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Journal of the Knowledge Economy

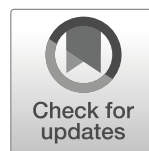
ISSN 1868-7865

J Knowl Econ

DOI 10.1007/s13132-020-00665-x



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Factors and Barriers to Tacit Knowledge Sharing in Non-Profit Organizations – a Case Study of Volunteer Firefighters in Portugal

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Received: 26 July 2019 / Accepted: 21 May 2020/Published online: 02 June 2020
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Abstract

Studies in Knowledge Management, targeting non-profit organizations (NPOs) are scarce, as opposed to what is happening in the private and public sectors. To study this, we opted for a case study of organizations such as the Portuguese Fire Brigades (FBs), unique in their action and identity and accompanies the need increasingly recognized by society, in enabling these organizations of competencies for the best possible performance in the face of tragic events that have occurred in recent years in Portugal, particularly with regard to large fires. The present study focuses on the sharing of tacit knowledge in NPOs in Portugal. Taking as a case study, the FBs present as objectives, the assessment of the most relevant factors and the most prevalent barriers to this sharing. A careful reading of the literature on tacit knowledge sharing allowed the identification of possible indicators and barriers to sharing this knowledge. The data obtained through questionnaires applied to the firefighters were subjected to two exploratory factorial analyses in order to diagnose the tacit knowledge sharing factors and the types of barriers to this sharing. Thus, 3 factors have been identified that are conducive to the sharing of tacit knowledge within these organizations: organizational culture, individual characteristics, and organizational structure. Four types of barriers with higher prevalence were also identified: personal, communicational, technological, and resource barriers or infrastructures. As limitations to the study, it is important to mention that the present research focuses exclusively on the sharing of tacit knowledge, not considering other forms of knowledge, and that if it is a case study, even with heterogeneous organizations, it cannot be replicated for different realities.

Keywords Tacit knowledge · Knowledge sharing · Barriers · Non-profit organizations

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Introduction

The present study focuses on the sharing of tacit knowledge in non-profit organizations (NPOs) in Portugal. The research in the field of knowledge management has focused mainly on the public and private sectors. It is possible to refer to the contributions of Graham and Pizzo (1996) and Gibbert et al. (2011) for the private sector and Syed-Ikhsan and Rowland (2004) and Riege and Lindsay (2006) for the public sector. For Ragsdell (2013), as motivation for this research drive in the private sector, it may be suggested to equip knowledge management organizations to obtain competitive and public sector gains, looking for ways to reduce costs and improve efficiency. Details regarding research in the field of knowledge management for the third sector, including NPOs, are discussed in the works of Lettieri et al. (2004), Hurley and Green (2005), and Hume and Hume (2008). However, these and other reference works are, according to Ragsdell (2016), the first steps taken in an area that offers immense research opportunities, especially when comparing the abundance of studies in other sectors with the still scarce research directed to this third sector. According to Fotler (1981), the organizations that operate in this sector operate in very dynamic and complex contexts, whose studies can lead to valuable conclusions. The relevance of the deepening of knowledge management research directed to the third sector still increases, about organizational behavior.

In carrying out the present study, we found no other study focused on the sharing of tacit knowledge in non-profit organizations that combined voluntary work with salaried work. Thus, the present study focuses on the determination of tacit knowledge sharing within volunteer fire brigades in Portugal, by verifying the prevalence of indicators for this sharing and the main barriers to this sharing. Thus, the objectives focus on the identification of the main factors and the main types of barriers to sharing tacit knowledge in these organizations.

This article begins with a summary of the essential information about the objectives, the methodological approach, the main conclusions, the limitations of the research, and the originality or value of the research. Here's a brief introduction to the topic and keywords. The theoretical framework, with emphasis on indicators, factors, and barriers to tacit knowledge sharing, is presented below. The next point deals with the presentation and discussion of the results. Finally, we present the conclusions and recommendations for future studies.

Theoretical Framework

Tacit Knowledge and its Sharing

Tacit knowledge refers to a type of knowledge whose description or communication is not easy and reflections on its importance only gain visibility with Polanyi's (1962, 1966) studies. According to Polanyi (1966), knowledge may be present in the explicit or tacit form. For Nonaka (1994), explicit knowledge is codified and can be easily communicated and transferred, as well as presented in the form of manuals, plans, procedures, among others. In contrast, tacit knowledge is implicit; it is difficult to conceptualize; it is subjective and composed by the experiences of the individual. According to Dalkir (2005), Haldin-Herrgard (2000), Kikoski and Kikoski (2004), McAdam et al. (2007),

and Pavlicek (2009), it is possible to gather a set of identifying properties about what is tacit knowledge. According to these authors, tacit knowledge resides in human minds and relationships among individuals in an unstructured form—difficult to see, encode, estimate, formalize, investigate, describe, capture, or communicate with accuracy—and is acquired through sharing of experiences, observation, imitation, or by “face-to-face” interaction. It is, therefore, a knowledge rooted in action, in procedures, in commitments, in values, and emotions. For these authors, tacit knowledge empowers the individual to better deal with exceptional and unexpected situations. For Stanton and Stammers (1990), the main characteristic of tacit knowledge is the belief that their nature is personal. For Sternberg and Horvath (1999), tacit knowledge has a practical utility because it is predominantly about how to do things. For Polanyi (1966) and McInerney (2002), tacit knowledge is subconscious, personal, difficult to articulate, perceived, unconscious, based on experience, shared through conversation, and imbued with stories. It is based on insights and understanding, judgments, assumptions, relationships, norms and values, and organizational culture. Davenport and Prusak (1998) describe some of the characteristics of tacit knowledge that make their sharing a challenge. For these authors, tacit knowledge is difficult to code in documents or databases and is developed and internalized over a long period of time and within a specific cultural environment; this tacit knowledge-taking process is not always a conscious process; and some of this tacit knowledge may not even be capable of representation outside the human mind. For Johnson (2007), the characteristics of tacit knowledge are as follows: a personal knowledge, because tacit knowledge is part of the understanding of an individual that is connected to other personal understandings; a knowledge with unspoken qualities, since tacit knowledge constitutes a knowledge that is disjointed and implicit; a knowledge dependent on personal experience, where its accumulation requires time, and its use requires intuition; a knowledge dependent on the context and the path followed by the individual; and a knowledge transmitted through learning, where the learner uses observation and/or imitative behavior.

According to Duffey (2013), the term “sharing and transfer” is often used in the literature, when it is intended to refer to a process of conversion or transmission of knowledge. According to Hong et al. (2011), knowledge sharing is the process by which an individual’s knowledge is converted into a format that can be understood, absorbed, and used by other individuals, through channels or networks between those who provide and those who seek knowledge. However, tacit knowledge is more difficult to transfer than explicit, since according to Nonaka (1994), explicit knowledge is based on theory and is transmitted in formal and systematic language. According to Polanyi (1966), in order to share tacit knowledge, the owner of that knowledge must first become aware that he has that knowledge and then find a way to express it properly. Only after this can knowledge sharing occur.

For Othman and Abdullah (2010), tacit knowledge is rarely shared and communicated because its nature is subjective and intuitive, which leads to a huge loss, for example, when a very experienced employee leaves the organization to which he belongs. In this regard, Mládková (2012) tells us that since tacit knowledge is always stored in the human brain, sharing this knowledge is difficult, complex, time-consuming and one of the greatest challenges for knowledge management. To better understand how tacit knowledge sharing works, we have to consider indicators and their grouping into factors and barriers and their grouping into typologies.

Indicators of Tacit Knowledge Sharing Within Organizations

By reviewing the literature on tacit knowledge sharing, it was possible to determine the following indicators that constitute units of analysis: time and opportunity, common language, mutual trust, relationship network, hierarchy, recognition and reward, type of training for the task, transmission of knowledge, storage of knowledge, power, favorable environment for questioning, type of valued knowledge, communication, and physical space (Oliveira and Pinheiro 2019).

Individual Time Management Since according to Haldin-Herrgard (2000), Castellani et al. (2019), and Fahey and Prusak (1998), the dissemination of knowledge comprises a set of tasks that, due to their slowness, may not be compatible with the speed that is experienced in business, tacit knowledge sharing still requires more time to be realized by comparison to explicit knowledge sharing.

Common Language As for Szulanski (1996), Haldin-Herrgard (2000), Davenport and Prusak (1998), and Disterer (2003), for a tacit knowledge transfer process to be effective and efficient, communication failures between the emitter and the receiver, thus the terminology and the expressions used, which often assume their own connotations depending on the organizational context in which they are used, must be widely known by the parties.

Mutual Trust For Roberts (2000) and Davenport and Prusak (1998), the smaller the risks and uncertainties in tacit knowledge sharing are, the greater is the trust between the individuals who make up the organization. Establishing a trust network depends on shared social, cultural values, and common expectations.

Relationship Network For Szulanski (1996) and O'Dell and Grayson (1998), one of the difficulties to the sharing of tacit knowledge stems from a weak diagnosis about the identification of the needs of tacit knowledge that each element of the organization must have and about the quantity and quality of knowledge to acquire to meet this need. Both the recipient and the issuer of the knowledge do not know who in the organization can hold or be interested in the knowledge that is lacking or that they have.

Hierarchy For Disterer (2003) and O'Dell and Grayson (1998), hierarchical and bureaucratized organizational structures hinder communication, information sharing, and ultimately, tacit knowledge sharing. Each element acts in order to achieve and enhance its own results and rewards, which discourages the exchange of experiences.

Recognition and Reward For Szulanski (1996), Disterer (2003), and Haldin-Herrgard (2000), organizations should recognize and reward their elements so that they feel motivated to continue sharing their knowledge. Sharing other forms of tacit knowledge as know-how should be as rewarded as the sharing of knowledge through formal education.

Type of Training for the Task For J6ia (2007), Disterer (2003), and Leonhard and Sensiper (1998), these are training forms provided by more experienced employees

who are encouraged to pass on their knowledge to younger employees, always in a work or organizational context. Coaching and mentoring are understood to be the most appropriate techniques when it comes to tacit knowledge sharing.

Transmission of Knowledge According to Nonaka and Takeuchi (1995), Leonhard and Sensiper (1998), Hansen et al. (1999), and Jóia (2007), since the knowledge transfer strategy of an organization can be focused on people or reuse of codified knowledge, if the organization privileges the interaction between the people that compose it, the focus is on the dialogue and interaction between them because it is through this personal contact that knowledge is transmitted. If one prioritizes the reuse of codified knowledge, it must be stored in databases that can be consulted and used by all elements of the organization, and there is no great interaction between people but between people and technology.

Knowledge Storage For Hansen et al. (1999), when the focus of knowledge storage is database driven, the organization tends to explicitly manage knowledge, whereas when the focus of knowledge storage is people-oriented, the organization tends to practice tacit knowledge management.

Power According to Szulanski (1996), Davenport and Prusak (1998), and Disterer (2003), the perception of loss of influence, of dominant job position over others, and of professional respect or job security, may inhibit knowledge sharing.

Favorable Environment for Questioning For Sun and Scott (2005), the lack of this psychologically secure environment to express different opinions and ideas is a factor that compromises the sharing of tacit knowledge in an organization.

Kind of Valued Knowledge For Lemos and Jóia (2012), various forms of tacit knowledge such as personal skills or intuition may not be recognized or valued by some organizations.

Communication For Leonhard and Sensiper (1998) and Haldin-Herrgard (2000), personal conversation is the richest form of communication because it allows for immediate and mutual feedback and the use of multiple forms of communication, such as demonstration of personal skills and even the use of body language.

Physical Space For Young (2010), the design of physical workspaces to support knowledge sharing varies according to the type of interaction that the organization needs. Open spaces for interactions that foster team collaboration and enable experimentation are conducive to sharing tacit knowledge.

Barriers to Tacit Knowledge Sharing: Personal, Communicational, Technological, and Resource or Infrastructure

However, if the analysis of the indicators is possible to determine the factors that influence the sharing of tacit knowledge, the role of the barriers to this sharing must

also be considered and can have very different origins. According to Riege (2007), the identification and recognition of the existence of barriers to knowledge sharing is an important factor for the success or failure of a knowledge management strategy. It is possible to determine the existence of several potential barriers within an organization, which are echoed in the literature, such as barriers at the personal, communicational, technological, and resource and infrastructure levels.

At the personal level, we can say that characteristics such as temperament, attitude, or interpersonal skills, according to Awad and Ghaziri (2007), can make it difficult to share tacit knowledge. For the same authors, it may happen that certain elements of the organization avoid sharing their knowledge because of the risk of weakening their work position against other elements. To Sveiby and Simons (2002) and Sveiby (1997), there are some other possible impediments or personal barriers to this sharing, such as age, gender, level of education, and experience in the role or position he plays.

For Riege (2005), the low perception of the tacit knowledge that one possesses and that others may need should be considered as an obstacle to this sharing. According to Nonaka and Takeuchi (1995), Michailova and Husted (2003), and Spender (1996), differences in culture of origin, race, and value systems should also be considered as important personal barriers. For Ellis (2001), Finerty (1997), McDermott (1999), and O'Dell and Grayson (1998), the perception of the lack of a reward and recognition system can lead to demotivation of people and hamper the sharing of tacit knowledge. Yet for Awad and Ghaziri (2007) and Holste and Fields (2010), the inability to pass a sense of confidence to others and the lack of confidence of perception in other organizational elements enhances interpersonal relationships that are obstacles to the sharing of tacit knowledge.

At the communicational level, according to Davenport and Prusak (1998) and Hendriks (1999) and Meyer (2002), effective communication, whether verbal or written, is fundamental for an effective sharing of tacit knowledge, for that its absence constitutes an important barrier. For Riege (2007), the lack of contacts and interactions between knowledge sources and recipients is another possible barrier to this knowledge sharing. For Joia and Lemos (2010) organizations with bureaucratic and hierarchical characteristics are not flexible, and these characteristics stand as barriers to communication in order to share tacit knowledge. For Holste and Fields (2010) and Riege (2005), internal competitiveness, high turnover, limited resources, lack of transparency, and lack of qualified and experienced staff can also constitute barriers to good communication and tacit knowledge sharing.

At the technological level, according to Mohajan (2016), technology has changed the way organizations operate and how they have the means to access and provide instant access to information and data over long distances. However, for the same author, technology is also a challenge, in the sense that it sometimes makes it difficult to apply and manage tacit knowledge. For organizations such as Awad and Ghaziri (2007) and Laudon and Laudon (2012), organizations that only invest in systems and processes of information and communication technologies become excessively dependent on this technology and invest little in the individual knowledge of their collaborators which can jeopardize the management of tacit knowledge. Riege (2005) also presents a set of technological barriers to the sharing of tacit knowledge, such as the insufficiency of these to respond to the tasks requested and their inadequacy to the needs of the members of the organization, and in relation to the need to communicate

with the elements of the organization, the complexity of its use by the elements of the organization, its inability to enhance the performance of the elements of the organization, and poor technical support to maintain them. For the same author, even if technology is rarely the ultimate solution to a knowledge-sharing strategy, the integration of the right technology is important, so there will be little doubt about the importance of the Internet, intranet, e-mail, or social networks that, if they do not happen or work poorly, constitute a barrier to the sharing of tacit knowledge.

At the level of resources and infrastructures, for Probst et al. (2000), the offices or departments of organizations tend to be organized according to management hierarchies or seniority rather than arranged in a way that promotes the closeness of people who need to work together regularly. Such a scenario is particularly burdensome and constitutes a great barrier when the knowledge one wishes to share is tacit knowledge. For Gold et al. (2001), it is important that work processes provide enough space to allow people time to generate and share knowledge and then identify those who may be interested in sharing it. According to these authors, a deficiency of formal and informal spaces where employees can interact often creates barriers to tacit knowledge sharing.

Thus, we present as starting questions for this study: What are the main factors for sharing tacit knowledge in FBs in Portugal? What are the main types of barriers facing the sharing of tacit knowledge in FBs in Portugal?

Data Collection and Methodology

For the present investigation an exploratory methodological approach was adopted, in order to better understand the indicators of tacit knowledge sharing within the FBs that most influence the factors leading to this sharing and which are the main barriers to this sharing. At first, a review of the literature on these indicators and barriers was made, and 14 indicators in Table 1 and 36 barriers in Table 2 were determined. Based on these indicators and barriers, a questionnaire was designed to respondents on the prevalence of each of the indicators under analysis. The questionnaire was composed of three parts, the first consisting of a set of generic questions about the respondent. The second and third parts were composed of 14 and 36 multiple-choice questions, respectively, according to the Likert scale with five response categories, ranging from “totally disagree” to “strongly agree”. Each question aimed to determine the degree of agreement on the prevalence of an indicator or barrier to tacit knowledge sharing.

The FBs were the chosen NPO, due to the voluntary bond with which the operatives carry out their functions in a sensitive area such as the prevention and relief of fires and all types of accidents. It is important to note that during the year of 2017 two major fires took place in Portugal, responsible for more than 500,000 ha of burned area, the first between 17 and 24 June in the Municipalities of Pedrogão Grande, Castanheira de Pêra, Ansião, Alvaiázere, Figueiró dos Vinhos, Arganil, Góis, Penela, Pampilhosa da Serra, Oleiros, and Sertão, where 64 people died and 490 dwellings and 50 industrial units burned. The second was between 14 and October 16, along 30 municipalities in the central region of Portugal, where 48 people died and 521 industrial units burned down, which were responsible for 4500 jobs. These events have refocused the importance of the activity of FBs in the area of civil protection and have launched a series of reflections with civil society, which, according to the Report of the Independent

Table 1 Rotated matrix component of tacit knowledge sharing indicators in FBs

Indicators	Factors		
	1—Organizational culture	2—Individuals characteristics	3—Organizational structure
11. Favorable environment for questioning	.736		
12. Kind of valued knowledge	.721		
13. Communication	.666		
14. Physical space	.591		
10. Power	.537		
8. Transmission of knowledge	.535		.503
6. Recognition and reward	.451	.418	
3. Mutual trust		.793	
2. Common language		.760	
1. Individual time management		.754	
5. Hierarchy			.791
4. Relationship network		.469	.637
9. Knowledge storage			.624
7. Type of training for the task	.538		.557

Source: Authors' own elaboration

Technical Commission for these events, require the knowledge, qualification, and the need to adopt best governance practices of the Portuguese forest. Thus, firefighters of FBs were chosen as respondents who anonymously and voluntarily adhered to the questionnaire. In line with the presented, the sample perfected a total of 380 firemen. In order to identify and eliminate possible problems of the questionnaire, a pre-test was carried out with 32 firefighters from Brasfemes FB. The application of the questionnaire was done using an online survey tool, called Google Forms. Once the data of the 380 respondents were collected during the month of September 2018, the reliability or internal consistency of the indicators and barriers was verified by calculating Cronbach's alpha, which according to Hair et al. (2005), is the reliability test of the internal consistency of the most adopted scale. We then proceeded to an exploratory factorial analysis, in order to obtain a reduction of data through its grouping into factors; thus, it is possible to diagnose the leading factors and the groups of barriers that effectively influence this phenomenon and to determine which indicators influence each factor conducive to the sharing of tacit knowledge within FBs. Initially, the Bartlett sphericity test was applied, and the Kaiser-Meyer-Olkin (KMO) test statistic was obtained, both tests verifying the adequacy of the data to the factorial analyses. Then, the principal component analysis (PCA) method was applied based on the correlation matrix, in order to obtain a minimum number of factors responsible for the maximum data variance. The minimum number of factors related to the indicators

Table 2 Rotated matrix component of barriers to tacit knowledge sharing in FBs

Barriers	Components									
	1	2	3	4	5	6	7	8	9	10
Insufficient or non-existent communication	.731									
Internal competitiveness	.712									
Hierarchical structure	.702									
Lack of benefit communication	.679									
Size of the organization	.570									
Need for cultural change	.511									
Low retention rate of knowledge	.508									
Different levels of experience	.441		.439							
Shortage of time for contacts	.437									
IT inadequate to internal communication		.807								
IT inadequate to the needs		.800								
Insufficient technical support		.770								
Insufficient IT		.758								
IT with no potential for better performance		.692								
IT difficult to use		.545								
Different cultural origins			.802							
Different genres			.770							
Different levels of schooling			.571							
Different generations or ages			.530							
Different languages			.481							
Information overload				.719						
Extra and intrusive activity				.703						
What I do leads to the absence of sharing				.496						
Time to meet needs					.863					
Time to share					.858					
I do not recognize advantages						.660				
Lack of recognition and reward						.605				
I do not like other FBs copies							.709			
Trust in the knowledge of others							.437			
Lack of access to social networks								.763		
Privilege to physical and documentary support								.576		
Incompatible with organization objectives								.409		
Strong sense of hierarchical structure									– .593	
I am afraid to share									.516	
Difficulty of interpersonal relationship									.497	
Lack of resources and infrastructures										.834

Source: Authors' own elaboration

was fixed using the eigenvalues, and only the factors with eigenvalues greater than 1 were maintained, according to the latent root method. The same exercise was applied to the calculation of the main groups of barriers. Finally, the Varimax orthogonal rotation method was used in this study, which according to Hair et al. (2005), aims to simplify the columns of the factorial matrix, providing a clearer separation of factors.

Presentation and Discussion of Results

Factors of Tacit Knowledge Sharing in FBs

Once the factorial analysis of the data obtained through the responses to the questionnaires by firefighters was carried out, as described in the previous section, it was possible to find the structure of factors relevant to the transfer of tacit knowledge, according to Table 1.

The first factor found was “organizational culture”, composed of the following indicators: (11) Environment favorable to questioning, (12) Type of knowledge valorized, (13) Communication, (14) Physical space, (10) Power, (8) Recognition and reward, and (7) Type of training for the task.

In this respect, it should be said that the current organizational culture is defining the existence of a favorable environment for questioning and, consequently, tacit knowledge sharing, where, according to Cross et al. (2001), each element can openly acknowledge its ignorance on certain subjects and where constructive criticism is well accepted. It is the organizational culture that, according to Leonhard and Sensiper (1998) and Haldin-Herrgard (2000), emphasizes the type of knowledge valorized, favoring forms of tacit knowledge such as personal skills or intuitions, to the detriment of standardized training actions and non-differentiating, where logic or rationality prevails as a dominant method. It is also in the organizational culture that the most prevalent forms of communication are found. For Leonhard and Sensiper (1998) and Haldin-Herrgard (2000), the promotion of personal and informal conversations is very valid as a form of communication for tacit knowledge sharing, as it allows the use of body language, the demonstration of personal and obtaining optimal and immediate feedback. It is deeply rooted in the organizational culture; the promotion or inhibition of this type of interaction is between the people who constitute it. Closely related to the form of communication are the physical spaces suitable for the same purpose. For Young (2010), spaces open to interactions that foster team collaboration and enable experimentation are conducive to sharing tacit knowledge. The availability of physical or even virtual spaces, such as the provision of access to social networks or teleconferences, is related to the culture of the organization. The organizational culture is also the main promoter of the perception of loss of power, influence, or privileged work position over other elements of the organization when sharing the knowledge of the holder. For Szulanski 1996Davenport and Prusak (1998), and Disterer (2003), the privilege is of stopping rare knowledge and the association thereof to an increase in power, rather than a matter of organizational structure or individual perception, of something culturally instituted in the organization. Although tacit knowledge is focused on people, it is the current organizational culture that determines the focus on their transmission or sharing. According to Nonaka and Takeuchi (1995), Leonhard and

Sensiper (1998), the organizational structure of the organizational structure (Jóia 2007), if this privileges the interaction between the people that compose it, the focus will be on dialogue and interaction, to the detriment of coding and storage for later consultation of knowledge. Reward and recognition by sharing tacit knowledge rather than being decreed by the organizational structure are considered to be part of the organizational culture. For Szulanski (1996) and Disterer (2003), the individual motivation that this exerts on the elements of the organization leads to include this indicator as influential in the factor relative to the individual characteristics. However, for the recognition and encouragement that can occur between peers, it reveals that the organizational culture is determinant for the individual sensation of recognition and reward for the sharing of tacit knowledge. The type of specialized training that promotes the acquisition of skills and tacit knowledge to perform tasks can be “enacted” by the organizational structure; however, their prevalence as part of the organizational culture is highly conducive to sharing tacit knowledge. For Disterer (2003) and Leonhard and Sensiper (1998), the adoption of processes such as mentoring or coaching is revealing of the importance that the organization attributes to the type of training aimed at this tacit knowledge sharing.

The second factor found is “individual characteristics”, composed of the following indicators: (3) Mutual trust, (2) Common language, (1) Individual time management, (4) Relationship network, and (6) Recognition and reward.

In relation to individual characteristics, innate to the person who belongs to an organization, there are determinants for the success of tacit knowledge sharing. The ability of a person to create and feel a sense of mutual trust between individuals favors the sharing of tacit knowledge. For Roberts (2000) and Davenport and Prusak (1998), the smaller the sense of diminishing risks and uncertainties in tacit knowledge sharing is, the greater is the individual’s ability to establish stable, secure, and trustworthy relationships among individuals. In this exercise of tacit knowledge sharing, and because the greater the tacit experience, according to Haldin-Herrgard (2000), the greater the difficulty of verbalization is, the greater is the importance of using a common language as well. For Haldin-Herrgard (2000), Davenport and Prusak (1998), and Disterer (2003), it is important that the sender and the receiver are in tune since they have highly individualized and personalized knowledge sharing experiences, being dependent on the intervening to adopt a language where both use the same terminology or expressions. Since time, according to Davenport and Prusak (1998), is an increasingly scarce resource within organizations and how sharing tacit knowledge can be time-consuming, as Haldin-Herrgard tells us (2000), what each element does with its available time is increasingly an individual option. It is not a question here of checking whether the elements have more or less time available, but rather what each one does with the free time they have in an organizational context, which can be channeled to tacit knowledge sharing, and much depends on the individual decision made. Within an organization, there are always elements that hold a greater source of tacit knowledge than others. Both from the perspective of those who have this knowledge and from the perspective of those who seek it, the network of relationships to which each element has access is determinant for this sharing to be done most effectively. For O’Dell and Grayson (1998), both the issuer and the receiver of this knowledge may not know who has or who needs this knowledge, something that the organizational structure can promote, fostering the approximation of the parts. However, the starting point for this process should come from an individual impulse to seek

tacit knowledge or an impulse to share it, later supported by the organization's internal network.

Although it is the organizational culture to foster an environment of reward and recognition for the sharing of tacit knowledge, for Szulanski (1996) and Disterer (2003), it is only effective if it finds echo in what individual expectations are intrinsic to the person. What can serve as an incentive or reward for one person can have a counterproductive effect for another, so it is an exercise that facilitates the sharing of tacit knowledge, but that which is based on the intrinsic characteristics of the individual.

The third factor found is "organizational structure", composed of the following indicators: (5) Hierarchy, (4) Relationship network, (9) Knowledge storage, (7) Training type for the task, and (8) Knowledge transmission.

According to Disterer (2003), bureaucracy and formality can act as an obstacle to the sharing of tacit knowledge. For O'Dell and Grayson (1998), this style of structure favors behaviors that discourage exchanges of experience and tacit knowledge, since the elements, rather than seek to achieve the goals of the organization, may seek to achieve their own goals. For Szulanski (1996), Fahey and Prusak (1998), and Sun and Scott (2005), the strong presence of a hierarchy leads to a reduction of time, flexibility, and the willingness to informality, ideal for sharing tacit knowledge. In addition to the individual use that each element can make of the relationship network at its disposal, it is important to mention that this indicator is also present in the organizational structure. Since the relationship network, according to Davenport and Prusak (1998), leaves which is potentially impaired by the departure of the hierarchy, the elements of the hierarchical pyramid base do not have as much access to the elements that make up the top of the pyramid as potentially more tacit knowledge and which could contribute to the more effective sharing of tacit knowledge. Through the organizational structure, this network of relationships does not favor the sharing of tacit knowledge. More than the individual will or the organizational culture, it is the organizational structure that is responsible for orienting the focus of knowledge stored in databases that promote the sharing of explicit knowledge, or in people, promoting the sharing of tacit knowledge. For Nonaka and Takeuchi (1995), Leonhard and Sensiper (1998), Hansen, Nohria and Tierney (1999), and Jóia (2007), in this case, a strategy oriented to the storage of knowledge in people themselves presupposes a high level of personalization of knowledge and thus is privileging and promoting the sharing of tacit knowledge. It is the responsibility of the organizational structure to implement strategies aimed at sharing tacit knowledge and promoting a specific type of training for the task, such as mentoring and coaching.

For Jóia (2007), the adoption of strategies that provide for the exchange of experience of elements with greater tacit knowledge with others more inexperienced or those who come back to the organization is something that is within the reach of the organizational structure. For Jóia (2007), its implementation reveals the importance that the organization gives to the sharing of tacit knowledge. Although the transmission of knowledge is closely linked with the organizational culture, it is the organizational structure that promotes the conditions for this transmission to occur effectively. For Nonaka and Takeuchi (1995), Leonhard and Sensiper (1998), Hansen et al. (1999), and Jóia (2007), if the organizational structure option rests on the adoption of strategies aimed at contact between people, tacit knowledge is fostered; on the other hand, to

Hansen et al. (1999), if the organizational structure promotes strategies that rely on the reuse of codified knowledge, there will be no great interaction between people, but between people and technology, so the focus is centered on the explicit sharing of knowledge.

Barriers to Tacit Knowledge Sharing in FBs

After completing the factorial analysis of the data obtained through the responses to the questionnaires by the firemen regarding the barriers to tacit knowledge sharing, it was possible to find 4 types of barriers most prevalent in these organizations, according to Table 2.

The first type of barrier identified in the study are the communication barriers included in component 1. This type of barrier is composed of the following barriers: insufficient or non-existent communication, internal competitiveness, hierarchical structure, lack of communication of benefits, size of the organization, need cultural change, low rate of retention of knowledge, different levels of experience, and shortage of time for contacts.

The first communication barrier identified in the present study is insufficient or non-existent communication. Communication is fundamental to the organization, as Davenport and Prusak (1998), Hendriks (1999), and Meyer (2002) refer. These authors tell us that communication may have a verbal or written nature, whereas Riege (2005) tells us that personal interactions are fundamental for tacit knowledge sharing, so the lack of communication that places the actors in interaction proves to be a very important barrier.

Internal competitiveness within the FBs can also be considered a barrier to this sharing, since the structure of the organization is based on a paramilitary logic—pyramidal, formal and relatively bureaucratic, and not flexible. In these contexts where internal competitiveness is enhanced in view of career progression, it is relatively easy to determine the prevalence of a barrier of this type. This barrier is also echoed in the literature, namely through the contributions of Holste and Fields (2010) and Riege (2005). Following these considerations, another barrier naturally arises based on the hierarchical structure. In this particular point, it should be noted that the distance between the top and the bottom of the hierarchical structure of the FBs promotes a separation between people, which usually corresponds to those with greater experience and less tacit knowledge. This distance leads to less communication, or even to its absence, which in many cases undermines the sharing of tacit knowledge. This barrier is echoed in the literature through Joia and Lemos (2010). The lack of communication of the benefits of tacit knowledge sharing is another communication barrier that the present study was able to ascertain. According to Riege (2005), it is the responsibility of the organization's management or administration to communicate that the objectives or strategies go through the adoption of tacit knowledge-sharing practices, their advantages, and their respective forms of reward and recognition.

The lack of this effective communication to subordinates rises as a barrier to the sharing of tacit knowledge. The size of the organization is another barrier identified in this study and is echoed in the contributions of Connelly and Kelloway (2003) and Sveiby and Simons (2002). For these authors, the size of the organization or functional departments, when too large, can hamper tacit knowledge sharing activities. In the

center of FBs, we find organizations of different dimensions, so the present barrier makes sense even though we have not ascertained what FBs are small, medium, and large. The need for cultural change is another barrier that we find in the present study. According to Sveiby (1997), the culture of an organization can be compared to its spirit and that which emanates from that spirit and that leads to the fulfillment of the mission, whether through the focus on customer satisfaction, profit making, and betting in research and development, among others. In a tacit knowledge-sharing logic, where communication is determinant, the need for cultural change within the FBs is to provide these organizations with a communicational culture that can mitigate or eliminate this barrier that was clearly identified in the present study. The low knowledge retention rates of the most experienced elements was another communication barrier identified in this study. All organizations have elements that hold more experience or tacit knowledge. For Riege (2005) and Stauffer (1999), whenever there is a prolonged absence or withdrawal from these elements of the organization to which they belong, it is a great source of tacit knowledge that is no longer available or is hopelessly lost. Timely adoption of communication strategies can avoid these unreliable scenarios to tacit knowledge sharing.

The coexistence of people with different levels of experience, according to Riege (2005), can be considered as an obstacle to the sharing of tacit knowledge, since it may prevail for the more experienced; the feeling that it is not relevant to communicate with the less experienced, as they may not understand the message, or even if communication is established, the less experienced will be able to have the same level of knowledge as the more experienced, questioning its importance within the organization. This was a clearly identified barrier for the FBs. The last communication barrier identified was the shortage of time to establish contacts and increase the relationship between people, who according to O'Dell and Grayson (1998) and Michailova and Husted (2003) refer, although the managers of the organization alert the need and the benefits of tacit knowledge sharing, the shortage of time that the employees have for the most different tasks leads them to choose to do immediately what can be translated into a visible or palpable result for the organization, which takes into account the prerequisites ideal for an effective sharing of tacit knowledge. The relationship between people and the constitution of a relationship network, even if informal, is fundamental for communication to flow and thus combat this barrier that is also present in FBs.

The second type of barrier identified in the study are the technological barriers included in component 2. This type of barrier is composed of the following barriers: inadequate information technologies for internal communication, inadequate information technologies, insufficient technical support, insufficient information technologies with no potential to improve the performance of FB elements, and difficult to use information technologies.

In relation to these types of barriers, we can see that they may be inadequate, both for internal communication within FBs and for their needs in general, and that these are barriers that are found in the literature (Riege 2005). For this author, the possibility of poor technical support is another technological barrier, which is also echoed in this study. Insufficient and difficult-to-use technology with no potential for improving the performance of firefighters are other barriers pointed out by Riege (2005) whose prevalence is verified in this type of organization.

The third type of barrier identified in the study is personal barrier, which is based on the individual characteristics of the people who make up the organization, their perceptions, feelings, or preferences.

In the present study, it was possible to find 6 subtypes of personal barriers: individual differences (component 3), individual perception of sharing costs (component 4), lack of time (component 5), recognition and reward (component 6), vision of others (component 7), and preference for explicit knowledge (component 8).

Thus, the first subtype of personal barrier is the personal differences that are based on different cultural origins, genres, levels of education, generations or ages, languages, and levels of experience. In this regard, it should be noted that these personal barriers are echoed in the literature, since for Ives et al. (2000), Chow et al. (2000), and McDermott and O'Dell (2001), there are several studies that point out the different cultural origins as barriers to the sharing of tacit knowledge, since they are responsible for giving the person a set of values, principles, practices, or symbolologies not necessarily consistent with those practiced in the organization. Sveiby and Simons (2002) and Sveiby (2003) point out differences in gender, schooling, or generation or ages as the focus of potential barriers, since they may be responsible for giving people different expectations, attitudes, postures, or commitment to the organization, and the organizational context may not correspond to everyone in the same way. In terms of different languages, but according to the business answer, we can consider the contributions of Terpstra and David (1991), who tell us that these differences may also restrict the sharing of tacit knowledge, but that the present study also found togetherness of FBs. Regarding different levels of experience, Riege (2005) also refers to this as a potential barrier in an organizational context, since individual experience interferes with individual expectations that do not necessarily have to be compatible with the expectations of the rest of the organization.

The second subtype of personal barrier is the individual perception of the costs of tacit knowledge sharing, since this sharing can be seen as an overload of information, be considered as an extra or intrusive activity or make pass the sensation that the action of the person does nothing to contribute to the sharing of tacit knowledge and thus to abandon the efforts leading to this sharing. For Nonaka and Takeuchi (1995) and O'Dell and Grayson (1998), if there is no specific focus of the organization on the sharing of what is tacit knowledge, easily the vicissitudes of the functions that people perform lead them to choose a more accessible and immediate knowledge, starting to consider what is tacit as something extra, secondary, or even intrusive and an information overload, not essential for the good performance of its functions. Once again, this barrier has also been identified within the FBs.

The third subtype of personal barrier is the lack of time, either for sharing tacit knowledge or for identifying who needs to receive this knowledge. These barriers are echoed in the literature through the contributions of Michailova and Husted (2003), who tell us that people naturally seek to occupy their time in activities that translate into the accomplishment of tasks in a short time and that this is not always compatible with the sharing of knowledge with the characteristics of tacit knowledge.

The fourth subtype of personal barrier is recognition and reward, in the sense that the poor perception of advantages in sharing tacit knowledge and the reduced realization that the effort at this sharing is not recognized or rewarded by the organization can lead to the abandonment of these practices. In this respect, it is important to mention the

contributions of Riege (2005), which tells us that it is in the nature of the human being that he must see his contribution recognized, valued, and rewarded and that the perception of the absence of this reward can constitute a barrier to tacit knowledge sharing, a fact that was also observed in the present study.

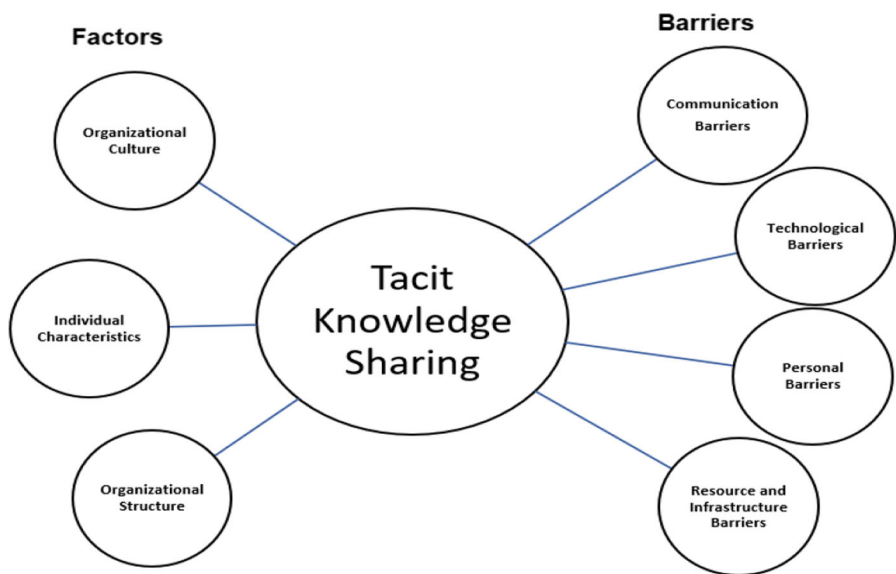
The fifth subtype of personal barrier is the view of others, since according to personal characteristics, each element of the organization may have greater or lesser pleasure or satisfaction in seeing its replicated knowledge, either by other elements of the same organization, or by elements of other organizations. Likewise, the sense of trust that each element has in relation to what others transmit to it can also constitute an important barrier to the sharing of tacit knowledge. In this respect, the contributions of Probst et al. (2000), Tiwana (2002), and Lelic (2001), who tell us that it is possible to detect some fear in sharing knowledge on the part of the organization with the managers or the managers for the lack of knowledge of their intentions about what they will do with this knowledge. Riege (2005) also tells us that lack of trust can be a barrier to tacit knowledge sharing, particularly because without this confidence about what others will do with shared knowledge, sharing is reduced. The same is true when faced with someone with little credibility, since the recipient of the knowledge will not value it and since it does not trust its issuer.

The sixth subtype of personal barrier to tacit knowledge sharing is the preference for explicit knowledge, either by giving priority to social networks or other physical media, in documentary, or other forms of distance communication, which reduces personal contact and the interaction by which tacit knowledge is transmitted, or because it is ultimately considered that this sharing is not in line with the organization's objectives. All these barriers that favor explicit sharing of knowledge were identified in the present study and in this regard, it is important to consider the contributions of Nonaka and Takeuchi (1995) and O'Dell and Grayson (1998). We need to emphasize the need for greater tacit knowledge sharing while at the same time sensitizing employees to how this is not an easy task to achieve.

The fourth type of barrier identified in the study are the resource and infrastructure barriers included in components 9 and 10. This type of barriers is composed of two subtypes of barriers: presence of formal sense and structure (component 9) and physical and materials (component 10).

The first subtype of barrier to resources and infrastructures is composed of the following barriers: tacit knowledge sharing is incompatible with organizational objectives, strong sense of hierarchical structure, fear of sharing, and difficulty of interpersonal relationship. Regarding the presence of formal meaning and structure, it is important to mention that this is one of the reasons why there is some fear of sharing tacit knowledge by firefighters, since according to De Long and Fahey (2000) one can be in front of where there is not much tolerance of the superiors towards the error of the subordinates, having little space for learning through mistakes or lessons learned. The FBs are an organization that build their internal organization in a strong presence of formal sense and pyramidal hierarchical structure, under logics of paramilitary functioning, that in a way promote the distance between people and that provide greater difficulties of interpersonal relationship, namely between elements of different levels of hierarchy.

The second subtype of resource and infrastructure barriers is the physical or material barrier, which is also reported in the literature by Probst et al. (2000) and Gold et al.



Source: Authors' own elaboration

Fig. 1 Factors and types of barriers to the tacit knowledge sharing in Portuguese FBs. Source: Authors' own elaboration

(2001) and also in the FBs, since these physical spaces or material ideas needed to create an environment conducive to the sharing of tacit knowledge is seen as being far from ideal. In FBs, this barrier is verified essentially to the level of the inadequacy of the functional areas and to the absence of suitable conditions for learning through training of competencies.

Figure 1. presents the different factors and types of barriers to be taken into account for the study of tacit knowledge sharing in FBs in Portugal.

Conclusions

Taking into consideration the objectives of the study, it can be concluded that the 14 indicators of tacit knowledge sharing are relevant in at least one factor of this sharing, even though the indicators (4) relationship network, (6) recognition and reward, (7) type of training for the task, and (8) transmission of knowledge are relevant in two of the three factors found. Through the factor analysis, it is possible to conclude that the 14 indicators can be grouped into 3 factors that influence tacit knowledge sharing (organizational culture, individual characteristics, and organizational structure).

It is also possible to conclude that the barriers to knowledge sharing in the organizations studied are of four different types: communicational, technological, personal, and resource barriers or infrastructures, and it is possible to identify within the personal barriers 6 subgroups of barriers (personal differences, costs of sharing, lack of time, recognition and reward, vision of others, and preference for explicit knowledge), as well as within the typology of resources and infrastructures, and it is possible to identify

two subgroups of barriers (presence of formal meaning and structure and resources, physical or material).

Limitations and Recommendation

For future work, and since we are dealing with non-profit organizations, it is recommended that a study be carried out to evaluate the impact of this knowledge sharing on organizational performance, especially in regard to the fulfillment of its missions. It is also suggested to carry out studies that point out solutions to better overcome the barriers identified in NPOs.

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