

INDIVIDUAL AND TEAM-LEVEL PREDICTORS OF SECI
AND CREATIVITY: A MULTILEVEL APPROACH

Mariama Maria Spencer Embaló Baldé

Thesis presented in partial fulfilment of the requirements for the degree of Master in
Business Administration

Supervisor:

Prof. Doutor Aristides Ferreira, Prof. Auxiliar, ISCTE Business School,
Organizational Behaviour and Human Resources Department

Co-Supervisor:

Prof. Doutor M. Travis Maynard, Associate Professor, Colorado State University,
Management Department

December, 2015

INDIVIDUAL AND TEAM-LEVEL PREDICTORS OF SECI AND CREATIVITY: A
MULTILEVEL APPROACH

Mariama Maria Spencer Embaló Baldé

Abstract

Knowledge creation is a prominent theme within the knowledge management field, thus questions arise regarding which factors facilitate SECI. Researchers have investigated knowledge creation enablers, in isolation, at different levels of analysis (i.e., organization level). To fill this gap, this paper develops a multilevel research design. As teams have emerged as a key unit of functioning, this research aims not only to examine the effects of individual and team-level enablers on team-level SECI, but also to develop two scales to measure SECI at both levels of analysis, consequently providing integration to a fragmented body of research. The model includes four facilitators: intrinsic motivation, individual-level LMX, team-level trust and team-level LMX. Furthermore, individual-level SECI is studied as a promoter of individual creativity.

Analyses of a multi-source data obtained from 431 team-members who worked in 59 teams, in 51 companies based in Lisbon, London and Maputo, showed that team-level trust has a cross-level moderating effect on the positive relationship of individual-level LMX on team-level SECI. The results may be used for further empirical research and as a guide to the use of individual and team processes as a vehicle to improve SECI, in team settings. Furthermore, findings suggest that the developed scale is a reliable measure of SECI, which can help organizations diagnose knowledge creation and sharing practices in teams and develop strategies accordingly.

Keywords: SECI, intrinsic motivation, LMX, Trust

JEL classification: D8

Resumo

A criação do conhecimento é um tema em destaque na área da gestão do conhecimento, logo, surgem questões sobre os fatores que facilitam SECI. Os investigadores têm estudado as variáveis que facilitam a criação de conhecimento, de forma isolada, em diferentes níveis de análise (ex., nível organizacional). Para preencher esta lacuna, este estudo desenvolve um modelo multinível. Uma vez que as equipas surgiram como uma unidade fundamental de funcionamento, este estudo tem como objetivo não só analisar os efeitos que fatores a nível individual e de equipa têm sobre o SECI, mas também desenvolver duas escalas para medir o SECI nos dois níveis, conseqüentemente, integrando esta área de estudo. O modelo inclui quatro facilitadores: motivação intrínseca, LMX a nível individual, confiança de equipa e LMX a nível de equipa. Adicionalmente, o a nível individual SECI é estudado como um promotor da criatividade individual.

Análises de um conjunto de dados *multi-source* obtidos a partir de 431 colaboradores originários de 59 equipas, mostraram que a confiança de equipa modera a relação positiva entre o LMX a nível individual com o SECI a nível de equipa. Os resultados podem ser utilizados para pesquisas futuras e como linhas orientadoras para o uso de processos individuais e de equipa, como veículos para melhorar o SECI, a nível da equipa. Além disso, os resultados sugerem que a escala desenvolvida é uma medida confiável do SECI, podendo assim ajudar as organizações a diagnosticar a criação e partilha de conhecimento nas equipas e desenvolver estratégias em conformidade.

Palavras-chave: SECI, motivação intrínseca, LMX, confiança de equipa

Classificação JEL: D8

Acknowledgements

Completing my Master was truly a marathon, and I would not have been able to complete this journey without the support of countless people over the last few months. Life doesn't stand still, nor wait until you are finished and have time to manage it, so I thank:

To all who kindly answered my questionnaire. Without you this study could not be performed.

To Prof. Dr. Aristides Ferreira, my research supervisor, my gratitude for his mentorship, patience, perseverance and the time invested to make this dissertation the best as possible.

To Prof. Dr. Travis Maynard, my co-supervisor, for his suggestions, help and guidance.

To my mother, Maco, for her endless love, affection, support, motivation and advises. Thank you for being there with me, under the sun (Moscavide, Vasco da Gama, Saldanha, Marquês de Pombal). Thank you for the big adventure of the data collection.

To you, Jaime, for your love, encouragement and for always supporting me.

To uncle Didi, John and Katie, for allowing me to have this amazing opportunity. There are not enough words to express my gratefulness, without you, none of this would be possible. Thank you for everything.

To uncle Tony, Samba and my father, Djibril, for the support.

To all my family and friends, with no exception, for supporting and encouraging me, with their best wishes throughout writing this thesis, when I needed it the most.

Thank you with all my heart!

Success is liking what you do, and liking how you do it. My mission in life is not merely to survive, but to thrive; and to do so with some passion, some compassion, some humour, and some style.

— Maya Angelou

Tenho em mim todos os sonhos do mundo.

— Fernando Pessoa

Table of Contents

Abstract	i
Resumo	ii
Acknowledgements	iii
Table of Contents.....	v
List of Tables	vi
List of Figures.....	vi
Chapter 1: Introduction.....	vii
Chapter 2: Theoretical Framework and Hypotheses.....	1
<u>The SECI Model</u>	1
Explicit versus Tacit Knowledge: SECI Epistemological Dimension.....	2
SECI Ontological Dimension	3
The Spiral of Knowledge Creation	4
<u>Individual Level Enablers</u>	8
<u>Team Level Enablers</u>	10
<u>Cross Level Effect</u>	13
<u>SECI and Creativity</u>	13
Chapter 3: Methodology.....	15
Study 1: The relationship between individual and team variables on team-level SECI	15
Method	15
Procedure	16
Measures	17
Measurement Validity.....	18
Model Estimation	18
Data Aggregation.....	19
Results.....	20
Study 2: The relationship between SECI and individual creativity	23
Method	24
<i>Sample</i>	24
Procedure	24
Measures	24
Measurement Validity.....	25
Results.....	25
Chapter 4: General Discussion.....	26
Chapter 5: Theoretical implications.....	29
Chapter 6: Practical implications	32
Chapter 7: Limitations and future directions.....	33
Chapter 8: Conclusion	35
References.....	35

List of Tables

1. Summary of companies.....	16
2. Means, standard deviations, and zero-order correlations between.....	20
study 1 variables	
3. HLM individual and team variables predicting SECI.....	23
4. Means, standard deviations, and zero-order correlations between.....	26
study 2 variables	

List of Figures

1. Proposed conceptual model and hypotheses.....	1
2. Intrinsic motivation as a function of individual-level LMX.....	22
at team-level SECI	
3. Team-level LMX at function of team-level trust at team-level SECI.....	22
4. Individual-level LMX at function of team-level trust.....	23
at team-level SECI	

Chapter 1: Introduction

Today's global economy has created a more complex, dynamic and fiercely competitive environment in which firms must learn to compete effectively to achieve sustainable growth (Tarique & Schuler, 2010), hence, they are expected to continuously reinvent themselves, anticipate future challenges and search for new ways to approach their core business (Devloo, Anseel, Beuckelaer, & Salanova, 2015). This requires a well-planned knowledge management system that enables organizations to excel in technological, market and administrative knowledge creation (Popadiuka & Choo, 2006). The ever-increasing importance of knowledge in contemporary society raises questions about how organizations create knowledge (Seidler-de Alwis & Hartmann, 2008), as the *raison d'être* of a firm is to continuously create knowledge (Nonaka, Toyama, & Konno, 2000).

Past research has identified knowledge creation as an important enabler for organizational success (e.g., Lee & Choi, 2003; Zelaya-Zamora & Senoo, 2013; Tseng, 2010), nevertheless as the leverage of knowledge still presents major challenges, it is essential for organizations to identify which factors and contexts facilitate employees' knowledge creation and sharing behaviour, so that strategies are addressed in this direction.

Knowledge creation is the process of making available and amplifying knowledge created by individuals as well as crystallizing and connecting it to an organization's knowledge system (Nonaka & Krogh, 2009). The present framework to examine the knowledge creation processes within teams is based on Nonaka and Takeuchi's (1995) SECI model (the acronym for Socialization, Externalization, Combination, Internalization), a "spiral" that illustrates the relationship between the epistemological and ontological dimensions of knowledge creation (Nonaka., 1994). The SECI model is one of the most influential theories of knowledge creation (Popadiuka & Choo, 2006), thus it have been most adopted by researchers, studying the relationship between knowledge creation and innovation (Popadiuka & Choo, 2006; Esterhuizen, Schutte, & Toitb, 2012; Zelaya-Zamora & Senoo, 2013) and the effect of critical enablers on SECI (Adenfelt & Lagerstrom, 2006; Magnier-Watanabe, Benton, & Senoo, 2011).

The studies that have been conducted (e.g., Magnier-Watanabe, Benton, & Senoo, 2011; Nejatian, Nejati, Zarei, & Soltani, 2013; Lee & Choi, 2003) focused on organizational factors, which impact the knowledge creation process, however, not

considering the influence that team-level factors may have on the overall process (Manohar Singh & Gupta, 2014). As teams have emerged as a fundamental unit of functioning, it has become increasingly important to define and measure knowledge management at team level (Manohar Singh & Gupta, 2014), once it is essential for long-term team effectiveness, innovation and productivity (Senge, 1990). Nevertheless, the literature on knowledge creation at team level is rather limited (Fong, 2003), this fact has led this research to emphasise the team context in order to fill a theoretical void.

Moreover, at a fundamental level, employees create and share knowledge (Nonaka, 1994). Despite the obvious significance of the individual-level factors, existing research has primarily focused on exploring organizational factors, thus neglecting the individual-level influences on knowledge creation (Foss & Felin, 2006).

To date, to my knowledge, no attempt has been made to assess SECI enablers through a multilevel approach, focusing on individual and team levels respectively. Accordingly, building on and extending previous SECI research, the aim of this study is to examine the combined effects of individual and team-level factors on team-level SECI.

A major challenge in organizations involves motivating people to their share knowledge (Hung, Durcikovab, Laia, & Lina, 2011). Once knowledge creation and sharing are essential for a firm's sustainable competitive advantage, it is key to identify the types of motivation needed to generate and transfer tacit knowledge, as opposed to explicit knowledge. The decision to rely on and enable intrinsic motivation depends strongly on the need to generate and transfer tacit knowledge, as intrinsic motivation is crucial when tacit knowledge in and between teams must be transferred (Osterloh & Frey, 2000). Thus, at the individual level this research will analyse the influence of intrinsic motivation on team-level SECI.

Leaders are central to the process of managing knowledge effectively, at multiple levels of the organization, as they not only provide the context but also influence employee's knowledge creation behaviour (Bryant, 2003). Yet, no published empirical studies have examined how LMX, simultaneously operating at individual and team levels, influences team-level SECI outcomes. As leaders develop a pattern of social exchanges with employees in their work teams (i.e., LMX), the quality of exchange relationships determines how willing the involved parties are to share resources, information and ideas to create new knowledge (Tse & Mitchell, 2010). In

this sense, this study will examine whether, beyond leader's exchange behaviours captured by individual-level perceptions of LMX quality, LMX operates at team-level to influence team-level SECI behaviours. Responding to calls in the leadership literature for multilevel research (e.g., Yammarino, Dionne, Chun, & Dansereau, 2005), in this study LMX will be analysed at individual and team-level on the relationship with team-level SECI, as the examination of the theory from each of these levels raises many unique and important issues and questions, the answers to which will likely advance our thinking about leadership (Graen & Uhl-Bien, 1995), clarifying how LMX operates at differing theoretical levels.

Team tasks require a high level of interdependence between members; hence trust is an integral part of teamwork (Mach, Dolan, & Tzafrir, 2010), as individuals are more willing to provide non-codifiable tacit knowledge to others they trust (Chung & Jackson, 2011). Understanding team-level trust is important to managing teams and organizations effectively, thus this research will study the relationship between team-level trust and team-level SECI.

This study's framework is developed in four steps. First, at the individual level, it is proposed that, employee's intrinsic motivation and LMX fosters team-level SECI. Second, at the team-level, it is argued that both trust and LMX promotes team-level SECI. Specifically, when there is team trust and a high quality LMX, teams are more likely to create knowledge (e.g., Chung & Jackson, 2011; Tse & Mitchell, 2010). Third, different types of individual and team variables will be analysed as moderators to such relations. Finally, it will be tested whether engaging individually on SECI leads to individual creativity.

This research provides a more rigorous empirical examination of relationships involving SECI, relative to prior work, by using a multilevel approach and collecting data from multiple sources, in a sample constituted by 431 employees from 59 teams, in 51 companies based in Lisbon, London and Maputo. This study applies HLM to investigate the research model contributing to SECI, intrinsic motivation, LMX, trust and creativity research by providing insights that help us better understand how variables at one level of analysis are linked to those at another.

Chapter 2: Theoretical Framework and Hypotheses

In this section, the development is traced in the overall research model, exploring the SECI model. Next, it is investigated how intrinsic motivation and LMX, at the individual-level influence team-level SECI, including consideration of a potential moderator, individual-level LMX. Then the influence of team-level trust and team-level LMX on team-level SECI is examined. As part of these arguments, team-level trust is incorporated as a moderating variable to help explain how team-level trust can affect the extent to which team-level LMX influences team-level SECI. Finally, the links between individual-level SECI and employee creativity are examined. A summary of hypothesized model is presented in Figure 1, and each is developed later.

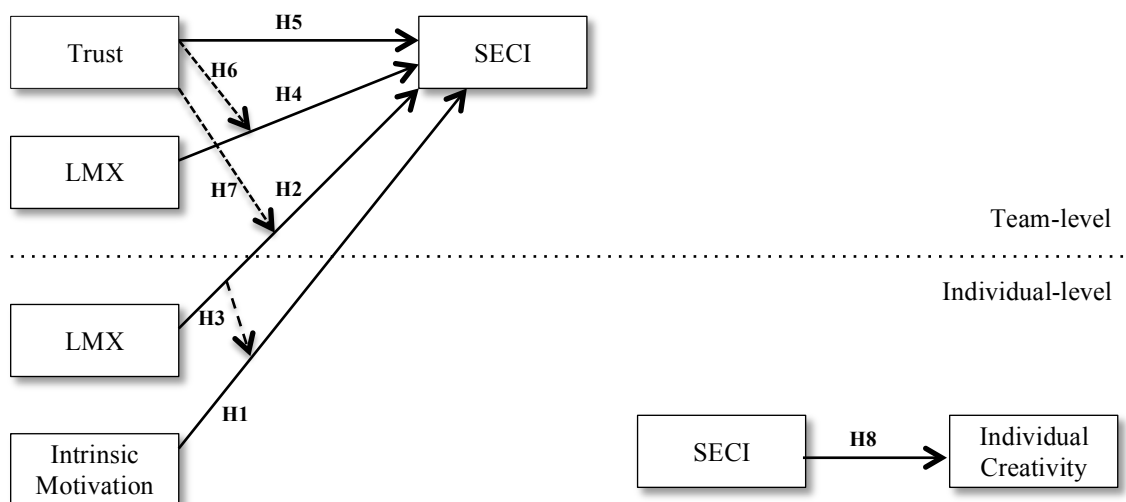


Figure 1. Hypothesized model. All the hypothesized relationships are positive. Note. Solid lines represent direct effects; dotted lines depict fully moderations relations. H = Hypothesis.

The SECI Model

More than 15 years ago, Nonaka (1994) presented pioneering premises that shaped the development of the organizational knowledge creation theory as it exists today (Esterhuizena, Schuttea, & Toitb, 2012), presenting to the world the SECI Model. The concept of tacit knowledge was introduced into this theory, consequently challenging the old paradigm by offering a dynamic view of knowledge creation and the duality of tacit and explicit knowledge (Hoe, 2006). Nonaka's theory has more or less turned into an axiom transcending the confines of time, space and culture (Glisby & Holden, 2003), meting with broad acceptance, especially among management practitioners, due to its intuitive logic and clear delineation of knowledge types between tacit and

explicit knowledge (Rice & Rice, 2008). Consequently, authors from diverse research areas have used this model to conduct their investigations (Chou & He, 2004).

The SECI model, results from the interaction and intersection between tacit and implicit knowledge (Chou & He, 2004) – modelled as knowledge spiral (Amalia & Yanuar, 2011). Explicit and tacit knowledge grow in both quality and quantity during this process of knowledge conversion (Esterhuizen, Schutte, & Toitb, 2012), which begins with the individual then increases and develops as it proceeds through various interactional communities, in this way, it goes beyond firm boundaries of section, department, division or organization (Al-adaileh, Dahou, & Hacini).

Explicit versus Tacit Knowledge: SECI Epistemological Dimension

Epistemologically, the creation of a new concept results from the continual dialogue between tacit and explicit knowledge (Nonaka., 1994). Knowledge exists on a spectrum. At one extreme it is almost completely tacit, that is, semiconscious and unconscious knowledge held in peoples' heads. At the other end of the spectrum, knowledge is almost completely explicit, or codified, structured, and accessible to people other than the individuals originating it (Polanyi, 1962).

"Tacit" knowledge has a personal quality, which makes it hard to formalize and communicate once it is deeply rooted in action, commitment, and involvement in a specific context (Nonaka., 1994). According to Nonaka & Takeuchi (1995) tacit knowledge also includes cognitive skills such as beliefs, intuition and mental models as well as technical skills such as know-how. Once it is much harder to grasp as the information is contained in people's heads, it cannot be given in lectures and it cannot be found in databases, textbooks, manuals or internal newsletters for diffusion (Haldin-Herrgard, 2000), the real difficulty is understanding how to document, share and manage it effectively (Goh, 2005). Hence every organization that seeks to be successful has to create the conditions enabling employees to verbalize their tacit knowledge (Seidler-de Alwis & Hartmann, 2008), or in other words, organizations have to find methods of communicating and capturing tacit knowledge (Hoe, 2006).

On the other hand, "explicit" knowledge refers to knowledge that is transmittable in formal, systematic language (Nonaka., 1994), once it is not only articulated into words and numbers (Amalia & Yanuar, 2011), but also captured in records of the past such as libraries, archives, and databases (Nonaka., 1994). Moreover, explicit

knowledge can be shared in the form of data, scientific formulae and manuals (Seidler-de Alwis & Hartmann, 2008). Examples include patents, trademarks, business plans and marketing research - any information that can be documented, archived and codified, often with the help of IT (Goh, 2005).

In the end, tacit and explicit knowledge are complementary, which means both are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning (Seidler-de Alwis & Hartmann, 2008).

SECI Ontological Dimension

There are several levels of social interaction at which the knowledge created by an individual is transformed and legitimized (Nonaka., 1994). Knowledge moves between individual, group and organizational levels (Hislop, 2005), consequently, the knowledge creation process can be viewed as an upward spiral process, starting at the individual level moving up to the collective (group) level, and then to the organizational level, sometimes reaching out to the inter-organizational level (Nonaka., 1994), with possible reverse actions from the organization toward group and individual (Bratianu & Orzea, 2010). Once this study focuses on the individual and group level of knowledge creation, organizational level is not considered.

The prime movers in the process of knowledge creation are the individual members of an organization (Nonaka., 1994). At a fundamental level, individuals create knowledge, drawing on their own resources to generate new knowledge (Fong, 2003), however, interaction plays a critical role in developing these ideas (Seidler-de Alwis & Hartmann, 2008). Initially two or more people create knowledge, and then the knowledge created is transferred and integrated with the knowledge that they already possess and internalized to the point that it becomes one set of knowledge (Zárraga & García-Falcón, 2003). Within this knowledge creation process, employees share the knowledge created, which is then transferred to the team and codified into written or digital format (Turner, Zimmerman, & Allen, 2012).

Teams are one such strategy that allows companies to successfully leverage human capital and intellect in a competitive global environment (Turner, Zimmerman, & Allen, 2012). Teams create knowledge by generating new or 'emergent' knowledge through interaction and communication (Fong, 2003). The employees' skills, knowledge, and experiences are shared through problem identification, task

achievement, and team-member interactions as the team works toward their common goal. It is here that the creation of knowledge takes place and knowledge management critical dimensions are manifested (Turner, Zimmerman, & Allen, 2012). Once team members have sourced new or emergent knowledge, they need to integrate their collective knowledge. This involves combining, modifying and negotiating among team members so that not only their needs but also those of stakeholders are fulfilled (Fong, 2003).

The Spiral of Knowledge Creation

It is now possible to bring together the epistemological and ontological dimensions of knowledge creation to form a "spiral" model constituted by four different "modes" (Nonaka., 1994): the conversion of tacit knowledge to tacit knowledge (socialization), tacit knowledge to explicit knowledge (externalization), explicit knowledge to explicit knowledge (combination) and explicit knowledge to tacit knowledge (internalization). Each of the four modes is characterized by different activities within an organization (Byosiere & Luethge, 2012), which can independently result in new knowledge creation, however the SECI Model hinges on a dynamic interaction between the different modes of knowledge conversion and takes place when all four modes of knowledge creation are "organizationally" managed to form a continual cycle (Nonaka., 1994).

Socialization

Socialization is the process in which tacit knowledge is created through shared experience (Nonaka., 1994). Here new tacit knowledge for one person is created through gaining access to the tacit knowledge of others as they work together on a day-to-day basis (Hislop, 2005). This process might be more relevant to learning at team-level through social interactions between groups of individuals, which allow exchanging of ideas from individual to team-level (Al-adaileh, Dahou, & Hacini).

In this mode of knowledge conversion the aim is to share tacit knowledge among individuals (Nonaka, Krogh, & Voelpel, 2006), therefore the individuals' willingness to exchange and share knowledge, both internally and externally with suppliers, customers and other stakeholders (Glisby & Holden, 2003), is key to the success of this stage (Bartol & Srivastava, 2002). This can become more difficult due to their reluctance: fear of losing superiority arising due to ownership of that knowledge and perception of not being adequately rewarded the knowledge sharing action (Bartol &

Srivastava, 2002).

It is essential to create an atmosphere in which employees feel safe in sharing their knowledge (Seidler-de Alwis & Hartmann, 2008). Some organizations provide members with the opportunity to learn from each other (Argote, McEvily, & Reagans, 2003), encouraging employees to share their knowledge among themselves, which may result in new knowledge creation. The knowledge shared could be explicit as well as tacit. While the former can be shared through verbal communication (Bartol & Srivastava, 2002), the latter can be acquired through socialization, observation, apprenticeship and on-the-job training (Nonaka., 1994).

In the end, pure socialization is a limited form of knowledge creation. As the knowledge never becomes explicit, it is difficult to apply in fields beyond the specific context in which it was created and it cannot easily be leveraged by the organization as a whole (Nonaka., 1994). Despite the efforts to store tacit knowledge, a problem arises on how to effectively capture and further properly store it. It is understood that not all-tacit knowledge can be "codified" (Amalia & Yanuar, 2011).

Externalization

It is risky for organizations to rely only on personal tacit knowledge; therefore the conversion of tacit knowledge to explicit or at least the ability to share it offers greater value to the organization (Haldin-Herrgard, 2000).

Externalization is the conversion of tacit into explicit knowledge (Nonaka., 1994), which requires that one translates what is known intuitively into a form that can be understood by others (Byosiere & Luethge, 2012), through mutual sharing, analysis and reflection on one another's mental models (Ortenblad, 2015). The success of this knowledge conversion mode depends on the capacity of using efficiently metaphors, analogies and cognitive models (Bratianu & Orzea, 2010). Difficulties are raised in reducing the tacitness of one's knowing in order to make it explicit, as it is often challenging to document or even express what seem obvious and natural to oneself (Haldin-Herrgard, 2000). For example, a company's chief financial officer (CFO) does not actually produce a conventional financial report, but rather, develops an innovative budgetary control method, which is based on implicit knowledge he has accumulated over years of experience (Shih, Chang, & Lin, 2010).

This knowledge creation process involves the movement of knowledge from the individual to group level (Hislop, 2005), which allows team members to articulate

their own perspectives, and thereby reveal hidden tacit knowledge that is otherwise hard to communicate (Nonaka., 1994). The explicit knowledge created is then externalized to be shared within the organization (Magnier-Watanabe, Benton, & Senoo, 2011), therefore it should not only be a strong reflection of best practice within the alliance group, but also easily understood outside its linguistic, organizational and cultural context (Rice & Rice, 2008). From the organizational perspective, employees are stimulated to document their knowledge, through manuals and databases, thus preventing knowledge loss (Nonaka., 1994).

Combination

Combination is the process of creating explicit knowledge from explicit (Nonaka., 1994), in which sense is made of the relations between previously unrelated knowledge domains (Schulzea & Hoeglb, 2008).

Combination aims at uniting different entities of explicit knowledge (Nonaka, Krogh, & Voelpel, 2006). In practice, the combination phase relies on three processes. Capturing and integrating new explicit knowledge is essential. This might involve collecting externalized knowledge (e.g., public data) from inside or outside the company and then combining such data. Second, the dissemination of explicit knowledge is based on the process of transferring this form of knowledge directly by using presentations or meetings. Here, new knowledge is spread among the organizational members. Third, the editing or processing of explicit knowledge makes it more usable (e.g., documents such as plans, reports, market data) (Nonaka & Konno, 1998).

The capture and compilation of knowledge must be a vertically and horizontally open and integrated process (Rice & Rice, 2008). As combination is predicated on 'free access to company information', the information should be 'stored in a single integrated database, open to any employee regardless of position' (Glisby & Holden, 2003). With the help of modern IT such as Internet and Intranet, information and precious experience are well organized and easy to access, enabling individuals to achieve combination (Chou & He, 2004). The key challenge is to do this in such a way that the combined knowledge takes into account the knowledge of all participants, and becomes a shared resource for all (Rice & Rice, 2008). Cooperation and sharing occur when people who add to and use databases are appropriately recognized and rewarded for sharing their special form of knowledge (Smith E. A.,

2001).

A lack of commitment and neglect of the personal meaning of knowledge might mean that pure combination becomes a superficial interpretation of existing knowledge, which has little to do with here-and-now reality. It may also fail to crystallize or embody knowledge in a form that is concrete enough to facilitate further knowledge creation in a wider social context (Al-adaileh, Dahou, & Hacini).

Internalization

Internalization is the conversion of explicit knowledge into tacit knowledge (Nonaka, 1994), through a series of iterations in which concepts become concrete and are ultimately absorbed as an integral belief or value (Lopez-Nicolas & Soto-Acosta, 2010). The process socializes, externalizes, and combines the explicit languages, texts, pictures, or information, and then internalizes it into personal knowledge (Shih, Chang, & Lin, 2010). Therefore, it is a process-oriented task (Chou & He, 2004).

In practice, internalization relies on two dimensions. First, explicit knowledge has to be embodied in action and practice. For example, training programs help trainees to understand the organization and themselves in the whole. Second, there is a process of embodying the explicit knowledge by using simulations or experiments to trigger learning-by-doing processes. New concepts or methods can thus be learned in virtual situations (Nonaka & Konno, 1998). Through an iterative process of trial and error, concepts are articulated and developed until they emerge in a concrete form. This tacit knowledge accumulated at the individual-level can then set off a new spiral of knowledge creation when it is shared with others through socialization (Nonaka, Toyama, & Konno, 2000).

In order to make internalization possible, it is necessary to encourage and facilitate informal conversations and discussions. Thus, designing physical meeting spaces and conducting face-to-face meetings may be essential for internalization (Chou & He, 2004). Furthermore, Nonaka & Takeuchi (1995) argue that verbalized and diagrammed knowledge needs to be transferred into documents, manuals, or oral stories in order to help individuals indirectly experience what others do. Finally, the employee's rotation policy in large organizations improves considerably the knowledge internalization, once it plays a key role in the interruption of habits and breakdowns in human perception, which is precisely one of the main purposes of the internalization process (Nonaka, 1994).

Individual Level Enablers

The knowledge creation process relies heavily on intrinsic motivation (Rollett, 2003), which is crucial when tacit knowledge in and between teams must be transferred (Nonaka, 2005), therefore knowledge to be created and shared, organizational members need to be highly motivated (Burton-Jones & Spender, 2012).

Intrinsic motivation is defined as an innate need of organisms for competence and self-determination, which guides individuals against a wide variety of behaviours. Intrinsically motivated behaviours are those that are performed in the absence of any apparent external contingency (Deci & Ryan, 1980).

When individuals are intrinsically involved in their work, they are more likely to devote all of their attention to the problems they encounter (Zhang & Bartol, 2010). Intrinsic motivation brings curiosity, which often leads to creativity and learning. Intrinsically motivated employees are often the ones, which will actively search for information, approach situations in a novel ways, and are able to solve more complex problems (Osterloh & Frey, 2000). Furthermore, individuals believe that the share of knowledge brings a non-measurable-good either for themselves, the requester, the group, or the company (Osterloh & Frey, 2000).

Some research (e.g., Lin, 2007; Muller, 2012) has shown that that motivation influences knowledge sharing behaviour. Furthermore, studies showed knowledge sharing positively influences knowledge creation (e.g. Yi & Jayasingam, 2012), thus in the context of this research, the following hypothesis is proposed:

H1: Intrinsic Motivation is positively related to team-level SECI.

Another predictor that may be important to enable knowledge creation is Leader-member-exchange theory, at individual level of analysis. Research suggests that leadership plays an important role in knowledge-creation processes, due to their direct control over the activities that are rewarded, the behaviours that are encouraged and valued in the organization (Tse & Mitchell, 2010). However, little is known about the type of leadership that facilitates knowledge creation (Tse & Mitchell, 2010), which results in a research gap. Instead, extant empirical literature has focused on knowledge sharing (e.g., Su, Wang, Lei & Ye, 2013).

Leader-member exchange (LMX) theory, which was developed as an extension of the vertical-dyad linkage model, is based on the differential types of relationships that form between leaders and group members (Liden, Erdogan, Wayne, & Sparrowe,

2006), proposing that leaders do not treat all followers identically; rather, they develop different quality of relationships with followers (Boies & Howell, 2006).

The existing body of research suggests that LMX plays an important role in understanding how employees become fully contributing and engaged organizational members (Vidyarathi, Liden, Anand, Erdogan, & Ghosh, 2010). Due the importance to study work teams, understanding the effect of LMX in team processes and outcomes, is crucial due to its influences on other exchange relationships within teams (e.g., Liden, Erdogan, Wayne, & Sparrowe, 2006; Tse H., 2014).

The quality of the LMX relationship has been found to predict positive individual level work-related outcomes; for example, LMX has been linked to follower's creativity (e.g., Pan, Sun, & Chow, 2012) and performance (e.g., Kang & Stewart, 2007). Findings provide evidence that knowledge creation is dependent upon the strength of knowledge exchange relationships (McFayden & Cannella Jr, 2004), as such, the quality of LMX relationship is important as it can ease the team knowledge creation (Tse & Mitchell, 2010), thus the following hypotheses were formulated:

H2: Individual-level LMX is positively related to team-level SECI.

There is growing interest in recognizing LMX as an important factor in determining team-level outcomes (e.g., Boies & Howell, 2006). A prevalent high LMX will provide team members with a strong sense of organizational commitment (e.g., Eisenberger, et al., 2010) and team performance (e.g., Liden, Erdogan, Wayne, & Sparrowe, 2006), which influences their level of competence, motivation and willingness to spend effort toward their work (Erdogan & Bauer, 2014). As LMX has implications for the way in which employee's experience the workplace (Erdogan & Bauer, 2014), it is argued that individual-level LMX moderates the positive relationship between intrinsic motivation and team-level SECI, and such a relationship is amplified when individual-level LMX is high rather than when the individual-level LMX is low.

This is argued that for several reasons. First, high-quality LMX members have a desire to reciprocate for the support provided by the leader in a high quality exchange relationship (Liden, Erdogan, Wayne, & Sparrowe, 2006). One key way to reciprocate is to share valuable information with their supervisor (Graen G. B., 2006), which may result in new knowledge creation. Second, in essence, leaders raise motivation both directly by a number of motivational strategies, and indirectly through their planning,

coordinating, personnel development, and feedback behaviours (Zaccaro, Rittman, & Marks, 2001). It is plausible that leaders may delegate more meaningful tasks and provide more support to higher-quality LMX members, resulting in greater levels of success with delegated tasks and intrinsic satisfaction. High-quality LMX members have access to challenging tasks (Erdogan & Bauer, 2014), which will impact in the employee's intrinsic motivation. Thus, the following hypothesis is developed:

H3: Individual-level LMX moderates the relationship between intrinsic motivation and team-level SECI.

Team Level Enablers

Although the individual-level perceptions of LMX quality are reflective of interpersonal social exchange behaviours and motives in the leader-member dyad, they do not capture how the social context arising through within-group LMX further influence employee attitudes and behaviours (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008).

Most of the empirical research on the LMX theory has examined the relationship between individual-level perceptions of LMX (Schriesheim, Castro, Zhou, & Yammarino, 2001), resulting in a limitation. Accordingly, recent empirical studies have generally found that LMX occurs at multiple levels (e.g., Boies and Howell, 2006, Henderson et al., 2008), considering LMX from a multilevel perspective (Zhou, Wang, Chen, & Shi, 2012), as leaders have been argued to play a key role in determining organizational effectiveness across levels (e.g., team) (Burke, Sims, Lazzara, & Salas, 2007). This offers distinctive insight into how leadership practices influence employee's evaluations and behaviours within the employment relationship (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008).

The examination of between-team effects may be particularly relevant for team-based organizations, where leaders lead teams, rather than single individuals belonging to units, and where the work is organized around whole units (Boies & Howell, 2006). The role of LMX at the team-level research is still far from clear, and more research on this construct is needed in order to advance LMX theory (Blanc & González-Romá, 2012), thus investigating the interaction between team-level LMX represents an important contribution to the LMX literature (Boies & Howell, 2006).

LMX was tied with positive team-level outcomes, namely, team performance (e.g., Tse, 2014), affective team commitment (e.g., Blanca & González-Romá, 2012),

team potency (e.g., Boies & Howell, 2006) and knowledge creation processes (e.g., Tse & Mitchell, 2010).

Being closer to the leader offers greater relative advantages and distinguishable treatment in the employment relationship in groups with high group-level LMX than it does in groups with low variability in LMX relationship quality (Henderson, Wayne, Shore, Bommer, & Tetrick, 2008). In other words, team-level LMX may interact with within-team differentiation in predicting team-level outcomes (Boies & Howell, 2006). In this regard, the quality of LMX relationship has been identified as an effective approach to facilitate knowledge-creation processes in teams (Tse & Mitchell, 2010), thus the following hypothesis is formulated:

H4: Team-level LMX is positively related to team-level SECI.

In today's turbulent business environment, employees work in collaboration and coordination. In the team context, trust is a key antecedent of cooperation (Smith, Carroll, & Ashford, 1995) and commitment (Morgan & Hunt, 1994), thus becoming an important factor to managing teams and organisations effectively (Chung & Jackson, 2011).

Trust is defined as the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party (Mayer, Davis, & Schoorman, 1995).

Research has suggested a link between trust and a variety of work behaviours including: team cohesion (Mach, Dolan, & Tzafrir, 2010), team effectiveness (Pangil & Chan, 2014) and team performance (Erdem, Ozen, & Atsan, 2003).

Given the increasing team-based organizations, studying the area of trust in peers appears more and more important (Han, 2010). This study extends Lee and Choi's (2003) model, adding a new level of analysis when studying trust, the team level.

While the relationship between trust and knowledge transfer has been acknowledged by a number of researchers (e.g., Sankowska, 2013; Pangil & Chan, 2014), still there is scant literature that connects it with other knowledge management processes, specifically, minimal research has been conducted toward knowledge creation and trust in its own right, resulting in a serious research gap (Sankowska, 2013). In order to initiate different processes of knowledge creation there must some atmosphere of safety and positive expectation stimulating creative behaviours, which is brought with

trust (Sankowska, 2013). A climate of openness and trust amongst organization members is the basic condition that allows tacit knowledge to be created and shared (Seidler-de Alwis & Hartmann, 2008).

Furthermore, team-level trust can foster team-level SECI in several ways. First, trust facilitates frequency and quality of communication between parties (Sankowska, 2013), which can result in knowledge creation. Second, trust influences knowledge exchange. Numerous studies have suggested that trust may facilitate knowledge sharing (e.g., Lisa C. Abrams, 2004; Pangil & Chan, 2014; Holste & Fields, 2010). The increase in knowledge exchange brought on by mutual trust results in knowledge creation (Lee & Choi, 2003), as employees who are trusted by teammates in their networks are more likely to gain a larger volume of tacit and confidential knowledge thus, they are more able to create new knowledge (Chung & Jackson, 2011).

Without trust team-members fail to understand and open up to one another, and instead resist the interdependence needed for teamwork to occur and a team to succeed. In this sense, for teams to be successful, team members must establish trust (DeOrtentiis, Summers, Ammeter, Ceasar, & Ferris, 2013). Thus, the following hypothesis is formulated:

H5. Team-level trust is positively related to team-level SECI.

Most of the trust-related research appears to position trust as a variable that has direct (main) effects on work group process and performance. In other words, when the level of trust is increased, a group is expected to experience superior group processes (e.g., higher levels of cooperation); when trust is decreased, a group is expected to experience inferior group processes and lower performance (Dirks, 1999).

Although the perspective described above has dominated the literature, it does not represent the only way that trust might have positive results (Dirks & Ferrin, 2001). Prior research suggest that trust is beneficial once it enables the effects of other determinants on desired outcomes, as trust influences task-related behaviour and/or performance via moderation (e.g., Dirks, 1999; Simons & Peterson, 2000). This idea is theoretically appealing, as trust may be conceived as a variable that influences how team members direct their energy (Dirks, 1999), however the broader theoretical issues, which may provide a solid foundation for understanding the moderating role of trust, have received little attention (Dirks & Ferrin, 2001).

The research on trust is essential to a deeper understanding of LMX relationships,

however little effort has been made to synthesize research on trust to advance LMX theory (Scandura & Pellegrini, 2008). Research integrating trust and LMX literatures is timely and warranted (Scandura & Pellegrini, 2008). Trust has been mostly studied as an antecedent or outcome of LMX (Scandura & Pellegrini, 2008), not as a moderator. Thus, the following hypothesis is formulated:

H6: Team-level trust moderates the relationship between team-level LMX and team-level SECI.

Cross Level Effect

As mentioned before, trust fosters positive outcomes in the relationship between two variables, by serving to facilitate (i.e., moderate) the effects of other determinants on work attitudes and behaviours outcomes. Nevertheless, to date, research has not fully considered the cross-level effect that team-level trust may have on the relationship between individual-level LMX with team-level SECI. This gap in the literature is interesting, as prior researchers have acknowledged that trust may moderate some relationships (e.g., Dirks, 1999). In this specific case, when the team-level trust is increased, it is expected that the relationship between individual-level LMX and team-level SECI, will be enhanced, as the team is expected to experience superior team processes (e.g., higher levels of knowledge creation and sharing). Thus it is proposed that team-level trust is a critical factor that affects the individual-level LMX and team-level SECI relationship. Stated formally:

H7. Team-level trust moderates relationship between individual-level LMX and team-level SECI.

SECI and Creativity

When exploring today's dynamic work environment and the demands for creative outcomes, it is clear that creativity is important for organizational success (Egan, 2005). People constantly discover new ideas and methods to solve problems, which can be distributed through the internal borders of the organization and transformed into shared routines and practices (Maimone & Sinclair, 2014). Creativity is the production of novel appropriate ideas in any realm of human activity (Amabile, 1997).

Numerous researchers have argued that enhancing the creative performance of employees is a necessary step if organizations are to achieve competitive advantage

(e.g., Amabile, 1998) and sustainable organizational success (e.g., Parka, Songb, Limc, & Kimd, 2014). However, neglecting organizational creativity can quickly undermine a business (Lee & Choi, 2003), creativity is weakened unintentionally every day in work environments that were established for entirely good reasons-to maximize business imperatives such as coordination, productivity, and control (Amabile, 1998). Furthermore, management actions that result in significant changes within the organization, such as downsizing, can have dramatic and potentially long-lasting effects on creativity (Amabile, 1997).

Unfortunately, little is known about the conditions that promote the creative performance of individual employees in organizations (Oldham & Cummings, 1996), thus it is meaningful to investigate the factors that influence employee creativity. Previous studies have identified some influential patterns with employee creativity. First, some work factors were found to influence employee creativity as antecedent variables. These included empowerment, leader support, support for innovation, and time demands (Unsworth, Wall, & Carter, 2005). Second, creativity tends to be encouraged by challenging work, team support (Amabile, 1997), provisions for autonomy and openness to new ideas (Egan, 2005).

Knowledge is essential for the organization's creativity, as it transforms knowledge into business value (Lee & Choi, 2003). Ideas are formed through a deep interaction among people in environments that have the conditions to enable knowledge creation (Popadiuka & Choo, 2006). Once creativity links and reorganizes the existing knowledge to create new and useful knowledge, the knowledge creation practice affects creativity (Nonaka & Krogh, 2009), as the process of knowledge conversion is required to generate new knowledge (Shih, Chang, & Lin, 2010). However the high potential of the relationship between knowledge creation and creativity, in other words, research on how knowledge creation influences creativity is extremely limited (Schulzea & Hoeglb, 2008). As a result, researchers have become increasingly interested in identifying the individual level factors that influence employee creativity (e.g., Zhang & Bartol, 2010; Joo, Yangb, & McLean, 2014). As mentioned before, the knowledge creation model in use in this research is the SECI Model, which facilitates both the transfer and the conversion of existing knowledge into new knowledge (Nonaka., 1994), thus it is assumed that knowledge creation advances creativity, at individual-level.

H8: SECI, at the individual level, is positively related to individual creativity.

Chapter 3: Methodology

Two studies were developed to understand how individual and team factors impact on SECI and individual creativity. As represented in the conceptual model (Figure 1), in study 1, the relationship between individual factors (intrinsic motivation and LMX) and team factors (Trust and LMX) were examined with team-level SECI (Hypotheses 1, 2, 3, 4, 5, 6 and 7). Despite the strength of HLM, study 1 included self-report measures, thus common method variance and other methodological limitations were considered. To overcome this limitation, study 2 was developed, with the use of a peer's evaluation, testing the relationship between individual SECI and individual creativity (hypothesis 8).

Study 1: The relationship between individual and team variables on team-level SECI

Method

Sample

The research was conducted in 97% teams based in Portugal, 1,5% teams based in England and 1,5% teams based in Mozambique, ranging from banking to consulting industry (see Table 1). The sample needed to be representative of diverse industries, once the heterogeneity in work experience of respondents supports the objective of this exploratory study and strengthens the potential for generalizability to work settings, due its relevance for organizations. The selection criteria were that the team members interacted with each other in everyday job tasks, such as task collaboration and discussion in meetings. Furthermore, each team had the minimum of three group members and a primary team leader.

After the reliability and validity analysis, a convenience sample was collected in 59 teams from 51 companies (Mean = 3,5 members per team), which agreed to participate in the study. Due to missing values in some of the study variables, the sample size for the main analyses was reduced to 431 valid cases. Of the 431 team-members, 151 were men (34%) and 277 women (62,4%). In terms of age, it varied between 18 and 70 years (M = 31,93, SD = 31). The majority were in their late 20s (41,9%) and 30s (43,3%), whereas only 14,8% were over 40.

Regarding their professional work experience, it ranged from 0 to 40 years (mean

10.7 years, median 10 years). The majority of participants (59,5%) had between 5 and 15 years of professional experience, while 18,2%, began their professional life more than 15 years prior to this study and 22,3% were employed for less than five years. As for the education level, most were highly educated employees: 65,6% were 3-year college graduates and the remaining 34,4% were high school graduates.

Companies/Sectors
Consulting Companies
Banking / Financial Services & Insurance
Company of health and well-being
Fashion /clothes/shoes company
Jewellery company
Start-up company
Multinational mobile operator
Software company
NGOs
Real state company
Advertising Agency
Pharmacies
Basic Education Institution
Book shop
Car company
Tourism company
Multinational of beverage

Table 1: summary of companies

Procedure

A new measure to assess the SECI model was developed for use in this study, based on the literature review. Therefore a draft questionnaire with self-developed questions was pilot tested by 24 professors and HR Professionals to ensure meaningfulness, relevance, and clarity. Based on the data analysis from the pilot phase and Professors and HR Professionals suggestions', the questionnaire was modified: twenty-two items were subsequently selected from the initial pool of 25 – thus 3 items were eliminated, and seven reworded.

The next step was to identify a contact person at each company. Contact persons were asked to identify teams with the minimum of three elements and distribute the self-administered questionnaire. Participants were also allowed to complete the surveys during work time. The average completion time for filling out this questionnaire was 15 minutes. To guarantee greater control, each questionnaire was distributed with

different codes for each team. The questionnaires were filled in on paper (when applied in person) and online (sent to the contact's person e-mail).

Participants were instructed to complete a survey concerning the activities they conducted during their current role. The information regarding the research goal, anonymity and confidentiality were highlighted.

Measures

Two main parts composed the questionnaire. In order to develop the respondent's basic demographic profile, the first part contained demographic data including gender, age, education level, years of professional experience and the participant name's initial. The second part of the questionnaire had scales that had been previously translated for the Portuguese population.

Trust. This construct was assessed by the affect-based trust of McAllister's (1995). For the purpose of conciseness, the three highest loading items of the five-item subscale of McAllister's (1995) were used to measure trust. Sample items are "We have a sharing relationship. We can both freely share our ideas, feelings and hopes"; "We would feel a sense of loss if one of us was transferred and we could no longer work together". The answers were scored on a seven-point anchored Likert-scale ranging from 1 (strongly disagree) to 7 (strongly agree).

The Cronbach's alpha reported in the original version was .89, and this research achieved a similar internal consistency of .74.

LMX. The LMX scale was assessed based on Graen & Uhl-Bien (1995) questionnaire, which described the leader-member relationship. Sample items are "Do you know what your leader thinks of you, and do you usually know how satisfied their leader is with your work?"; "To what extent does your leader understands your problems and needs at work?". The answers were scored on a five-point anchored Likert scale ranging from 1 = strongly disagree to 7 = strongly agree.

The Cronbach's alpha in this research achieved an internal consistency of .87.

Intrinsic motivation. The employees' intrinsic motivation was measured using four items ($\alpha = .71$) developed by Grant (2008). Sample items include "Because I enjoy the work itself"; "Because I find the work engaging". The

answers were scored on a seven-point anchored Likert-scale ranging from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's alpha reported in the original version was .71, and this research achieved a similar internal consistency of .92.

SECI. As mentioned before, a new scale was developed to measure knowledge creation and sharing behaviour within teams. To minimize common method bias the SECI model was measured on team and individual levels of specification. At the team level the scale consisted of 22 items, 6 assessing the socialization phase, 4 assessing the externalization dimension, 7 assessing the combination dimension and 6 assessing the internalization phase. Based on 7-likert scale, 1 (does not apply) to 7 (always applies), participants indicated their agreement with various statements about their work behaviour. The team-level sample items are: "We are encouraged to spend some time observing and collaborating with our colleagues in order to better understand the work" (socialization); "After each event (including meetings), we make summaries regarding what happened" (externalization); "There is a computer system organized/structured that allows us to store documents" (combination); "We play better our tasks due to Training and manuals available" (internalization).

The Cronbach's alphas in this research were: .93, .93, .92, .83.

Measurement Validity

A principal components analysis was used for determining the interrelationships among the items used to measure intrinsic motivation, LMX, trust and SECI. The rule of thumb is that loading of .50 (Hair, Anderson, Tatham, & Black, 1998) and above is preferable, and this analysis revealed a clean factor structure for all constructs strong factor loadings (all above .50) for any of the items, thus providing substantive evidence in support of the discriminant validity of the constructs in study.

Model Estimation

To estimate the hypothesized model (Figure 1), in study 1, the relationship between Level 1 variables (Intrinsic Motivation and LMX) and SECI (Hypotheses 1 and 2) was specified. Furthermore, at Level 2, the relationships between team-level variables (LMX and Trust) on team-level SECI (Hypotheses 4 and 5) were considered.

Moreover, the moderation effect was analysed at different levels. First, at individual level, studying the effect of individual LMX in the relation between Intrinsic Motivation and team-level SECI (Hypothesis 3). Second, at the team level, examining the influence of team-level trust on the relationship between team-level LMX and team-level SECI (Hypotheses 6). Lastly, the cross-level moderator effect of team-level trust in the relationship between individual-level LMX and team-level SECI (hypothesis 7) was measured.

To facilitate the interpretation of the findings, all individual variables were all grand mean-centered. The individual-level variables (LMX and trust) were centered to the team-level (group-mean centering – Level 2).

Data Aggregation

Given the nature of organizations, it is clear that variables at one hierarchical level can influence variables at another hierarchical level (Hofmann, 1997). In order to test the research hypothesis, which included individual and team-level variables, the hierarchical linear modeling (HLM) was used. Hierarchical linear models provide a conceptual and statistical mechanism for investigating and drawing conclusions regarding the influence of a phenomena at different levels of analysis (Hofmann, 1997), hence HLM is considered a more suitable analytical tool than ordinary least square model (Hofmann & Gavin, 1998), which allows for the investigation of both within- and between-group effects in which two different models are estimated iteratively (Kidwell, Mossholder, & Bennett, 1997). Furthermore, this tool allows investigating both lower and higher-level unit variance in the outcome measure, while maintaining the appropriate level of analysis for the independent variables (Hofmann, 1997).

Researchers have been collecting data from individual team members and then aggregating responses to the team level (e.g., Kirkman, Tesluk, & Rosen, 2001; Barrick & Stewart, 1998). Once LMX and trust are shared by all group members and refers to the shared perception among group members about what they feel in order to perform tasks, individuals' perceptions of LMX and trust were aggregated at the team-level. Here, the lower level units were aggregated so that relationships at the group level of analysis could be investigated.

Scores of team trust were aggregated from individual ratings to the team level to form the measure of trust. In support of aggregation, the median $r_{wg(j)}$ across the teams

was .83, indicating that in all the teams in study, members shared perceptions regarding team trust in their particular teams. Additional support for aggregating team trust scores to the team level was provided by interrater reliability indices (intraclass correlation (ICC(1) .20 and ICC(2) .47). This line of evidence supported the aggregation of the team trust ratings.

Regarding LMX, the scores were aggregated from individual ratings to the team level. In support of aggregation, the median rwg(j) across the teams was .79, indicating that in all the teams surveyed, members shared perceptions regarding team LMX in their particular teams. Additional support for aggregating team trust scores to the team level was provided by interrater reliability indices (intraclass correlation (ICC(1) .41 and ICC(2) .71). This line of evidence supported the aggregation of the team LMX ratings.

In sum, findings indicated that it was statistically appropriate to analyse trust and LMX at the group level.

Results

Descriptive statistics

Means, standard deviations and variables' correlations are reported in Table 2. The findings show that all the variables are significantly related to others, with .614 being the largest correlation recorded.

At the individual-level, team-level SECI was positively correlated with intrinsic motivation ($r = .351, p < .01$) and LMX ($r = .396, p < .01$). At the team-level, team-level SECI was positively associated with trust ($r = .261, p < .01$) and not with LMX ($r = .200, p < .01$). These findings provided preliminary support for the hypothesized relationships.

Variables	Mean	SD	1	2	3	4	5
Level 1 (individual)							
1. Intrinsic Motivation	5.27	1.10					
2. LMX	3.60	3.60	.387**				
Level 2 (team)							
3. Trust	5.27	1.06	.231**	.200**			
4. LMX			.226**	.614**	.324**		
5. SECI	3.59	1.29	.351**	.396**	.261**	.200**	

* $p < .05$; ** $p \leq .01$.

Table 2 - Means, standard deviations, and zero-order correlations between study 1 variables

Tests of hypotheses

The hierarchical structure of the research data contained responses of individual-level variables, which were nested within teams. Once both levels individually have limitations: at the individual level, the disaggregation does not provide independence of observations assumption that underlies traditional statistical approaches, whereas at the team level, aggregation might ignore potentially meaningful individual level variance in the outcome measure (Hofmann, 1997). Thus, in order to overcome these weaknesses, the data was analysed with hierarchical linear modeling (Heck, Thomas, & Tabata, 2010), which allowed to model both individual and team-level relationships, through SPSS 22.0.

Table 3 presents the results of the multilevel model providing an overall test the hypotheses. First, the null model was tested with the only dependent variable. The null model for SECI revealed a significant team-level effect ($\gamma = 4.01, p < .01$), meaning that there was significant within-team variation in the creation of new knowledge.

Next, all individual level variables relationships were tested on SECI. Model 1 in Table 3 reports the results of the analyses used to test Hypothesis 1, which predicted a positive relationship between Intrinsic Motivation and team-level SECI ($\gamma = .25, SE = .05, p < .01$). As anticipated, team members who were intrinsically motivated also create more knowledge.

The third hypothesis stated that: individual-level LMX would be positively related to team-level SECI. This hypothesis was supported once ($\gamma = .62, SE = .12, p < .01$), which means that an employee that has a positive relationship with his leader creates more knowledge.

Moreover, all team variables relationships were tested on SECI. Considering hypothesis 4, team-level LMX is positively related to SECI, the results show that team-level LMX is negatively associated with SECI ($\gamma = -.30, SE = .16, p < .05$). Therefore, the fourth hypothesis was not confirmed. Furthermore, the results show that team-level trust was significantly related to team SECI ($\gamma = .32, SE = .07, p < .01$) as theorized in hypothesis 5. Specifically, the higher the team-level trust the more likely employees are to create and share knowledge. Hence, Hypothesis 5 was confirmed.

Additionally, level 1 and level 2 interactions were tested. The relationship between Intrinsic Motivation and team-level SECI (Hypotheses 3) is not moderated by

individual-level LMX. This means that, when employees are intrinsically motivated they create knowledge and the relationship between employees and leaders does not have a significant effect in this relationship.

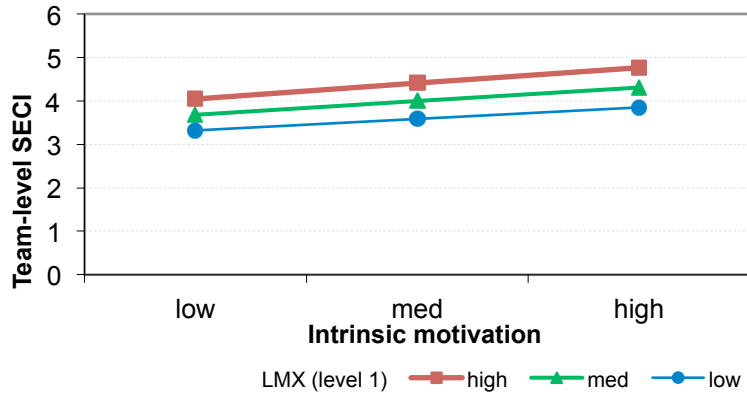


Figure 2. Intrinsic motivation as a function of individual-level LMX at team-level SECI.

At the team level, the positive relationship between team-level LMX and team-level SECI is negatively moderated by team-level trust (Hypotheses 6), that is, as team-level trust decreases, team-level LMX and team-level SECI increases.

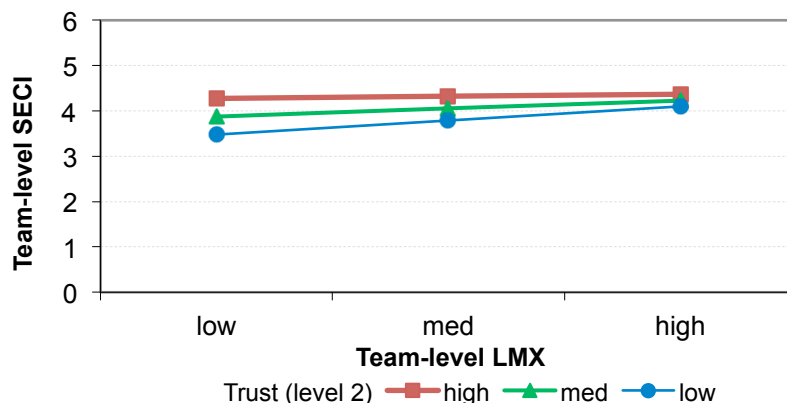


Figure 3: Team-level LMX at function of team-level trust at team-level SECI.

Moreover, the moderating effect of team-level trust on cross-level relationship between individual-level LMX and team-level SECI (Hypothesis 7) was analysed. The results indicated that team-level trust significantly affected the relationship between individual-level LMX and team-level SECI (Model 3; Figure 2: $\gamma = .25$, $SE = .11$ $p < .05$). As predicted and shown in Figure 4, for team members that trusted each other, the relationship between LMX and SECI was stronger than for team members that did not trust each other.

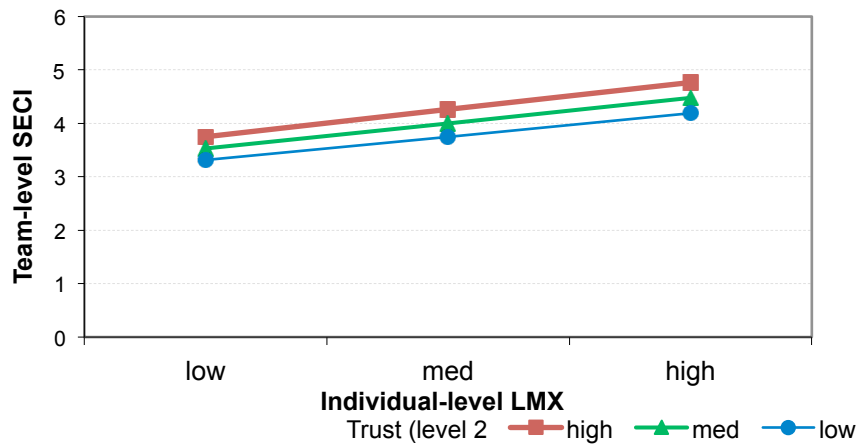


Figure 4: Individual-level LMX at function of team-level trust at team-level SECI.

Predictors	SECI		
	M1	M2	M3
Intercept	4.01**(.06)	4.01**(.06)	3.97**(.07)
<i>Level 1 (Individual)</i>			
<i>Variables:</i>			
Intrinsic Motivation		.29**(.06)	.25**(.05)
LMX		.49**(.06)	.62**(.12)
<i>Level 2 (Team)</i>			
<i>Variables:</i>			
Trust			.32**(.07)
LMX			-.30*(.16)
<i>Level 1 interaction:</i>			
Gm LMX x Gm I. motivation			.08 (.05)
GG Trust x GG LMX			-.38*(.16)
<i>Cross-level interactions:</i>			
GG trust x Gm LMX			.24*(.11)
Model deviance	1459.26	1360.26	1306.44
<i>df</i>	2	6	17

Note. $N_{\text{individual}} = 431$, $N_{\text{team}} = 207$, * $p < .05$; ** $p \leq .01$. The estimate of SE is in the parentheses.

Table 3: HLM individual and team-level variables predicting team-level SECI

Study 2: The relationship between SECI and individual creativity

Due the fact that study 1 included self-report measures, substantive findings are likely to be contaminated by common method variance (Donaldson & Grant-Vallone, 2002) and other methodological limitations, notwithstanding the strength of HLM. To overcome this limitation, study 2 was developed with the use of peer's rating. Here, co-workers were asked to evaluate their colleagues' behaviour engagement in SECI and creativity, so that the relationship between the two variables could be studied

(hypothesis 8).

Method

Sample

The research was conducted in 97% teams based in Portugal, 1,5% teams based in England and 1,5% teams based in Mozambique, ranging from banking to consulting industry (see Table 1). Due to missing values in some of the study variables, the sample size was reduced to 207 valid cases. Of the 207 team-members, 76 were men (36,9%) and 130 women (63,1%). In terms of age, it varied between 19 and 60 years ($M = 32$, $SD = 8,5$).

Regarding their professional work experience, it ranged from 0 to 40 years (mean 10.7 years). The majority of participants (58,8%) had between 5 and 15 years of professional experience, while 22,1%, started their professional life more than 15 years prior to this study and 19,1% were employed for less than five years. As for the education level, most were highly educated employees: 72,7% were 3-year college graduates and the remaining 27,3% were high school graduates.

Procedure

Participants were instructed to complete a survey concerning the activities their colleagues conducted in their current role. More specifically, participants had to evaluate the extent to which three co-workers engaged in knowledge creation and creativity behaviour. The use of three different sources had the aim to avoid single-source bias, common method and increase validity. Hence, both knowledge creation and creativity scores were obtained by averaging the three ratings that were provided by a different combination of raters. Complete confidentiality was guaranteed to all participants.

Measures

SECI. As mentioned before, a new scale was developed to measure knowledge creation. To minimize common method bias the SECI model questionnaire was adapted to the individual level, through peer's ratings instead of self-ratings. Each employee rated three peers.

To measure SECI at the individual level, the scale used is a revised version of the developed in study 1, consisting of 22 items that describe knowledge

creation behaviour in each of the four phases: socialization, externalization, combination and internalization. Samples are: “Usually spends some time watching and collaborating with our colleagues in order to better understand the work” (socialization); “After each event (including meetings) makes summaries of what happened (externalization)”; “Contributes to the organized/structured computer system by saving documents (combination)”; “My colleague is part of the rotation scheme and works with other people/teams” (internalization).

Based on 7-likert Scale, 1 (does not apply) to 7 (always applies), participants indicated their agreement with various statements about their colleagues’ knowledge creation behaviour. Reliability estimates (Cronbach's alphas) for socialization, externalization, combination and internalization were .82, .95, .95, .93.

Creativity

To measure individual creativity, the scale used is a revised version of a scale developed by Scott & Bruce (1994), consisting of 6 items that describe behaviour in different stages of an innovative process. Participants were asked to rate their co-workers, to the extent she/he “generates creative ideas”; “promotes and champions ideas to others”. These items were evaluated on a frequency scale of 1 (does not apply) to 7 (always applies). The Cronbach’s alpha reported in the original version was .89, and this research achieved a similar internal consistency of .94.

Measurement Validity

A principal components analysis was used for determining the interrelationships among the items used to measure individual-level SECI and individual Creativity. Both constructs showed strong factor loadings (all above .50) for any of the items, hence discriminant validity was supported for the variables in study.

Results

The results show that creativity was significantly correlated with the variable in study, individual SECI ($p < .01$). The data presented in Table 4 confirms the significant relationship ($r = .77$, $p < .01$) between creativity and SECI. Based on the eight hypotheses: individual-level SECI would be positively related to individual

Creativity. As shown in the results, this variable was positively related to creativity ($\gamma = .69$, $SE = .09$, $p < .001$), therefore a hypothesis 8 was supported.

Variables	Mean	SD	1	2
SECI	3.59	1.29		
Creativity	4.44	1.44	.771**	

* $p < .05$; ** $p \leq .01$.

Table 4 - Means, standard deviations, and zero-order correlations between study 2 variables

Chapter 4: General Discussion

The primary goal of this research was to build a multi-level theory of SECI, showcasing the influences across levels of analysis. This study provided support for prior research that indicated a significant positive relationship between individual (e.g., Lee & Choi, 2003) and team-level factors on knowledge creation. Furthermore, this model expanded Lee and Choi's model demonstrating that individual (i.e., intrinsic motivation and LMX) and team (i.e., trust and LMX) variables were positively related to team-level SECI. Moreover, as expected, individual-level SECI also acted as an independent variable that explains individual creativity.

As hypothesized, by using HLM, the results showed a significant relationship between individual-level variables and team-level SECI. The positive relationship between intrinsic motivation and team-level SECI confirmed hypothesis 1. This outcome can be explained by the fact that intrinsic motivation, makes the difference between what an individual can do and what an individual will do (Amabile, 1998), in this sense creative solutions may be generated when an individual devotes substantial attention to a problem and chooses to fully engage in the creative process — that is, the employee identifies the problem from various perspectives; gathers diverse, but relevant, information; and creates a variety of alternatives (Zhang & Bartol, 2010).

Hypothesis 2 referred to the relationship between individual-level LMX and team-level SECI. Based on the results, this hypothesis was confirmed once knowledge is combined and shared within the quality of exchange relationships between leaders and followers; in other words, when an employee has a good relationship with his leader (higher LMX) then, the team-level SECI will be enhanced; hence the quality of LMX relationship facilitates the knowledge-creation process (Graen G. B., 2006).

Regarding hypotheses 3, which theorized about the moderation role of individual-

level LMX on the relationship between intrinsic motivation and team-level SECI, the results showed that employees might engage in SECI because they identify with its significance and meaning, or because they integrate SECI with their goals. Consequently, the employee does not feel enforced to create and share knowledge, but has internalized it as being important. Irrevocably, intrinsic motivation promotes the behaviour due to its inherent satisfaction, such that the activity is challenging and interesting (Amabile, 1997). In this sense, intrinsic motivation, on its own, leads to knowledge creation and sharing. Henceforth, individual-level LMX did not moderate the positive relationships between intrinsic motivation and team-level SECI, consequently the hypothesis was not confirmed.

Afterwards, the relationship between team-level variables and team SECI were analysed. Regarding hypothesis 4, which theorized about the positive relationship between team-level LMX and team-level SECI, the findings, revealed an unexpected result: a negative relationship between the two variables, thus not confirming this hypothesis. A good relationship between leaders and subordinates encourages the sharing of useful and valuable information, and increases subordinates' loyalty to their superiors (Hu, Ou, Chiou, & Lin, 2012), hence this can have a negative influence in the teams' knowledge creation and sharing behaviour. As showed in this study, when there is a high-quality Leader-member-exchange (LMX), employees share more information with their leader and not with their colleagues leading to a negative relationship between team-level LMX and team-level SECI. This finding strengthens a presumption of Erdogan and Bauer's study (2010) regarding LMX, which showed that the level of LMX differentiation in groups was negatively related to subordinates' work attitudes and behaviours. This result can be explained by the fact that, the quality of LMX relationship is an antecedent of the knowledge shared between leaders and members (Tse & Mitchell, 2010). Individuals with high-quality LMX relationships are likely to have greater access to valuable information due the quality of their exchanges with their leader. In addition, due to the reciprocal nature of LMX relationship, these individuals will probably share more information with their supervisor to the extent that such behaviour is consistent with the role expectations established through the LMX relationship (George B. Graen, 2006). More in-depth research needs to be carried out on this issue.

Hypothesis 5 was confirmed, which referred to the relationship between the team-level trust and team-level SECI. The results of this study reinforced the prediction that

teams' success in knowledge creation is enhanced when co-workers trust each other. When trust is present, it can result in more information and knowledge being shared (Hu, Ou, Chiou, & Lin, 2012). In the light of the findings, team-level trust strongly fosters knowledge creation and therefore should be treated as a cornerstone to SECI. This outcome supports the findings of previous research (e.g., Sankowska, 2013), which found trust as an important predictor of knowledge creation.

Hypothesis 6 theorized about the moderation effect of team-level trust on the relationship between team-level LMX and team-level SECI. Team-level trust was conceptualized as a group-level construct and as an enhancer of the relationship between team-level LMX and team-level SECI. Due the negative relationship between team-level LMX and team-level SECI, in this case, the degree of team-level trust moderated negatively team-level LMX in relation to team-level SECI. This result is not consistent with the study of Dirks's (1999), where trust moderated the relationship between motivation and group performance. One possible explanation for this difference is due the fact that in this sample, the context for high-performing teams pressure to deliver high results is based on coordination and cooperation, that is, team trust did not enhance the relationship between team-level LMX and team-level SECI. The results demonstrate a moderating relationship that is the opposite of what Dirks's found; that is, team-level LMX did not enhance team-level SECI where work required cooperation and coordination (i.e., team-level trust).

A cross-level moderating effect was analysed to understand the conditions under which individual-level LMX contributes to team-level SECI, through the moderating role of a core team-level factor: trust (hypothesis 7). To date no preceding studies examined the moderating effect of team-level trust on the relationship between individual-level LMX and team-level SECI. In line with other studies, the results show that trust resulted in higher SECI levels (e.g., Lee & Choi, 2003), and hence, the relationship between individual-level LMX and team-level SECI was moderated by the team trust, thus supporting hypothesis 7. This aspect is an important advance in the literature since it empirically demonstrates that the relationship between the two variables is higher in a team trust context. Trusting relationships are key to the collaborative business environment, in which a high quality LMX is expected to facilitate information sharing and creation.

Furthermore, this research contributes to the literature by confirming the relationship between individual-level SECI and individual creativity: the higher the individual

knowledge creation, the greater their creativity performance is likely to be. Ideas are formed through a deep interaction among people (Popadiuka & Choo, 2006), thus the shared knowledge is transformed into new knowledge, which facilitates creativity. Research that studied the relationship between knowledge creation/sharing and creativity showed that both internal and external knowledge sharing led to increased creativity and innovation (e.g., Hulsheger, Anderson, & Salgado, 2009; Lee & Choi, 2003), thus supporting hypothesis 8.

Chapter 5: Theoretical implications

This research offers six important theoretical insights on the inputs of SECI in team settings.

First, more can be learned about team dynamics due to this research's integrative approach. A conceptual model that integrates SECI was built and tested, extending Lee and Choi's framework, including the team level of analysis. Additionally, the current study developed a multi-level theory of SECI, explaining that both individual and team characteristics enhance SECI, which offers a new dimension in examining how two different levels of analysis can facilitate knowledge creation simultaneously, henceforth contributing to this stream of SECI research. Whereas most prior research has focused on organizational-level antecedents to SECI (e.g., Tseng, 2010; Lee & Choi, 2003), in this study, team and individual-level variables were examined, explicitly theorizing the effect of team members' relationships influence on team knowledge creation and sharing and the moderating role of trust in these mechanisms. Secondly, to my knowledge, this study is the first attempt to investigate SECI using a dyadic data. Particularly, the knowledge creation behaviour was examined by comparing two-criterion variables: self-rated and peers-rated SECI. Hence, this paper reports the development of two scales to measure SECI, at individual and team-level, respectively, advancing the theory and practice on knowledge creation with a multi-source data. This approach of measuring team members perception will also be useful to studies in organizational behaviour that are interested in individual-as well as team-level data to conduct multi-level and cross-level analyses. As teams are the basic units around which work is organized in modern organizations, a scale to measure knowledge creation and sharing practices in the team would be valuable to understand and improve their practices. Organizations can use both scales to diagnose knowledge creation practices and focus on appropriate dimensions to allow efficient use of

knowledge resources in the organization.

The individual level scale can be used to measure individual's perception of knowledge creation and sharing in the team, through peer's evaluation. A high individual score on this SECI scale would mean that the individual perceives that knowledge is well managed in the team. On the contrary, a low score would mean that the individual does not feel that practices in the team encourage knowledge creation and sharing. The team level scale can be used to measure the team perception of knowledge creation and sharing in the team. Hence, a high score would mean that the team efficiently engages in knowledge creation behaviour.

Third, the findings suggest that motivational processes are effective mechanisms that can relate to SECI outcomes. Although a number of studies have investigated relationships between intrinsic motivation and knowledge sharing (Quigley, Tesluk, Locke, & Bartol, 2007), knowledge creation has been absent from consideration. Yet, as argued and modelled in this research, there are strong theoretical reasons to expect intrinsic motivation to be well positioned to influence knowledge creation outcomes, an argument that was empirically supported in this study.

Fourth, considerable research attention has been devoted to understanding the importance of knowledge creation in organizations, however the relationship between leadership and knowledge creation has not been explicit and fully established (Tse & Mitchell, 2010). Having into account that some research suggests that leadership plays an important role in knowledge-creation and sharing processes (e.g., Tse & Mitchell, 2010; Hu, Ou, Chiou & Lin, 2012), in this study, a proactive approach was taken to integrate a leadership perspective and research on team-level SECI. This study contributes to this research stream identifying a team-level mechanism (trust) through which individual-level LMX influence team-level SECI. As hypothesized, individual-level LMX was positively related to team-level SECI, hence a more comprehensive account of how LMX relates to important team-level outcomes was delineated in this study. However, it is important to note that a high-quality LMX relationship should be balanced with a high TMX (team-member-exchange), otherwise team knowledge creation behaviour will be replaced by leader-member SECI. This finding helps leaders improve strategies in promoting effective knowledge creation through developing high-quality LMX and TMX relationships with all team members.

Fifth, this study advanced the understanding on how team-level trust affects team-

level SECI by empirically examining if team-level trust affects team-level SECI directly (main effect) or indirectly (moderating effect), through the influence of trust-level on the relationship between individual individual-level LMX and team-level SECI. Thus, it specified when team-level trust was likely to demonstrate a main effect and a moderating effect, integrating the existing literature on team trust. The results of this study confirmed that these relationships are significant and provide further support to the emergent body of literature on trust within teams by contributing to the theory, which helps to describe team member's relationships. In any team, each member is highly dependent on other team members in order to complete the task or project that is assigned to them, hence trust plays an important role in this process. As showed in previous studies, knowledge creation occur when there is trust between the individuals involved (e.g. Sankowska, 2013; Chung & Jackson, 2011), therefore, it is important for the teams to invest efforts in building and sustain trusting relationships between team members to enhance the knowledge creation practice. Trust helps to explain team members' relationships; hence researchers must take into account team trust as an exchange mechanism when predicting team-level SECI.

Previous researchers have suggested that trust is important for developing and maintaining the social exchange relationship (e.g. Mach, Dolan, & Tzafrir, 2010), based on the results team-level trust had a moderating effect on the relationships between individual-level LMX and team-level SECI. This shows that high levels of team-level trust increase the likelihood of better team knowledge creation and sharing behaviour, on the contrary when the relationships among team members is lacking trust this reduced the level of team-level SECI. In fact, it is plausible that what makes the difference in terms of the team's overall knowledge creation behaviour is the synergy and cooperation between the team as a whole. Leaders and employees can achieve team goals more effectively, if they cooperate and generate behaviours of mutual trust. Furthermore, this appears to have been one of the first studies to examine the moderating role of team-level trust, facilitating the effect of individual-level LMX on team-level SECI. Once this idea was substantiated, it offers a different way of thinking about trust theoretically, studying it empirically, and using the concept practically (Dirks & Ferrin, 2001).

Finally, the findings are also theoretically and practically relevant for those interested in improving individual creativity. According to the results, those who engage in the knowledge creation and sharing behaviour tend to be more creative. In this sense, a

new construct was introduced in creativity research. Although some previous studies have investigated the relationships knowledge creation and creativity in organizations (i.e., Lee & Choi, 2003), little research has explored SECI as an antecedent for creativity (Chang, Hung, & Lin, 2012), at the individual level. This research provides empirical evidence for this assumption, therefore contributing to this research stream.

Chapter 6: Practical implications

Once the *raison d'être* of a firm is to continuously create knowledge (Nonaka, Toyama, & Konno, 2000; Nonaka, 1994), when promoting the employees' knowledge creation and sharing behaviour, companies will also be investing in the development and sustaining of their competitive advantage, corporate performance and creativity. Nevertheless, as shown in the results, when enhancing team-level SECI, intrinsic motivation, individual-level LMX and team-level trust must be taken into account. Managers should develop mechanisms and strategies to increase these three variables. The results suggest that employees display higher levels of knowledge creation and sharing when they experience intrinsic motivation, henceforth managers may design work contexts to cultivate intrinsic motivation. For example, rewarding cooperation, providing recognition and enhancing employees to share their concerns and needs should maximize the effect on the employees' intrinsic motivation. Similarly, empowerment interventions are thought to increase intrinsic motivation (Gagné, Senégal, & Koestner, 1997).

It is key that leaders understand how to foster high-quality LMX relationships with their followers. Effective leadership training programs for managers may reinforce the importance to develop effective LMX relationships over time, through which they can articulate the importance of effective work relationships within workgroups in order to maximize individual and team potential for knowledge creation (Tse & Mitchell, 2010). Furthermore, managing the relationships that employees cultivate and preserve during the knowledge creation process is essential. Although employees should be encouraged to have a good relationship with their leader, ultimately the effort used in developing this relationship diminishes the amount of knowledge created in team settings, in this sense, it is important to develop further TMX.

The findings suggest that organizations can improve performance on knowledge creation by supporting the development of strong trust relationships. By increasing trust, people can accelerate communication and heighten willingness to share

experiences (Hu, Ou, Chiou, & Lin, 2012). Therefore, managers who provide socialization practices, training programs, create a collaborative climate, employee involvement programs and reward team leaders who successfully create conditions that allow trust to flourish, are providing opportunities for employees to get to know one another and build trust (Chung & Jackson, 2011). This can be achieved by linking the provision of feedback and personal incentives to the accomplishment of team rather than individual goals (Hulsheger, Anderson, & Salgado, 2009)

This research also provides empirical evidence revealing that individual commitment in SECI leads to individual creativity. The results suggest that individual creativity may be enhanced if an employee is willing to engage in an effective knowledge creation and sharing process. This finding emphasizes the need to adopt more integrative team management strategies that include encourage employees to share and create knowledge, organizing informal meetings which provide employees with brainstorming opportunities, training employees in creativity-relevant methods and creating a climate that is open to change. Thus, enhancing employee's creativity will require an integrated strategy. This is not an easy feat, but organizations that are successful in building this type of learning organization are likely to have a sustainable competitive advantage (Joa, Yangb, & McLean, 2014).

Chapter 7: Limitations and future directions

Although this research makes several important contributions, it has some limitations that should be noted and which may offer ideas for future research.

The team size was representative of different industries, however some teams in study were constituted by three elements. Future research should replicate this study, with bigger team size, in order study intra-teams relationships. Moreover, such relations should be investigated using other types of teams (i.e., virtual teams) and in other context. Additionally, team size should be tested, as a moderator in the relationships, once it will help identify what mechanisms leaders should use to facilitate effective knowledge creation.

The conceptual framework in this research is mainly based to the Portuguese population. To examine whether the relationships discussed herein are culturally bound or universal, future research may apply the framework to other countries, and study possible cultural differences in team settings. Based on Hofstede's cultural dimensions, Portugal, in comparison with the rest of the European countries is

Collectivist. This is manifest in a close long-term commitment to the member 'group', be that a family, extended family, or extended relationships. Furthermore, Portugal scores 31 on masculinity vs femininity dimension, translates a country where the key word is consensus. So polarization is not well-considered or excessive competitiveness appreciated (Hofstede, 1980). Therefore, other research should explore countries with individualism and masculinity culture. Following this line of thought, SECI will be analysed at the individual, team and country level resulting in a three-level study, which may enhance our understanding of the studied relationships and provide meaningful theoretical and managerial implications.

Future research should consider a longitudinal approach, studying SECI at different periods of time, allowing for greater detail in data collection, once it may help understand better the relationship between individual and team factors on SECI and individual creativity.

The impact of individual and team variables of SECI was explored in this study. Only two team factors (team trust and LMX) and two individual factors (intrinsic motivation and LMX) were considered, hence it is arguable that there are other possible variables that may be included in the model. It would be interesting to explore other factors such as TMX, to understand the role of team-member interactions and group process on SECI. Other antecedent worth exploring is the employees trust in the leader, once different types of trust may have different effects on team-level SECI, this may provide more insights about how employees' trust contributes to team-level SECI.

In this research, employees were asked to rate their peers engagement in SECI and creativity behaviour. Future studies could ask leaders to rate co-workers creativity and SECI behaviour, to study its implications for the workplace, in order to have multiple-source of data.

Finally, this research investigated the moderation effect of team-level trust on individual-level LMX and team-level SECI. Due the importance of teams in the current business context, more studies are needed to investigate moderating effects of team factors (e.g., commitment) on the relationships between individual variables and team-level SECI.

Chapter 8: Conclusion

Team's dynamics are highly complex; consequently there are many factors that influence its member's knowledge creation and sharing behaviour. Nevertheless, the results of this research advances the existing theory, research, and practice related to SECI, by providing empirical evidence to support the conceptual model that link not only individual (intrinsic motivation and LMX) and team (LMX and trust) factors with team-level SECI, but also individual-level SECI and individual creativity. Specifically, this research finds that intrinsic motivation, individual-level LMX and team-level trust are positively associated SECI, through which trust was found to be a moderator in the relationship between individual-level LMX and team-level SECI. Furthermore, individual-level SECI was positively associated with individual creativity.

These findings highlights the fact that organizations need to remain working on organizational support structures that increase team-level trust, employee's intrinsic motivation and LMX which will then help to promote SECI and finally boosts individual creativity.

With a multilevel approach, the results emphasize the importance of developing individual and team concepts that are significantly correlated with team-level SECI. Moreover, the correlations found between the SECI enablers, alerts for the need to develop more studies and to incorporate SECI as a main managerial issue.

References

- Al-adaileh, R. M., Dahou, K., & Hacini, I. The impact of knowledge conversion processes on implementing a learning organization strategy. *The Learning Organization* , 19 (6), 482-496.
- Amabile, T. M. (1997). Motivating Creativity in Organizations: On doing what you love to and loving what you do. *California Management Review* , 40 (1), 39-58.
- Amabile, T. M. (1998). How to kill creativity. *Harvard Business Review* , 77-87.
- Amalia, M., & Yanuar, N. (2011). An innovation perspective of knowledge management in a multinational subsidiary . *Journal of Knowledge Management* , 71-87.
- Argote, L., McEvily, B., & Reagans, R. (2003). Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science* , 49 (4), 571-582.
- Bartol, K. M., & Srivastava, A. (2002). Encouraging knowledge sharing: The role of organizational reward systems . *Journal of Leadership & Organizational Studies*, 9 (1), 64-76.

- Blanc, P. M., & González-Romá, V. (2012). A team level investigation of the relationship between Leader–Member Exchange (LMX) differentiation, and commitment and performance. *The Leadership Quarterly*, 23 (3), 534–544.
- Boies, K., & Howell, J. M. (2006). Leader–member exchange in teams: An examination of the interaction between relationship differentiation and mean LMX in explaining team-level outcomes. *The Leadership Quarterly*, 17 (3), 246–257.
- Bratianu, C., & Orzea, I. (2010). Organizational Knowledge Creation. *Management & Marketing*, 5 (3), 41-62.
- Bryant, S. E. (2003). The Role of Transformational and Transactional Leadership in Creating, Sharing and Exploiting Organizational Knowledge. *The Journal of Leadership and Organizational Studies*, 9 (4), 33-44.
- Burke, C. S., Sims, D. E., Lazzara, E. H., & Salas, E. (2007). Trust in leadership: A multi-level review and integration. *The Leadership Quarterly*, 18, 606–632.
- Burton-Jones, A., & Spender, J.-C. (2012). *The Oxford Handbook of Human Capital*. Oxford: Oxford University Press.
- Byosiére, P., & Luethge, D. J. (2012). Knowledge domains and knowledge conversion: an empirical investigation. *Journal of Knowledge Management*, 12 (2), 67-78.
- Chang, J.-J., Hung, K.-P., & Lin, M.-J. J. (2012). Knowledge creation and new product performance: the role of creativity. *R&D Management*, 44 (2), 107-125.
- Chou, S.-W., & He, M.-Y. (2004). Knowledge management: the distinctive roles of knowledge assets in facilitating knowledge creation. *Journal of Information Science*, 30 (2), 146–164.
- Chung, Y., & Jackson, S. E. (2011). Co-worker trust and knowledge creation: A multilevel analysis. *Journal of Trust Research*, 1 (1), 65-83.
- Deci, E. L., & Ryan, R. M. (1980). The Empirical Exploration of Intrinsic Motivational Processes. In L. Berkowitz, *Advances in Experimental Social Psychology* (pp. 39-80). New York: Elsevier Inc.
- DeOrtentis, P. S., Summers, J. K., Ammeter, A. P., Ceasar, D., & Ferris, G. R. (2013). Cohesion and satisfaction as mediators of the team trust - team effectiveness relationship: An interdependence theory perspective. *Career Development International*, 18 (5), 521-543.
- Devloo, T., Anseel, F., Beuckelaer, A. D., & Salanova, M. (2015). Keep the fire burning: Reciprocal gains of basic need satisfaction, intrinsic motivation and innovative work behaviour. *European Journal of Work and Organizational Psychology*, 24 (4), 491–504.
- Dirks, K. T. (1999). The effects of interpersonal trust on work group performance. *Journal of Applied Psychology*, 84 (3), 445-455.
- Dirks, K. T., & Ferrin, D. L. (2001). The Role of Trust in Organizational Settings. *Organization Science*, 12 (4), 450-467.
- Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior research. *Journal of Business and Psychology*, 17 (2), 245-260.
- Egan, T. M. (2005). Creativity in the Context of Team Diversity: Team Leader Perspectives. *Advances in Developing Human Resources*, 7 (2), 207-225.
- Erdem, F., Ozen, J., & Atsan, N. (2003). The relationship between trust and team performance. *Work Study*, 52 (7), 337 - 340.
- Esterhuizena, D., Schuttea, C., & Toitb, A. d. (2012). Knowledge creation processes as critical enablers for innovation. *International Journal of Information Management*, 32, 354– 364.

- Fong, P. S. (2003). Knowledge creation in multidisciplinary project teams: an empirical study of the processes and their dynamic interrelationships. *International Journal of Project Management*, 21, 479–486.
- Foss, N., & Felin, T. (2006). Individuals and Organizations: Thoughts on a Micro-Foundations Project for Strategic Management. In D. J. Ketchen, & D. J. Ketchen, *Research Methodology in Strategy and Management* (Vol. 3, pp. 253-288). London: Elsevier Ltd.
- Gagné, M., Senégal, C. B., & Koestner, R. (1997). Proximal Job Characteristics, Feelings of Empowerment, and Intrinsic Motivation: A Multidimensional Model. *Journal of Applied Social Psychology*, 27 (14), 1222-1240.
- George B. Graen, . A. (2006). *Sharing Network Leadership*. New York: IAP.
- Glisby, M., & Holden, N. (2003). Contextual Constraints in Knowledge Management Theory: The Cultural Embeddedness of Nonaka's Knowledge-creating Company. *Knowledge and Process Management*, 10 (1), 29–36.
- Goh, A. L. (2005). Harnessing knowledge for innovation: an integrated management framework. *Journal of Knowledge Management*, 9 (4), 6-18.
- Graen, G. B. (2006). To share or not share leadership: New LMX-MMX network leadership or charismatic leadership on creative projects. In G. G. B, & G. J. A, *Sharing network leadership* (pp. 25-36). New York: Charlotte NC: Information Age Publishing.
- Graen, G., & Uhl-Bien, M. (1995). Relationship-based approach to leadership: Development of leader-member exchange (LMX) theory of leadership over 25 years: Applying a multi-level multi-domain perspective. *The leadership quarterly*, 6 (2), 219-247.
- Hair, Anderson, Tatham, & Black. (1998). *Multivariate Data Analysis*. Sydney: Pearson Education Australia.
- Haldin-Herrgard, T. (2000). Difficulties in diffusion of tacit knowledge in organizations. *Journal of Intellectual Capital*, 1 (4), 357-365.
- Han, G. (. (2010). Trust and career satisfaction: the role of LMX. *Career Development International*, 15 (5), 437-458.
- Henderson, D. J., Wayne, S. J., Shore, L. M., Bommer, W. H., & Tetrick, L. E. (2008). Leader-member exchange, differentiation, and psychological contract fulfillment: A multilevel examination. *Journal of Applied Psychology*, 93 (6), 1208-1219.
- Hislop, D. (2005). *Knowledge Management in Organisations: a critical introduction*. Oxford: Oxford University press.
- Hoe, S. L. (2006). Tacit Knowledge, Nonaka and Takeuchi seci model and informal knowledge process. *International Journal of Organization Theory and Behavior*, 9 (4).
- Hofmann, D. A. (1997). An Overview of the Logic and Rationale of Hierarchical Linear Models. *Journal of Management*, 23 (6), 723-745.
- Hofmann, D. A., & Gavin, M. B. (1998). Centering Decisions In Hierarchical Linear Models: Implications for Research in Organizations. *Journal of Management*, 24 (5), 623-641.
- Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Newbury Park, CA: Sage.
- Hu, M.-L. M., Ou, T.-L., Chiou, H.-J., & Lin, L.-C. (2012). Effects of social exchange and trust on knowledge sharins and service innovation. *Social Behaviour and Personality*, 40 (5), 783-800.

- Hulsheger, U. R., Anderson, N., & Salgado, J. F. (2009). Team-Level Predictors of Innovation at Work: A Comprehensive Meta-Analysis Spanning Three Decades of Research. *Journal of Applied Psychology*, 94 (5), 1128–1145.
- Hung, S.-Y., Durcikova, A., Laia, H.-M., & Lina, W.-M. (2011). The influence of intrinsic and extrinsic motivation on individuals' knowledge sharing behavior. *International Journal of Human-Computer Studies*, 69 (9), 415–427.
- Joo, B.-K. (.), Yang, B., & McLean, G. N. (2014). Employee creativity: the effects of perceived learning culture, leader– member exchange quality, job autonomy, and proactivity. *Human Resource Development International*, 17 (3), 297–317.
- Kidwell, R. E., Mossholder, K. W., & Bennett, N. (1997). Cohesiveness and Organizational Citizenship Behavior: A Multilevel Analysis Using Work Groups and Individuals. *Journal of Management*, 23 (6), 775 - 794.
- Lee, H., & Choi, B. (2003). Knowledge Management Enablers, Processes, and Organizational Performance: An Integrative View and Empirical Examination. *Journal of Management Information System.*, 20 (1), 179-228.
- Liden, R. C., Erdogan, B., Wayne, S. J., & Sparrowe, R. T. (2006). Leader-member exchange, differentiation, and task interdependence: Implications for individual and group performance. *Journal of Organizational Behavior*, 27, 723-746.
- Lopez-Nicolas, C., & Soto-Acosta, P. (2010). Analyzing ICT adoption and use effects on knowledge creation: An empirical investigation in SMEs. *International Journal of Information Management*, 30, 521–528.
- Mach, M., Dolan, S., & Tzafrir, S. (2010). The differential effect of team members' trust on team performance: The mediation role of team cohesion. *Journal of Occupational and Organizational Psychology*, 83, 771–794.
- Magnier-Watanabe, R., Benton, C., & Senoo, D. (2011). A study of knowledge management enablers across countries. *Knowledge Management Research & Practice*, 11, 17–28.
- Maimone, F., & Sinclair, M. (2014). Dancing in the dark: creativity, knowledge creation and (emergent) organizational change. *Journal of Organizational Change Management*, 27 (2), 344-361.
- Manohar Singh, R., & Gupta, M. (2014). Knowledge management in teams: empirical integration and development of a scale. *Journal of Knowledge Management*, 18 (4), 794-777.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of organizational trust. *Academy of Management Review*, 20 (3), 709-734.
- McFayden, M. A., & Cannella Jr, A. A. (2004). Social capital and knowledge creation: Diminishing returns of the number and strength of exchange relationships. *Academy of Journal Journal*, 47 (735-46).
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5 (1), 14-38.
- Nonaka, I. (2005). *Knowledge Management (Critical Perspectives on Business and Management)*. New York: Routledge.
- Nonaka, I., & Konno, N. (1998). The concept of "ba": Building a foundation for knowledge creation. *California Management Review*, 40 (3), 40-54.
- Nonaka, I., & Krogh, G. v. (2009). Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science*, 20 (3), 635–652.
- Nonaka, I., Krogh, G. v., & Voelpel, S. (2006). Organizational Knowledge Creation Theory: Evolutionary Paths and Future Advances. *Organization Studies*, 27 (8), 1179–1208.

- Nonaka, I., Toyama, R., & Konno, N. (2000). SECI, Ba and Leadership: a Unified Model of Dynamic Knowledge Creation. *Long Range Planning* (33), 5-34.
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, 5 (1), 14-37.
- Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal*, 39 (3), 607.
- Ortenblad, A. (2015). *Handbook of Research on Knowledge Management: Adaptation and Context*. Oslo: Edward Elgar Pub .
- Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms. *Organization Science*, 11 (5), 538-550.
- Osterloh, M., & Frey, B. S. (2000). Motivation, knowledge transfer, and organizational forms. *Organization Science*, 11 (5), 538-550.
- Pangil, F., & Chan, J. M. (2014). The mediating effect of knowledge sharing on the relationship between trust and virtual team effectiveness. *Journal of Knowledge Management*, 18 (1), 92-106.
- Polanyi, M. (1962). *The tacit dimension*. New York: Doubleday.
- Popadiuka, S., & Choo, C. W. (2006). Innovation and knowledge creation: How are these concepts related? *International Journal of Information Management*, 26, 302-312.
- Quigley, N. R., Tesluk, P. E., Locke, E. A., & Bartol, K. M. (2007). A Multilevel Investigation of the Motivational Mechanisms Underlying Knowledge Sharing and Performance. *Organization Science*, 18 (1), 71-92.
- Rice, J. L., & Rice, B. S. (2008). The applicability of the SECI model to multiorganisational endeavours: an integrative review. *International Journal of Organisational Behaviour*, 9 (8), 671-682.
- Rollett, H. (2003). *Knowledge Management: Processes and Technologies*. New York: Springer Science.
- Sankowska, A. (2013). Relationships between organizational trust, knowledge transfer, knowledge creation, and firm's innovativeness. *The Learning Organization*, 20 (1), 85-100.
- Scandura, T. A., & Pellegrini, E. K. (2008). Trust and Leader-Member Exchange A Closer Look at Relational Vulnerability. *Journal of Leadership & Organizational Studies*, 15 (2), 101-110.
- Schriesheim, C. A., Castro, S. L., Zhou, X., & Yammarino, F. J. (2001). The folly of theorizing 'A' but testing 'B' A selective level-of-analysis review of the field and a detailed Leader-Member Exchange illustration. *Leadership Quarterly*, 12 (4), 515-552.
- Schulze, A., & Hoegl, M. (2008). Organizational knowledge creation and the generation of new product ideas: A behavioral approach. *Research Policy*, 37 (10), 1742-1750.
- Seidler-de Alwis, R., & Hartmann, E. (2008). The use of tacit knowledge within innovative companies: knowledge management in innovative enterprises. *Journal of Knowledge Management*, 12 (1), 133-147.
- Senge, P. (1990). *The fifth discipline: the art and practice of the learning organization*. New York: Currency Doubleday.
- Shih, K.-H., Chang, C.-J., & Lin, B. (2010). Assessing knowledge creation and intellectual capital in banking industry. *Journal of Intellectual Capital*, 11 (1), 1469-1930.
- Smith, E. A. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management*, 5 (4), 311-321.

- Smith, K. G., Carroll, S. J., & Ashford, S. J. (1995). Intra and interorganizational cooperation: towards a research agenda. *Academy of Management Journal* , 38 (1), 7-23.
- Tarique, I., & Schuler, R. S. (2010). Global talent management: Literature review, integrative framework, and suggestions for further research. *Journal of World Business* , 45, 122-133.
- Tse, H. H., & Mitchell, R. J. (2010). A theoretical model of transformational leadership and knowledge creation: The role of open-mindedness norms and leader-member exchange. *Journal of Management and Organization* , 16 (1), 83-99.
- Turner, J. R., Zimmerman, T., & Allen, J. M. (2012). Teams as a sub-process for knowledge management. *Journal of Knowledge Management* , 16 (6), 963-977.
- Unsworth, K. L., Wall, T. D., & Carter, A. (2005). Creative Requirement: A Neglected Construct in the study of employee creativity? *Group & Organization Management* , 30 (5), 541-560.
- Vidarthi, P. R., Liden, R. C., Anand, S., Erdogan, B., & Ghosh, S. (2010). Where do I stand? Examining the effects of leader-member exchange social comparison on employee work behaviors. *Journal of Applied Psychology* , 95 (5), 849-861.
- Zárraga, C., & García-Falcón, J. M. (2003). Factors favoring knowledge management in work teams. *Journal of Knowledge Management* , 7 (2), 81-96.
- Zhang, X., & Bartol, K. M. (2010). Linking empowering leadership and employee creativity: the influence of psychological empowerment, intrinsic motivation and creative process engagement. *Academy of Management Journal* , 53 (1), 107-128.
- Zhou, L., Wang, M., Chen, G., & Shi, J. (2012). Supervisors' Upward Exchange Relationships and Subordinate Outcomes: Testing the Multilevel Mediation Role of Empowerment. *Journal of Applied Psychology* , 97 (3), 668-680.