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How to Overcome Barriers to Sharing Tacit Knowledge in Non-Profit Organizations?

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Abstract
This paper aims to elaborate a diagnosis and performance matrix concerted on the increment of human capital value by sharing tacit knowledge in non-profit organizations. The following objectives were defined: determine which indicators of tacit knowledge sharing are appliable; determine the measures to be implemented, aiming the augmentation of tacit knowledge sharing and learning organizational. Interviews were conducted with the commanders of volunteer fire brigades in Portugal. It was possible to create a diagnosis and performance matrix to increase the tacit knowledge sharing in these organizations. The application of this matrix improves the tacit knowledge sharing and consequently increases the human capital value. The option of a multiple case research of organizations such as voluntary fire brigades is unique in its action and identity, enabling such organizations with competencies to improve their performance with the purpose of mitigating tragic circumstances that may lead to the loss of human lives.

Keywords Tacit knowledge · Organizational learning · Indicators · Human capital · Non-Profit organizations

Introduction

Over the past years, there has been an exponential increase in the tertiary sector all over Europe, specifically in non-governmental or non-profit organizations. However, this development was not uniform across all member states especially in states where local civil societies are considered to be weak (Clarke, 2016; Sotiropoulos, 2005). Being so, member states, such as Poland, Romania, and Bulgaria as well as countries in southern Europe such as Greece are increasingly developing non-profit organizations. Such organizations are assisting

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unfavorable classes in social matters. These social issues have been aggravated due to financial crises and refugee calamities (Zbuchea et al., 2019). In the recent years, Portugal was also affected by economic and financial crises, forest fires and more recently the covid19 pandemic.

In this context, the most successful organizations are those based on knowledge (Kessler, 2006; Kong, 2015). These organizations have the ability to implement knowledge management strategies that may maximize the use of knowledge in their services or products, thus minimizing losses. Knowledge-based organizations must have inventiveness, creativity, and innovation. However, it is not easy for non-profit organizations to become knowledge-based organization as the surrounding environment on which they operate is constantly being affected by internal and external changes (Banks et al., 2015). Regarding the internal environment, many non-profit organizations depend on human resources who are loyal volunteers as they collaborate for the cause and not for employment or financial opportunity. However, human resources are extremely moveable, as organizations do not have the capacity to offer long-term contracts (for those who are not volunteers), which leads to job uncertainty and consequently knowledge loss. Concerning the external environment, some non-profit organizations face difficulties to recruit volunteers as funding opportunities are sometimes scarce or very bureaucratic to obtain and government policies not always include all non-profit organizations (Banks et al., 2015; Zbuchea et al., 2019).

Previous studies on knowledge management in non-profit organizations are focused on the organizational context, more specifically, on knowledge transfer from the point of view of the infrastructure and organizational facilitators (Hasnain & Jasimuddin, 2012; Martin-Perez et al., 2012; Rathi et al., 2014). In this context, the Portuguese Voluntary Fire Brigades (FBs) are non-profit organizations and represent the main intervention force, both in fire prevention, firefighting and relief delivering to people and property in the event of accidents regardless its nature (Oliveira & Pinheiro, 2019). The operations of non-profit organizations need to incorporate the knowledge produced each day in the field. This tacit knowledge is an asset that is not easily found in other types of organizations, such as state services or companies (Zbuchea et al., 2019).

FBs are constituted by people who carry out their activities based on volunteerism, whereby the use of professionals is intended exclusively to guarantee the provision of minimum regulatory services. Due to this volunteer link and the area of activity, tacit knowledge sharing of firefighters in viewed as an organizational learning of great importance and possibly decisive in operational success. However, this sharing is not easy to establish as a regular practice. Thus, this paper presents the results of a research on tacit knowledge sharing with the FBs commanders by assessing the prevalence of the main indicators mentioned in the literature translated into a valid diagnosis matrix to determine the effectiveness of sharing and subsequently converted into an performance matrix that may be adopted by the management of these organizations as an effort to provide FBs with greater organizational learning through this type of knowledge. This study complements the results of the article by Oliveira and Pinheiro (2020).

For Hislop (2007), knowledge sharing is achieved by members of an organization who share relevant ideas for the task (skills, experience, and understanding), information and suggestions amongst researchers, policy makers, and service providers. For Hong et al. (2011), knowledge sharing indicates the dissemination of knowledge to improve the work of the entire organization and can be characterized by the transfer of part or the totality of knowledge from one person to another. For these authors, this knowledge sharing is a process by which knowledge once maintained by an individual is now converted into a form that can be understood, absorbed, and used by other individuals. By reviewing the literature on tacit knowledge sharing, it was possible to determine the following indicators that comprise units of analysis: time and opportunity, common language, mutual trust, network of relationships, 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, and communication. The determination of the prevalence of these indicators in the organizations under study enables to meet the first objective and leads to the presentation of a set of measures to be implemented aiming the promotion a more effective sharing of tacit knowledge, which is sought with the second objective of this study.

This paper starts with an introduction followed by the literature review that takes into account the main topics covered in the research. Next, the results are presented and discussed, followed by the conclusions, research limitations, and recommendations for future studies.

Theoretical Framework

Tacit Knowledge and Sharing

Although the beginning of discussions on the nature of knowledge dates back to Socrates and Plato, reflections on tacit knowledge only gain visibility with the studies of Polanyi (1962). Polanyi's contributions to the notion of tacit knowledge were first introduced in management literature by Nelson and Winter (1982) and later spread by the proponents of knowledge-based view (Grant, 1996; Kogut & Zander, 1992; Nonaka & Takeuchi, 1995; Spender, 1996).

For Nonaka (1994), explicit knowledge is codified and can be easily communicated and transferred. Explicit knowledge can be presented in the form of manuals, plans, procedures, amongst others. In contrast, tacit knowledge is implicit, difficult to conceptualize, subjective, and composed of the individual's experiences. According to Venkitachalam and Busch (2012), tacit knowledge is evidenced in the form of behaviors or actions and is often highly ambiguous. For these authors, this type of knowledge has an important cognitive dimension and includes mental models, beliefs, and perspectives. Mooradian (2005) complements that knowledge develops interactively over time, through shared experiences and the inherent know-how is reflected in the individual skills resulting from learning and practice.

Davenport and Prusak (1998) describe some characteristics of tacit knowledge that make its transfer a challenge. To these authors, tacit knowledge is difficult to

encode in documents or databases; it is developed and internalized over a long period of time and within a specific cultural environment; the process of making tacit knowledge is not always a conscious process and some of this tacit knowledge may not even be capable of representation outside the human mind. Sveiby (1997) considered tacit knowledge as a personal knowledge being difficult to express, formalize, or share and available in intangible formats. For Muralidhar (2000), tacit knowledge is what people internalize through observation and experience learning, therefore not readily available to transfer to another person. Hislop et al. (2018) suggest that tacit knowledge is difficult to articulate as it can be subconscious. The characteristics of tacit knowledge make it difficult to disincorporate from people and later codified. For Nonaka (1994) and De Long and Fahey (2000), tacit knowledge is reflected in human actions and in their interactions with the social environment.

According to Nonaka and Takeuchi (1995), nearly two thirds of the information received in work context is transformed into tacit knowledge through: face-to-face interaction; such as informal conversations; direct interaction; storytelling; mentoring; networking or internships, resulting on a complex task to compile Mongkolajala et al. (2012); furthermore, it requires communication between co-workers in order to capture this type of knowledge. Sharing tacit knowledge will increase the value of human capital (Hsu, 2008).

To transfer tacit knowledge, extensive personal contact, regular interaction, and trust should exist between the parties involved. Tacit knowledge is shared when its owner or holder joins a network or community (Mongkolajala et al., 2012).

Bloodgood and Salisbury (2001) argues that there are two processes of sharing tacit knowledge: directly through personal contacts with other employees of the organization and indirectly through information and communication technologies. In the first case, and according to Falconer (2006) and Szulczyńska and Majewska (2014), we can take as an example the knowledge obtained through participation in personal meetings, meetings between employees who need support, direct observations, amongst others. In the second case, and according to King and Marks (2008) and Szulczyńska and Majewska (2014), we may consider the Internet and Intranet networks, e-mails, databases, videoconferences, and teleconferences.

Indicators for Sharing Tacit Knowledge

In order to ascertain the existence of tacit knowledge sharing within the organization, it is possible to compile a set of indicators echoed from the literature (Oliveira & Pinheiro, 2019); these indicators were adopted for the present research and are portrayed as follows: (1) individual time management; (2) shared language; (3) mutual confidence; (4) relational network; (5) hierarchy; (6) recognition and reward; (7) type of training for the task; (8) transmission of knowledge; (9) storage of knowledge; (10) power; (11) environment favorable to questioning; (12) type of knowledge valued; and (13) communication.

Organizational Learning and Tacit Knowledge Sharing in Non-Profit Organizations

According to Castilho et al. (2004), learning can be understood as a process of change caused by various stimuli mediated by emotions, which may or may not produce alterations in people's behavior. To these authors, there is a distinction between the learning process, which occurs within the organism of the learner and the responses issued by the individual, which can be observable and measurable.

Intrinsically linked to the concept of learning we should take into account the notions of knowledge and organizational knowledge. Davenport and Prusak (1998), refer to individual knowledge as being highly dynamic. According to these authors, to use organizational knowledge more effectively there should be a need to better understand the forces that drive it. Thus, according to Duncan and Weiss (1979), the analysis of organizational learning takes us to a systemic level and not to an individual level, which results on a process through which knowledge results from the organization's interaction with the environment.

The focus of research on knowledge sharing has been centered essentially on the public and private sectors. As a motivation for this impulse of research in the private sector, it can be suggested to provide organizations with knowledge management (KM) to obtain competitive gains; as for the public sector, it is recommended to search for other paths to reduce costs and improve efficiency (Ragsdell, 2013). The scarce work available on KM is aimed to non-profit organizations (NPO) according to Ragsdell (2016) and represents the first steps to be taken in an area that offers immense research opportunities.

According to Fottler (1981), the relevance of deepening the investigation on knowledge sharing aimed to the tertiary sector will increase on the organizations that work in this sector, leading them to operate in extremely dynamic and complex contexts. This research can lead to valuable conclusions on organizational behaviors.

Amongst the references of environmental complexity in which the NPO operates that may influence the KM process or strategy, in the literature, we can find abundant references on the following: uncertainty and lack of financial stability (Gronbjerg, 1991; Phillips & Hebb, 2017), heterogeneity and ephemerality of human resources (Ragsdell, 2013; Reed & Selbee, 2000), cultural specificity (Banks, 1999; Oliver & Reddy Kandadi, 2006; Sackmann, 1992), and the organizational structure (Earl & Scott, 1999; Webster & Wong, 2008).

Following these specificities, and, since NPO's are organizations that are part of a society that increasingly play a fundamental role in the transfer and sharing of knowledge, it is important to mention that more and more, their action is focused on knowledge acquisition through part of the human resources that compose it. Most of this knowledge is tacit and can be found in the minds of the employees, thus making it difficult to generalize it across the organization as a whole or by interested parties. According to Davenport and Prusak (1998), once the tacit knowledge is made explicit, the organization is at a lower risk of losing its intellectual capital when employees leave the organization.

As such, knowledge sharing can be seen as a viable approach to solve organizational issues such as the competitive pressure to which they are gradually subjected,

as well as the need for innovation. Effective knowledge management also leads to less time to adapt to the market, improved innovation, and improved personal productivity (Miller, 1996).

Data Collection and Methodology

In the present research, a qualitative methodology was used, specifically, the research of multiple cases.

According to Creswell (2009) and Kothari (2004), a case study method is a form of analysis where an investigator focuses on a single entity or unit and studies it intensively in order to obtain information to allure the correct inference. For these authors, a case study examines the depth of a unit of analysis in an exhaustive and comprehensive manner. Regarding the study of multiple cases, according to Yin (2017), it is a holistic approach with simple multiple design, where a literal replication occurs in all cases and, later, a comparison is made to verify convergences and/or divergences in the results. For the same author, the study of multiple cases is valid and applicable when the research strategy seeks to answer to questions such as "how?" or "why?". For Merriam and Tisdell (2015), the study of multiple cases is a description and an in-depth analysis of a phenomenon or social unit as an individual, group, institution or community, and this type of investigation is consistent with the objectives proposed for this study, ensuring that it does not seek to establish perennial causal relationships, but rather to explore rational explanations for the phenomenon.

According to Creswell (2009), this approach allows a systematic analysis and observation of facts in the natural environment. This type of approach is interpretive in nature. By building patterns, the researcher is able to interpret what he perceives, what he hears and what he sees during the research. According to Kothari (2004) and Neuman (2020), this type of approach also opens some space for flexible variables that can change objectives along the progression, which will also provide opportunities for researcher to record unexpected events, which will increase the healthiness of results. Due to the natural environment where it occurs, the researcher will be able to observe forms of behavior, and how and when they occur.

Thus, a questionnaire was built with 13 open questions that resulted from literature review (one per indicator). Semi-structured interviews were carried out, given the possibility for the interviewees to influence the interview process with relevant information around broad themes arising from their experience in the work context, or from personal development (Myers, 2004). This methodology is the most suitable for this research since the authors were able to research a specific reality which allowed to understand in a clear and detailed manner the facts about the subject under analysis (Lopes et al., 2018).

A set of semi-structured interviews to FB commanders of the central region of Portugal was carried out to ascertain the prevalence of tacit knowledge sharing. The technique used to select the sample was the snowball technique, and eight interviews were carried out between July 12 and August 24, 2018 (Table 1).

According to the World Health Association (1994), the snowball technique is a form of non-probabilistic sample where the initial participants indicate new participants until the saturation point is reached. This occurs, when the phenomenon

under study is characterized by different actors without adding new relevant information to the investigation.

The interview questions deal with the demographic data of the interviewees and their experience, supported by a set of questions to determine the prevalence of tacit knowledge sharing indicators and a further set of questions intended to determine tacit knowledge sharing through lessons apprehended subsequent to major operational events.

In order to meet the research questions and the objectives of this research, the qualitative stage of data collection was personally conducted by the researcher through visits to the Fire Brigades (FBs) and interviews with the respective commanders. Table 2 exhibits the profile of each interviewee.

It should be noted that the interview with Penela' FB was not conducted with the commander, but the 2nd commander. Due to internal operational reasons, in this FB, the commanding functions are delegated to the 2nd commander.

Presentation and Discussion of Results

Tacit Knowledge Sharing Indicators

Indicator 1-Individual Time Management

The "individual time management" indicator aims to understand whether firefighters have the time and opportunity to share and receive knowledge through direct interaction with other elements. For Haldin-Herrgard (2000), knowledge dissemination comprises a set of tasks, due to their slowness, they may not be compatible with the speed experienced in the business world. In this line of thought, Davenport and Prusak (1998) mention that in the organizational context, time is a scarce resource and should be spent on tasks that bring added value to the organization. Sharing tacit knowledge still needs more time to take effect, and the results arise from the exchange of experiences, reflections, and dialogue (Lemos & Joia, 2012). The availability of time is one of the fundamental characteristics to share tacit knowledge (Leonard & Sensiper, 1998; Roberts, 2000).

Table 1 Sequence of interviews conducted under the technique of snowball sampling

1st interview	2nd interview	3rd interview	4th interview	5th interview	6th interview	7th interview	8th interview
E1 Brasfemes 12.07.2018	E2 Oliveira do Hospital 06.08.2018	E3 Anadia 07.08.2018	E4 Góis 10.08.2018	E5 Loriga 13.08.2018	E6 Penela 14.08.2018	E7 Guarda 20.08.2018	E8 Miranda do Corvo 24.08.2018

Table 2 Interviewee profile

FBs	Commander's name	Age	Education level	Category	Position held	Years on service	Years within this position
Brasfemes	Acácio Monteiro	63	Secondary level (12th year)	Commandant	Commander	30	11
Ol. Hospital	Emídio Camacho	54	Secondary level (12th year)	Commandant	Commander	35	17
Anadia	Bruno Almeida	37	Master	Commandant	Commander	14	1
Góis	Jody Rato	43	Undergraduate	Commandant	Commander	29	1
Loriga	António Alves	48	Secondary level (12th year)	Commandant	Commander	28	25
Penela	António Lima	48	Secondary level (12th year)	2nd Commandant	Commander	30	12
Guarda	Paulo Sequeira	47	Undergraduate	Commandant	Commander	32	6
Miranda Corvo	Fernando Rodrigues	53	Undergraduate	Commandant	Commander	36	18

In this regard, it should be noted that the indicator "individual time management" was not incorporated in most of the FBs. The only exception is in E6 (PENELA), which states that the organization carries out a very wide range of initiatives that provide knowledge sharing, specifically tacit knowledge to firefighters.

Indicator 2-Common Language

The "common language" indicator aims to understand whether firefighters use a common language accessible to all, allowing tacit knowledge sharing. According to Szulanski (1996), for a tacit knowledge transfer process to be effective and efficient, there should be no communication failures between the sender and the receiver. Another relevant factor for the success transfer of tacit knowledge is the language used to communicate (Lemos & Joia, 2012). Davenport and Prusak (1998) Haldin-Herrgard (2000) also refer that the terminology and expressions used in the transfer process often assume their own connotation depending on the organizational context on which they are used. It is also important to consider the difficulties in verbalizing the tacit knowledge that each person may have internalized. Often people are unaware of the knowledge they have and are unable to articulate in words what seem obvious or natural to say (Bou-Llusar and Segarra-Ciprés, 2006). The greater the experience is, the vaster tacit knowledge is developed, which can lead to increased difficulty to verbalize it (Haldin-Herrgard, 2000).

In relation to this indicator, we have verified that the majority of the interviewed firefighters do not use a common language accessible to all peers to facilitate tacit knowledge sharing. Only E1 (Brasfemes), E2 (Oliveira do Hospital) and E6 (Penela) recognize that a common language exists. However, the majority of respondents reported difficulties to apply this indicator. Main reasons pointed out the unfavorable socioeconomic context from which the firefighters are native. The error is clearly penalized, which affects issues such as shyness or the shame of exposing themselves, demonstrating that possibly they could be unfit to a certain matters or subjects.

Indicator 3-Mutual Confidence

The "mutual confidence" indicator aims to determine whether there is an environment of trust amongst firefighters allowing sharing of tacit knowledge within the organization. More specifically, to assess whether firefighters feel that there is an effective sharing of tacit knowledge and understand whether the firefighters perceive a favorable environment, of mutual trust between the elements, so that tacit knowledge can be shared.

In this respect, Davenport and Prusak (1998) and Roberts (2000) state that the risks and uncertainties in tacit knowledge sharing are reduced as greater the trust between the individuals that compose the organization. To have a successful transfer of tacit knowledge in the organizational context, it is important that the relationship

of trust between individuals is developed taking into account the social and cultural context on which they are inserted (Foos et al., 2006). The establishment of a network of confidence depends on the sharing of social, cultural values and common expectations (Davenport & Prusak, 1998; Roberts, 2000).

Taking into account this indicator, we can be verify that there is no sharing of information and operational knowledge regardless the category or function that each one performs and that there are several events that potentially generate mutual distrust, since only E1 (Brasfemes) and E6 (Penela) recognize this indicator in their organizations. The majority of respondents refer to the existence of several problems that are the basis for the observation that this indicator does not occur in their FBs.

Indicator 4-Relationship Network

The "relationship network" indicator aims to find out if it is possible to ascertain who are the people who have the knowledge that is needed for an effective tacit knowledge sharing to occur. In this regard, for Lemos and Joia (2012), the form of communication within an organization is closely linked to the internal network of relationships. The lack of knowledge seen inside organizations is one of the driving forces to research matters related to knowledge sharing (Davenport & Prusak, 1998). One of the difficulties in tacit knowledge sharing comes from a weak diagnosis on the identification of the needs for tacit knowledge. Each element of the organization should know the quantity and quality of knowledge to be acquired (Szulanski, 1996). In this assessment, O'Dell and Grayson (1998) affirm that both receiver and emitter of knowledge do not know who within the organization is aware of the knowledge that is missing or unavailable. One of the reasons for these problem that remain over time is the difficulty that each element has in assessing the extent to which the tacit knowledge they have is important to another element; this can be critical when there is still little experience in the organization (Disterer, 2003).

In relation to this indicator, it is evident that the majority of commanders assume the importance of the knowledge owned by the firefighters, which within the organization have the experience necessary for an effective knowledge sharing.

Indicator 5-Hierarchy

The "hierarchy" indicator is intended to assess whether people who occupy hierarchically superior positions and holds most of the tacit knowledge allows access to most firefighters, regardless their hierarchical position. Hierarchical and bureaucratic organizational structures delay communication, information sharing, and ultimately, sharing of tacit knowledge (Disterer, 2003). In this type of organizations, each element acts in order to achieve and enhance its own results and rewards which discourages the exchange of experiences (O'Dell & Grayson, 1998). Some of these organizational factors hinder the knowledge transfer process, including a hierarchical chain of command, specialization by function, standardized procedures for each function, and non-flexible organizational structure. Organizational contexts that involve formal command, control structures, and systems clearly delineate what individuals can and cannot do. This may create barriers that affect the

availability of time, flexibility, and necessary complexity to transfer tacit knowledge (Fahey & Prusak, 1998; Szulanski, 1996; Yih-Tong Sun & Scott, 2005). To guarantee the transfer of tacit knowledge, it is necessary that people have access to the knowledge they need, regardless of their hierarchical position in the organization (Fahey & Prusak, 1998).

In respect to this indicator, it is possible to verify that the majority of the interviewees recognize that hierarchical superiors are not accessible to most firefighters, or, when this accessibility occurs, there is no guarantee that there will be knowledge sharing between superiors and hierarchical inferiors.

Indicator 6-Recognition and Reward

The indicator "recognition and reward" is intended to assess whether the organization recognizes and rewards firefighters who practice the transfer of tacit knowledge. In this regard, it is important to mention the contributions of Disterer (2003) and Szulanski (1996), who assume that organizations must recognize and reward their staff, so they feel motivated to continue sharing the knowledge they hold. On the other hand, there is a genuine need for organizations to develop performance evaluation systems that take into account this knowledge sharing, translated into bonus, salary increase or promotions, assuring that knowledge share on behalf of the organization is effectively rewarded (Davenport & Prusak, 1998). Recognizing technical skills at the expense of recognizing knowledge sharing can be counterproductive (Leonard & Sensiper, 1998; O'Dell & Grayson, 1998). The sharing of other forms of tacit knowledge as know-how should be as rewarding as the sharing of knowledge via formal education (Haldin-Herrgard, 2000).

Concerning this indicator, it was verified that there is no significant material or financial bonus that rewards the sharing of tacit knowledge in any organization targeted in this research.

Indicator 7-Type of Training for the Task

The indicator "type of training for the task" is intended to assess whether the organization provides specialized or personalized training to its firefighters, with a view to tacit knowledge sharing. Regarding specialized training or the implementation of strategies based on personal contact, it is possible to pursue the contributions of Disterer (2003) and Leonard and Sensiper (1998), who refer the necessity of coaching and mentoring as more appropriate strategies for tacit knowledge sharing. According to Joia (2007), these are forms of training provided by more experienced employees who are encouraged to transmit their knowledge to younger employees, always at work or in the organizational context. The application of these techniques must be complemented by adequate monitoring of new employees ensuring they are as prepared as possible to perform their functions (Joia, 2007). The incorporation of training techniques for the task reveals the importance that the organization gives to tacit knowledge sharing. An important aspect of this research is the clear difference between the techniques that aim to share tacit knowledge referred above and the techniques aiming to share explicit knowledge (Lemos & Joia, 2012). The direct

correlation between what is learned through coaching or mentoring and through formal education is a very common mistake in organizations. Classes, or other formal training moments aim to share explicit knowledge (Nonaka & Takeuchi, 1995). These techniques intending to share explicit knowledge can be promoted by trainers, either in person or through distance learning and are suitable for the transfer of codified knowledge such as rules and procedures (Murray & Peyrefitte, 2007).

Since the present research deals with the reality of firefighters whose performance in centered in emergency contexts, whereby knowledge is codified and performance is based on procedure manuals, a question aimed at sharing tacit knowledge can be easily answered with techniques available through explicit knowledge.

Therefore, it was possible to verify that none of the interviewees recognized this indicator as prevalent in their FBs, the examples provided correspond to explicit knowledge sharing practices.

Indicator 8-Knowledge Transmission

The indicator "knowledge transmission" is intended to evaluate whether the tacit knowledge that is transferred within the organization is predominantly done through the interaction between staff. The emphasis of the organization's knowledge transfer strategy can be through people, or, on the reuse of coded knowledge. The organization privileges the interaction between the people who compose it, the focus is on the dialogue and interaction between people. It is through this personal contact that knowledge is transmitted. On the other hand, if the reuse of coded knowledge is privileged, such, should be done through knowledge stored in databases that may be consulted and used by all elements of the organization. In this case the interaction is not between people but between people and technology (Hansen, Nohria, and Tierney, 1999; Joia, 2007; Leonard & Sensiper, 1998; Nonaka & Takeuchi, 1995).

Therefore, it is possible to verify that the vast majority of the respondents revealed the absence of this indicator.

Indicator 9-Knowledge Storage

The indicator "knowledge storage" is intended to determine whether the organization's knowledge is performed effectively. According to Hansen et al. (1999), when the focus of knowledge storage is oriented toward a database, the organization tends to practice explicit knowledge management, on the other hand, when the focus of knowledge storage is oriented to people, the organization tends to practice an tacit knowledge management. For Lemos and Joia (2012), a strategy oriented to the storage of knowledge in databases implies a high investment to be made in information technology. This strategy does not favor the personalization of knowledge; therefore, it does not favor tacit knowledge, but explicit knowledge. A strategy aimed to store knowledge in people who make up the organization implies a high level of personalization, which indicates a prevalence of tacit knowledge storage (Hansen et al., 1999; Joia, 2007; Nonaka & Takeuchi, 1995).

In relation to this indicator, it can be found that most organizations favor the storage of knowledge in people.

Indicator 10-Power

The "power" indicator is intended to assess whether knowledge is seen as a source of power in the organization. According to Lemos and Joia (2012), knowledge is seen as a manner for an individual or group to increase their sphere of dominance within the organization. Glazer (1998) sustains that the real value of knowledge is in its access and use, and not in its ownership or control. However, the perception of loss of influence, dominant position over others, and professional respect or job security may inhibit knowledge sharing (Davenport & Prusak, 1998; Disterer, 2003; Szulanski, 1996). The elements that dominate rare knowledge are potentially highly appreciated and may enjoy recognition amongst their peers (Haldin-Herrgard, 2000; Leonard & Sensiper, 1998; Yih-Tong Sun & Scott, 2005). When this type of knowledge is largely personalized and not transmitted, inhibitions to share tacit knowledge may exist.

When exploring this indicator, it is possible to corroborate that the fear of losing power due to knowledge sharing occurs in almost all the FBs interviewed, with the exception of E1 (BRASFEMES). The remaining respondents admit that this is an indicator that happens in their organizations and obstructs the sharing of tacit knowledge.

Indicator 11-Favorable Environment for Questioning

The indicator "favorable environment for questioning" is intended to verify whether the organization has a favorable environment for questioning by peers on the execution of tasks, aiming continuously for improvement. According to Yih-Tong Sun and Scott (2005), an environment that is not conducive to free expression compromises the sharing of tacit knowledge in the organization. Since tacit knowledge is obtained through personal experience and interaction between people, this type of attitude compromises the development of innovative ideas and practices (Disterer, 2003). For Cross et al. (2001), an organizational environment where each element can openly recognize their lack of knowledge in relation to certain matters and individually criticize constructively, is conducive to knowledge sharing.

Concerning this indicator, it is possible to confirm that a favorable environment for questioning exists in half of the inquired organizations.

Indicator 12-Type of Valued Knowledge

The indicator "type of valued knowledge" is intended to determine the type of knowledge valued by the organization in order to verify the acceptance by its members of suggestions and ideas that are not supported by data and facts. Various forms of tacit knowledge, such as personal skills or intuition, may not be recognized or considered valuable by some organizations (Lemos & Joia, 2012). Thus, in certain business areas, traditional forms of decision such as logic or rationality are

still privileged. This dominant method may inhibit the creation and sharing of tacit knowledge (Haldin-Herrgard, 2000; Leonard & Sensiper, 1998).

Concerning this indicator, it was confirmed that in most of the interviewed organizations there is a culture of openness to suggestions or ideas that ascend within the organization.

Indicator 13-Communication

The indicator "communication" is intended to understand whether personal dialogues is the most used form of communication by people who have relevant knowledge for the daily tasks in the organization. According to Roberts (2000), the use of worthy means of communication which facilitates understanding between the parties is important to transfer tacit knowledge. Personal conversation is the richest form of communication, as it allows mutual and immediate feedback and permits the use of multiple forms of communication and even body language (Haldin-Herrgard, 2000; Leonard & Sensiper, 1998). Conversely, for Murray and Peyrefitte (2007), other means of communication that are less complete or comprehensive are more appropriate to share explicit knowledge.

When observing this indicator, it is possible to validate that most of the interviewees refer that personal conversations is the privileged form of communication for the daily transmission of knowledge between firefighters.

Table 3 exhibits a synthesis of the results on tacit knowledge sharing in FBs.

From the analysis of Table 3, it is possible to confirm that out of the 13 indicators under research, only four are manifestly available in most of the interviewed FBs. These indicators are: "relationship network," "knowledge storage," "type of knowledge valued," and "communication." With the corroboration of "relationship network" indicator, it is clear that in FBs, it is possible to ascertain who are the people that owe the necessary knowledge to enable an effective tacit knowledge sharing. With the confirmation of the "knowledge storage" indicator, it is possible to recognize that the organization's knowledge is effectively stored in the people who are part of it. With the corroboration of the indicator "type of knowledge valued," it is possible to determine that suggestions or ideas that reach the organization based on elements that are not based on data or facts are valued and accepted. Finally, from the authentication of "communication" indicator, it can be concluded that personal conversation is the most used form of communication by people who have important knowledge to transfer as a result from the daily tasks in the organization.

Continuing with the analysis, half of the interviewees recognized the indicator "favorable environment for questioning" to prevail in their FBs. The remaining 8 indicators were not present in most interviewed FBs. The reasons pointed out by the interviewees for the absence of these 8 indicators are associated with a large number of circumstances related to cultural, sociological, economic, technological and geographical motivations with repercussions at the individual and organizational levels.

The indicators "recognition and reward" and "type of training for the task" were not identified in any FB.

The only FB that exhibits a list of indicators where tacit knowledge sharing actually occurs is FB Penela. In this organization, 9 of the 13 indicators are present. It

Table 3 Prevalence of tacit knowledge sharing indicators in FBs, according to data collected in the interviews

	Brasfemes		Anadia		Oliveira Hospital		Góis		Loriga		Penela		Guarda		Miranda Corvo	
Indicator	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified	Verified	Not Verified
Individual time management		x		x		x		x		x	x			x		x
Common Language	x			x	x			x		x	x			x		x
Mutual confidence	x			x		x		x		x	x			x		x
Relationship network	x			x	x		x		x		x		x		x	
Hierarchy		x		x	x			x	x		x			x		x
Recognition and reward		x		x		x		x		x		x		x		x
Type of training for the task		x		x		x		x		x		x		x		x
Knowledge transmission		x		x		x		x	x		x			x		x
Knowledge storage		x	x		x		x		x			x	x		x	
Power		x	x		x		x		x		x		x		x	
Favorable environment for questioning		x		x		x		x	x		x		x		x	
Type of valued knowledge	x		x			x		x	x		x		x			x
Communication		x	x		x		x			x	x		x		x	

Legend:
X – Indicates Reply / Not Reply in the respective FB
- Favorable to share tacit knowledge
- Unfavorable to share tacit knowledge

should be noted that this was the only FB that claimed to have a quality management plan in place for several years. In the remaining 7 FBs, most of the indicators were not verified, in the case of FB Anadia and FB Góis, only 3 indicators were verified, in FB Miranda do Corvo only 4 indicators are present and in Brasfemes, Oliveira do Hospital FBs and Guarda, only 5 indicators are present.

Tacit Knowledge Sharing Diagnostic Matrix

Taking into account the literature review and the research results presented, it was possible to elaborate a diagnostic matrix for tacit knowledge sharing, aimed at FBs, with a view to increasing organizational learning (Table 4).

Table 4 Tacit knowledge sharing diagnostic matrix for FBs

Indicator	Question	Response typology
Individual time management	There is time and opportunity to share and receive knowledge from others	5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree and 5 = strongly agree
Common Language	There is easiness in verbally sharing on the knowledge I have	
Mutual confidence	There is safety when sharing knowledge with colleagues	
Relationship network	I know who in the organization has the specific knowledge that can help me with my tasks	
Hierarchy	I have access to the people who have the experience I need, regardless of their hierarchical level	
Recognition and reward	The organization recognizes the result of teamwork	
Type of training for the task	To acquire specific knowledge, the organization appoints a specialist to assist me	
Knowledge transmission	When I need some knowledge, I am encouraged to seek it out with other colleagues	
Knowledge storage	People hold most of the knowledge that the organization has	
Power	Knowledge is a source of power in the organization	
Favorable environment for questioning	The organization's culture favors questioning about the work of colleagues	
Type of valued knowledge	My colleagues and superiors appreciate suggestions and ideas I have, based on my own knowledge, even when I don't have enough information to substantiate them	
Communication	The type of communication I use most to interact with people in the organization whose knowledge is important to my work is personal conversation	

Table 5 Matrix of measures to be adopted by FBs, with a view to promoting the sharing of tacit knowledge

Indicator	Reference Authors	Measures to be adopted
Individual Time Management	Michailova and Husted (2003), Riege (2007)	- Recognize the difficulties of time availability, share them with the whole organization and define periods of work break purposefully, ensuring tacit knowledge sharing occurs. For example, reserve half an hour daily, during the shift change period between employees (day service) and volunteers (night picket) to facilitate these initiatives, which should cover all elements of the active body, regardless of their link to the institution - Offer or improve existing social or social areas, i.e. coffee room, bar, cafeteria, gym, games room, where people can meet and feel good, providing an increased sense of well-being in the FB, increasing their sense of belonging to the organization and informal contacts between members of different hierarchies and between employees and volunteers - Gather and share "success stories" that emphasize the importance of transferring tacit knowledge about explicit knowledge for individual and organizational learning and allowing firefighters to recognize time spent in this tacit knowledge sharing activity
Common Language	Riege (2007)	- Ensure that the knowledge shared is understood in the same way by the sender and the recipient - Choose technical terms to be used by the entire active body and use them in the context of training, instruction, training or in an operational setting - Promote additional training for firefighters who do not master the technical terms related to the FB's daily activity - Promote rotation in the activities performed by firefighters (driver, makeup artist, communications operator, among others)

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Mutual Confidence	Tiwana (2002), Riege (2007)	- Identify the firefighters on which tacit knowledge is very important for the FB and present them as a credible specialist to support all other elements that can benefit from sharing their knowledge - Promote the establishment of trust relationships between firefighters, through face-to-face and informal communication - Demonstrate that the main sources of tacit knowledge are elements with high experience and credibility, that incorporate the best practices in their action and that reflect the wisdom of true specialists - Encourage the elements of the command and leadership to promote a direct and regular interaction between all firefighters in the active staff, not promoting the dynamics of groups that tend to close in on themselves - Provide moments and opportunities for all elements of the active body to ask questions about knowledge sharing practices, and there should be no doubts to be clarified - Recognize and reward the proactivity of tacit knowledge sharing and generating new ideas - Ensure a non-bureaucratic communication flow between firefighters from different hierarchies

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Relationship Network	Gold et al. (2001), Riege (2007)	- Provide ongoing support for tacit knowledge sharing through formal and informal activities or mechanisms focusing the FB and its hierarchical structure on the most important initiatives for this purpose - Limit the number or size of formal groups to a small size with the purpose of maximizing the activities to implement it in relation to tacit knowledge sharing - Provide formal and informal spaces and moments, giving firefighters opportunities to share tacit knowledge in social situations, such as at social events, gym, cafeteria, bar, social room, among others - Project the redefinition of spaces in the areas of work, learning and socializing, so that they contribute to the timely sharing of tacit knowledge - Position workplaces, learning and socializing areas to promote interaction between firefighters, from different positions in the hierarchical structure and with different levels of knowledge and experience

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Hierarchy	De Long and Fahey (2000), Riege (2007)	- Guarantee the commitment from all elements of the command and leadership framework to share tacit knowledge, it is important that they are the ones to take the initiative to share tacit knowledge - Involve the elements of the active body, regardless of the hierarchical position or link to the organization when planning the activity, for example, in the elaboration of scales of service to the night pickets and weekends, in the preparation of instruction or other initiatives of relief for the day to day of FB - Make accessible to all elements of the active body the results of work that are a consequence of sharing tacit knowledge, such as correct decisions, achieved skills, greater effectiveness or efficiency in operational tasks - Establish individual objectives or goals and encourage the sharing of knowledge as something natural to achieve such objectives, for example, the acquisition of competence in handling equipment, which should be facilitated if there is knowledge sharing between colleagues - Introduce real, tangible and differentiating rewards for firefighters who transfer tacit knowledge, avoiding obvious tasks, for example, the use of personal protective equipment that can be seen as something necessary for the provision of assistance, therefore, something that should already be guaranteed at the outset by organization, or something that all other firefighters will eventually receive - Implement an individual performance evaluation system, where one of the items under evaluation is the individual contributions to the sharing of tacit knowledge

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Recognition and Reward	Riege (2007)	- Adopt a recognition and reward system that is simple and transparent and that uses the same criteria for all firefighters in the active corps and that ensures that all elements are reviewed and recognized in it - Inventory everything that can be considered as a fair reward or recognition by the firefighters and include these rewards and recognitions in an action plan to be adopted, safeguarding the right to individual difference for each element - Demonstrate through practical examples that the sharing of tacit knowledge is desirable by the organization, but that it is also possible and rewarding for those who adopt compliant behaviors - Use rewards and recognition to encourage people to invest time in acquiring experience Provide incentives to efforts made by groups of firefighters in tasks that would not be possible to be well performed individually - Make tacit knowledge sharing practices as part of individual, organizational development and include these sharing attitudes in performance evaluations - Ensure that any reward or recognition system that is adopted, promotes the sharing of organizational knowledge instead of individual knowledge

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Type of Training for the Task	Nonaka and Takeuchi (1995),O'Dell and Grayson (1998), Riege (2007)	- Provide mentoring and coaching programs to firefighters, where it is emphasized that knowledge sharing is important for you as well as for the entire FB - Ensure that firefighters have access to a detailed description of their functions, competences, duties and rights, so that they know exactly what the FB expects of them - Rotate the firefighters between functions inside the FB, so that they know and learn from each other - Ensure that firefighters know that with their work they are creating value for the organization - Gather and share success stories (storytelling) about how knowledge sharing practices have helped firefighters to improve their performance - Establish internal communities in the FB, according to the interests and desires of the firefighters, directed to specific areas of action of the firefighters (for example, first aid, forest fires, extrication, etc.)

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Knowledge Transmission	Nonaka and Takeuchi (1995),O'Dell and Grayson (1998), Riege (2007)	- Encourage and promote practical learning through learning by doing, through observation and dialogue or in an interactive way between those who teach and those who learn - Increase awareness that tacit knowledge cannot be transferred easily, but that this is possible, demonstrating concrete ways of doing it and its benefits for firefighters and the FB - Support the networks of stakeholders in each intervention area, existing inside and outside the FB, such as in the first aid area, involving doctors, nurses and firefighters, so that standards of action can be discussed, based on best practices and that lead to tacit knowledge sharing among all stakeholders - Emphasize the main means for the transfer of tacit knowledge, such as experiences, stories or demonstrations of know-how - Provide time to share tacit knowledge

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Knowledge Storage	Riege (2007)	- Determine what really motivates people to become firefighters and then to stay in the FB - Communicate to the firefighters what specific impact their knowledge has on the other elements and reward them accordingly - Ensure that firefighters are placed in positions where their responsibilities correspond to the set of skills and career aspirations they have, since incompatibilities at this level only create inefficiencies or firefighters who perform their function below what their capabilities are - Involve, whenever possible and beneficial, firefighters from the reserve or honor roll as mentors and/or skills trainers of the most inexperienced elements - Streamline mentoring and coaching programs, always involving firefighters with more experience and tacit knowledge, not exactly the most graduated - Offer skills training programs and personal and operational development, internally and externally, ensuring and planning the succession of the current top elements of the hierarchy - Provide corporate benefit programs to encourage firefighters' loyalty and continuity of commitment to the FB, rewarding this loyalty through monetary and/or non-monetary incentives

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Power	Holste and Fields (2010), Riege (2007)	- Eradicate the notion that holding information or knowledge is synonymous with power within the FB - Introduce a reward / recognition plan to maximize tacit knowledge sharing practices - Encourage or apply collective decision-making processes, where and when appropriate - Minimize or eliminate any personal, hierarchical or linkage differences in the organization that may prevent, or limit tacit knowledge sharing practices

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Favorable Environment for Questioning	De Long and Fahey (2000), Riege (2007)	- Guarantee the commitment of tacit knowledge sharing by all elements of the command and leadership framework, so that they are the ones to take the initiative to share tacit knowledge - Involve the elements of the active body, regardless of the hierarchical position or link to the organization, at times of planning the activity, for example, in the elaboration of scales of service to the night pickets and weekends, in the preparation of instruction or other initiatives of relief for the day to day of FB - Make accessible to all elements of the active body, the results of work that are a consequence of sharing tacit knowledge, such as correct decisions, achieved skills, greater effectiveness or efficiency in operational tasks - Establish individual objectives or goals and encourage the sharing of knowledge as something natural to achieve such objectives, for example, the acquisition of competence in handling equipment, which should be facilitated if there is knowledge sharing between colleagues - Introduce a real, tangible and differentiating reward for firefighters who transfer tacit knowledge, not opting, for example, for personal protective equipment that can be seen as something necessary for the provision of assistance, therefore, something that should already be guaranteed at the outset by organization, or something that all other firefighters will eventually receive - Implement an individual performance evaluation system, where one of the items under evaluation is the individual contributions to the sharing of tacit knowledge

Table 5 (continued)

Indicator	Reference Authors	Measures to be adopted
Type of Valued Knowledge	Nonaka and Takeuchi (1995),O'Dell and Grayson (1998), Riege (2007)	- Encourage and promote practical learning through learning by doing, through observation and dialogue or in an interactive way between those who teach and those who learn - Increase awareness that tacit knowledge cannot be transferred easily, but that this is possible, demonstrating concrete ways of doing it and its benefits for firefighters and the FB - Support the networks of stakeholders in each intervention area, existing inside and outside the FB, such as in the first aid area, involving doctors, nurses and firefighters, so that standards of action can be discussed, based on best practices and that lead to tacit knowledge sharing among all stakeholders - Emphasize the main means for the transfer of tacit knowledge, such as experiences, stories or demonstrations of know-how - Provide time to share tacit knowledge
Communication	Davenport and Prusak (1998), Hendriks (1999), Riege (2007)	- Guarantee the recruitment of firefighters with adequate communication skills, in order to try to get the best out of the firefighters that the FB already has in its active staff - Provide training programs and development of communication skills appropriate to the FB activity - Support an open communication flow between all FB organizational levels - Encourage people to be open, proactive and close, without fear of contributing ideas and opinions - Recognize and reward well done communication

Performance Matrix to Increase Tacit Knowledge Sharing

The measures contained in the following table are suggestions to be adopted by FBs. These are instruments on which these organizations can make their action plan should they intend to adopt strategies to reinforce tacit knowledge sharing and increase organizational learning. This performance matrix is structured according to the main indicators identified in this research (Table 5).

Conclusions

The present research aims to determine the prevalence of tacit knowledge sharing indicators, create a diagnostic and performance matrix aiming the growth of tacit knowledge sharing in non-profit organizations. Based on these assumptions, eight interviews were conducted with commanders of volunteer fire brigades (FBs) in Portugal.

FBs are non-profit organizations with unique characteristics where tacit knowledge sharing is crucial for the fulfillment of their missions. Despite the existence of several academic works that mention the added value of this sharing in organizations from other sectors, there is no known academic work or research focused in non-profit organizations. With this research, it was possible to understand the main gaps in this type of organizations and the main measures to be implemented so that knowledge sharing effectively brings added value for the effective pursuit of its missions and the organizational learning.

From the analysis of the obtained results, it is now possible to affirm that in these organizations, there is a tendency about who needs knowledge and who has tacit knowledge and experience, and; most of the knowledge is "stored" within people and not in physical, material, or technological supports; a culture of openness to new suggestions or ideas prevails, even if these are not supported by facts or hard data; and finally, formal conversations prevail as the main form of communication within the FBs. These findings are important as they indicate that as a consequence of these indicators, there is a sharing of tacit knowledge.

However, the lack of prevalence of a greater number of indicators, points out that sharing of tacit knowledge is not a common or regular practice in these organizations. This finding culminates with a clear message that the indicators "recognition and reward" and "type of training for the task" were not identified as prevalent in any of the eight target FBs in this study. These are the main conclusions we have reached, in the search for the fulfillment of the first objective.

Knowledge and its management have gradually assumed the importance that other factors of production had in the past, such as work, property and capital. The great driving force behind the importance that knowledge and its management have been assuming for organization is related to real gains in terms of efficiency, performance and the acquisition of competitive advantages regardless the activity area of the organization. Since tacit knowledge is rarely shared and communicated in the studied organizations, we can infer that this will causes enormous tangible losses.

Thus, the matrices of diagnoses and performance presented here intend to serve as instruments to foment this cause.

As a contribution to praxis, it was possible to build a diagnostic matrix that aims to serve as a tool for the diagnosis of tacit knowledge sharing in this type of organizations and the construction of a performance matrix to provide FBs with a set of instruments to strength tacit knowledge sharing and increase of organizational learning.

When considering the contribution to theory, it was possible to confirm the applicability of the indicators to knowledge sharing already identified in the literature, although, originally associated to private and public sector organizations. These contributions are the consequence of our search for the fulfillment of the second objective.

Limitations and Recommendations

The results of this investigation should be outlined in the context of an exploratory research and a first approach to a field of research that is practically unexplored, when considering the immensity and complexity of the theme. In this respect, it is important to emphasize the need and relevance to conduct longitudinal studies to confirm (or not) some of the main conclusions present in this paper.

This research is focused exclusively on tacit knowledge sharing and not considering other forms of knowledge. In this respect, the authors recommended that future studies should also address explicit knowledge.

Being a case study with very heterogeneous organizations, it cannot be replicated for different realities. The FBs targeted in this research are a type of organization with special specificities. These are characteristics that are not found in others NPOs (mercies, cooperatives, foundations, associations, amongst others).

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