statistically significant trajectories, there are three considered by Cohen (1998) as representing a large effect size: Principles of Cooperative Relationship (ORCOQ_F1) → Formal Practices (KM_F3) β =.72, Principles of Cooperative Relationship (ORCOQ_F1) → Knowledge-Centered Culture (KM_F1) β =.51 and Principles of Cooperative Relationship (ORCOQ_F1) → Informal Practices (KM_F4) β =.46. A moderate effect size is seen in the trajectory Principles of Cooperative Relationship (ORCOQ_F1) → Competitive Orientation (KM_F2) β = .31, and, finally, there are four small effect sizes: Cooperation focused on organizational mission (ORCOQ_F3) → Competitive Orientation (KM_F2) β =.24, Cooperation focused on organizational mission (ORCOQ_F3) → Knowledge-Centered Culture (KM_F1) β =.19, Formal Cooperation (ORCOQ_F2) → Knowledge-Centered Culture (KM_F1) β =.18 and

Formal Cooperation (ORCOQ_F2) → Informal Practices (KM_F4) β =.15. There were found four relationships that are not statistically significant: Cooperation focused on organizational mission (ORCOQ_F3) → Formal Practices (KM_F3), Formal Cooperation (ORCOQ_F2) → Competitive Orientation (KM_F2), Cooperation focused on organizational mission (ORCOQ_F3) → Informal Practices (KM_F4), and Formal Cooperation (ORCOQ_F2) → Formal Practices (KM_F3) (see Table 4).

It can be concluded that the Principles of Cooperative Relationship have a large effect in three KMQ-SF factors, higher in the Formal Practices (β =.72), then in the Knowledge-Centered Culture (β =.51) and, finally, in the Informal Practices (β =.46), with only a moderate effect in the Competitive Orientation (β = .31). Concerning the Formal Cooperation, it only had two small effects in Knowledge-Centered Culture (β =.18) and in the Informal Practices (β =.15), showing no effect in the other KMQ-SF factors. Finally, the Cooperation focused on organizational mission had also only two small effects, in the Competitive Orientation (β =.24) and in the Knowledge-Centered Culture (β =.18).

Figure 2 presents the model with the standardized estimates of the regression coefficients and the R^2 of the dependent variables.

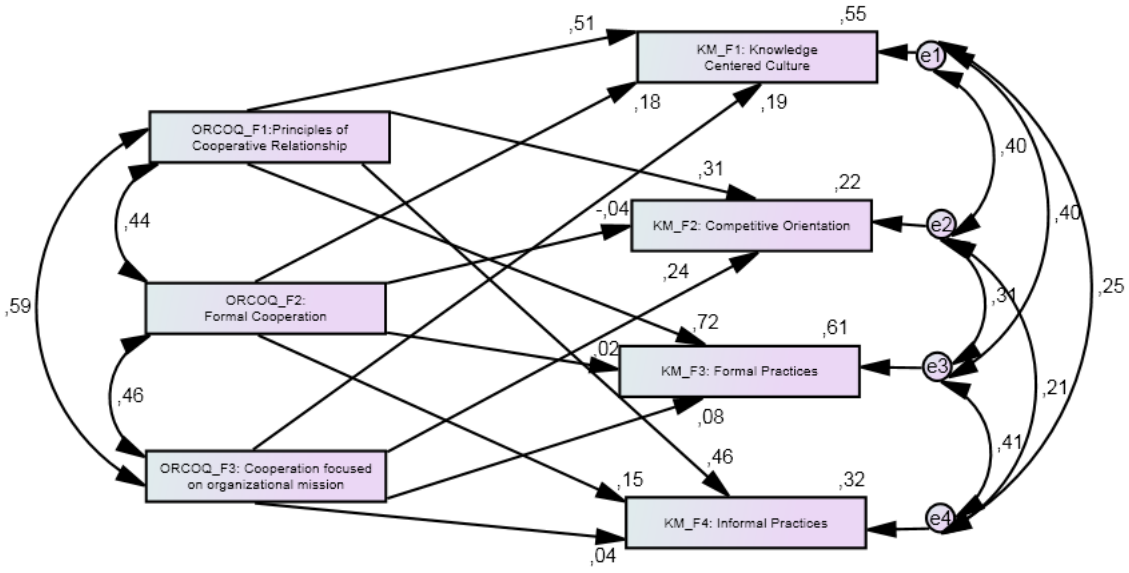

Figure 2: Model of Multivariate Multiple Linear Regression Analysis between the variables ORCOQ_F1, ORCOQ_F2 and ORCOQ_F3, and the dependent variables, KM_F1, KM_F2, KM_F3, and KM_F4.

Table 4: Multiple multivariate regression analysis: Regression weights (b), standard errors (SE), critical ratios (CR), significance levels (p), and standardized regression weights (β) for the KMQ-SF factors predicted by the ORCOQ factors

			b	S.E.	C.R.	β	p
KM_F2	<---	ORCOQ_F3	.18	.04	5.12	.24	**
KM _F3	<---	ORCOQ_F3	.07	.03	2.34	.08	.02
KM _F2	<---	ORCOQ_F2	-.03	.03	-.95	-.04	.35
KM _F2	<---	ORCOQ_F1	.26	.04	6.66	.31	**
KM _F4	<---	ORCOQ_F2	.133	.034	3.91	.15	**
KM _F1	<---	ORCOQ_F2	.15	.03	5.72	.18	**
KM _F3	<---	ORCOQ_F1	.73	.03	22.32	.72	**
KM _F1	<---	ORCOQ_F1	.42	.03	14.57	.51	**
KM _F4	<---	ORCOQ_F3	.03	.04	.86	.04	.39
KM _F3	<---	ORCOQ_F2	.02	.03	.74	.02	.46
KM _F1	<---	ORCOQ_F3	.14	.03	5.37	.19	**
KM _F4	<---	ORCOQ_F1	.41	.04	10.65	.46	**

**p<.001

Legend: ORCOQ_F1: Principles of Cooperative Relationship; ORCOQ_F2: Formal cooperation; ORCOQ_F3: Cooperation focused on organizational mission; KM_F1: Knowledge-Centered Culture; KM_F2: Competitive Orientation; KM_F3: Formal Practices of Knowledge Management; KM_F4: Informal Practices of Knowledge Management.

Moderation

The moderations presented are only the ones that were found to be statistically significant. In order to explore the moderation (interaction effect) between ORCOQ_F1 and ORCOQ_F3 in the prediction of KM_F1, the variables were centered in its mean to avoid multicollinearity issues.

Analyzing the regression coefficients in Table 5, we can see that there is a statistically significant interaction between the factor Principles of Cooperative Relationship (ORCOQ_F1) and the Cooperation focused on organizational mission (ORCOQ_F3) (p<.001), in the prediction of the Knowledge-Centered Culture (KM_F1). Through the regression equation, there can be seen that when there is an increase of one value in one of the referred ORCOQ factors, it corresponds to a decrease of .14 values in the slope between the other ORCOQ factor, and the Knowledge-Centered Culture (KM_F1). This interaction can be seen in Figure 3.

Table 5: Analysis of moderation effect between the ORCOQ_F1 and the ORCOQ_F3 in the prediction of the Knowledge-Centered Culture (KM_F1): Non-standardized Regression Coefficients (b), Standard Errors (SE), Standardized Regression Coefficients (β), t-value (*t*) and significance (*p*)

Variable	b	SE	β	*t*	*p*
ORCOQ_F1	.43	.03	.51	14.54	.000
ORCOQ_F3	.11	.03	.14	3.84	.000
ORCOQ_F1 x ORCOQ_F3	-.12	.03	-.14	-4.07	.000

Note. The variables ORCOQ_F1 e ORCOQ_F3 were centered in its mean value.
Legend: ORCOQ_F1: Principles of Cooperative Relationship; ORCOQ_F3: Cooperation focused on organizational mission;

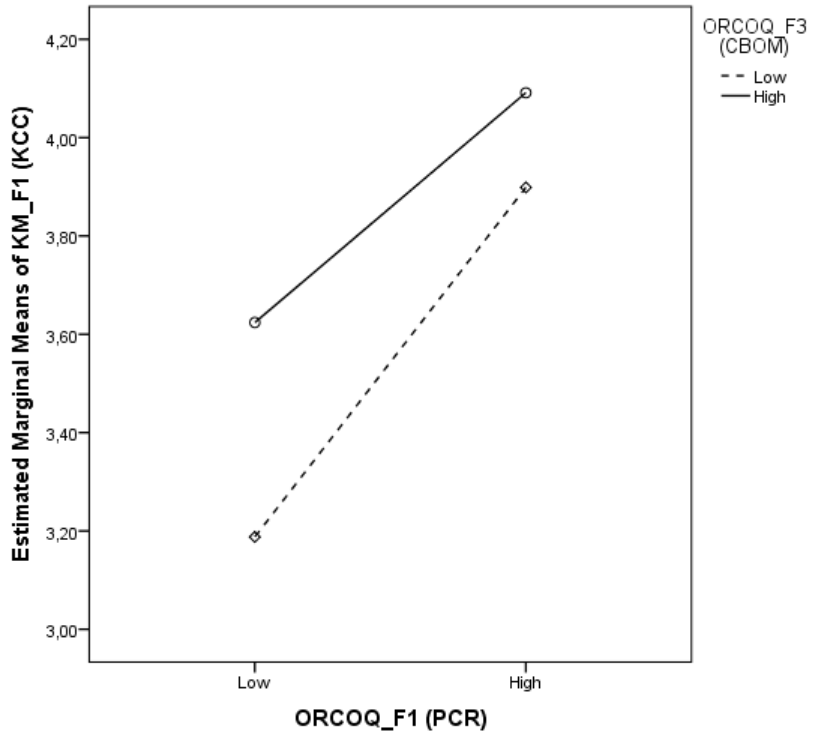

Figure 3: Interaction between the Principles of Cooperative Relationship (ORCOQ_F1) and the Cooperation focused on organizational mission (ORCOQ_F3) in the prediction of the Knowledge-Centered Culture (KM_F1)

Examining the interaction plot (Figure 3), it can be noticed that when the Principles of Cooperative Relationship (ORCOQ_F1) is low there is a more positive perception of Knowledge-Centered Culture (KM_F1) of the workers who have higher perceptions of Cooperation focused on organizational mission (ORCOQ_F3). However,

when Principles of Cooperative Relationship (ORCOQ_F1) is high, the ones who tend to have a more positive perception of Knowledge-Centered Culture (KM_F1) are the ones who have lower values of Cooperation focused on organizational mission (ORCOQ_F3).

No other moderations effects were found between the ORCOQ factors, in the prediction of the KMQ-SF factors.

Discussion

As mentioned previously in this paper, the goal we pursued was to understand the relationship between the participants' perception of the OC, and their perception of the KM in their workplace. More concretely, we aimed at explaining how the OC dimensions like the Principles of Cooperative Relationship, the Formal Cooperation and the Cooperation focused on organizational mission can predict the perception of the KM dimensions such as the Knowledge-Centered Culture, the Competitive Orientation, the Formal Practices of KM, and the Informal Practices of KM.

Firstly, the results show a strong positive correlation of .77 between the ORCOQ and the KMQ-SF, which means that when the workers have a high perception of the OC they will equally have a high perception of KM, likewise, when one is low the other will be low. After having demonstrated a positive and strong relationship between OC's perception and KM's perception of the researchers, we analyze how OC predicted positively the KM, as stated in our ***Hypothesis 1 (H1):*** *Individuals' organizational Cooperation predicts positively their perception of Knowledge Management dimensions.* This was supported, with 62% of variability explained by the ORCOQ in the KMQ-SF Global Scale, a value that was aligned with our expectations deduced by the literature, and goes forward with the aim of this study. This result shows that the research team members' perception of KM is affect by their perception of OC, meaning that when they perceive cooperation among their coworkers, at the same time, the importance of knowledge and KM-related processes comes to life. In research centers, where people tend to work in teams, the more they cooperate the better they manage the knowledge. These results are coherent with some of the authors aforementioned that announced a connection between these two concepts. For instance, Arthur and Kim (2005), had asserted that different ways of cooperation in the organization would result

in different ways of information sharing, Allarakhia, Walsh, and Wensley (2007), stated that the creation of biological knowledge would better be done cooperatively, plus, Ghobadi and D'Ambra (2011), assumed that cooperation, as well as competition, could affect the knowledge sharing, and, finally, Xu and Bernard, (2013) considered that cooperation could be an important part in the process of knowledge selection. As we can see, although these studies lack in a comprehensive understanding of both the constructs and its connection, they already pointed to a possible strong and positive relationship between them, fact that was concluded in the present research. Then, we had deepened the insight about the effect of each of the three ORCOQ factors, separately, in the four factors of KMQ-SF, testing our Hypothesis ***H2***, ***H3***, and ***H4***.

Regarding the ***Hypothesis 2 (H2):*** *The Principles of Cooperative Relationship have a positive effect on the levels of the Knowledge Management dimensions,* specified in the ***H2a****: Knowledge-Centered Culture;* ***H2b****: Competitive Orientation;* ***H2c****: Formal Practices of KM;* ***H2d:*** *Informal Practices of KM,* all the effects were significantly positive, strong or moderate. The *Formal Practices* was the dimension more strongly predicted by the *Principles of Cooperative Relationship*, meaning for instance, that the cooperative relationship requires time scheduling, and coordination of tasks and procedures (Santos, 2000), which can be established by the *Formal Practices of KM*. This result shows that the formal rules and practices established in research centers are in some way empowered by the framework of the organization, meaning that the informal principles and relationships contribute to a better acceptance of formalities. Then, was the *Knowledge-Centered Culture*, that as a collective memory of shared values and norms (Pais, 2014), takes advantage from a culture where cooperation is the norm, embed in trust and respect (Gratton, 2005). Considering that research centers are supposed to have a *Knowledge-Centered Culture*, this result shows that when this culture is combined with cooperative principles it is more spread because the culture is also made of cooperation and involvement with colleagues. It was found that the *Principles of Cooperative Relationship* and the *Cooperation focused on the organizational mission* interact negatively in the prediction of the *Knowledge-Centered Culture*. From this result we can see that the prediction of the *Knowledge-Centered Culture* by the *Principles of Cooperative Relationship* is affected by the perception of the *Cooperation focused on the organizational mission*. At the same time the prediction of the *Knowledge-Centered Culture* by the *Cooperation focused on the organizational*

mission is affected by the perception of the *Principles of Cooperative Relationship.* This interaction shows that the dimensions of the OC relate with each other and can together impact the perceptions of KM dimensions.

The *Informal Practices of KM* were next in the prediction effect by the *Principles of Cooperative Relationship,* and can be explained by the fact that they refer to the interactions and social construction of knowledge (Pais, 2014), strictly linked with the face-to-face interactions that define cooperation (Argyle & Lu, 1991, Smith, Carroll, & Ashford, 1995, Ahmadi, Selsele, & Ahmadi, 2011). Finally, the *Competitive Orientation* was predicted in a moderate way by the *Principles of Cooperative Relationship*, which means that the focus on the sustainable competitive advantage (Pais, 2014), benefits from the shared values, perceived in the interior of the organization, that handle the cooperative relationships, and were previously seen as a key resource for the organizations' success (Gratton, 2005, Schalk & Curseu, 2010). This result can be explained by the fact that when co-workers build relationships based on cooperation, they create a cooperative environment which will impact the way the organization operates and can be source of differentiation when compared with the competitors. These results show the predictive capacity of the *Principles of Cooperative Relationship* in the four dimensions of the KMQ-SF, making it the ORCOQ dimension which has a higher predictive impact in the KM. We can assume that the *Principles of Cooperative Relationship*, being the collective shared framework that leads the researchers to cooperate, is the basis of OC involved in knowledge management processes.

The ***Hypothesis 3 (H3):*** *The Formal Cooperation has a positive effect on the levels of the Knowledge Management dimensions,* specified in the ***H3a****: Knowledge-Centered Culture;* ***H3b****: Competitive Orientation;* ***H3c****: Formal Practices of KM;* ***H3d:*** *Informal Practices of KM,* was only partly supported, with small positive effects in the *Knowledge-Centered Culture* and *Informal Practices of KM,* and no significant effects in the other dimensions. The effect of the *Formal Cooperation* on the *Knowledge-Centered Culture* may be interpreted in the terms that the cooperation by rules, established processes, procedures, and formal structures of control (Smith, Carroll, & Ashford, 1995), must include processes related to the KM that are institutionalized in respect of a *Knowledge-Centered Culture.* Further, the significant effect on the *Informal Practices of KM,* means that when the researchers have established cooperation

practices to develop their work, the fact that they do not need to discuss about procedures, gives them space to debate about the content of their work, and develop *Informal Practices of KM*. In contrast with this effect, there is no significant effect of the *Formal Cooperation* on the *Formal Practices of KM*. As it was seen before, in ***H2c***, the *Formal Practices of KM* are strongly predicted by the *Principles of Cooperative Relationship* which goes in accordance with the last interpretation that the established cooperation procedures release the *Informal Practices of KM.* Additionally 2 of the 3 characteristics proposed by Lin (2007) regarding the cooperative relationship – ”collaborative working relationship”, and “high quality interactions (communication)” seem to trigger the sharing, creation, acquisition, recovery and use of knowledge, namely *Formal Practices of KM*. Lastly, regarding *Formal Cooperation,* there was no significant effect on *Competitive Orientation*, which can be explained by the fact this is an orientation towards the organization’s external environment, and so the internal processes that formally induce cooperation do not impact this orientation.

Finally, concerning the ***Hypothesis 4 (H4):*** *The Cooperation focused on the organizational mission has a positive effect on the levels of the Knowledge Management dimensions,* detailed in the ***H4a****: Knowledge-Centered Culture;* ***H4b****: Competitive Orientation;* ***H4c****: Formal Practices of KM;* ***H4d:*** *Informal Practices of KM,* was partly supported in the effect of *Knowledge-Centered Culture* and *Competitive Orientation.* This ORCOQ dimension (*Cooperation Focused on the Organizational Mission)* corresponds to the cooperative behaviors developed to accomplish the organizational mission. It has an impact on workers’ commitment and how they manage their knowledge in a competitiveness-oriented way, to deal with environmental challenges and constraints. *Cooperation Focused on the Organizational Mission* also relates to *Knowledge Centered Culture.* This dimension is the “common referential” and “collective memory” (Pais, 2014) of the organization. This effect can be explained by the fact that when individuals are working as a team to advance the organizational mission, they are embedded in this collective memory, which builds Knowledge-Centered Culture. Further, the *Cooperation focused on the organizational mission* was found to be connected with the *Competitive Orientation*, which can be understood by the fact that in the organizational world, in order to understand the environment where the organization operates, one has be strongly linked with the mission of his organization. Particularly in research centers, the organizational mission is usually to

create some new products which will respond to the needs of society, so, cooperation focused on the mission must be towards the outside. Accordingly, the cooperation through the mission can have an impact on the way the workers perceive the external environment because with a better notion of the inside (the mission of the organization) they will better perceive the outside (competitive orientation).

The two effects missing are the prediction of the *Formal Practices* and *Informal Practices of KM* by the *Cooperation focused on the organizational mission*, which were not found to be significant. This lack of significance may be interpreted by the fact this ORCOQ dimension addresses the behaviors through the alignment of the workers with the organizational mission, making a linkage with the meaning of the work and the commitment with the mission, with no impact in the *Formal* and *Informal Practices of KM*. This last result may contradict the indirect effect found by Cardoso, Meireles, and Peralta (2012) of the personal commitment on the *Formal* and *Informal Practices of KM*. Also, as previously seen, the *Cooperation focused on the organizational mission* is more related with the *Knowledge-Centered Culture* and *Competitive Orientation* because the mission usually reflects the culture and projects how an organization positions itself in the environment. So, the Practices of KM, may not be affected by this perception as they are more linked with concrete behaviors or situations, rather than a focus on the mission.

Limitations and further directions

First of all, in the present research there is a limitation concerning the collect of the data: as the questionnaires were addressed by email, there was no way to answer to momentary doubts. Although there is no information that this has affected the results, it would be even more reliable if the data was collected in presence of the researcher. It can also be noticed that the answers follow a tendency to the center, something that can be explained by the social desirability bias, common in self-reported questionnaires. Also, both instruments refer to people's perceptions of the organizational reality and not concretely to the existing actions and situations that occur, due to fact that OC and KM are complex and wide variables to measure. Further, as this is a transversal study, the results are limited to a specific time and occasion when the data was collected. To overcome this limitation we suggest the conduction of a longitudinal study to explain better the relationship between these two constructs in time. Plus, our sample is

composed only by Portuguese workers, so it can lead to a mistake to generalize the results. In spite of this, it would be interesting to study cultural differences between countries. More than this, the fact that the study was conducted with knowledge-workers leads to an important restriction when generalizing conclusions. The results shown, happen to be real for organizational environments where knowledge is the core business and main asset for sustainability. For this reason we can not generalize conclusions for different working contexts not so concerned with the importance of KM. The sample chosen was considered *a priori* to represent organizations with a knowledge-centered culture, where organizational cooperation could affect the KM processes. Moreover, further research could analyze the relationship between OC and KM in different populations of knowledge-workers, for instance engineers, doctors, architects, lawyers, and teachers that are usually seen as individual workers, but are more and more working in cooperative environments. In order to empower this study we suggest further research to include other organizational variables that can have an impact on the relationship studied, like the organizational culture, organizational effectiveness, organizational communication, and job satisfaction. Also, it would be interesting to do following researches that could verify some of the interpretations made from the results of the present study, for instance, with combined measures of commitment and cooperation and its effects in KM.

Conclusion

The results of the present research come up with the reasoning that Organizational Cooperation predicts strongly the Knowledge Management. Especially, the Principles of Cooperative Relationship predict the Formal Practices of KM, the Knowledge-Centered Culture, the Informal Practices of KM and the Competitive Orientation, positively and significantly in this order. What the results reveal is that a working environment based on cooperative relationships, sharing actions and interdependence will better develop the organizational knowledge. Through this evidence, several practical implications for organizations can be found, for example in the way human resources are managed. With the proven result that OC impacts KM, and knowing that this last is the resource for sustainable competitive advantage needed in today's knowledge society (Cardoso, 2007b), organizations are encouraged to build a culture oriented towards people and the value they can achieve working in cooperation.

The leaders and human resources departments have a huge role in this change. To promote cooperative behaviors and a better KM, all HR-related processes must be embedded in this logic. From recruitment and selection to organizational recognition, performance management, learning and development and so on, every process must promote cooperation and have knowledge as a central asset. Cooperative behaviors included in contextual performance need to be recognized and rewarded as an added value for the organization. This could be done by including cooperative behaviors as a relevant issue in the performance management processes. Moreover, organizational communication should be designed to create moments for sharing knowledge and for learning how to cooperate. Monthly meetings, employee's parties, teambuilding activities or simply sharing mealtimes can have a great impact on this.

Moving back to where we first started in the present research, we are living in a knowledge society, characterized by an acceleration of production processes, a wide spread, access and use of information and knowledge (Figueiredo & Ferrão, 2007). In this setting, organizations depend from globalization constraints, technologies of information and the flow of science production. The findings of the present research point to a specific context of a knowledge society in Portugal. We can consider that the results shown represent little knowledge societies - the research centers who participated in this study. Likewise, the present study can have a role in the affirmation of the knowledge society in Portugal by revealing the importance of knowledge as the key asset to organizations' sustainability, especially by humanizing the KM. Through the spread of studies like this which show how human resources (for instance, principles of cooperative behavior, formal and informal cooperation), can have an impact on the processes of KM, organizations' leaders can start changing the framework of KM to one which positions the person in the center. Following this idea, the knowledge society will better be developed, and will positively impact peoples' lives, if the role of people is growing in consideration for example valuing soft aspects, which can be done by linking the KM to the HR functions and responsibilities.

References

Ahmadi, A. A., & Selsele, M. (2011). Review of Knowledge Management in level of organization. *Interdisciplinary Journal of Contemporary Research in Business, 3*(7), 568–578.

Aish, A., & Jöreskog, K. (1990). A panel model for political efficacy and responsiveness: An application of LISREL 7 with weighted least squares. *Quality and Quantity*, *19*, 716-723.

Allarakhia, M., Walsh, S., & Wensley, A. (2007). *Models of Cooperation and Knowledge Management.* Paper Presented at PICMET 2007, Portland, Oregon, USA: PICMET.

Arbuckle, J. L. (2008). *Amos 17 user's guide*. Chicago, IL: SPSS Inc.

Arbuckle, J. L. (2009). *Amos 18 Reference Guide (Version 18) [Computer Software]*. Chicago, IL:SPSS Inc.

Argyle, M. (1991). *Cooperation, the basis of sociability.* London: Routledge.

Argyle, M. & Lu, L. (1991). Happiness and Cooperation. *Personality and Individual Differences, 12*(10), 1019-1030.

Arthur, J. B., & Kim, D. O. (2005). Gainsharing and knowledge sharing: the effects of labour–management co-operation. *The International Journal of Human Resource Management*, *16*(9), 1564–1582.

Balliet, D., Parks, C., & Joireman, J. (2009). Social Value Orientation and Cooperation in Social Dilemmas: A Meta-Analysis. *Group Processes & Intergroup Relations*, *12*(4), 533–547.

Bentler, P. (1990). Quantitative methods in psychology: Comparative fit indexes instructural models. *Psychological Bulletin, 107*, 238-246.

Bogaert, S., Boone, C., & Declerck, C. (2008). Social value orientation and cooperation in social dilemmas: a review and conceptual model. *The British Journal of Social Psychology / the British Psychological Society*, *47*(Pt 3), 453–80.

Brown, T. (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.

Cardoso, L., Gomes, D. & Rebelo, T. (2005). Para uma conceptualização e operacionalização da gestão do conhecimento. *Psychologica,* 38, 23-44.

Cardoso, L. (2007a). *Gerir conhecimento e gerar competitividade. Estudo empírico sobre a gestão do conhecimento e seu impacto no desempenho organizacional.* (Doctorate's Thesis, University of Coimbra.)

Cardoso, L. (2007b). Gestão do conhecimento e competitividade organizacional: Um modelo estrutural. *Comportamento Organizacional e Gestão,* 13 (2), 191–211.

Cardoso, L., Meireles, A & Peralta, C. (2012). Knowledge management and its critical factors in social economy organizations. *Journal of Knowledge Management*.

Chen, C. C., Chen, X.-P., & Meindl, J. R. (1998). How Can Cooperation Be Fostered? The Cultural Effects of Individualism-Collectivism. *The Academy of Management Review*, *23*(2), 285-304.

Davenport, T.H. & Prusak, L. (1998), *Working Knowledge: How Organizations Manage What They Know*, Harvard Business School Press, Boston.

Desouza, K.C. (2004). My two cents on knowledge management research. *Journal of Information Science and Technology*, *1*(2), 1-5.

Deutsch, M. (2001). Cooperation and conflict resolution: Implications for consulting psychology. *Consulting Psychology Journal: Practice and Research, 53*(2), 76–81.

Durst, S., & Edvardsson, I. R. (2012). Knowledge management in SMEs: a literature review. *Journal of Knowledge Management*, *16*(6), 879–903.

Fernandes, N. (2011). *Estudo das qualidades psicométricas do Questionário de Cooperação Organizacional (QCO) em equipas de investigação.* (Master's Thesis, Universidade de Évora).

Figueiredo, E., & Ferrão, P. (2007). *O Conhecimento não cresce nas árvores: os desafios da Sociedade do Conhecimento e o Mundo Rural em Portugal.* (Universidade de Aveiro).

Fornell, C. & Lacker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*, 39-50.

Ghobadi, S., & Ambra, J. D. (2011). Coopetitive Knowledge Sharing : An Analytical Review of Literature, *The Electronic Journal of Knowledge Management, 9(4), 307–317.*

Gorsuch, R. (1983). *Factor analysis.* Hillsdale, NJ: Lawrence Erlbaum.

Gratton, L. (2005). Managing integration through cooperation. *Human Resource Management*, *44*(2), 151–158.

Gravili, G. (2010) *Can Cooperation in Virtual Social Networks Help Organizations Manage Knowledge?*, Proceedings of the 4th European Conference on Information Management and Evaluation. Lisbon, Portugal. Academic Publishing Limited Reading.

Griffiths, D., & Evans, P. (2011). Scaling the fractal plain: towards a general view of knowledge management. *Journal of European Industrial Training*, *35*(8), 779–807.

Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (2008). *Multivariate data analysis* (7th ed.). Pearson Prentice-Hall.

Hu, L., & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

Lin, B. (2007). *The Effects of Cross-functional Cooperation and Competition on New Product Performance: How does Knowledge Management Processes Matter?* (Master's Thesis, University of Hong Kong).

Marcus, J., & Le, H. U. (2013). Interactive effects of levels of individualism – collectivism on cooperation: A meta-analysis, *Journal of Organizational Behavior, 34*, 813–834.

Maroco, J. (2010). *Análise estatística com o PASW statistics.* Pêro Pinheiro: ReportNumber.

Moss, G., Kubacki, K., Hersh, M., & Gunn, R. O. D. (2007). Knowledge Management in Higher Education: a comparison of individualistic and collectivist cultures. *European Journal of Education, 42*(3), 377-394.

Murphy, R. O., & Ackermann, K. A. (2013). Social value orientation: theoretical and measurement issues in the study of social preferences. *Personality and Social Psychology Review: An Official Journal of the Society for Personality and Social Psychology, Inc, 18*(1), 13–41.

Nahapiet, J., Gratton, L., & Rocha, H. O. (2005). Knowledge and relationships: when cooperation is the norm. *European Management Review*, *2*(1), 3–14.

Nonaka, I. & Takeuchi, H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford University Press, Oxford.

Nunnally, J. (1978). *Psychometric theory*. New York, NY: McGraw-Hill.

Organ, D. W., (1997). Organizational citizenship behaviour: It's construct clean-up time. *Human Performance,* 10

Pais, L. (2014). Gestão do conhecimento. In Siqueira, M. (Org.), *Medidas do comportamento organizacional. Ferramentas de diagnóstico e de gestão*. Porto Alegre: Artmed.

Pais, L., dos Santos, N. R., Monico, L. M., Fernandes, N., Rebelo, L., Figueiredo, C. (2014). *Cooperation in Research Teams: an Exploratory factor analysis of the Organizational Cooperation Questionnaire.*, Proceedings of the SGEM Conference on Psychology & Psychiatry Sociology & Healthcare Education, *1*, 77-84. Bulgaria.

Pais, L. & dos Santos, N. R. (2015). Knowledge-sharing, cooperation and personal development. In K. Kraiger, J. Passmore, N. R dos Santos & Sigmar Malvezzi (Eds), *the Wiley-Blackwell Handbook of the Psychology of Training, Development, and Performance Improvement* (278-302). UK, Chichester, West Sussex: Wiley Blackwell.

Pestana, M. H., & Gageiro, J. N. (2008). *Análise de dados para ciências sociais: A complementaridade do SPSS* (5ª ed.). Lisboa: Edições Sílabo.

Ribiere, V., & Walter, C. (2013). *10 Years of IC and KM Research – a Content and Citation Analysis*, Paper presented at International Conference on Intelectual Capital, Knowledge Management and Organizational Learning, Washington, DC, USA. Academic Conferences & Publishing International Ltd.

Rutten, M. E. J., Dorée, A. G., & Halman, J. I. M. (2009). Innovation and interorganizational cooperation: a synthesis of literature. *Construction Innovation: Information, Process, Management*, *9*(3), 285–297.

Santos, N. (2000). *Identidade e Cooperação: individual e colectivo em contextos organizacionais.* (Doctorate's Thesis, University of Évora)

Schalk, R., & Curseu, P. L. (2010). Cooperation in organizations. *Journal of Managerial Psychology*, *25*(5), 453–459.

Schumacker, R. E., & Lomax, R. G. (1996). *A beginner's guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum Associates.

Serenko, A., Bontis, N. & Moshonsky, M. (2012). Books as a knowledge translation mechanism: citation analysis and author survey. *Journal of Knowledge Management*, *16*(3), 495-511.

Serenko, A. (2013). Meta-analysis of scientometric research of knowledge management: discovering the identity of the discipline. *Journal of Knowledge Management*, *17*(5), 773–812.

Singh, J. (2005). Collaborative Networks as Determinants of Knowledge Diffusion Patterns. *Management Science*, *51*(5), 756–770.

Smith, K. G., Carroll, S. J., & Ashford, S. J. (1995). Intra- and Interorganizational Cooperation: Toward a Research Agenda. *Academy of Management Journal*, *38*(1), 7–23.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston: Allyn & Bacon.

Tsai, W. (2002). Social Structure of "Coopetition" Within a Multiunit Organization: Coordination, Competition, and Intraorganizational Knowledge Sharing. *Organization Science*, *13*(2), 179–190.

Tseng, F. C., & Fan, Y. J. (2011). Exploring the Influence of Organizational Ethical Climate on Knowledge Management. *Journal of Business Ethics*, *101*(2), 325–342.

Van Lange, P. A., Otten, W., De Bruin, E. M., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: theory and preliminary evidence. *Journal of Personality and Social Psychology*, *73*(4), 733–46.

Van Lange, P. a. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology*, *77*(2), 337–349.

Vieira, A. (2012). *Cooperation and Knowledge Management in Portuguese local municipalities: Individual and organizational moderators.* (Master's Thesis, Universidade de Coimbra, Università di Bologna.).

Xu, Y., & Bernard, A. (2013). A quantitative model on knowledge management for team cooperation. *Knowledge-Based Systems*, *45*, 41–46.

Effects of Organizational Cooperation on Knowledge Management: a study among researchers.

Annexes

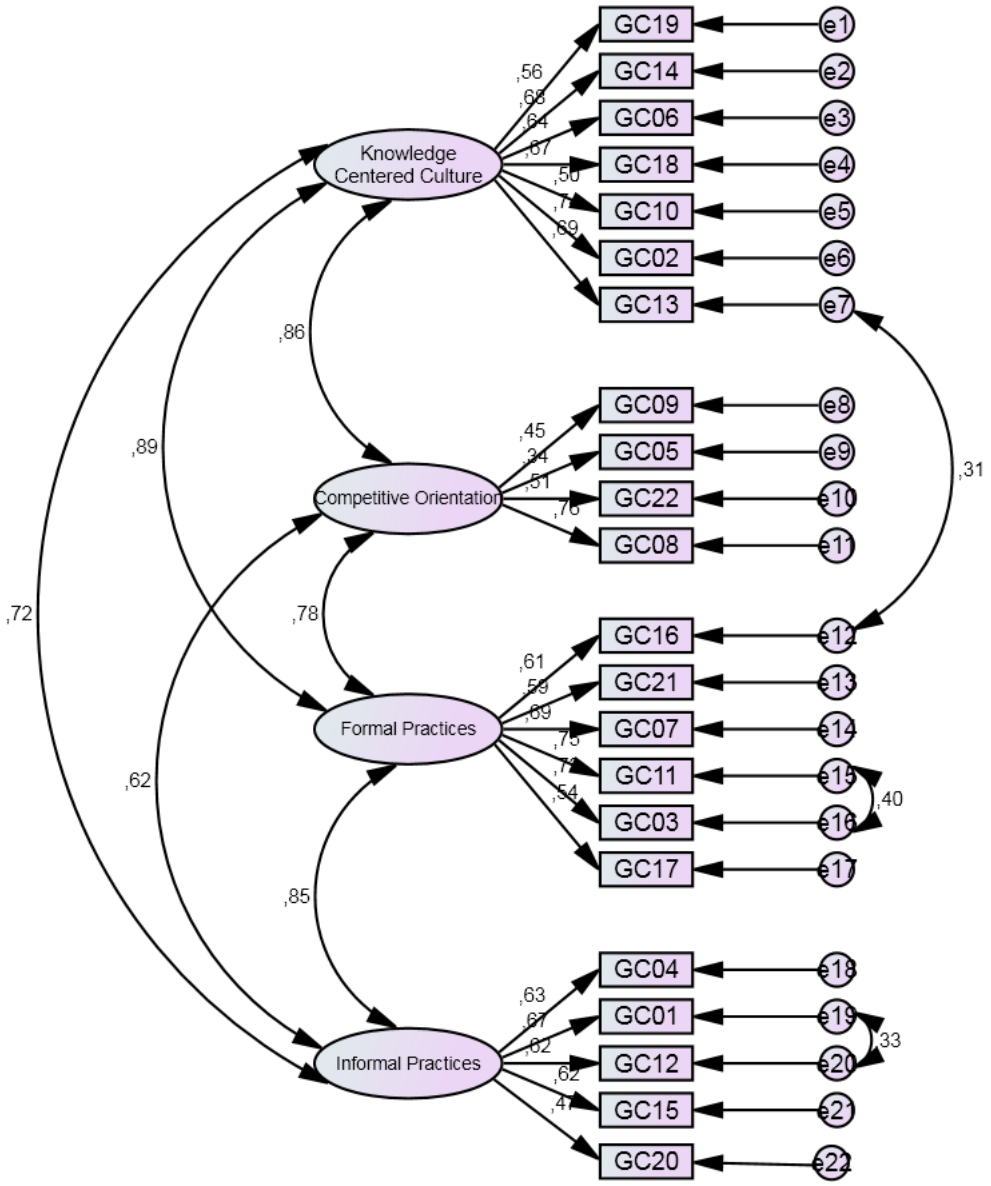

Fig. 1 - Tetra-Factorial Model of Factorial Validation of Knowledge Management Questionnaire - Short Form

Table 1 – Principal Component Analysis of the three factors of the ORCOQ (items 20, 21, 22, 27, 28, 30, and 31 excluded): Mean (M), standard-deviations (SD), factorial loadings (s) and communalities (h^2) of the rotated component matrix

	M	SD	s			
			F1	F2	F3	h^2
12. …by having a sense of equality among people	2.98	1.14	.810	.093	.100	*.675*
9. …because there is a culture of cooperation between us	3.14	1.11	.791	.139	.210	*.690*
15. …because everyone is different, and this improves cooperation	3.17	1.01	.771	.128	.255	*.676*
1. …by discussing our different points of view before reaching an agreement	3.32	1.03	.716	.117	.222	*.576*
2. …by realising that the more our colleagues achieve, the more we achieve	3.09	1.10	.714	.144	.310	*.627*
26. …by realising that an individual can only achieve his/her targets if his/her colleagues also achieve theirs	2.83	1.05	.675	.255	.307	*.614*
5. …knowing that to have a different opinion is not a problem	3.56	1.08	.666	-.005	.361	*.573*
6. …by bearing in mind the general principles that guide the work	3.54	0.92	.620	.220	.381	*.578*
14. …by each individual making sacrifices for the good of the group	2.52	1.03	.610	.265	.222	*.491*
3. …by fulfilling the City Council's mission (on a daily basis)	3.25	0.96	.605	.245	.336	*.539*
10. …trying to reach the goals of each one of us	3.53	0.87	.529	.066	.012	*.284*
24. …while safeguarding the interests of each one	3.24	0.91	.507	.134	-.049	*.278*
13. „by acknowledging that what each individual does can also be done by others	2.81	0.92	.485	.313	.152	*.357*
19. …following the detailed rules on everything that has to be done	2.72	1.02	.119	.878	.086	*.792*
16. …by following predefined procedures for everything	2.67	1.00	.161	.826	.108	*.719*
25. …by complying with the detailed procedures that pertain to our work	3.01	.99	.187	.787	.090	*.663*
23. …complying with the laws that govern everything we do	2.85	1.08	.064	.778	.140	*.628*
11. …by following specific procedures on how to perform each task	3.11	0.99	.338	.683	.134	*.599*
8. …because everything is regulated	2.75	0.99	.019	.667	.355	*.571*
18. …by putting into practice the guidelines provided by our superiors	3.41	0.96	.324	.589	.147	*.474*
4. …by acknowledging that what we do is important to citizens	3.28	0.98	.204	.123	.831	*.747*
17. …because we acknowledge the importance of the service provided to society by the organization	3.24	0.98	.205	.229	.803	*.740*
29. …by acknowledging that the contribution of each individual to society is important	3.14	0.97	.285	.233	.769	*.728*
7. …because each individual has a contribution to make to society	3.25	1.01	.387	.206	.690	*.667*
Total explained variance			26.28	18.92	14.33	
Accumulated variance			26.28	45.21	59.53	
Cronbach's Alpha (global scale = .936)			*.920*	*.894*	*.876*	

Effects of Organizational Cooperation on Knowledge Management: a study among researchers.

Summary of results

Analysis	*Relationships*	*Hypothesis*	*Effect*
Correlation	ORCOQ_Global – KMQ-SF_Global		.77 (large)
Explained variability of the prediction	ORCOQ_Global– KMQ-SF_Global	H1	62%
	ORCOQ_Global– KM_F1	H1	55%
	ORCOQ_Global– KM_F2	H1	22%
	ORCOQ_Global– KM_F3	H1	61%
	ORCOQ_Global– KM_F4	H1	32%
Regression effects	ORCOQ_F1–KM_F3	H2c	.72 (large)
	ORCOQ_F1–KM_F1	H2a	.51 (large)
	ORCOQ_F1–KM_F4	H2d	.46 (large)
	ORCOQ_F1–KM_F2	H2b	.31(moderate)
	ORCOQ_F3–KM_F2	H4b	.24 (small)
	ORCOQ_F3–KM_F1	H4a	.19 (small)
	ORCOQ_F2–KM_F1	H3a	.18 (small)
	ORCOQ_F2–KM_F4	H3d	.15 (small)
	ORCOQ_F3–KM_F3	H4c	Not sig
	ORCOQ_F2–KM_F2	H3b	Not sig
	ORCOQ_F3–KM_F4	H4d	Not sig
	ORCOQ_F2–KM_F3	H3c	Not sig
Moderations	ORCOQ_F1xORCOQ_F3–KM_F1	H2a /H4a	-.18

Effects of Organizational Cooperation on Knowledge Management: a study among researchers.

Organizational Cooperation Questionnaire (ORCOQ)

UNIVERSIDADE DE ÉVORA
Departamento de Psicologia

Faculdade de Psicologia e de Ciências da Educação
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O estudo para o qual solicitamos a vossa participação está inserido na linha de investigação sobre gestão do conhecimento e cooperação organizacional e realiza-se através de uma parceria entre a Faculdade de Psicologia e de Ciências da Educação da Universidade de Coimbra e o Departamento de Psicologia da Universidade de Évora. O propósito da presente investigação é obter informação relativa a aspectos organizacionais, num conjunto de institutos de investigação e laboratórios associados. Pedimos-lhe que reflicta cuidadosamente e responda a todas as questões tão honestamente quanto possível, baseando-se no conhecimento que tem da **organização onde trabalha. Não há respostas certas ou erradas**, pretendendo-se, apenas, a sua opinião pessoal e sincera. Algumas das questões podem parecer idênticas, no entanto, pedimos-lhe que responda a todas elas. Os dados têm um fim exclusivamente de investigação e nunca serão analisados ao nível individual. Trata-se, portanto, de um **questionário de natureza confidencial e anónima** e em momento nenhum será pedido que se identifique. O seu contributo é fundamental para o sucesso da presente investigação e agradecemos, antecipadamente, o tempo que vai disponibilizar para preencher este questionário.

Relativamente a esta lista de afirmações, pedimos-lhe que as leia atentamente e diga em que medida cada uma delas se aplica, verdadeiramente, à sua organização. Assinale a sua resposta com uma cruz, de acordo com a seguinte escala:

1. Quase nunca se aplica 2. Aplica-se pouco 3. Aplica-se moderadamente 4. Aplica-se muito 5. Aplica-se quase totalmente

Nesta organização cooperamos uns com os outros no nosso trabalho...	Quase nunca se aplica	Aplica-se pouco	Aplica-se moderadamente	Aplica-se muito	Aplica-se quase totalmente
1. Debatendo as nossas diferentes opiniões antes de chegarmos a um acordo	1	2	3	4	5
2. Percebendo que quanto mais ganham os nossos colegas mais ganhamos nós também	1	2	3	4	5
3. Concretizando a missão da organização (no dia-a-dia)	1	2	3	4	5
4. Sabendo que o que fazemos é importante para o cidadão	1	2	3	4	5
5. Sabendo que ter opiniões diferentes não é um problema	1	2	3	4	5
6. Tendo presentes os princípios gerais orientadores do trabalho	1	2	3	4	5
7. Porque cada um tem de fazer a sua parte para a sociedade	1	2	3	4	5
8. Porque tudo está regulamentado	1	2	3	4	5
9. Porque existe uma cultura de cooperação entre todos	1	2	3	4	5
10. Procurando alcançar os objectivos de cada um	1	2	3	4	5

Nesta organização cooperamos uns com os outros no nosso trabalho...	Quase nunca se aplica	Aplica-se pouco	Aplica-se moderadamente	Aplica-se muito	Aplica-se quase totalmente
11. Seguindo procedimentos concretos sobre como fazer todas as tarefas	1	2	3	4	5
12. Havendo um sentimento de igualdade entre as pessoas	1	2	3	4	5
13. Sabendo que o que cada um faz também pode ser feito pelos outros	1	2	3	4	5
14. Sacrificando-se cada um pelo colectivo	1	2	3	4	5
15. Porque há diferenças entre todos o que melhora a cooperação	1	2	3	4	5
16. Seguindo procedimentos que estão definidos a respeito de tudo	1	2	3	4	5
17. Porque sabemos que o serviço que a organização presta à sociedade é importante	1	2	3	4	5
18. Pondo em prática as orientações gerais que recebemos dos nossos superiores	1	2	3	4	5
19. Seguindo regras detalhadas sobre tudo o que há a fazer	1	2	3	4	5
20. Mantendo-nos fiéis à filosofia da organização	1	2	3	4	5
21. Sendo reconhecido o contributo único de cada um	1	2	3	4	5
22. Sabendo que não há pessoas insubstituíveis	1	2	3	4	5
23. Cumprindo leis sobre tudo o que temos que fazer	1	2	3	4	5
24. Salvaguardando os interesses individuais de cada um	1	2	3	4	5
25. Cumprindo procedimentos pormenorizados sobre o nosso trabalho	1	2	3	4	5
26. Porque percebemos que cada um só atinge as suas metas se os colegas atingirem também as suas	1	2	3	4	5
27. Sabendo que quantos mais contributos únicos dermos mais importantes seremos para a organização	1	2	3	4	5
28. Somente quando estamos de acordo	1	2	3	4	5
29. Sabendo que o contributo de cada um é importante para a sociedade	1	2	3	4	5
30. Porque a organização valoriza as competências únicas de cada um	1	2	3	4	5
31. Porque é "mal visto" quem procura destacar-se	1	2	3	4	5

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Knowledge Management Questionnaire - Short Form (KMQ-SF)

Apresentamos-lhe de seguida uma lista de afirmações. Leia-a atentamente e diga em que medida cada uma delas se aplica verdadeiramente à sua organização. Assinale, por favor, a sua resposta com uma cruz, de acordo com a seguinte escala:

1. *Quase nunca se aplica*	2. *Aplica-se pouco*	3. *Aplica-se moderadamente*	4. *Aplica-se muito*	5. *Aplica-se quase totalmente*

Nesta empresa:

GC01	Falamos uns com os outros sobre assuntos que não compreendemos bem	1	2	3	4	5
GC02	Pensamos na forma como resolvemos problemas no passado (nos nossos sucessos e insucessos)	1	2	3	4	5
GC03	Juntamo-nos em grupo para resolver alguns problemas	1	2	3	4	5
GC04	Falamos das nossas funções	1	2	3	4	5
GC05	Sabemos que os nossos concorrentes têm informações sobre nós	1	2	3	4	5
GC06	Cada um de nós tem uma função a cumprir	1	2	3	4	5
GC07	Somos encorajados a tomar a iniciativa	1	2	3	4	5
GC08	Estamos atentos ao que os nossos concorrentes vão fazendo (por exemplo, adoptamos os melhores "truques")	1	2	3	4	5
GC09	O que sabemos vê-se naquilo que fazemos melhor do que os nossos concorrentes	1	2	3	4	5
GC10	Agimos de acordo com a forma como estamos organizados	1	2	3	4	5
GC11	Passamos informação uns aos outros em reuniões de trabalho	1	2	3	4	5
GC12	Contamos uns aos outros histórias engraçadas que se passaram no nosso trabalho	1	2	3	4	5
GC13	Procuramos toda a informação que possa melhorar a qualidade do que fazemos	1	2	3	4	5
GC14	Agimos de acordo com certos princípios	1	2	3	4	5
GC15	Falamos da nossa empresa	1	2	3	4	5
GC16	Assistimos a seminários/conferências, lemos o que se publica ou contratamos especialistas	1	2	3	4	5
GC17	Frequentamos cursos de formação ou temos formação no posto de trabalho	1	2	3	4	5
GC18	Todos somos responsáveis pelo que devemos saber para trabalhar com qualidade	1	2	3	4	5
GC19	O que sabemos vê-se na forma como produzimos - VP	1	2	3	4	5
GC20	Conversamos sobre o trabalho quando casualmente nos encontramos (por exemplo, no intervalo do café)	1	2	3	4	5
GC21	São recompensados aqueles que partilham o que sabem	1	2	3	4	5
GC22	O que sabemos é uma "arma" fundamental para ultrapassarmos os nossos concorrentes	1	2	3	4	5