

Knowledge Sharing Enablers and Barriers: Insights From a Socio-Environmental Project

Natália Silvério, Edilene dos Anjos Cavalcanti, Mariângela Poleza and Gregório Varvakis
Department of Knowledge Engineering and Management, Federal University of Santa Catarina, Florianópolis, Brazil

natalia.silverio@posgrad.ufsc.br

edilene.anjos@posgrad.ufsc.br

mapoleza@outlook.com

g.varvakis@ufsc.br

Abstract: Knowledge is recognized as an organizational asset in projects, as it reduces failures, improves competencies, and saves resources. Knowledge sharing (KS), specifically, brings value to projects. However, it is poorly investigated in project management literature, as generally previous works have focused on IT and civil construction projects. The literature has described some factors which foster or inhibit KS, nevertheless, there is little consensus about KS enablers and barriers in the project's contexts. Therefore, this paper investigates KS enablers and barriers in a socio-environmental project. It adopted Action Research as the strategy of investigation. Observations and semi-structured interviews were used for data collection, as well as field notes. The thematic analysis method was used for data analysis. The results highlight the participants' systemic thinking, which can explain why the feeling of dependence and perceived personal benefits were assumed as KS enablers. Also, the team's collaborative and empathetic behavior and the participants' openness to dialogue influenced positively the intention to share knowledge. The project's horizontal organizational structure and the availability of virtual and physical spaces facilitated the knowledge flow. Most of the interviewees were professors which possibly influenced their KS behavior. The social restrictions imposed by COVID-19 were a KS barrier. In addition, the team size, lack of time, and the multidisciplinary character of the project likely hindered KS. Surprisingly, the lack of previous social ties was not a significant KS barrier. In summary, our results confirmed previous results regarding KS enablers, and we found systemic thinking as a KS enabler. As a KS barrier, we highlighted the lack of time, suggesting it is common in projects due to their limited timeline. These findings add to the KS literature, mainly to analyze an organizational context that is unsatisfactorily investigated. Furthermore, this study helps managers to identify KS enablers and barriers aimed at adopting appropriate organizational interventions to increase KS. Moreover, this research has shown evidence from a multidisciplinary project from the socio-environmental field which needs to integrate several professionals' knowledge to provide substantial conclusions regarding the social, cultural, and natural aspects they were analyzing.

Keywords: Knowledge Sharing, Enablers, Barriers, Project, Socio-Environmental, Multidisciplinary Project.

1. Introduction

Knowledge is recognized as an organizational asset in projects, as it is essential to reduce failures, improve competencies, and save resources (Gasik 2011, Moraes, Silva and Oliveira 2020). In the literature, interest in studying the contribution of knowledge in projects has increased (Karagoz, Whiteside and Korthaus 2020), mainly because projects or programs represent 40% of economic activities (Cuevas, Bodega and Torres-Lima 2021). Projects are carried out according to a defined schedule and resources aimed at creating a unique product, service, or result (PMI 2017).

Knowledge sharing (KS) allows knowledge to be made available to people (Ipe 2003). KS brings value to projects, however, it is poorly investigated in project management literature, as generally previous works have focused on Information Technology (IT) and civil construction projects (Favoretto and Carvalho 2021, Gomes, Oliveira and Chaves 2018, Latif et al. 2020). Furthermore, KS is not sufficiently explored in the public sector (Jorgensen et al. 2020).

The literature has described some factors which foster KS, like trust (Amayah 2013) and perceived benefits (Henttonen, Kianto and Ritala 2016). On the other hand, barriers also have been identified, such as lack of time, individual factors, and team size (Santos, Soares and Carvalho 2012, Shinoda, Maximiliano and Sbragia 2015, Smith 2006). Although scholars have researched KS enablers and barriers, there is little consensus on projects context (Karagoz, Whiteside and Korthaus 2020). Therefore, this paper aims to investigate KS enablers and barriers in a socio-environmental project. The literature highlights the relevance of this study, which is a significant theoretical and empirical contribution to the advancement of studies on knowledge sharing in socio-

environmental projects and multidisciplinary teams. In addition, it is research focused on public service, where there is also a need for scientific advances.

2. Literature Review

The literature emphasizes three main aspects concerning the concept of projects: time, budget, and scope, which are clearly defined. Projects are temporary organizations and generally short-term oriented. The scope includes specific objectives which are achieved through complex and interrelated tasks performed by individuals from different areas of knowledge (Hanish et al. 2009, Lindner and Wald 2011, Prabhakar 2008, Reich 2007). It results in new products, processes, or services development. Therefore, projects are unique, so it hinders the creation and development of organizational routines (Lindner and Wald 2011).

Factors to the project's success include leadership style (Padalkar and Gopinath 2016), clear and realistic objectives, timeframe, and budget (Fortune and White 2005, Frinsdorf, Zuo and Xia 2014). Furthermore, management based on knowledge allows projects to achieve their results successfully due it reducing failures and increasing the team's productivity, learning, creativity, performance, and innovation capacity (Kinder 2020, Moraes, Silva and Oliveira 2020, Navimipour and Charband 2016).

2.1 Knowledge sharing

Knowledge sharing is a key process of knowledge management in terms of individual and organizational learning. This process refers to the exchange of information to solve problems, develop new ideas, or implement procedures (Riege 2005, Wang and Noe 2010). It is also defined as the “exchange of task-related information, advice and expertise to help others and to collaborate with others to carry out daily tasks” (Ahmad and Karim 2019, p. 208). An effective knowledge-sharing process reduces costs, accelerates product development, and improves innovation and performance. Therefore, it increases the competitive advantage of organizations (Ahmad and Karim 2019), and impacts project success (Polyaninova 2011). In projects, KS optimizes the use of resources and avoids reworking (Gomes, Oliveira and Chaves 2018, Pauli and Sell 2019). So, KS is considered a critical success factor (Navimipour and Charband 2016, Zhang and He 2016).

Furthermore, KS is a complex process due to individual, organizational and contextual factors that influence it. Thus, there are barriers that inhibit this process and facilitators promote sharing (Ahmad and Karim 2019).

2.1.1 Enablers

KS enablers play a key role in the knowledge management process. They motivate group members to share their knowledge and experiences, allowing organizational knowledge to grow (Yeh, Lai and Ho 2006). Some of the factors that facilitate KS include rewards, organizational structure, organizational culture (Lee et al. 2020), leadership, trust, and pleasure in helping others (Ali 2019, Lin 2007, Singh et al. 2021).

Rewards, for example, can range from monetary incentives, such as salary increases and bonuses, to non-monetary rewards like promotions and job security (Lee et al. 2002, Lin 2007). Organizational culture can provide a context for employees to obtain, create and share knowledge during their functional tasks (Azeem et al. 2021).

In projects, social ties, feeling of dependence, and perceived personal benefits facilitate KS. Social ties, defined as the close relationship between colleagues, are able to increase the willingness to share knowledge (Navimipour and Charband 2016, Zhang and He 2016). Regarding the feeling of dependence, these authors mention that project team members share knowledge when they feel dependent on other people's results. Zhang and He (2016) found evidence that the perception of personal benefits motivated the sharing of tacit knowledge in the investigated project.

2.1.2 Barriers

Barriers to KS are factors that difficult the share of knowledge between colleagues. Riege (2005) states that identifying and recognizing barriers to KS is fundamental to the success of knowledge management strategies. At the individual level, barriers are often related to lack of time, lack of communication skills, overemphasis on job status, and lack of trust (Riege 2005, Santos, Soares and Carvalho 2012). At the organizational level, barriers are usually associated with economic viability, lack of infrastructure and resources, accessibility of formal and informal spaces, and team size (Karagoz, Whiteside and Korthaus 2020, Riege 2005, Santos, Soares and Carvalho 2012).

Shinoda, Maximiliano, and Sbragia (2015) and Pauli and Sell (2019) state the lack of time as a barrier to KS in projects. Karagoz, Whiteside, and Korthaus (2020) considered the department size as a KS barrier due to a large number of members. Furthermore, the authors mentioned that the geographically dispersed team also inhibited KS.

3. Methods

A qualitative research approach was adopted using Action Research as the strategy of investigation. The research was conducted based on four steps: identify the problem, plan the solution, implement the solution, and evaluate the solution (Creswell 2014, Sampieri, Collado and Lucio 2013). The context investigated referred to a socio-environmental project which aimed to conduct a diagnosis to create a protected area.

The project belonged to the Federal University of Santa Catarina. It was composed of a multidisciplinary team from the socio-environmental area. The team included professors, researchers, and students working in the areas of environmental education and governance, fauna, flora, geology, hydrology, and socio-anthropology, for instance. Observations and semi-structured interviews were used for data collection, as well as field notes, which took place between September 2019 and April 2020.

Specifically, we conducted interviews based on pre-set questions with eight project leaders (professors and researchers), including the general coordinator. Those participants were selected due to their role in the project. We recorded all interviews and transcribed them for data analysis according to the thematic analysis method. The inductive approach was used for data coding and subsequently clustering into categories with similar meanings (Braun and Clarke 2006, Creswell 2014). In the end, we reviewed all transcription sorts for report writing.

4. Results

The role of KS was emphasized by all interviewees, especially on how it could help them to analyze and discuss data collected by teams they led. This highlights their systemic thinking because they recognized a link between the different project's research fields and allowed them to be collaborative and empathetic, as well as open to dialogue. In their opinion, KS could help them to understand better the land where data was collected and give insights into data analysis. It can explain why it was identified a feeling of dependence and personal benefits to sharing knowledge between different research fields. In other words, they saw benefits to sharing knowledge because they depended on the results provided by their colleagues to analyze data.

Concerning personal characteristics, the higher educational level was another KS enabler. All informants had a master's degree level, and six of them had a doctoral level, which likely facilitated KS.

Regarding organizational aspects, it was observed that the project had a horizontal organizational structure, which eased the team in sharing knowledge, regardless of their project's role. According to one informant, the horizontal structure allowed an open dialogue between professors, undergraduate, and postgraduate students, something which was not common in other projects he had participated in.

Lastly, they mentioned virtual spaces as tools to share knowledge, especially WhatsApp which facilitated team interaction due to its agility and facility to use. The participants on the whole agreed that the project's WhatsApp group was an important virtual space to be updated about the project results. As an example of WhatsApp Group's benefit, respondents commented about new insect species identified by a team member, which was an important discovery regarding the natural land analyzed.

Other tools revealed were e-mails and the repository. E-mails were used mainly by the project manager to schedule meetings and events with the team, and for team members to send files, for instance. Google Drive, the principal project's data and information repository, stood out as a tool to search for documents from different areas of the study. Moreover, they mentioned that it stored important documents provided by the project's management, such as guidelines for trips to the field site, and allowed them to work online with their colleagues.

Comparing the three tools above mentioned, the WhatsApp Group was recognized as the best one to interact virtually. Therefore, it was an important tool to promote KS within the project, especially due to the team members were geographically dispersed.

Although participants acknowledged the WhatsApp role, they said they preferred face-to-face meetings to share knowledge. Thus, they cited meeting rooms and the natural space where they collect field data as physical spaces to share knowledge. Including, one interviewee stated that trips to the field site were opportunities to strengthen ties between team members.

The specialists performed their activities geographically dispersed and separately according to their research field due to the multidisciplinary character of the project. Notably, one professor mentioned that multidisciplinary teams, in general, have difficulties interacting in projects because members focus on their specific field of research, and just spend their time achieving results in this concern. Moreover, some interviewees thought that their results could not be interesting or useful to others, therefore, they did not share knowledge with their colleagues from different fields.

Another interviewee argued that the project's final report should be integrated, which required KS between all members, independently of which field they were from. Even though they recognized the importance to share knowledge, the lack of time hindered them from sharing knowledge as often as they would like. In addition, the team members had never worked together on previous projects. So, they did not have prior social ties, which was considered a KS barrier.

As mentioned before, the informants appreciated trips to the field site to share knowledge, which were forbidden due to COVID-19 social restrictions. Thus, the restrictions hindered KS in those physical spaces, and as a consequence, virtual spaces assumed the main role to enable it, despite the difficulty to schedule meetings with the whole team due to the high number of members. So, the team size was considered an aspect that hindered KS.

Overall, these results indicate that personal and organizational aspects drove nine factors to enable KS, whereas five barriers hindered it, which are presented in Figure 1. The next section, therefore, moves on to discuss the results according to the literature.

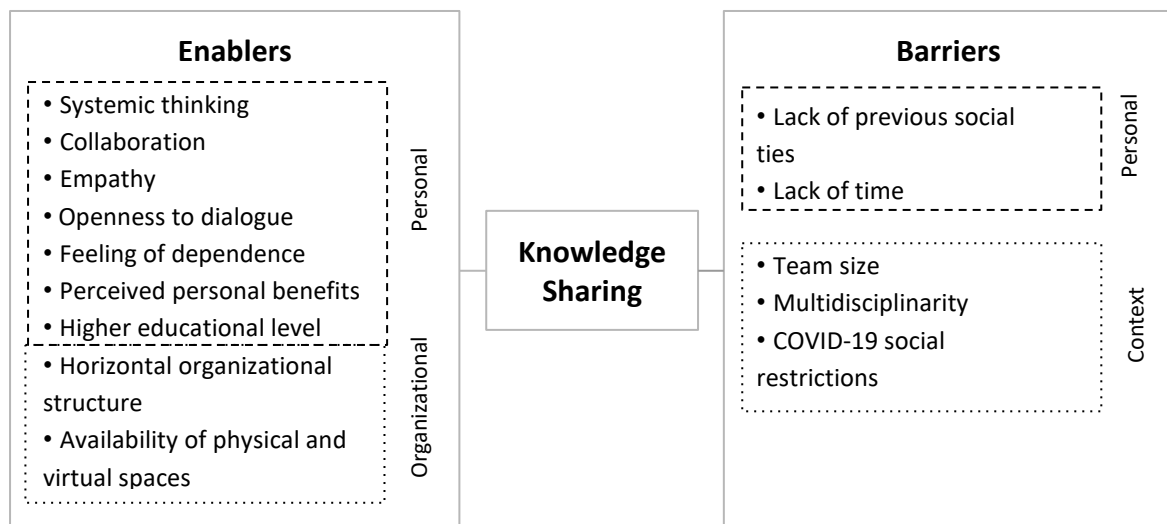


Figure 1: Overview of knowledge sharing enablers and barriers identified.

5. Discussion

Aiming to widen the understanding of KS in temporary organizations, this paper investigated KS enablers and barriers in a socio-environmental project. The results evidenced nine enablers factors to KS classified according to personal and organizational aspects. On the other hand, five barriers regarding personal aspects and the context analyzed were identified, which hindered KS within the project.

The first personal KS enabler was systemic thinking. Although each interviewee focused on their specific field, they recognized a link with others. Systemic thinking allowed them to analyze specific parts of their studies and their relationship with other parts, which is common in the socio-environmental field (Seiffert and Loch 2004). Therefore, this thinking facilitated KS within the project because they depended on results provided by other fields. Systemic thinking has not been recognized as a KS enabler, however, Rana, Crowe, and Usoro (2013) described it as a factor to build trust between employees, which helps organizations to improve KS in workplaces.

The feeling of dependence and perceived personal benefits were also considered KS enablers. Due to their systemic thinking, they saw benefits in sharing knowledge with colleagues, as mentioned above, so doing it supported the data analysis, otherwise, it could limit their studies' conclusions. This outcome is contrary to Amayah (2013) who found that the increasement in personal benefits decreased willingness to share knowledge. On the other hand, the perception of benefits was one motivator for sharing tacit knowledge in integrated project teams (Zhang and He 2016), and it has increased the likelihood of knowledge-sharing (Henttonen, Kianto and Ritala 2016). Moreover, team members share knowledge if they feel dependent on other participants (Navimipour and Charband 2016).

The results evidenced the team's collaborative and empathetic behavior, which influences positively the intention to share knowledge (Goswami and Agrawal 2019, Von Krogh 1998) and accord with the findings obtained by Rios-Ballesteros and Fuerst (2021). The authors have demonstrated that empathy facilitates people's willingness to share knowledge, even if they worked in geographically dispersed teams. So, they also understood empathetic behavior as a KS enabler. Regarding collaborative behavior, Wróbel (2007) believes that is difficult to promote KS when the collaborative culture is weak. Thus, he suggested building strong interpersonal relations between employees to overcome the lack of collaboration.

Another participants' personal characteristic which facilitated the share of knowledge was openness to dialogue, which is consistent with Karagoz, Whiteside, and Korthaus (2020). Specifically, they assumed an open culture promotes open communication, which enables KS, as also presumed by Shinoda, Maximiniano, and Sbragia (2015).

All of the interviewees had a high level of education, which possibly influenced their KS behavior. This is in line with Henttonen, Kianto, and Ritala (2016) and Karagoz, Whiteside, and Korthaus (2020) findings. The previous one demonstrated that employees with a higher educational level are more likely to share knowledge, and Karagoz, Whiteside, and Korthaus (2020) verified the level of education was not a barrier to KS. These results refute the previous finding from Riege (2005), who classified the education level as a KS barrier. In our case, KS occurred independently of the participants' educational level. Professors, for instance, shared knowledge with undergraduate and postgraduate students and consultants.

It may also be connected with the project's horizontal organizational structure, an organizational aspect that facilitates KS. Generally, knowledge flows easier in less hierarchical organizations (North and Scharle 2020).

Virtual and physical spaces also were considered KS enablers, in line with (Dorow, Fraga and Rados 2018). Virtual spaces, in particularity, assumed an important role due to COVID-19 social restrictions and the geographically dispersed team characteristic. In our case, the WhatsApp group was the main virtual space mentioned by participants, in contrast to e-mails and the repository. This can be explained due to instant messaging allows people to send text messages, audio, and images in a fast and dynamic way, as highlighted by Mallmann, Maçada, and Oliveira (2018). So, this can be the reason why participants preferred the WhatsApp group to update about field data and share knowledge between members.

Despite technology having been strategic for KS (Dorow, Fraga and Rados 2018), mainly to teams geographically dispersed (Mallmann, Maçada and Oliveira 2018), the informants had a preference for physical spaces to share knowledge due to their information richness. However, the social restrictions imposed by COVID-19 prevented them from using physical spaces, thus, it was a KS barrier. A similar result was observed by Bolisani et al. (2020) who investigated the effects of enforced working from home condition caused by the spread of COVID-19 on KS. They noted that the share of knowledge between employees was more difficult due to its enforced condition and substitutes for face-to-face interactions are hard to implement due to the relational essence of human work.

Considering the temporary nature of projects, the lack of time also was confirmed by our results as a KS barrier, in accordance with Shinoda, Maximiniano, and Sbragia (2015), Pauli and Sell (2019), Karagoz, Whiteside, and Korthaus (2020). Therefore, it seems common not only in the context of the projects but also in other organizations (Riege 2005).

In addition, the team size and the multidisciplinary character of the project likely hinder KS for some reasons: a) difficulty to organize meetings with the entire team; b) specialists performed their activities separately according to their field, which probably hinders KS between different groups, and c) lack of collective understanding of some results reported by groups, which can hide KS due to lack of common language (Holloway 2009).

Regarding the team size, our results support evidence from Karagoz, Whiteside, and Korthaus (2020), who considered the department size as a KS barrier due to a large number of people. Indeed, they worked dispersed, so it took considerable time and effort to establish a professional network with colleagues in different departments. As a result, it inhibited KS.

Despite the most of the interviewees have never worked together previously on the project, the lack of previous social ties was not a significant KS barrier as acknowledged by Bakker et al. (2006). Bakker et al. (2006) believe that teams composed of members who have been working together longer are more likely to share knowledge than those teams that are younger. It is closely related to trust, which is generally addressed by literature (Amayah 2013) and fundamental to motivating people to share knowledge (Ipe 2003).

In general, the multidisciplinary character can explain why they prioritized their time to work on their specific field of research. Also, it can be the reason why most of the team members had never worked together on previous projects. So, they did not have prior social ties, which was considered a KS barrier, mainly during the beginning of the project execution.

6. Conclusion

In summary, our results evidenced nine KS enablers, which were classified according to personal and organizational aspects. Most enablers confirm findings from previous studies, such as perceived personal benefits (Zhang and He 2016), collaborative and empathetic behavior (Goswami and Agrawal 2019, Von Krogh 1998), horizontal organizational structure (North and Scharle 2020), and availability of virtual and physical spaces (Dorow, Fraga and Rados 2018). We identified systemic thinking as a KS enabler, which has not been widely discussed by literature. This thought stimulated the interviewees to share knowledge due to the dependence they had on results from different fields.

Regarding KS barriers, we identified five barriers concerning personal aspects and the context analyzed. We highlighted the lack of time as a barrier, which supports previous findings from Shinoda, Maximiniano, and Sbragia (2015), and Karagoz, Whiteside, and Korthaus (2020).

Exploring the KS enablers and barriers helps managers to adopt appropriate organizational interventions to increase KS (Goswami and Agrawal 2019). Thus, it is possible to strengthen the positive factors and weaken the negative ones (Amayah 2013). These findings add to the KS literature mainly to analyze a multidisciplinary project from the socio-environmental field, an organizational context that is unsatisfactorily investigated. This type of project integrates different professionals' knowledge to provide significant solutions regarding the social, cultural, and natural aspects they analyze. Considering that this study focused on the leaders of the project, future research may interview participants who do not have a strategic role. Also, it can explore if systemic thinking is a KS enabler in other contexts or is particular to specific socio-environmental projects.

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It will be added after the review process.

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