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DISSERTAÇÃO

Psychosocial antecedents of knowledge sharing in healthcare research centers: a mixed methods approach

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PSYCHOSOCIAL ANTECEDENTS OF KNOWLEDGE SHARING IN HEALTHCARE RESEARCH CENTERS: A MIXED METHODS APPROACH

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"Connaître, ce n'est point démontrer, ni expliquer. C'est accéder à la vision." - Saint-Exupery

"If a man empties his purse into his head no man can take it from him. An investment in knowledge pays the best interest." - Benjamin Franklin

"O conhecimento une cada um consigo mesmo e todos com todos." – José Saramago

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Abstract

Knowledge sharing is related to complex psychosocial phenomena. Prediction and control of knowledge usage is useful for Human Resources Management due to its nature as a resource and link with human capital in organizations – especially those that rely on knowledge intensively. By following previous studies focused on identifying and measuring the impact of psychosocial factors as antecedents of knowledge sharing behavior (KSB), a mixed methods approach was used on a sample of 150 healthcare researchers to verify the link between perceptions of social network, shared goals, social trust and knowledge sharing behavior. Firstly, a quantitative approach was used to verify this link and the effects of moderation of knowledge sharing intention (KSI) on KBS. Secondly, a fuzzy-set qualitative comparative analysis (fsQCA) was used to identify alternative configurations that lead to KSI or its absence; KSB and its absence. Findings show evidences of the proposed antecedents of KSI and affecting the KSB. Alternative configurations are discussed regarding conditions that lead to the presence or absence of KSI and KSB (considering tacit and explicit knowledge apart).

Keywords: Knowledge sharing, Social network, Shared goals, Social trust, Healthcare research centers.

Resumo

A partilha de conhecimento está relacionada com fenómenos psicossociais complexos. Este estudo analisa o impacto de factores psicossociais como antecedentes do comportamento de partilha de conhecimento (KSB). O estudo segue um desenho assente numa metologia híbrida utilizando uma amostra de 150 investigadores na área da saúde para estudar a ligação entre perceções de rede social, objetivos partilhados, confiança social e comportamento de partilha de conhecimento. Em primeiro lugar, uma análise quantitativa foi utilizada para verificar esta relação e os efeitos de moderação da intenção de partilha de conhecimento (KSI) no KSB. Em segundo lugar, uma análise qualitativa comparativa utlizando conjuntos *fuzzy* (fsQCA) foi utilizada para identificar configurações alternativas que levam a presença de KSI e respetiva ausência e de presença de KSB e sua ausência. Os resultados demonstram evidências na relação dos antecedentes propostos de KSI e seu impacto em KSB. Configurações alternativas de condições que levam a presença ou ausência de KSI e KSB são igualmente discutidas (considerando diferenças entre conhecimento tácito e explícito).

Palavras-Chave: Partilha de conhecimento, Rede social, Objetivos partilhados, Confiança social, Centros de investigação na saúde.

1. – INTRODUCTION

Knowledge is a source of sustained competitive advantage in organizations (Barney Wright and Ketchen, 2001). Knowledge can be defined into specific moments and forms, while relying on three intertwined foundations: People, Processes and Technologies. (Bhatt, 2001).

As an organizational asset (Boisot, 2002), knowledge exists in two major forms: tacit and explicit knowledge (Nonaka, 1991). Tacit knowledge is defined as uncodified knowledge, deeply connected with cognitive abilities, unrefined, highly abstract, with a lack of operation at a conscious level (Wiig, 1993; Nonaka and Takeuchi, 1995; Boisot, 2002; Choo, 2006; van den Berg, 2013). The degree of abstraction and individual input present in this kind of knowledge is, therefore, ever present in the minds of the individuals, molded and changed by experience. Explicit knowledge, on the other hand, is described as tangible knowledge, codified and translated into symbols (Nonaka and Takeuchi, 1995). This codification can assume a wide spectrum of mediums: from books, patents and formulas to rules and equipment, allowing the transformation of knowledge as a tangible product, aimed at a more quantifiable strategical management (Choo, 2006). Thus, Knowledge Management (KM) can be referred to the range of processes and practices aimed to target activities that affect knowledge, from knowledge creation to knowledge use, storage and transference (Seonghee and Boryung, 2008).

KM practices rely on Human Resources Management (HRM) (Boon *et al.*, 2017), regardless of the organization's sector or type (Kianto and Andreeva, 2014; Massaro *et al.*, 2015). This is not surprising, considering the connection between knowledge and the intellectual and human capital inside the organization (Kianto *et al.*, 2014). Nonetheless, this view of knowledge as a vital resource has created some disparities over the last thirty years in the theories of KM (Barley, Treem and Kuhn, 2018). The healthcare institutions, for example, while being a recent focus in the literature (De Silva and Vance, 2017; Zhang *et al.*, 2017; Park and Gabbard, 2018) still have difficulties to expand their KM practices (Ferlie *et al.*, 2012).

This comes as surprising, considering the sector's intensive rely on knowledge (Robertson and Hammersley, 2000).

Considering the novelty of these KM frameworks, there are still difficulties inside the healthcare services to expand their KM practices to optimize knowledge sharing (KS) and knowledge use after its creation (Ferlie *et al*., 2012). Thus, there is a gap in the literature regarding an overview of practices and research when considering the relationship between KS, KM and healthcare (Nicolini *et al*., 2008; Ferlie *et al*., 2012). The reliance on human cognition and the importance of social relationships and mutual feelings of trust are recognized by the research in this area as meaningful factors (Nicolini *et al*., 2008; Park and Gabbard, 2018), thus giving leverage to the creation of an enlarged body of work that further explores the social aspects of knowledge, and specifically KS, inside these organizations.

Research centers and healthcare research centers depend heavily in social networks and relationships between peers (De Silva and Vance, 2017; Zhang *et al*., 2017). Considering the issues found in the literature regarding some obsolete practices in healthcare towards KM (Ferlie *et al.*, 2012) and by extending Chow and Chang's work (2008), the present research aims to explore antecedents of knowledge sharing behavior in healthcare research centers while addressing its importance to KM and HRM. This exclusive reliance on knowledge by healthcare research centers validates the need to further discuss enablers acting as psychological antecedents rooted in the social cognition of the individuals that impact KS (and consequent performance) while providing an overview that will allow the development of HRM practices aimed to such improvement.

Therefore, the **research question** is the following: **what is the impact of psychosocial antecedents in knowledge sharing in healthcare research centers?**

To answer this question, the study uses a mixed methods approach to enrich the discussion and to provide a more insightful view of this complex phenomenon (Cavaliere *et al*., 2015) that cannot be fully comprehended by using a quantitative approach alone (Venkatesh *et al.* 2013).

This dissertation is structured as follows: First, an introduction to the subject matter is presented. Following this introduction, a literature review aimed to explain the knowledge management process by specific phases is explored. Then, a more in-depth discussion centered in knowledge sharing behavior in knowledge intensive environments with a focus in the healthcare sector takes place. A second part of the literature review is focused on targeting common and transversal psychosocial antecedents found in the literature towards knowledge sharing intention and behavior used in previous researches. Then, a focus in the Theory of Reasoned Action (Ajzen, 1985) is presented, whose abstract measurement of behavioral intention is considered for the present research. The methodological approach is explained; a quantitative and qualitative analysis is performed and the results discussed. Finally, the study conclusions are presented while exploring consistencies and inconsistencies with previous researches and detailing characteristics that need to be considered in KSB. General limitations for the present study are also discussed and suggestions are given for future research on the subject.

2 – LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 – Knowledge Management Process

Knowledge Management (KM) can be referred to the range of processes and practices aimed to target activities that affect knowledge – either by *"creating, capturing, identifying, organizing, storing, representing, transferring, and reusing knowledge."* (Seonghee and Boryung, 2008: pp 282). However, it appears to exist a lack of unanimity when discussing the

dynamics of KM (Salisbury, 2009; Evans *et al.*, 2014). Alavi and Leidner (2001) and Heisig's (2009), offer similar approaches to KM based on the often mentioned four moments:

1) **Knowledge Identification and/or Creation** – Knowledge is identified and created by the means of practices such as probing, experimentation, resource mapping, prototyping or information flow analysis. By involving the analysis of assets and establishing specific criteria, a need to abstract the known knowledge assets takes place when facing new necessities. Due to its social and cognitive complexities, knowledge creation is hard to categorize (Nonaka, 1991). Specific naming alternatives for this moment stand for knowledge acquisition (Meyer and Jack, 1999), knowledge capture (Dalkir, 2005) and knowledge claim (McElroy, 2003).

2) **Knowledge sharing or integration** – Knowledge is shared by using the organizational memory, making knowledge flow between two types: tacit and explicit knowledge. The literature is focused on the importance of sharing, either by the social and cognitive awareness of its existence between all the organizational members or by the organization's structure preparation and flexibility to allow the knowledge flow (Chow and Chang, 2008).

Present under the name sharing, exchange or transfer, knowledge relationship with the structural, relational and cognitive dimensions of communication is one of extreme interest for the human resources management (Hutchings and Michailova, 2004; Huysman and De Wit, 2004; Lang, 2004; Inkpen and Tsang 2005; Wasko and Faraj, 2005; Chow and Chang, 2008; Kianto *et al.*, 2017). Therefore, different practices between different types of organizations and between different types of knowledge are considered when addressing Human Resources Management. For example, while the KM maturity of a firm based on explicit network and communities of practice may increase its overall sharing of knowledge (Evans *et al.*, 2014), knowledge can also be enlarged by social and cognitive strategies such as coaching and mentoring programs, and by nurturing specific shared languages while being focused on the

individuals´ social networks (Andrews e Delahaye, 2000; Darr e Krutzberg, 2000; McFadyen e Cannella, 2004; Bock *et al.* 2005; Chiu *et al*. 2006).

3) **Knowledge use** – after KS, knowledge is distributed in the organization for problem solving, to support decisions and to promote innovation and efficiency (Evans *et al.*, 2014). While not providing a direct translation to understanding, knowledge use is of great value when extracted - allowing an enrichment over the information flow (Boisot, 2002).

4) **Knowledge transference** – ensuring the full extent of the knowledge lifecycle, some identifiable practices take place to improve and transfer knowledge either inside the organization or out of it (Evans *et al.*, 2014). Therefore, knowledge is archived in the organization, deleted, refined (Meyer and Zack, 1999) or expanded to a scope outside of itself, while focusing in methods like learning management and workflow technologies.

Since knowledge is a fundamental human-related process, the KM scope is also related with Human Resources Management processes and practices (Scarbrough, 2003). The underlying HRM practices and organizational characteristics perceived by individuals with direct and indirect HRM influence, such staffing, training, participation, performance appraisal and compensation have a connection to knowledge creation (Papa *et al*. 2018), knowledge sharing and knowledge use (Chen and Huang, 2009). The importance of HRM, regarding its capacity to change attitudes, skills and specific behaviors, and to aim for strategical goals in the organization is not unknown (Collins and Clark, 2003). Therefore, it is vital for the HRM to be an enabler of KM by focusing on the knowledge-based view of the firm and by playing a role in focusing its individuals towards innovation related activities (Grant, 1996; Laursen and Foss, 2003). It is also important to understand and develop KM while searching for the best HRM practices that allow a knowledge friendly environment organization (Kianto and Andreeva, 2014), and by considering a need for an extensive comprehension of physical and

psychosocial factors capable of predicting and exploring strategical dimensions between knowledge and the human capital in the organization.

2.2 – Knowledge sharing in knowledge intensive environments: the healthcare sector

Knowledge intensive organizations focus their business model on knowledge (Robertson and Hammersley, 2000). For Starbuck (1992), knowledge is the central asset of these organizations, overcoming and being more pivotal than other physical or financial inputs to their lines of business. Regarding their technical and intellectual skills, these organizations' expertise is found in areas who rely heavily on "*professional bodies of knowledge*" (Robertson and Hammersley, 2000: pp. 241).

It seems, however that the growing tendency in the literature is that knowledge intensive environments have a larger focus on the technology and process fundamentals of knowledge while discarding the human side of it (Robertson and Hammersley, 2000; Bhatt, 2001; Cavaliere *et al*., 2015). Only in recent years a growing awareness of people management and its bounds with HRM practices seems to be set in motion. Some researchers have extended the role of knowledge mobilization in this organizations while discussing their interactions with HRM practices to a deeper level (Bresman, Birkenshaw and Nobel, 1999; Davenport and Prusak, 1998; Ipe, 2003; Kim and Byun, 2001; Kim and Lee, 2006;). Practices like recruitment and selection, training and development, improving of the retention rates, organizational trust and a reward system based on knowledge sharing have a positive outcome as a support for the best knowledge mobilization (Robertson and Hammersley, 2000).

This focus in the relationship between HRM practices and KS appears to be gaining support, enabling a shift in the KM literature. Nonetheless, KS is a sometimes-difficult process in such environments due to individual complexities and barriers (Cavaliere *et al.*, 2015) making its difficulties and hostilities a current topic in the literature (Sbarcea, 2001; Husted and Michailova, 2002). Considering the continuous learning nature of healthcare (Keeling and

Lambertt, 2000) and the interest on knowledge mobilization present in this sector (Ferlie *et al.* 2012), most healthcare organizations can be considered knowledge intensive environments.

Nonetheless, and even when considering the heavy usage of knowledge inside healthcare organizations, old fashion practices and a lack of focus in managing knowledge mobilization still seems to persist in this sector (Kim, Newby-Bennett and Song, 2012; Karamitri *et al.*, 2017).

Although KS leads to a performance increase in the healthcare (Leal *et al.*, 2018), KS difficulties are also an issue for the health sector (Sbarcea, 2001; Husted and Michailova, 2002; Nicolini *et al.*, 2008). To remove such barriers, healthcare organizations should be focusing in the reduction of knowledge stickiness (Radaelli, Lettieri and Massella, 2015) aimed to a balance between people, processes and technologies. Similarly with other organizations, knowledge sharing performance in the healthcare sector relies on the individual perceptions of social networks, shared goals, trust, reputation (Kim *et al.*, 2012; Mura *et al.*, 2013; Radaelli *et al.*, 2014; Radaelli *et al.*, 2015; Karamitri *et al.*, 2017; Park and Gabbard, 2018). These criteria are also applicable to research centers and academic institutions (Seonghee and Boryung, 2008; Park and Gabbard, 2018). By anticipating positive relationships, reciprocal benefits and by focusing in individual reputation and altruism, researchers are more willing to share knowledge in such environments (Karamitri *et al.*, 2017; Park and Gabbard, 2018). Research centers in healthcare have common enablers to knowledge sharing due to the learning processes behind knowledge network, which increases collaboration between scientific peers (De Silva and Vance, 2017; Zhang *et al.*, 2017).

2.3 - Psychosocial enablers in Knowledge Sharing

The psychosocial importance behind the study of knowledge has a relation between different knowledge phases and the strength of human processes rooted in the psychosocial level (Nahapiet and Ghoshal, 1998; Lang, 2004; Chow and Chang, 2008).

Some studies, considering this theoretical framework, tend to be specific by pinpointing the psychological or social enablers that influence the different knowledge moments (Table I). Chow and Chang (2008), in a literature review, found twelve different studies regarding this matter, while trying to identify commons enablers for different moments of knowledge: from its creation to its transference. In the analysis, structural, relational and cognitive dimensions were found as common points between the previous studies while also being related with sharing, confirming the initial thesis by Nahapiet and Ghoshal (1998). Thus, psychological and social factors enable or hinder the knowledge sharing behavior in the organization (Razmerita *et al.*, 2016; Karamitri *et al.*, 2017).

Discussed Factors	Domain			Literature
	Social Network	Social Trust	Shared Goals	
Shared Language			X	Nahapaet and Ghoshal (1998); Chua (2002); Huysman and De Wit (2004); National Research Center (2015)
Shared Vision /Goals			X	Nahapaet and Ghoshal (1998); National Research Center (2015); Xie *et al.* (2016); Yu *et al.* (2018)
Social Identification	X		X	Bandura (1989); Andrews and Delahaye (2000); Darr and Krutzberg (2000); Cabrera and Cabrera (2005); Chiu *et al.* (2006); National Research Center (2015); Xie *et al.* (2016); Zhang *et al.* (2017)
Social Trust		X		Tsai and Ghoshal (1998; Chua (2002); Huysman and De Wit (2004); Chiu *et al.* (2006); Cavaliere *et al.* (2015); Karamitri *et al.* (2015); National Research Center (2015); Xie et al. (2016)
Willingness to help		X		Cavalieri *et al.* (2015); Razmerita *et al.* (2016); Xie et al. (2016); Zhang *et al.* (2017); Park and Gabbard (2018)
Reciprocity	X	X		Lang (2004); Cabrera and Cabrera (2005); Wasko and Faraj (2005); Karamitri *et al.* (2015); Razmerita *et al.* (2016); Xie *et al.* (2016); Zhang *et al.* (2017); Park and Gabbard (2018)
Interpersonal relationships	X	X		McFadyen and Cannella (2004); Chiu *et al.* (2006); Karamitri *et al.* (2015)
Quality of the relationships	X			McFadyen and Cannella (2004); Chiu *et al.* (2006)
Group Membership and Personal Networking	X	X		Lang (2004); Chow and Chang (2008); National Research Center (2015); Xie *et al.* (2016)
Antecipation of the relationships and affiliation	X	X		Nahapaet and Ghoshal (1998); Bock *et al.* (2006); Park and Gabbard (2018)
Comfort zone, social confidence and perceived approachability	X	X		Andrews and Delahaye (2000); Razmerita *et al.* (2016); Xie et al. (2016); Zhang *et al.* (2017)
Shared narratives and language			X	Inkpen and Tsang (2005); Xie *et al.* (2016)
Standardization of language, cooperation, stream of communication to avoid barriers			X	Huysman and De Wit (2004); National Research Center (2015); Xie *et al.* (2016)

Table I - Psychosocial factors found in Knowledge sharing literature (adapted from Chow and Chang (2008)).

In the literature, common factors between this interaction seem to aim to specific directions under the structural, relational and cognitive dimensions. Considering the

communalities between the interactions found in the literature, the following domains were regarded in the antecedents' analysis: Shared network, Social Trust and Shared Goals (Chow and Chang, 2008; Karamitri *et al.*, 2017; Park and Gabbard, 2018).

2.3.1 – Social Network

Social network regards the social links between organizational members that occur on top of the formal ties (Inkpen and Tsang, 2005). As a fundamental part of human life inside the organization, the perceived quality of relationships, the relationship between peers, the number of social relations inside the organization and perceptions of identification between members can be factors to consider while measuring the knowledge sharing behavior inside the organization (Nahapiet and Ghoshal, 1998; Hyusman and De Witt, 2004; McFayden and Cannela, 2004; Chiu *et al.* 2009). The sociological and psychological factors related to the anticipation of relationships between members of the organization and the feeling of affiliation do play a role in KS intention – either in explicit or tacit knowledge (Bock *et al.,* 2005). Such an effect is also evident with the help of practices focused in technology to enhance existing social networks, by promoting interdependency, and establishing common goals and communities of practice (Cabrera and Cabrera, 2005). The shared network and its integration and interaction with the individual appear under different definitions, such as "social confidence", "comfort zone" and "perceived approachability" (Andrews and Delahaye, 2000). Razmerita *et al.* (2016) also explored the topic by finding the enlargement of social networks as an enabler for the frequency of KS in the enterprise social media. Feelings of respect and caring behind the frequency and quality of interactions lead to a common goal of egalitarianism and reciprocal benefits – fostering an environment of cooperation and share (Cabrera and Cabrera, 2005; Park and Gabbard, 2018).

In academic research communities, and healthcare research communities, a similar focus towards the importance of the internal ties as part of the effects of social capital on

knowledge sharing is considered (García-Sanchez *et al.*, 2017) - especially when stressing the ever-constant pressure to improve their services while creating new demands to the most important assets they work with: researchers (cf. Ramírez *et al*., 2015). Therefore:

H1a – There is a positive relation between the perception of a strong social network by the individuals inside healthcare research centers and the attitude towards knowledge sharing;

H1b – There is a positive relation between the perception of a strong social network by the individuals inside healthcare research centers and a more favorable social norm towards knowledge sharing.

2.3.2 – Shared Goals

Shared goals, or sometimes shared vision, compromises a sum objectives and aspirations shared between the members of the organization, according to Tsai and Ghoshal (1998). To the authors, a set of compatibility views between the individual and the organizational its part of a link between the relational and cognitive dimension of the social capital inside the organization defined as shared vision. By fostering communication inside the company, individuals can identify other members with whom they share a vision with, resulting in more sharing or exchange of mutual resources. Nahapiet and Ghoshal (1998) enlarge this research to a larger scope by studying shared goals as part of the cognitive dimension in its interaction with the anticipation of value in KS, access to knowledge, motivation to share and combination capacity. Huysman and De Wit (2004) as well as Inkpen and Tsang (2005) also elaborate on the matter, suggesting a larger framework to the perception of shared goals and its impact in knowledge sharing by expanding the study in the analysis of different approaches on shared goals. By considering the analysis of shared narratives, language and vision as social capital dimensions across organizational types of networks, shared goals can impact knowledge sharing performance (Inkpen and Tsang, 2005). Due to the focus in common goals in research groups, shared goals are also an enabler of knowledge sharing in academic research teams (Yu

et al., 2018). Analyzing the important of factors such the standardization of language, reassuring cooperation and reinforcing the stream of communication is vital to avoid language and culture barriers to KS (Huysman and De Wit, 2004). Therefore:

H2a – There is a positive relation between the perception of shared goals by the individuals inside healthcare research centers and the attitude towards knowledge sharing;

H2b – There is a positive relationship between the perception of shared goals by the individuals inside healthcare research centers and a more favorable social norm towards knowledge sharing

2.3.3 – Social Trust

Trust is defined as a cognitive process focused in the individual related to the perception of sincerity in the commonality of goals and purposes found in another (Tanis and Postmes, 2005). It regards the social constructs of perceived trustworthiness, enticed by concepts such as perceived support and endorsement. Regarding this connection with other aspect of social life of the individual in the organization, perceived trustworthiness, here describes as social trust, has been studied under diverse forms in its interactions with KS(Chow and Chang, 2008). Lang (2004) in a review of the social context and social capital enablers for knowledge sharing, states that, as being part of the social network, trust is critical, here under the form of low social embeddedness and interorganizational coupling with a focus in the organizational trust enforcement, to instrumental knowledge integration. That is, to the focus of knowledge integration as a tool used for economic transactions relying on the explicit knowledge that the organization has available. Nonetheless, trust is also pivotal in the perception individuals have on the quality of the information being shared and distributed between peers – either considering organizations (Razmerita *et al.*, 2016) academic research communities (García-Sanchez *et al.*, 2017; Fullwood *et al*., 2018; Yu *et al.,* 2018) and healthcare research communities (García-Sanchez *et al.*, 2017; Zhang *et al.*, 2017; Park and Gabbard, 2018). This comes as unsurprising considering the reliance of practices that have a support in technology

to improve social relationships in knowledge networking systems and platforms (Cabrebra and Cabrera, 2005). Therefore, by focusing in the mutual trust presented in the relational dimension of social capital (Nahapiet and Ghoshal, 1998), organizational KM practices will be able to last longer, when compared to other practices such as tailor-made teams, whose networks are enforced by the means of the organizational engineering (Huysman and de Wit, 2004). Therefore:

H3a – There is a positive relationship between the perceptions of social trust by the individuals inside healthcare research centers and the attitude towards knowledge sharing;

H3b – There is a positive relationship between the perceptions of social trust by the individuals inside healthcare research centers and a more favorable social norm towards knowledge sharing.

2.4 – Knowledge sharing intention and behavior

As stated, literature argues on a group of factors comprised between social, psychological, cognitive and structural dimensions (Andrews and Delahaye, 2000; Darr and Krutzberg, 2000; McFadyen and Cannella, 2004; Bock *et al.* 2005; Chiu *et al.* 2006; Lu, Leung and Koch, 2006) that affect KS. The relationships between these antecedents and KS follows and approach from Social Psychology, addressing the reasons that lead to specific behaviors: The Theory of Reasoned Action (TRA) (Ajzen, 1985). The TRA, as a persuasion model, it is aimed to explore the relation between attitudes and their behavioral outcomes based in the individual expectations. This theory states that the Behavioral Intention equals the sum of two empirical weights: the individual attitude towards the performance of a specific behavior and the subjective norm behind it. Thus, the highest the intention towards a specific behavior, the higher the chances for that behavior to be performed. The TRA is vastly used when studying KS in organizations – being presented as accurate in predicting behavioral sharing intention when compared to other models of persuasion (Ho *et al.*, 2009). This complex nature of

knowledge on the individual level can be demanding when studied in further detail (Cavaliere *et al*, 2015).

Knowledge sharing intention consists in the personal perception that one has towards engaging in knowledge sharing behavior (Bock *et al.*, 2005), whereas knowledge sharing behavior regards a predisposition or willingness to share valuable expertise and information between peers (Hwang *et al.*, 2018; Leal *et al*., 2018). Considering the TRA focus in the literature (Ho *et al.*, 2009), a gap between behavioral intention and actual behavior measures is missing (Hwang *et al.*, 2018). Therefore, and using the TRA assumptions (Ajzenk, 1985), the following hypothesis are proposed:

H4a – There is a positive relationship between the attitude towards knowledge sharing and the intention to share knowledge;

H4b – There is a positive relationship between a favorable subjective norm towards knowledge sharing and the intention to share knowledge;

H5 – There is a positive relationship between the intention to share knowledge and knowledge sharing behavior.

Additionally, to provide a larger framework to the complex relation between psychosocial factors and KS (Cavaliere, *et al*. 2015), and considering the nature of behavioral intention (Ajzenk, 1985), the following hypothesis are proposed:

H6a – There are alternative configurations for the presence of KSI;

H6b – There are alternative configuration for the absence of KSI.

Furthermore, while addressing the lack of findings in the literature behind individual/group characteristics in KS (see García-Sanchez *et al.*, 2017), additional exploratory configurations using demographic variables were added to study their impact in overall KSB, tacit KSB and explicit KSB. Aiming a larger framework of analysis, the following hypothesis are proposed:

H7a – There are alternative configurations for the presence of KSB;

H7b – There are alternative configurations for the absence of KSB;

H8a – There are alternative configurations for the presence of tacit KSB;

H8b – There are alternative configurations for the absence of tacit KSB;

H9a – There are alternative configurations for the presence of explicit KSB;

H9b – There are alternative configurations for the absence of explicit KSB;

3 - EMPIRICAL STUDY: PRESENTATION AND DATA ANALYSIS

3.1 – Mixed Methods

The study uses a mixed methods approach following a trend in business studies (Bryman and Bell, 2003) by combining a quantitative analysis and a qualitative analysis of the data collected to enrich the discussion and to provide a more insightful view on the phenomena that cannot be fully comprehended by using a quantitative approach alone (Venkatesh *et al.*, 2013). Secondly, to avoid some of the weaknesses behind the abstraction and direct context application behind the quantitative methods, a qualitative approach is also considered due to the extraction of more detailed information found by this method in local contexts (Johnson and Onwuegbuzie, 2004). Further discussion from these authors mentions a rise of business studies dedicated to this methodological approach. Hammersley (1996) classification of approaches to mixed methods also supports this decision because of the need found in the present study to corroborate the results between methods (triangulation), the need to have a research strategy employed to further support other methods (facilitation), and the need to access different aspect of an investigation to ensure they are dovetailed (complementarity). Considering the strengths behind mixed methods for evidence of conclusions thru convergence and corroboration of results, a hybrid quantitative and qualitative approach is used to produce more knowledge and expand the discussion between theory and findings. (Johnson and Onwuegbuzie, 2004; Creswell and Tashakkori, 2007; Morgan, 2007). Thus, and by following

recent studies focused in discussing managerial practices regarding KM, a quantitative analysis focused on dimension reduction and variable interaction/mediation is considered by using a principal component analysis and a structural equation model for the quantitative analysis. For the qualitative analysis, the fsQCA method is used, considering the depth of analysis it allows in recent KM research (Xie *et al*., 2016; Stejskal and Hajek, 2017; Curado *et al*., 2018; Oyemomi *et al*., 2018).

3.2 – Sample

The data comes from an online survey sent to 1489 healthcare researchers working in both Portuguese healthcare research centers and international healthcare research organizations with teams and/or research centers based in Portugal. The survey gathered 255 responses.

Sample Characteristics (*N=150*).

	Characteristics	Frequency	%
Gender	Female	108	72
	Male	42	28
Age group	18 to 25	10	6.7
	26 to 35	49	32.7
	36 to 45	49	32.7
	46 to 55	26	17.2
	56 to 65	12	8
	> 65	4	2.7
Experience (in years)	< 1	7	4.7
	1 to 2	13	8.7
	3 to 4	10	6.7
	5 to 6	8	5.2
	7 to 10	22	14.7
	> 10	90	60
Seniority in the organization (in years)	< 1	14	9.3
	1 to 2	27	18
	3 to 4	13	8.7
	5 to 6	15	10
	7 to 10	19	12.7
	> 10	62	41.3
Number of employees in the organization	1 to 20	7	4.7
	21 to 50	12	8
	51 to 100	13	8.7
	> 100	118	78.6
Number of members in current team	1 to 5	47	31.3
	6 to 10	46	30.7
	> 10	57	38
Work experience in the current team (in years)	< 1	22	14.7
	1 to 2	26	17.3
	3 to 4	21	14
	5 to 6	19	12.7
	7 to 10	23	15.3
	> 10	39	26

Table II – Demographic characteristics of the sample

Following Hair, Anderson, Tatham and Black (2009) method to clean the sample, the final sample compromises 150 responses (10.07% response rate). The vast majority of the

respondents are female (72%) and ages between 26 and 45 (32.7% of respondents for both age groups). Most respondents have more than 10 years of experience in healthcare research (60%), with 41.3% of the sample having a seniority inside the organization of more than 10 years. More than 78.6% of the organizations have more than 100 employees. Team dimensions are even in comparison , with 47 respondents being part of a team of 1 to 5 members, 46 respondents in a team of 6 to 10 members and 57 respondents in teams with more than 10 members. More than 26% of respondents have been working in the same research team for more than 10 years. Table II further summarizes the demographic information of the sample.

3.3 – Instrument and Measures

The final instrument used for this study consists in two sections. The first contained questions designed to characterize the sample. The second section, considering the given framework, consists of scales from the literature. The scales used were measured according to a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scales for social network (SN), shared goals (SG) and social trust (ST), comes from Chow and Chang (2008). Attitude towards knowledge sharing (AKS) comes from Lin and Lee (2004). Subjective norm regarding knowledge sharing (SNK) comes from Bock *et al.* (2005). Knowledge sharing intention (KSI) comes from Ryu, Ho and Han (2003). The items addressed both personal and peer perception regarding the discussed antecedents, with a focus on scale validation with the KSI scale being previously used in a healthcare sector sample. The knowledge sharing behavior scale (KSB) comes from Oliveira, Maçado, Curado and Nodari (2015). The questionnaire was translated to Portuguese with all the items validated according to the translate-translate back method, with a total of four translate and back-translate validations (Hill and Hill, 2002).

3.4 – Quantitative analysis

Figure 1 shows the used research model. The integration of social network, shared goals and social trust is studied in their interactions with both the individual attitude and social norm

towards knowledge sharing while addressing healthcare research centers. The interaction between attitude and social norms towards knowledge sharing intention is also measured according to the TRA (Ajzen, 1985; 1992) and according to the individual level (attitude) and collective level (social norm) of the relation found in the literature for the mentioned antecedents. However, and further following the TRA, the interaction between knowledge sharing behavior intention and knowledge sharing behavior outcomes is also considered on both the quantitative and qualitative analysis. First, a quantitative approach is considered to access the data. A principal component analysis (PCA) is used to extract the main components being accessed in the analysis (Hair *et al.*, 2009). The new extracted variables are then analyzed in a structural equation model to test the proposed hypothesis. The conceptual model (Figure 1) addresses a structural path between social network (SN), shared goals (SG) and social trust (ST) with both attitude towards knowledge sharing (AKS) and subjective norm towards knowledge sharing (SNKS). Since both AKS and SNKS are empirical weights that act as enablers of behavioral intention (Ajzen, 1985; 1992), two other paths were added between AKS, SNKS and knowledge sharing intention (KSI). Finally, a path was considered in the conceptual model to explore the relation between KSI and knowledge sharing behavior (KSB) (cf, Ajzen, 1992).
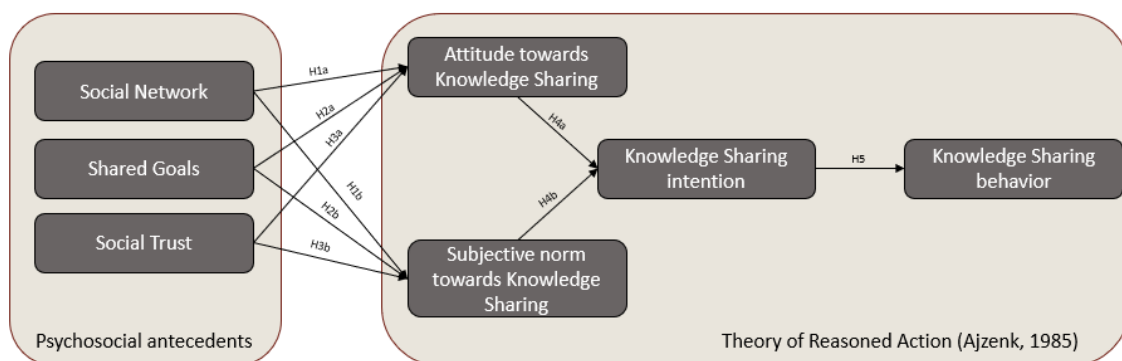
Figure 1 – Quantitative research model and hypotheses

3.4.1 – Factor analysis and reliability of constructs

After addressing the measures, an exploratory factor analysis (EFA) was conducted for the research using SPSS® software. EFA was used to determine the nature and number of common factors correlated between variables. A Kolmogorov-Smirnoff test was used in order to access normality of data (Fuller and Hemmerle, 1966). All variables followed a normal distribution, establishing a necessary condition for the procedure ($p < 0.001$). Assuming the items presented are related in underlying components, a PCA was conducted and the components extracted. Initial analysis of the factor correlation matrix presented correlations between factors higher than 0.32 (Appendix B). This cutoff value that states an overlap of variance higher than 10% between factors. Then, a promax oblique rotation technique was conducted to extract the factors considering correlations between them (Tabachnick and Fidell, 2007).

Both the Bartlett's Test of Sphericity and KMO were significant to ensure the procedure ($p < 0.001$; KMO = 0.857). The default value of kappa (4) was considered as procedure criteria to allow the factor correlation in the rotation (Costello and Osborne, 2005). All variables had a sufficient extraction with no communalities lower than 0.5 (Hair *et al.*, 2009). As show in Table III, the rotation was converged into 7 factors while ensuring the cutoff of >0.32 for each loading stated in the literature (Tabachnick and Fidell, 2007; Howard, 2015).

The Cronbach's alpha (Cronbach, 1951) ranged from 0.75 to 0.92, accessing the internal consistency of the constructs above the cutoff value (0.7) (Hair *et al.*, 2009). The composite reliability of the factors was calculated according to Fornell and Larcker's proposed equation model (Fornell and Larcker, 1981) to provide a more robust measurement for internal consistency of the extracted constructs (Sijtsma, 2009). The results ranged from 0.76 to 0.92, accessing the internal consistency of the constructs above the cutoff value (0.7) (Hair *et al.*, 2009). Therefore, all the constructs were considered reliable.

Factor loadings and reliability

Constructs	Observed Variables	Average	Standard deviation	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Cronbach's alpha	Composite Reliabitiy
KSI	KSI1	4,33	0,728	0,514								
	KSI2	4,33	0,748	0,972							0,92	0,92
	KSI3	4,35	0,743	1,018								
	KSI4	4,33	0,739	0,894								
KSB	KSB1	4,02	0,966		0,733							
	KSB2	4,17	0,814		0,953						0,82	0,89
	KSB3	4,41	0,626		0,919							
	KSB4	4,39	0,663		0,669							
SNK	SNK1	3,83	0,903			0,823						
	SNK2	3,92	0,916			0,814					0,83	0,86
	SNK3	3,77	0,868			0,670						
	SNK4	3,85	0,806			0,881						
ST	ST1	3,43	0,944				0,763					
	ST2	3,24	1,015				0,873				0,89	0,89
	ST3	3,25	0,983				0,928					
AKS	AKS1	4,32	0,717					0,991				
	AKS2	4,49	0,610					0,808			0,88	0,91
	AKS3	4,09	0,814					0,864				
SN	SN1	4,23	0,752						0,761			
	SN2	3,59	0,914						0,891		0,84	0,82
	SN3	3,73	0,932						0,896			
SG	SG1	2,95	0,873							0,847		
	SG2	2,80	0,882							0,888	0,75	0,76
	SG3	3,37	0,972							0,374		

Table III – Description, factor loadings and reliability

3.4.2 – Structural equation model

After the factor extraction and item reliability validation, a structural model was used for measurement of the hypotheses presented (H1 to H5). The nature of the structural equation model (SEM) seems to be growing in management research studies (Hair *et al.*, 2010) to theory confirmation by accessing covariance between variables in a multiple regression analysis fashion (Hair *et al.*, 2009). A skewness statistical test was used to validate the normality of the data used after the PCA. Results showed a range between -1.189 and 0.169, which stand for acceptable values above and below the threshold in the literature (-2; +2) (Gravetter and Wallnau, 2014). All the relations addressed in the structural model were supported by both the conceptual framework found in the literature and by statistical procedures.

3.4.3 – Results

Results of the structural model testing were conducted using AMOS® software which provided the fit indexes shown in Figure 2, supporting most of the established hypotheses: H1a, H1b, H3a, H3b, H4a, H4b and H5.
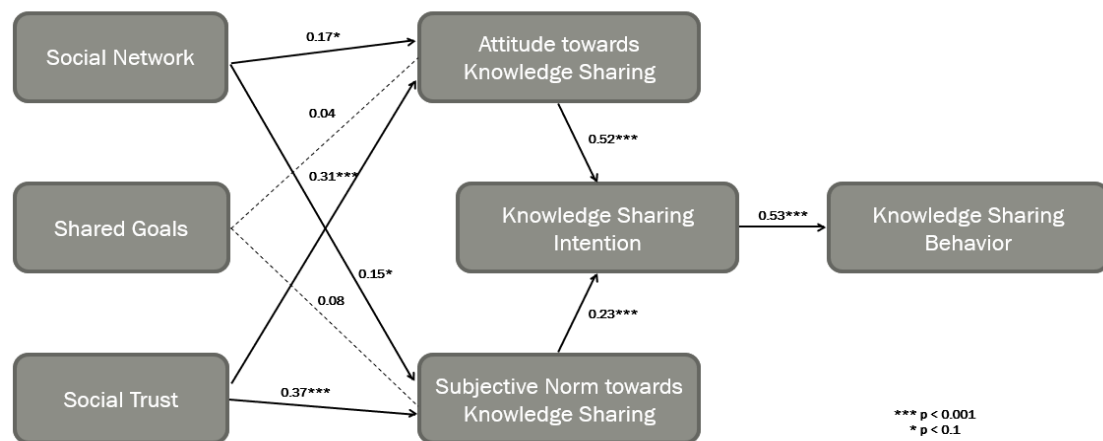
X² / df	GFI	RMR	NFI	AGFI	CFI	TLI	RMSEA
1.549	0.975	0.046	0.954	0.922	0.983	0.959	0.061

Figure 2 – Results of the quantitative research model and model indexes

SN has a positive effect on both AKS (β=0.17;p <0.1) and SNK (β=0.145; p<0.1). Individual and group perceptions of the advantages of fostering and enabling the existing social network while promoting the quality of interactions impacts the behavioral intention of knowledge sharing (Razmerita *et al*., 2016), especially when addressing healthcare research centers (Park and Gabbard, 2018). Given the nature of the items addressed in the construct, the frequency, quality and common perception of approachability have a positive effect in both the individual cognitive evaluation and predisposition to share knowledge. Conversely, a positive norm behind group membership and personal networking between members has a positive effect towards the cognitive construction of collective subjective norms that support knowledge sharing, as found in the literature (Lang, 2004; Chow and Chang, 2008). Thus, the additional perception of approachability and trustworthiness behind social trust that comes hand-in-hand with social network is also found to have a positive effect with both the attitude (β=0.31; p<0.1) and the subjective norm towards KSI (β=0.37; p<0.1).

The SG construct, on the other hand, did not have a significant effect in both AKS and SNK. Considering these results, H2a (p>0.1) and H2b (p>0.1) were not supported, posing a contradiction to some of the previous established studies that consider this antecedent as one

with a positive effect on KSI and KSB (Nahapaet and Goshal, 1998; Chua, 2002; Inkpen and Tsang, 2005). Nonetheless, the specific and social complexities of knowledge, especially in its tacit form, can be more focused in the frequency and reciprocity of communication to improve knowledge performance in academic research teams, where the individual goals and the social motivation can be addressed as a barrier to knowledge sharing (Yu *et al.*, 2018). Additionally, multiteam systems with interconnected teams are common in healthcare research centers. This design, however, can be translated in contrary forces that, while diffusing broaden goals, slow the collaboration between peers who become progressively more distant from those goals (National Research Council, 2015), which can pose as a significant cause to these findings.

Both AKS ($\beta=0.524$; $p<0.001$) and SNK ($\beta=0.533$; $p<0.001$) had a significant positive effect towards KSI, confirming the TRA principles of behavioral intention mediated by the empirical weights of both the individual attitude and social norm present in the individual´s social environment (Ajzen, 1985; 1992). Therefore, and as proposed in H5, the higher the behavioral intention, the higher the behavior outcome ($\beta=0.533$; $p<0.001$). Appendix C presents additional information regarding both the direct and indirect effects found in the analysis.

3.5 – Qualitative analysis

To better understand the behavioral outcome in knowledge sharing behavior, additional combinations or configurations are discussed using fsQCA. This method, qualitative in its essence, relies in Boolean algebra principles to consider configurations of causal conditions, representing a valuable method to explore and examine situations of complex causality (Fiss, 2011). The choice for this method relies on a holistic approach that is necessary by both HRM and KM to understand the interaction and independencies between the antecedents and other variables that are further understood when not in isolation. (Short *et al.*, 2008). The depth of the analysis allows additional configurations - even unrelated and inversely relates ones. Most

importantly, the fsQCA method explores different peripheral conditions present in configurations where the same core conditions are present (neutral permutations), permits the variety of design choice by allowing a system to reach the same outcome from a variety of conditions and paths (equifinality), and studies relationships of causal asymmetry – addressing both the conditions for the presence and the conditions for the absence of the desired outcome (Fiss, 2011). Considering the richness of this method framework, the fsQCA analysis performed here uses the same variables as the SEM analysis for further discussion.

3.5.1 – Calibration

After the acknowledgement of the causal conditions, a calibration stage for the variables is considered to transform the constructs into fuzzy set membership scores. Following Ragin (2008), all used variables were calibrated using the direct method into three anchors to allow classification of the conditions in three qualitative states: From full membership (1.00) to full non-membership (0.00) for each score. Therefore, all values closer to 1 can be consider "more in" and values closer to 0 "more out" with 0.5 as the threshold for the most ambiguity in the fuzzy-set. This technique rescales the construct with the support of these anchors from which deviant scores are calculated considering the values of membership (Fiss, 2011). The transformation of the Likert scales was made via calculation of the average values of the construct for each latent variable (Woodside *et al.*, 2011). To further enlarge the analysis, the KSB construct was also further rescaled by dividing into fuzzy-set scores two variables aimed to tacit and two for explicit knowledge sharing behavior, respectively. Table IV further displays descriptive statistics and calibrations of the causal conditions.

Conditions	Descriptive Statistics	Calibration (cutoff from 0 to 1)
Gender (gen)	M = 28%	(M = 0)
	F = 72%	(F = 1)
Age (age)	18-25 = 6.70%	(18-25 = 0)
	26-35 = 32.70%	(26-35 = 0.25)
	36-45 = 32.70%	(36-45 = 0.50)
	46-55 = 17.30%	(46-55 = 0.75)
	56-65 = 8%	(56-65 = 0.95)
	>65 = 2.70%	(>65 = 1)
Experience (exp)	< 1 y = 4.70%	
	1-2 y = 8.70%	
	3-4 y = 6.70%	(< 10 y = 0)
	5-6 y = 5.30 %	(> 10 y = 1)
	7-10 y = 14.70%	
	> 10 y = 60%	
Seniority (sen)	< 1 y = 9.30%	
	1-2 y = 18%	
	3-4 y = 8.70%	(< 1-2 y = 0)
	5-6 y = 10%	(3-10 y = 0.50)
	7-10 y = 12.70%	(> 10 y = 1)
	> 10 y = 41.30%	

Conditions	Descriptive Statistics	Calibration (cutoff for 0.90; 0.50; 0.10)
Social Network (fsnet)	$\mu = 3.85$, $\sigma = 0.76$, min = 1, max = 5	(5; 3.9; 3)
Shared Goals (fsgoals)	$\mu = 3.04$, $\sigma = 0.75$, min = 1, max = 5	(3.9; 3.1; 2)
Social Trust (fstrust)	$\mu = 3.31$, $\sigma = 0.89$, min = 1, max = 5	(4.1; 3.5; 2)
Attitude towards Knowledge Sharing (fsatitu)	$\mu = 4.30$, $\sigma = 0.65$, min = 1.6, max = 5	(5; 4.5; 4)
Subjective Norm regarding Knowledge Sharing (fsnorm)	$\mu = 3.84$, $\sigma = 0.72$, min = 1, max = 5	(5; 3.9; 2.8)
Knowledge Sharing Intention (fsint)	$\mu = 4.34$, $\sigma = 0.67$, min = 2.5, max = 5	(5; 4.3; 4)
Knowledge Sharing Behavior (fsbeh)	$\mu = 4.25$, $\sigma = 0.63$, min = 2.5, max = 5	(5; 4.1; 3.8)
Tacit Knowledge sharing Behavior (fstacit)	$\mu = 4.09$, $\sigma = 0.81$, min = 2, max = 5	(5; 4.1; 3.1)
Explicit Knowledge Sharing Behavior (fsexplit)	$\mu = 4.40$, $\sigma = 0.57$, min = 3, max = 5	(5; 4.1; 3.9)

Table IV – Descriptive statistics and calibration of the casual conditions

3.5.2 - Necessity and sufficiency and analysis

After the calibration, causal conditions were accessed for necessity and sufficiency. The necessity analysis indicates the degree of impact of a condition to achieve a specific outcome, while the sufficiency analysis provides information regarding the causal conditions' degree of relation with the explanation of a specific outcome (Fiss *et al*. 2013). This possibility to distinguish between necessary and sufficient conditions provides a more in-depth comprehensive analysis. Therefore, sufficient and necessary conditions must be differentiated. Although some authors pose questions regarding the principle of necessity compared to the sufficiency, stating that is highly improbable that a condition would be universally necessary due to the better empirical support found in sufficiency (Goertz, 2006), both analyses are addressed.

The necessity analysis was performed with a focus on the mentioned conditions. Additional conditions regarding demographic characteristics of the sample were explored due

to their pertinence as possible control variables in the social complexities of the knowledge process (García-Sanchez *et al.*, 2017).

Table V – Summary of necessary conditions

	Outcomes															
	fsint		~fsint		fsbeh		~fsbeh		fstacit		~fstacit		fsexplit		~fsexplit	
Condition	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage	Consisten	Coverage
gen	0.301811	0.501989	0.260989	0.498011	0.311235	0.548864	0.249532	0.451136	0.289485	0.543013	0.269507	0.456987	0.308905	0.599332	0.24562	0.400668
~gen	0.698189	0.451605	0.739011	0.548395	0.688765	0.472359	0.750468	0.527641	0.710514	0.518301	0.730493	0.481699	0.691094	0.52144	0.75438	0.47856
age	0.578375	0.5639	0.597334	0.668141	0.639836	0.661421	0.593749	0.629241	0.662345	0.728285	0.644149	0.640255	0.642862	0.731127	0.618067	0.591002
~age	0.659622	0.588119	0.610115	0.624079	0.641339	0.606281	0.680518	0.659525	0.672826	0.676546	0.726633	0.660479	0.640378	0.666022	0.718814	0.62856
exp	0.575002	0.446309	0.62179	0.553691	0.623575	0.513182	0.577004	0.486818	0.613504	0.537042	0.585061	0.462958	0.612111	0.554216	0.585595	0.445784
~exp	0.424998	0.494817	0.37821	0.505183	0.376425	0.464678	0.422996	0.535322	0.386496	0.50749	0.414938	0.49251	0.387889	0.526802	0.414405	0.473198
sen	0.606227	0.495311	0.628028	0.58868	0.64577	0.559418	0.610104	0.541836	0.647007	0.596178	0.642288	0.534991	0.637806	0.607874	0.613992	0.492001
~sen	0.496573	0.537814	0.461578	0.573524	0.471114	0.540993	0.503908	0.593229	0.495345	0.605037	0.515188	0.568839	0.466987	0.589979	0.510648	0.542414
fsnet	0.669369	0.656713	0.532426	0.599276	0.653176	0.679448	0.581114	0.619716	0.662776	0.733333	0.630426	0.630548	0.652089	0.746275	0.60263	0.579858
~fsnet	0.591553	0.524437	0.695007	0.706881	0.634419	0.596338	0.699415	0.673994	0.666094	0.665978	0.733384	0.662835	0.632883	0.654494	0.736311	0.640209
fsgoal	0.67295	0.620554	0.57314	0.606338	0.653556	0.638993	0.651654	0.653183	0.678296	0.705408	0.689205	0.647917	0.651037	0.700301	0.655943	0.593231
~fsgoal	0.5731	0.539228	0.64133	0.692279	0.645279	0.643733	0.639838	0.654386	0.661449	0.70188	0.686636	0.658632	0.621845	0.682507	0.66862	0.616996
fstrust	0.713279	0.640059	0.554886	0.571244	0.693366	0.659689	0.610316	0.595301	0.708297	0.716804	0.640659	0.586086	0.679492	0.711259	0.628118	0.552793
~fstrust	0.522197	0.505587	0.650366	0.722399	0.574642	0.589895	0.651106	0.685227	0.590998	0.645316	0.690434	0.681488	0.572765	0.646876	0.671914	0.638023
fsatitu	0.748363	0.817488	0.33983	0.425881	0.636145	0.736786	0.436005	0.517705	0.625586	0.770691	0.459534	0.511753	0.611177	0.778786	0.46106	0.493954
~fsatitu	0.474427	0.385148	**0.854365**	0.795717	0.583583	0.502315	0.778324	0.686814	0.60368	0.552699	0.79409	0.657206	0.602864	0.5709	0.793518	0.631793
fsnorm	0.719064	0.681486	0.529148	0.575339	0.692242	0.695606	0.601154	0.619293	0.708945	0.75775	0.670899	0.648217	0.685813	0.758189	0.625278	0.581196
~fsnorm	0.551923	0.505374	0.707057	0.742757	0.621133	0.603026	0.704521	0.701214	0.670874	0.692787	0.749273	0.699437	0.621174	0.663484	0.739848	0.664413
fsint					0.738917	0.783451	0.399809	0.434584	0.693995	0.782674	0.446549	0.455243	0.708415	0.826362	0.409944	0.402055
~fsint					0.466724	0.431339	**0.80078**	0.758712	0.516965	0.508192	0.786824	0.699189	0.487399	0.495575	**0.822955**	0.703525

gen = gender; idad = age; exp = experience; ant = seniority; fsnet = social network; fsgoal = shared goals; fstrust = social trust; fsatitu = attitude towards KS; fsnorm = subjective norm regarding KS;

fsint = knowledge sharing intention; fsbeh = knowledge sharing behavior; fstacit = tacit knowledge sharing behavior; fsexplit = Explicit knowledge sharing behavior

~ = absence of the condition

Considering the threshold value of 0.80 (Ragin, 2000), the necessary conditions are: absence of attitude towards knowledge sharing (~fatitu) for the absence of knowledge sharing intention (~fsint) and absence of knowledge sharing intention (~fsint) for the absence of the overall knowledge sharing behavior (~fsbeh) and for the absence of explicit knowledge sharing behavior (~fsexplit). No necessary conditions were found for knowledge sharing behavioral intention (fsint). Table V presents an overall summary of the necessary conditions found for each outcome.

For the sufficiency analysis, three types of solutions are provided: a complex, a parsimonious and an intermediate solution. Each of the solutions presents configurations of causal conditions that lead to the outcome. There are some discrepancies between solutions regarding absence and presence of logical remainders and their role in the data analysis (cf. Ragin, 2008; Fiss, 2011). The suggested inspection of both intermediate and parsimonious solution was considered as an analysis framework for this study (Fiss, 2011). Considering this approach, core conditions are conditions present in both the parsimonious and intermediate

solution, while peripheral conditions are the conditions only present in the intermediate solution. The respected parameters for the minimum threshold for raw consistency of the configurations (0.80) and the overall PRI consistency for the solutions (0.75) were followed (Ragin, 2006). The coverage values presented in the solutions also respected the suggested range in the literature (0.25-0.90) (Ragin, 2008; Woodside and Zhang, 2013). Results of the parsimonious and intermediate solutions can be found in Tables VI and VII.

Intermediate solution for fsint

Model: fsint = f (fsnorm, fsatitu, fstrust, fsgoal, fsnet)						Coverage		
Configurations	fsnet	fsgoals	fstrust	fsatitu	fsnorm	Raw	Unique	Consistency
1	◦			●		0,445716	0,018831	0,836843
2		◦		●		0,453640	0,040216	0,836538
3			•	●		0,571644	0,167756	0,811520

Overall solution coverage: 0.701481
Overall solution consistency: 0.816912

Intermediate solution for ~fsint

Model: ~fsint = f (fsnorm, fsatitu, fstrust, fsgoal, fsnet)						Coverage		
Configurations	fsnet	fsgoals	fstrust	fsatitu	fsnorm	Raw	Unique	Consistency
1				◦		0,854365	0,541792	0,795717
2	○	○	●		◦	0,332983	0,020410	0,842610

Overall solution coverage: 0.874775
Overall solution consistency: 0.775446

Black circles (●) indicate the presence of a condition, and void circles (○) indicate its absence. Larger circles, both black and void indicate core conditions. Small, peripheral conditions. Blank spaces indicate condition that does not matter for the configuration.

Table VI – Intermediate solution for the presence and absence of knowledge sharing intention.

Intermediate solution for fsbeh

Model: fsbeh = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1		•	●		•	0,367902	0,170154	0,903815
2	●	◦	○	◦		0,074892	0,074892	0,853394
3	◦		●	•	•	0,244978	0,047231	0,855551

Overall solution coverage: 0.490025
Overall solution consistency: 0.886099

Intermediate solution for ~fsbeh

Model: ~fsbeh = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1			●	●	◦	0,414821	0,352964	0,790282
2	●	◦	●		◦	0,102966	0,041109	0,961947
3	◦		○	◦	◦	0,222999	0,222999	0,855078

Overall solution coverage: 0.678929
Overall solution consistency: 0.818819

Intermediate solution for fsexplit

Model: fsexplit = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1		•	●		•	0,341391	0,158321	0,922714
2	●	◦	○	◦			0,0724	0,072400	0,907652
3	◦		●	○	•	0,231100	0,048051	0,888023

Overall solution coverage: 0.461842
Overall solution consistency: 0.918807

Intermediate solution for ~fsexplit

Model: ~fsexplit = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1		◦	●	●	◦	0,243070	0,176210	0,872596
2	●		●		◦	0,114196	0,047337	0,962605
3	●		●	●	◦	0,147639	0,080780	0,832717
4			○	◦	◦	0,240128	0,240128	0,830776

Overall solution coverage: 0.611314
Overall solution consistency: 0.845995

Intermediate solution for fstacit

Model: fstacit = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1		•	●		●	0,347425	0,204699	0,907856
2	●	◦		○		0,065536	0,065536	0,794326
3	◦	◦	●		●	0,225149	0,089861	0,898957
4	◦		●	○	◦	0,056300	0,024178	0,842526

Overall solution coverage: 0.528408
Overall solution consistency: 0.869987

Intermediate solution for ~fstacit

Model: ~fstacit = f(fsint, sen, exp, age, gen)						Coverage		
Configurations	gen	age	exp	sen	fsint	Raw	Unique	Consistency
1		◦	●	●	◦	0,240027	0,174074	0,895688
2	●	◦	●	●	◦	0,106670	0,040716	0,934653
3	◦	◦	◦		◦	0,227170	0,227170	0,816970

Overall solution coverage: 0.507914
Overall solution consistency: 0.857408

Black circles (●) indicate the presence of a condition, and void circles (○) indicate its absence. Larger circles, both black and void indicate core conditions. Small, peripheral conditions. Blank spaces indicate condition that does not matter for the configuration.

Table VII – Intermediate solution for the presence and absence of knowledge sharing behavior, explicit knowledge sharing behavior, and tacit knowledge sharing behavior.

3.5.3 – Results

The sufficiency analysis addressed the same conditions considered as variables in the SEM model. Results show the different configurations for the presence and absence of KSI (3 for

presence, 2 for absence of outcome). Results confirm the nature of richness of configurations found in fsQCA, as discussed before. Regarding the presence of KSI (fsint), neutral permutations (second-order equifinality) were present in the solution (Fiss, 2011). That is, the same core conditions are present with variation in the peripheral conditions. Considering the configurations, attitude towards knowledge sharing is a core condition in all three configurations to reach KSI. Curiously, SNK (fsnorm) was not present in the configurations. Regarding the discussed antecedents, only one configuration found presence of ST (fstrust) and AKS (fsatitu) in order to reach KSI (fsint). The other antecedents, however, were either absent or were not important for the configuration (Table VI). Therefore, H6a is supported.

Regarding the absence of the outcome (~fsint), different core conditions were found in the solution (see first-order equinifinality (Fiss, 2011)). Results show that ST leads both to the presence and the absence of the outcome in different configurations, confirming a fsQCA characteristic. On the other hand, there are other conditions, regarding the discussed antecedents, that remain absent in both the presence and absence of the outcome. Conversely, AKS absence (~fsatitu) was found alone in one of the configurations as a core condition leading to the absence of KSI (~fsint). Thus, H6b is supported.

Further analysis was conducted regarding configurations leading to KSB as well as considering differences between tacit and explicit knowledge sharing while using demographics of the sample and KSI. Results found a difference in certain characteristics, such as work experience, seniority and age in the configurations found for the presence and absence of the outcomes (Table VII). The absence of KSI for all configurations and solutions regarding the absence outcomes confirms the usage of TRA to measure KSB as a valid approach (Ho *et al.*, 2009). The presence of young researchers (~age) also seems to damper knowledge sharing, as found in almost all configurations for KSB overall and for tacit and explicit knowledge sharing behaviors.

Although the overall configurations are similar for the presence of some outcomes, some differences were addressed in the analysis. For example, more experienced and tenured male researchers with high KSI were found to share more knowledge in one configuration for knowledge sharing behavior (fsbeh) overall but not for explicit knowledge sharing behavior (fsexplit), were the absence of seniority seems to be a peripherical condition to explicit knowledge sharing (fsexplit). Conversely, while the absence of seniority (~sen) is also present in some of the configurations leading to explicit knowledge sharing (fsexplit), its presence is relevant in different configurations leading to its absence (~fsexplit). Therefore, seniority is a barrier to explicit knowledge sharing. García-Sanchez *et al.* (2017) while researching the effects of trust between peers in academic research centers, found a negative significant moderation of PhD seniority on the trust of the research team in KSB that impacts in explicit KS. On the other hand, tacit knowledge sharing behavior is an outcome for both the presence and absence of the seniority in the organization. While young (~age) and "junior" (~sen) researchers in the organization do share tacit knowledge between them, there is a gender difference. One configuration for the tacit knowledge sharing outcome (fstacit) found that young female researchers with less experience and seniority in the organization are more likely to share knowledge. However, more experienced male researchers with less seniority in the organization are more prone to share tacit knowledge. This richness of alternative configurations for both the presence and absence of KSB, explicit KSB and tacit KSB, support H7a, H7b, H8a, H8b, H9a and H9b. Curiously, while the presence of knowledge sharing intention (fsint) is found in configurations for both knowledge sharing behavior (fsbeh) and explicit knowledge sharing behavior (fsexplit), it can also be found as absent for tacit knowledge sharing behavior (fstacit). The degree of high abstraction and the lack of its operationalization, at a conscious level, found in the literature for this type of knowledge can justify its ever-constant flow in the social life of the organization (Wiig, 1993; Nonaka and

Takeuchi, 1995; Boisot, 2002; Choo, 2006; van den Berg, 2013) even when individuals seem to lack a behavioral intention to share it.

3.6 – Discussion and conclusions

This research presents a mixed-method approach as a suitable and more adequate design to address the psychosocial antecedents that impact on KSI and KSB within the healthcare research centers. Considering the pending difficulties still found in the healthcare services to expand their KM practices (Ferlie *et al.*, 2012), and by further expanding Chow and Chang's (2008) model, this study focused on the psychosocial factors contributing to KS in healthcare research organizations. Similar studies have focused in healthcare, especially in recent years (De Silva and Vance, 2017; Zhang *et al*., 2017; Park and Gabbard, 2018), yet no other applies a mixed methods approach combining SEM and fsQCA. Table VIII gives a summary of the testing results.

Hypothesis	Methods	
	SEM	fsQCA
H1a	Supported	-
H1b	Supported	-
H2a	Not supported	-
H2b	Not supported	-
H3a	Supported	-
H3b	supported	-
H4a	Supported	-
H4b	Supported	-
H5	Supported	-
H6a	-	Supported
H6b	-	Supported
H7a	-	Supported
H7b	-	Supported
H8a	-	Supported
H8b	-	Supported
H9a	-	Supported
H9b	-	Supported

Table VIII – Results of SEM and fsQCA.

Considering the quantitative study, findings show that the perception of a positive social network perceived by both the individual and its peers is related to a better attitude towards knowledge sharing while also improving the group subjective norms regarding KS, affecting its intention and subsequent behavioral outcome. Similar results regard the individual and collective perception towards social trust. Trust goes hand in hand with social network in

the literature (Lang, 2004; Cabrera and Cabrera, 2005; Chiu *et al.*, 2006; Razmerita *et al.*, 2016) and influences the perception that individuals have on the quality of information being shared and distributed inside the organization when considering other members. Nonetheless, shared goals between organization and members do not have a significant effect towards KSB in healthcare research centers, which seems to confirm the apparent contradictory results in previous investigations for this sector (Yu *et al.*, 2018). As mentioned, team design and configuration (Nation Research Council, 2015) can be related to a lack of common language and cultural barriers in research centers (Huysman and De Wit, 2004), especially considering the organizations in the sample with a multinational scope. Possible causes for these findings are poor communication when assessing processes and goals, and the lack of training on effective collaboration in research teams (Cheruvelil *et al*., 2014). These findings can also be justified by the difficulties of establishing shared goals in geographically dispersed and even virtual teams (Kasper-Fuehrera and Ashkanazy, 2001; Palanisamy, 2009; Olaniran, 2017) whose configurations are common in healthcare research organizations. Due to its advantages to KS, a clear, broad and engaging policy must be deployed and communicated by managers to avoid a sense of fadedness in the shared goals between research teams and members.

Regarding the qualitative study, an original contribution is provided using fsQCA allowing for a more in-depth discussion. Necessity and sufficiency analysis of the conditions leading to the presence and absence of the outcomes further enlarge the initial findings, providing a wider scope of the framework with the usage of the fsQCA. Although the attitude towards knowledge sharing behavior is not a necessary condition for the KSB outcome, it is a present condition for all the configurations of the outcome. However, the absence of attitude (~fsatitu) is a necessary and sufficient condition leading to the absence of intention (~fsint), allowing the discussion of possible paths to avoid when considering managerial practices and policies. The absence of attitude towards knowledge sharing (~fsatitu) is a necessary condition

for the absence of knowledge sharing behavior (~fsbeh) and absence of explicit knowledge sharing behavior (~fsexplit). It is not, however a necessary condition for the absence of tacit knowledge sharing behavior (~fstacit), which is not surprising, considering the highly abstract and social nature behind tacit knowledge, leading to an almost unconscious process of its creation, sharing and usage inside the organization (Boisot, 2002). Regarding the configurations in the intermediate solutions (Tables V and VI), the absence of knowledge sharing intention (~fsint) is present in all configurations leading to the absence of knowledge sharing behavior (fsbeh), the absence of explicit knowledge sharing behavior (fsexplit), and the absence of tacit knowledge sharing behavior (fstacit). Thus, this condition needs to be suppressed in management practices when considering KS – independently of knowledge type. The lack of necessary conditions for knowledge sharing behavior (fsbeh), tacit knowledge sharing behavior (fstacit) and explicit knowledge sharing behavior (fsexplit) and the lack of conditions common to all configurations for the models (Table VI) reinforce the complex nature of KS and suggest a careful approach when devising strategies to engage in KSB.

As discussed previously, individual's characteristics are also considered to contribute to different paths towards KSB. Overall results show a consistency in some configurations leading to KSB (overall, tacit and explicit knowledge). Age and experience are presented as core conditions for explicit KS. Seniority is also considered a core condition for tacit KS. On the other hand, configurations leading to explicit KS show seniority as a barrier to the outcome (García-Sanchez *et al.*, 2017). Regarding the overall number of configurations found in the models, there are more configurations towards tacit KSB (4) than for explicit KSB (3) (Table VI). Therefore, it is easier to share tacit knowledge. Consistently, there are more configurations leading to the absence of explicit KSB (4) than for tacit KSB (3), which indicates that, considering the causal conditions used, there are more ways leading to the absence of explicit KS and to the presence of tacit KS, as seen before. Nonetheless, a higher number of core

conditions (3) is present in the configurations leading to tacit knowledge sharing behavior (fstacit) compared to the explicit KS solution. Given the higher number of configurations found leading to the absence of explicit KSB with less core conditions (meaning less demanding configurations), a focus must be given by managers to avoid such behaviors. Additionally, the solutions leading to the absence of the outcomes share the same core conditions. On the other hand, the same is not true regarding the solutions leading to the presence of the outcomes, which gives leverage to adopt practices aimed to explore new configurations to reach equifinality.

Considering similarities between the fsQCA and the SEM approaches, the convergence of results is evident. Although two configurations present the absence of social network (~fsnet) and the absence shared goals (~fsgoals) leading to the KSB (fsQCA), the results do not pose as a contradiction but as an integration of each other. The mixed approach provides an in-depth analysis of certain behavioral outcomes provided by the juxtaposition between the SEM and the fsQCA. The addressed antecedents of KS behaviors have a more complex relationship in the configurations provided by the fsQCA than the results of SEM model. However, the SEM method allows to uncover the relationships between latent variables of interest and their manifestation found in both direct and indirect effects – exploring causal and mediation effects suitable for abstract constructs like the ones addressed in this study. Nonetheless, the absence of the antecedents (~fstrust; ~fsgoals; ~fsnet) is considered a core condition when paired with the absence of a group subjective norm leading to the absence of KSI (~fsint), which reinstates the multitude of factors and the complexities in the psychosocial phenomena behind KSB (fsbeh) not directly observed by using the SEM method alone. Results of the mixed methods approach show both a convergence and corroboration of the data findings (Bryman and Bell, 2003; Venkatesh *et al*., 2013). Considering the practical implications of the findings, practices must be implemented in the research centers, considering the discussed

antecedents in the quantitative analysis with the paths explored in the qualitative analysis. The findings suggest that managerial practices require more focus towards fostering an active environment allowing social interactions between researchers (Zhang *et al.*, 2017).

There are theoretical and practical implications from the solutions leading to the presence and the absence of the outcomes as discussed in the findings. Managerial practices focusing on trust and communication channels are to consider when addressing knowledge sharing between healthcare research professionals (Park and Gabbard, 2018). Additional attention should be given to the importance of team demographics to provide tools focused on helping team design models and practices (cf. García-Sanchez *et al.*, 2017). Therefore, a strong and rich communication environment, focused on approachability, trust and proximity while considering team and individual characteristics should be provided. Such attention should give leverage to policies and practices joining HRM and KM topics on communication, goal reinforcement and development of positive bounds and trust between organizational members.

3.7 – Limitations and future work

The sample size of 150 is a limitation of the study. Nonetheless, the sample here used is nationwide, with organizations only based in Portugal, university laboratories, research centers and international research centers with either branches or headquarters based in Portugal. Thus, further studies should be addressed in order to expand these results to a wider cultural and geographical scope while considering other research centers and/or other fields of study. Although the presented psychosocial antecedents are based in the literature, further assessment of other factors should be considered, such as organizational culture and organizational climate perceptions. Other researches, more focused in a longitudinal approach can be also considered to backtrack origins of knowledge sharing behavior and patterns of behavioral evolution. Furthermore, more research ought to be developed aimed to explore the relationship between tacit and explicit knowledge sharing behavior to provide a

larger discussion of mutual and different antecedents. Additional research center information is missing, such as team configuration and other relevant demographic data, which might be relevant for future studies. Expanding the current research while aiming for more data and more psychosocial antecedents is a goal worth pursuing due to the richness and pending KM development in the healthcare sector.

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APPENDIX A
Measurement Items

Items	Label	Construct	Literature
My organizational members and I always agree on what is important to work.	SG1		
My organizational members and I always share the same ambitions and vision at work.	SG2	Shared Goals (SG)	Chow and Chan (2008)
My organizational members and I are always enthusiastic about pursuing the collective goals and missions of the whole organization	SG3		
In general, I have a very good relationship with my organizational members	SN1		
In general, I am very close to my organizational members	SN2	Social Network (SN)	Chow and Chan (2008)
I always hold a lenghty discussion with my organizational members	SN3		
I know my organizational members will always try and help me out if I get into difficulties	ST1		
I can always trust my organizational members to lend me a hand if I need it	ST2	Social Trust (ST)	Chow and Chan (2008)
I can always rely on my organizational members to make my job easier	ST3		
To me, knowledge sharing with other organizational members is an enjoyable experience	AKS1		
To me, knowledge sharing with other organizational members is valuable	AKS2	Attitude Towards Knowledge Sharing (AKS)	Lin and Lee (2005)
To me, knowledge sharing with other organizational members is pleasant	AKS3		
My CEO thinks that I should share my knowledge with other members in the organization	SNK1		
My boss thinks that I should share my knowledge with other members in the organization	SNK2	Subjective Norm Towards Knowledge Sharing (SNK)	Bock *et al.* (2005); Chow and Chang (2008)
My colleagues think that I should share my knowledge with other members in the organization	SNK3		
Generally speaking, I try to follow the CEO's policy and intention	SNK4		
I intend to share my knowledge with my colleagues in the future	KSI1		
I am likely to share my knowledge with my colleagues in the future	KS2	Knowledge Sharing Intention (KSI)	Ryu, Ho and Han (2003)
I will try to share my knowledge with my colleagues	KS3		
I plan to share my knowledge with my colleagues	KS4		
I often share the reports and the official documents from my work with the members of my team	KSB1		
I always share my manuals, methodologies and models with the members of my team	KSB2	Knowledge Sharing Behavior (KSB)	Oliveira, Curado, Maçada and Nodari (2015)
I often share my experience or know-how with the members of my team	KSB3		
I always share my know-where and know-whom when prompted by the members of my team	KSB4		

APPENDIX B
Principal Component Analysis Outputs

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.857

	Bartlett's Test of Sphericity	Approx. Chi-Square	2478.971
		df	276
		Sig.	.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.683	36.180	36.180	8.683	36.180	36.180	6.089
2	3.406	14.193	50.372	3.406	14.193	50.372	4.580
3	1.669	6.953	57.325	1.669	6.953	57.325	4.997
4	1.458	6.077	63.402	1.458	6.077	63.402	5.525
5	1.307	5.445	68.847	1.307	5.445	68.847	5.727
6	1.058	4.408	73.254	1.058	4.408	73.254	4.399
7	.884	3.682	76.937	.884	3.682	76.937	3.336
8	.746	3.110	80.047				
9	.652	2.716	82.764				
10	.540	2.250	85.014				
11	.513	2.137	87.151				
12	.384	1.602	88.753				
13	.378	1.576	90.329				
14	.335	1.396	91.725				
15	.326	1.359	93.084				
16	.296	1.234	94.317				
17	.278	1.157	95.475				
18	.224	.933	96.408				
19	.204	.851	97.258				
20	.202	.842	98.100				
21	.160	.666	98.766				
22	.116	.482	99.248				
23	.106	.443	99.691				
24	.074	.309	100.000				

Extraction Method: Principal Component Analysis.
a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Pattern Matrix[a]

	Component						
	1	2	3	4	5	6	7
SN1	-.098	-.005	.042	.101	.080	.761	.071
SN2	-.027	.021	.128	.043	-.077	.891	-.084
SN3	.139	.045	-.198	-.091	.096	.896	.008
SG1	-.043	.019	-.034	.105	.028	-.063	.847
SG2	.052	.029	.023	.025	-.115	.034	.888
SG3	.015	-.091	.129	.368	.023	.068	.374
ST1	.041	.003	-.037	.763	.104	.015	.141
ST2	-.020	.066	-.024	.873	.003	.052	.061
ST3	.008	-.040	.016	.928	-.046	-.039	-.025
AKS1	-.085	-.047	.029	-.043	.991	.024	.039
AKS2	.027	.060	-.003	.139	.808	-.046	-.132
AKS3	.057	-.079	.013	-.008	.864	.116	-.041
SNK1	.104	-.058	.823	.081	-.040	.019	-.046
SNK2	.000	.052	.814	.024	.028	.061	-.052
SNK3	.088	.147	.670	.184	.029	-.075	-.180
SNK4	-.117	-.063	.881	-.192	.041	-.067	.204
KSI1	.514	.167	.078	-.263	.331	-.113	.190

KSI2	.972	-.079	.035	.044	-.027	.020	-.044
KSI3	1.018	-.058	-.008	.096	-.081	.014	-.068
KSI4	.894	.068	-.044	-.036	.018	.039	.075
KSB1	.095	.733	-.157	.183	.090	-.190	-.045
KSB2	-.162	.953	-.009	.003	.004	.063	.024
KSB3	-.049	.919	.073	-.042	-.019	.046	.005
KSB4	.155	.669	.073	-.114	-.156	.118	.039

Extraction Method: Principal Component Analysis.
 Rotation Method: Promax with Kaiser Normalization.
 a. Rotation converged in 7 iterations.

Component Correlation Matrix

Component	1	2	3	4	5	6	7
1	1.000	.533	.412	.325	.604	.265	.167
2	.533	1.000	.227	.216	.434	.122	-.021
3	.412	.227	1.000	.483	.354	.367	.302
4	.325	.216	.483	1.000	.425	.520	.443
5	.604	.434	.354	.425	1.000	.350	.247
6	.265	.122	.367	.520	.350	1.000	.349
7	.167	-.021	.302	.443	.247	.349	1.000

Extraction Method: Principal Component Analysis.
 Rotation Method: Promax with Kaiser Normalization.

APPENDIX C
Structural Equation Model outputs

Regression Weights: (Group number 1 - Default model)

			Estimate	S.E.	C.R.	P	Label
AKS	<---	SNK	.169	.087	1.949	.051	
AKS	<---	ST	.317	.090	3.500	***	
AKS	<---	SG	.047	.082	.576	.565	
SNK	<---	SN	.145	.084	1.730	.084	
SNK	<---	ST	.368	.087	4.212	***	
SNK	<---	SG	.088	.080	1.102	.270	
KSI	<---	AKS	.524	.065	8.111	***	
KSI	<---	SNK	.226	.065	3.492	***	
KSB	<---	KSI	.533	.070	7.578	***	

Standardized Direct Effects (Group number 1 - Default model)

	SG	ST	SN	SNK	AKS	KSI
SNK	.088	.368	.145	.000	.000	.000
AKS	.047	.317	.169	.000	.000	.000
KSI	.000	.000	.000	.229	.532	.000
KSB	.000	.000	.000	.000	.000	.527

Indirect Effects (Group number 1 - Default model)

	SG	ST	SN	SNK	AKS	KSI
SNK	.000	.000	.000	.000	.000	.000
AKS	.000	.000	.000	.000	.000	.000
KSI	.045	.249	.121	.000	.000	.000
KSB	.024	.133	.065	.120	.280	.000