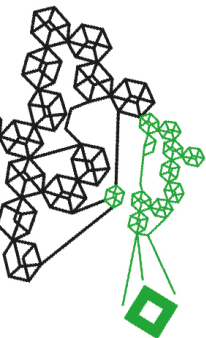# *International innovative collaborations in the public sector*
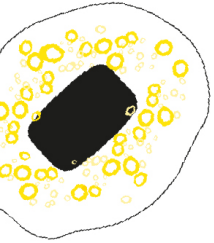
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Abstract

Research goal

The aim of the research is to understand the mechanisms of knowledge sharing within international innovative collaborations in the public sector.

Design

Relevant literature is analysed and used to identify elements known about knowledge sharing and international collaborations in the public sector. Document analysis and a total of 8 interviews, from six organizations and five different countries, are conducted and analysed in order to achieve the aim of the study.

Findings

The findings not only show how public organizations collaborate internationally but the focus on knowledge sharing leads to the creation of a three-phase process (initiation, execution and acquisition and implementation) in which the mechanisms of knowledge sharing are highlighted. Within the process different implications (positive and challenges/barriers) are shown and explained.

Implications

The insides added with this study concerns mostly knowledge sharing in an international public context. Therefore, theoretical and practical implications reside in the three- phase model.

Key words

International innovative collaborations, public organizations, knowledge sharing, international networks, public value.
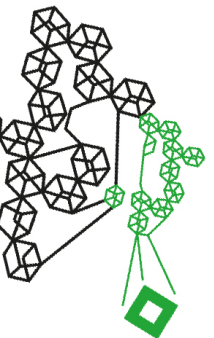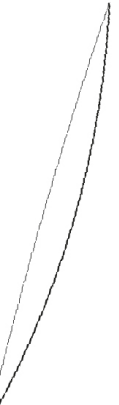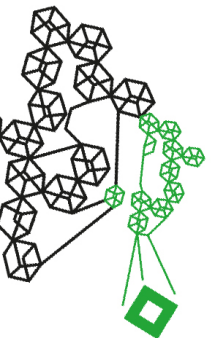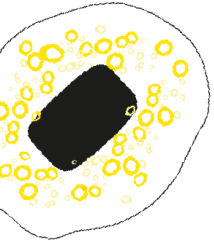
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1. Introduction

1.1 Literature and problem identification

While in the private sector innovation is considered essential for organizations to be competitive, the notion of public sector innovation implies that new ideas create value for society. Even though the public sector is characterised by barriers such as bureaucratized and hierarchical systems, lack of competitive environment and risk aversion that limit and make the innovation process quite difficult, this does not necessarily mean that public organizations are less innovative than the private ones (Hartley, Sorensen & Torfing, 2013). Indeed, public sector organizations are also defined as knowledge intensive public sector organizations (KIPSOs) because they are characterised not only by solving problem capacity through creative and innovative solutions, but they are also able to provide knowledge-intensive services that create public value (Jenssen & Nybakk, 2009; Bos-Nehles, Bondarouk, & Nijenhuis 2016).

The innovation process can take place within an organization but also between them through inter-organizational collaborations at the national and/or international level. These collaborations can increase organizational innovation opportunities and capabilities (Dagnino et al., 2015). Indeed, innovation activities include not only in-house activities but also international inter-organizational collaborations which implies possible international partners for cooperation (in the public or private sector). A general definition of collaboration is reported from Cankar and Petkovšek (2013) as that collaboration "*involves activities where two or more parties work together and each contributes resources, such as intellectual property, knowledge, money, personnel or equipment, to address a shared objective, with a view to obtaining a mutual benefit*" *(p.6).*
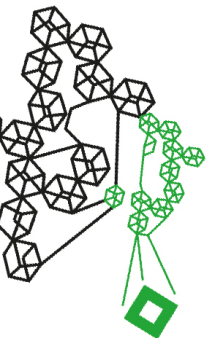
International collaborations between organizations are considered important for increasing the development of innovations that in- house development alone cannot make possible or make difficult to achieve. In fact, previous studies have shown that international collaborations lead to an improvement in the quantity and quality of innovation due to the exchange of new knowledge and information (Chen, Zhang & Hu, 2019; Briggs, 2015; Iino, Inoue, Saito & Todo, 2020). When actors with different experiences, insights and
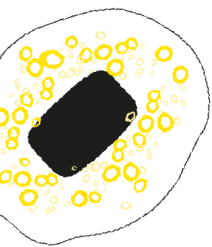
ideas interact through processes in which ideas are circulated, challenged, transformed, and expanded, the generation of ideas is accelerated and enriched (Cankar & Petkovšek, 2013). It is important to realize that the international collaborations may be challenging because of the required ability of employees or managers to share knowledge (Radaelli, Lettieri, Mura & Spiller, 2014). Knowledge sharing is not simply passing on information but is "a process of cognitive processing and reworking that provides individuals with a new understanding of the knowledge they already possess and supports its mobilization for innovation" (Radaelli et al, 2014, p.401). This also means that organizations that stimulate knowledge sharing within, and outside organizational boundaries are more likely to develop innovations and improve their performance. Furthermore, it is crucial for those who are part of international innovation collaborations to share new knowledge, acquired during such collaborations, within the organization because this can lead to an improvement on the innovation process. Exchanging knowledge at international level contribute to an increase of knowledge both organizational and employees by growing their abilities, skills and competences (Panarina, 2021). Therefore, knowledge and how is used plays a fundamental role. Many authors showed that knowledge sharing is fundamental for innovation (Kamasak & Bulutlar,2009; Castaneda & Cuellar, 2020; Wang & Hu, 2020). Since today's workplaces are characterized by competent, productive, and flexible employees, who contribute significantly to the company's performance through innovation (Malone, 2004), the recognition of different knowledge networks is important to understand how to organize knowledge sharing and learning how to support it. Knowledge-intensive organizations and KIPSOs rely on knowledge-sharing networks in order to develop innovation (Verburg & Andriessen, 2011). In fact, depending on the type of network, which differs in terms of "objectives, desired connectivity and dispersion", the support required may differ (Verburg & Andriessen, 2011, p.42).
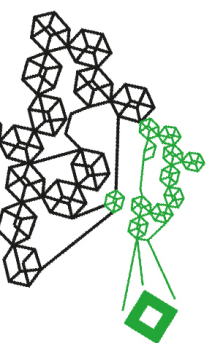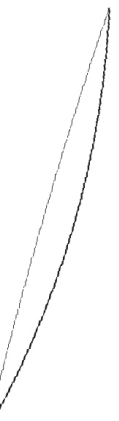
However, sharing knowledge internationally presents some difficulties that needs to be taken into account, such as transparency, codification of knowledge, credibility of knowledge and factors like costs due to distance and secrecy are considered fundamental (Moenaert, Caeldries, Lievens & Wauters, 2000). Furthermore, barriers such as language, different regulations and culture may create problems. Therefore, analyzing these elements
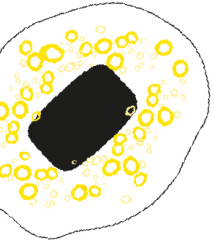
in the public sector could be of fundamental importance to better understand collaborations and how knowledge is shared and acquired within an international context.

Understanding how the international exchange of ideas and knowledge takes place can be crucial for improving the innovation process which can lead to the improvement of public service. Knowledge sharing is fundamental to innovate, and innovation depends on how organizations benefit from abilities, experiences, and knowledge during the value creation process of the organization (Singh, Gupta, Busso & Kamboj, 2019). Indeed, knowledge sharing is considered one of the most important phases of the knowledge management process and can be explicit or implicit (tacit) (Sabherwal & Becerra-Fernandez, 2003; Mubarak, Petrait &Kebure, 2021).

1.2 Research Gap
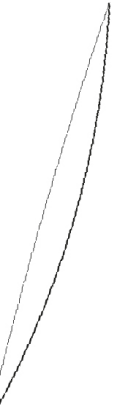
While some previous studies accentuate the role of knowledge sharing in organizational innovation (e.g., Wang & Wang, 2012) and the positive influence on it (Yesil¸Koska, & Büyükbese, 2013), little is known about international collaborations within the public sector and how knowledge is shared and used to improve innovation. Previous authors on the impacts of knowledge sharing have mostly conceptualized knowledge sharing as a whole (Ahmad & Karim, 2019). Therefore, looking at the different types of knowledge that is shared and the mechanisms of sharing it within an international context in the public sector is still not clear. Not only does there seem to be little research on the sharing of different types of knowledge, but also contradictory research (Kessel et al., 2012; Reychav et al., 2012). For this reason, it is crucial to analyze the type of knowledge shared in order to assess the different effects and outcomes it may have on innovation but also for the different organizations and stakeholders involved. So, studying how the different types of knowledge within public organizations are shared through international collaborations can add to the literature new useful insights regarding knowledge sharing not only for innovation but most importantly for public service and value. Furthermore, the study conducted by Ahmad and Karim (2019) shows that most of the studies conducted on knowledge sharing are quantitative studies therefore the qualitative case study conducted in this research can help to understand important elements like conflicts, challenges and
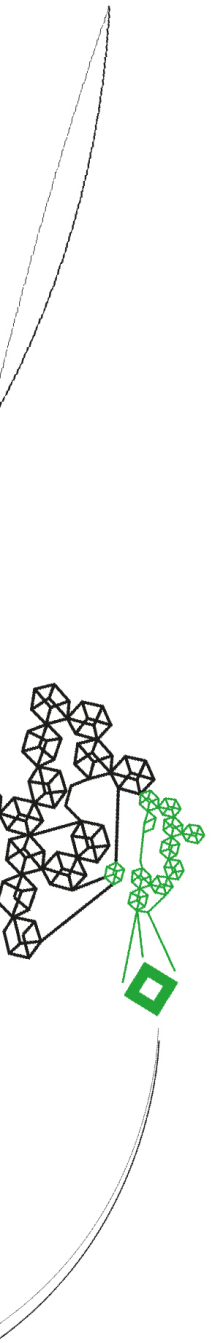
convergences/divergences on knowledge sharing by looking to the participants' perspective.
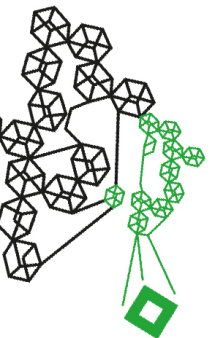
1.3 Research question

The literature on knowledge management highlights the relevance of knowledge and how it is managed for organizational success and competitiveness and thus for innovation (Argote et al., 2003; Alavi & Leidner, 2001; Sabherwal & Sabherwal, 2005). Therefore, understanding the different type of knowledge shared and the mechanisms within an international context in the public sector if fundamental not only for competitiveness and innovation but also for public value and safety. For this reason, and for the above-mentioned gaps the aim of this study is to answer to the following research question:

What are knowledge sharing mechanisms within international innovative collaborations in the public sector?

1.4 Theoretical and practical relevance

By understanding the knowledge sharing mechanisms the aim of the study is to provide and contribute to the literature with new and useful insights regarding international collaborations within the public sector and particularly on exploring how is knowledge shared and what kind of knowledge is shared within international networks in the public sector. First, understanding how international networks are formed and what type of knowledge do they share and how do they share it can extend the literature of knowledge management. Further a qualitative multiple case study can provide new insides regarding the knowledge management theory in international contexts by exploring where knowledge sharing is standing by looking to the participants' perspective. This is further enriched by looking to different organizations from different countries and exploring their differences. Furthermore, the study gives useful information not only about knowledge sharing but also about knowledge acquisition and application in order to have more complete view of how the knowledge shared is used and implemented within the collaboration but also within the single organization.

These insides may be useful for public organizations because it could help them to understand and encourage knowledge sharing in international collaborations but above all

to overcome adversities and barriers concerning knowledge flows with different countries and cultures with the aim of improving public value. They can also provide useful information on why to engage in international collaborations, how to select international collaborators and what to share. Furthermore, can provide also reasons on how to manage knowledge sharing and why to share it in an international context.

1.5 Outline of the document

In the first chapter there is an introduction to the fundamental concepts and a subsequent elaboration of the problem and research question with related theoretical and practical contributions. This is followed by the second chapter where the fundamental concepts are analyzed in detail through a literature review and a conceptual model is presented. In the third chapter, there is a description of the methodology in order to answer the research question and also the method of data collection and analysis is outlined. The fourth chapter focuses on the results obtained through the detailed analysis of the data. Finally in chapter five the focus will be on discussion, implications and limitations and conclusions.

2. Theoretical framework

2.1 Innovation in the public sector

Innovation is considered critical because it can be used to increase efficiency and effectiveness, improve performance, and gain competitive advantage (Damanpour & Schneider, 2009; Bos-Nehles et al., 2016). In fact, it can be defined as "the adoption of an internally generated or purchased device, system, policy, program, process, product or service that is new to the adopting organization" (Damanpour, 1991, p.556). Two categories are distinguished: incremental and radical innovation (Malik et al., 2017). Incremental innovation can be defined as enhancing the potential of current product/service designs and technologies by improving them, while radical innovation is about the design or technology prevalent in products and services being radically changed so that it becomes redundant (Subramaniam & Youndt, 2005; Malik et al., 2017). Radical innovation implies fundamental changes in the organizational activities (Jiménez-Jiménez & Sanz- Valle, 2008) and is related to the acquisition, share and creation of new
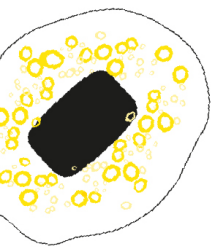
knowledge. For some authors, indeed, innovation is a process in which knowledge is acquired, shared, and assimilated to create new knowledge that is embodied in products and services, methods and processes, and social and environmental contexts (Herkema, 2003; Brewer & Tierney, 2012; Harrington et al., 2017). Innovation is considered important for value creation (Castaneda & Cuellar, 2020).

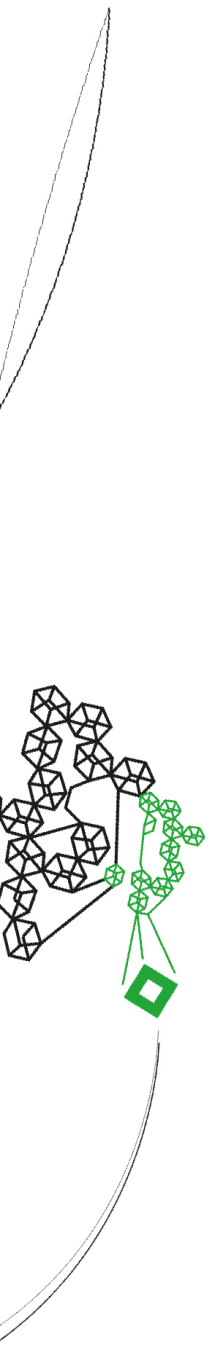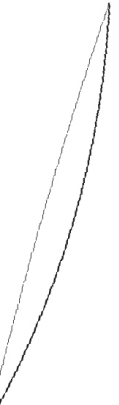In the public sector the concept of innovation implies new ideas that create value for society. The concept/definition of value is complex and difficult to measure due to different outcomes such as less crime, poverty, or violence (Mulgan & Albury, 2003) or to ensure safety. Public organizations are part of a much larger and more complex system, playing a fundamental role not only at the local and regional level, but also at the national and supranational levels. Indeed, they enable and are responsible for building and maintaining trust in government, making rules and laws, ensuring social security, creating favorable institutional frameworks, providing quality services and responding, "to the needs of citizens and businesses"(European Commission, 2013, p.137; Natário & Couto, 2022).

There is a widely held assumption that the public sector is inherently less innovative than the private sector and the main reasons associated to this include a lack of competition and incentives, a culture of risk aversion and highly bureaucratic systems, a workforce which is unresponsive to, and unwilling to change (Mulgan & Albury, 2003; Hartley, 2005). By contrast, the drivers in the public sector are to achieve widespread improvements in governance and service performance, including efficiencies, in order to increase public value (Moore, 1995). Indeed, some public sector organizations are also defined as Knowledge intensive public sector organizations (KIPSOs) because they are characterised not only by solving problem capacity through creative and innovative solutions, but they are also able to provide knowledge-intensive services that create public value (Jenssen & Nybakk, 2009; Bos-Nehles, Bondarouk, & Nijenhuis 2016). Such public goals can be enhanced through national and international collaborative collaborations to "create, share, transfer, adapt and embed good practice" (Hartley, 2005, p.27). Next section will deepen and emphasize on the importance of knowledge sharing for improving the innovation process.

2.2 Knowledge sharing and innovation

In the previous paragraph I highlighted the importance of innovation within the public sector. Innovation is highly dependent on knowledge sharing and organizations that s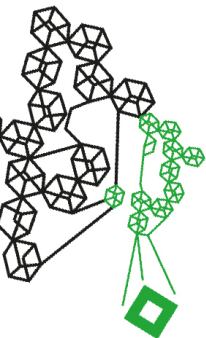timulates knowledge sharing are able to produce new ideas and facilitate innovative capabilities (Castaneda & Cuellar, 2020). Knowledge sharing is considered as one of the most important components of the knowledge management process which is formed by knowledge acquisition, knowledge creation, knowledge sharing and knowledge utilization (Li et al, 2019). Knowledge sharing involves the process of mutually/reciprocally exchange of tacit and explicit knowledge between employees and/or organizations with the purpose of creating new knowledge (Van Den Hooff & De Ridder, 2004; Kamasak & Bulutlar, 2009). Explicit knowledge is defined as that which is codified and expressed in a formal language (Nonaka, 1991), while tacit or implicit knowledge is intuitive and is more difficult to communicate and codify (Li & Gao, 2003). Both of them are considered relevant to foster innovation (Kamasak & Bulutlar, 2009). In fact, organizations that promote and undertake activities to engage in knowledge networks consequently increase their innovative capacity (Belso & Diez, 2018; Castaneda & Cuellar, 2020). KIPSOs are characterized by knowledge intensive activities that brings public value and to achieve this goal they "depend on the knowledge, creativity and innovative efforts of employees" (Bos-Nehles et al, 2017, p.381). Indeed, individuals as employees bring their own set of values, perspectives, and attributes into their organizational lives (Ahmed, Hassan, Ayub & Kalimosky, 2018). When individual knowledge is shared and modified within a network, it brings benefits in terms of innovation capability. Therefore, knowledge sharing happens when people engage in different networks within and outside the company and share their knowledge. It is of fundamental value looking at how and what kind of knowledge is shared within international innovative collaborations and how the knowledge stock can be used to improve knowledge sharing and innovation internationally. This is important, particularly in the public sector because sharing knowledge internationally can lead to an improvement on public service. While some previous studies accentuate the role of knowledge sharing in organizational innovation (e.g., Wang & Wang, 2012) and the positive influence on it (Yesil¸Koska, & Büyükbese, 2013), the study of Ode and Ayavoo,
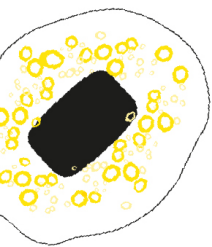
(2020) shows that knowledge sharing is more relevant to innovation when mediated by knowledge application and contradicting previous studies on the direct positive influence of it. So, studying how the stock of knowledge within public organizations is shared through international collaborations can add to the literature new useful insights regarding the role of knowledge sharing not only for innovation but most importantly for public service and value. Moenaert, Caeldries, Lievens and Wauters, (2000) focused on innovation processes in international collaborations and particularly on the communication flow during such projects within the private sector. Key elements such as transparency, codification of knowledge, credibility of knowledge and factors like costs due distance and secrecy are considered fundamental and to be taken into account during international collaborations and projects. Nevertheless, as mentioned above the study focuses on the private sector and therefore analyzing these elements in the public sector could be of fundamental importance in better understanding the role of knowledge sharing within international collaborations within the public sector.

2.3 International innovative collaborations

Innovation is often the result of interaction and collaboration between different individuals and/or organizations. Indeed, collaboration is seen as a key factor for innovation not only within each sector but also between different sectors, nationally but also internationally (Fu, Fu, Ghauri & Hou, 2022). Since innovation requires the involvement of different actors and different types of knowledge and their combination, the diffusion of knowledge through networks of individuals and organizations is an important driver of innovation (Iino, Inoue, Saito & Todo, 2020). Therefore, intercompany collaboration generates knowledge networks between companies that can be an important channel for disseminating knowledge, thus improving the innovation process (Owen-Smith & Powell, 2004). Previous studies have examined the geographic and technological impact of collaborative partners (Boschma & Frenken 2010; Iino, Inoue, Saito & Todo, 2020). If in one hand, geographically and technologically close networks can facilitate knowledge-sharing due to lower transport and transaction costs and therefore more innovation, on the other hand, closer links may not be effective for innovation due to overlapping and
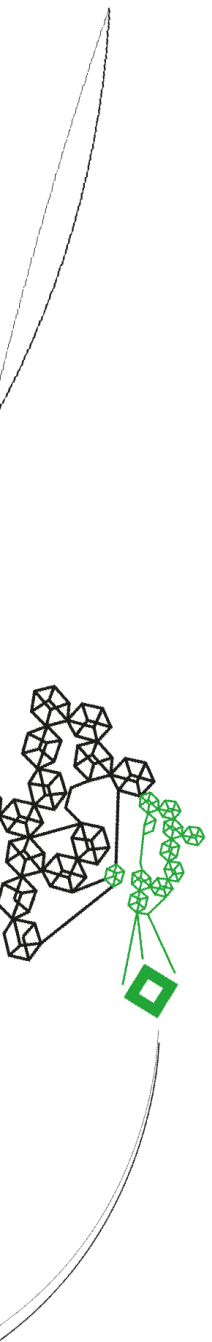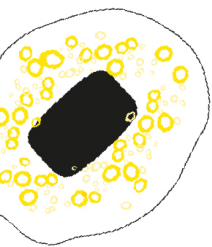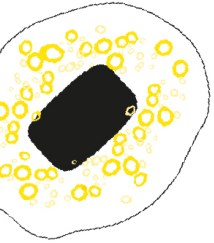
redundant knowledge (Iino, Inoue, Saito & Todo, 2020). In other words, firms can learn more from international collaboration than from in-house collaboration, because the knowledge of foreign collaborators may not be available nationally. However, in the public sector having a more open and collaborative approach to innovation has some practical implications. Relevant stakeholders should be activated to participate in the innovation process (Hartley, 2005). This problem is strongly related to ideas about network governance, the role of social capital and trust within this network (Klijn & Koppenjan, 2015), and the role of leadership, which is needed to connect people, resources, and ideas (Bekkers & Tummers, 2018).

Strategic networks are defined as "institutionalized groups of experts whose activities are focused on organizational learning" (Verburg et al, 2011, p.38). These groups are highly supported with resources, so participants are expected to be committed to the company, develop best practices or even innovative solutions. The creation of these groups requires the selection of highly trained members and support and coordination to be effective because of they tend to be distributed organizationally and geographically. These networks also interact a lot in face-to-face meetings as opposed to online strategic networks, which have the same characteristics as knowledge networks, but because they only interact electronically, coordination becomes difficult. Creating knowledge international networks implies that the knowledge shared is much more since partners bring their knowledge within the team and this is beneficial for improving and developing new innovations (Hartley et al, 2013). Furthermore, depending on the type of network, which, as already stated, differs in terms of "objectives, desired connectivity and dispersion", the support required may differ (Verburg et al, 2011 p.42). Some networks need extensive top-down facilitation (Vento, 2020), while others must be allowed to grow spontaneously from the bottom-up without management intervention (Sorensen & Torfing, 2018).

Although innovation through international collaborations has many potential benefits, there are some situations or contexts in which it is not always functional or feasible. First of all, if these collaborations compromise, affect or harm public safety, the privacy of citizens and businesses, and the interest of public organizations, it may be detrimental and create no public value (Hartley, Sorensen & Torfing, 2013). Furthermore, it might be difficult to implement these collaborations in some geographical regions where there are

religious conflicts or strong religious or ethnic ideologies (Hartley et al.,2013; Gray,1989) or in public-private collaborations where it might be difficult to align or match private value with public value (Hatley et al, 2013; Benington & Moore, 2011; Moore 1995). However, little is known about international collaborations and how knowledge is shared and used to improve innovation. By analyzing these processes and taking into account advantages and possible barriers is crucial to understand how knowledge flows the aim is to have new useful insides regarding international collaborative innovations within public organizations.
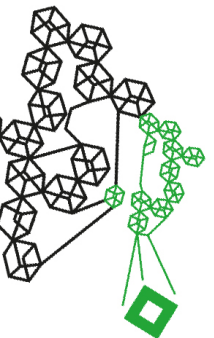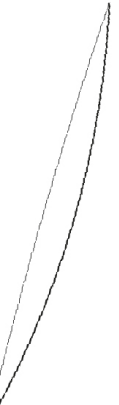
2.4 Knowledge sharing and international innovative collaborations in the public sector

In the previous paragraphs the importance of knowledge sharing and International innovative collaborations within the public sector is addressed. With the theoretical framework the aim is to combine these aspects in order to build a conceptual model (Figure 1) that can better help to explore the international knowledge sharing through collaborations in the public sector. The figure shows a network of organizations part of the public sector, Org.1, Org.2, Org.3, Org.n (with "n" indicating a non-specified number of organizations), that can be involved within international collaborations trough sharing knowledge.
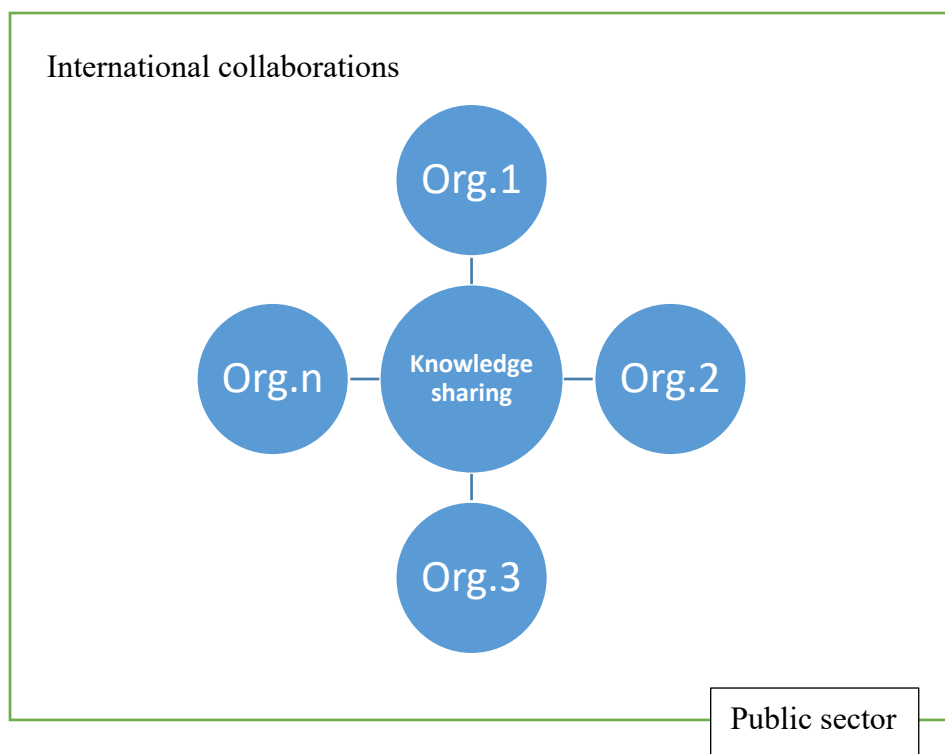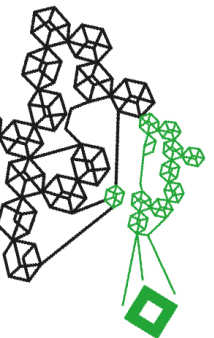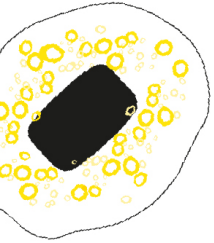

Figure 1: Conceptual model

3. Methodology

The following four sub-paragraphs concerns the methodology used for the data analysis. First of all, a design of the methodology is provided by highlighting the importance of using a qualitative exploratory case study composed of the analysis of interviews and documents (Triangulation). Then a detailed description of participants and of the procedure is provided in the sub-paragraphs 3.2 and 3.3. Finally, data analysis is made which provides a detailed description of the deductive and inductive analysis used for this research.

3.1 Design

To understand the role of knowledge sharing within international innovative collaborations in the public sector a qualitative exploratory case-study is used to collect and analyze data from five public organizations. A qualitative study allows for better understanding of certain phenomena because it is characterized, even if by few observations compared to a quantitative analysis, by in-depth investigation/questioning (Verhoeven, 2018). Indeed, it allows an understanding of behavior, values, beliefs, and so on in terms of the context in which the research is conducted (Bryman, 2016). The study concerns public organizations, which are primarily financed by the state and directed by public and political entities and its objective is to ensure and increase public value. In order to increase public value, the development and continuous improvement of work processes and products is necessary within the organizations. Thus, understanding where knowledge sharing is standing within international collaborations can provide information about how public value can be improved.

A case study method "explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information[...] and reports a case description and case themes" (Creswell, 2013, p. 97). A multiple case studies allow a wider discovering of theoretical evolution and research questions (Gustafsson, 2017) and is useful when there are contrasting results about the topics in the literature.
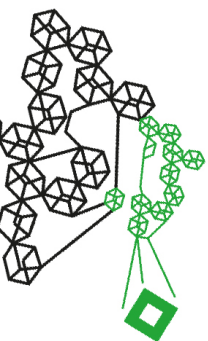
Semi-structured interviews are conducted with eight participants from six different public organizations in five different countries. All the organizations are involved in international collaborations and projects (from which four also in the same projects/collaborations), and they can be considered as a good study case for the aim of this research as they are public organization involved in many European and international projects and collaborations that can lead to new useful practical and theoretical insides regarding knowledge flows and its role on fostering innovation.

3.2 Participants

The information collected for this project involves interviews conducted with eight participants from five different countries and six organizations (see table 1). The interviews were conducted in presence when possible and by Microsoft Teams (from 30 to 60 min). For the aim of the research the characteristics required for the participants are the following:

- Part of international collaborations (at least one year of experience)
- Collaborations for innovation
- Knowledge shared within international collaborations

The first participant was contacted via e-mail and selected because in line with the characteristics mentioned above. Then for recruiting other respondents a snowball effect technique is used which consists of asking to each participant for contact details to be interviewed (Parker et al.,2019). This method is used due to the difficulty to reach international participants. Interviews with participants who are part of international innovative collaborations are semi-structured with the aim to understand international collaborations and what knowledge they share and how they share it within international collaborations. Questions asked are (see appendix I for the full interview guide): In which international innovative collaborations did you take part? How is knowledge shared between people?
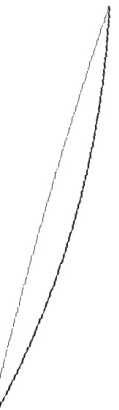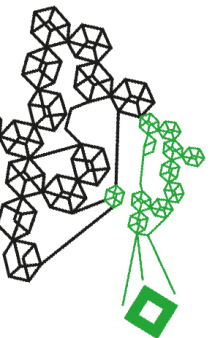
Participants	Country	Organization	Experience in international collaborations	Duration of interview (minutes)
1	Netherlands	Fire service/FEU	4 years	43:35
2	Netherlands	Fire service/FEU	3 years	20:33
3	Denmark	Danish fire service	4 years	30:50
4	Denmark	Danish fire service	4 years	38:36
5	Sweden	Swedish fire service	1 year	36:32
6	Croatia	Croatian fire service	4 years	32:16
7	Sweden	Municipality	2 years	32:56
8	Argentina	Fire service/ OBA	4 years	36:41

Table 1: Participant description

3.3 Procedure

Together with interviews documents such as business plans, reports and information retrieved from the official web pages of the organizations (see table 2) are analyzed to have a better understanding and comparison of data. Document analysis is defined as a "systematic procedure" for analyzing documents which can be printed or electronical (retrieved from computer or internet) (Bowen,2009, p.27). This process then requires a careful analysis and interpretation in order to have understanding and develop empirical knowledge (Corbin & Strauss, 2008; Bowen, 2009).

Document	Country	Type of document
1	Netherlands	Business Plan (2022-2026)
2	Argentina	Organization de Bomberos Americanos
3	Sweden	Information brochure (SBB)
4	Netherlands	Presentation (pawer point)
5	Croatia	Program activities 2023
6	Denmark	Web site

Table 2: Document description

Thus, triangulation on the data collection is realized since concerns the use of multiple sources of data to examine a particular phenomenon (Baxter & Jack, 2008). The term has been used to refer to an approach that uses 'multiple observers, theoretical perspectives, sources of data, and methodologies' (Denzin,1970, p.310), but the emphasis has tended to be on methods of investigation and sources of data.

The semi-structured interviews are conducted with a focus on the following topics:

-Importance of international projects/collaborations

-International Innovative projects

-International collaborations between people

-Knowledge sharing for innovation

-Difference between national and international innovative collaborations

Thus, the focus is on the interview guide (see appendix I) incorporating a series of broad themes to be covered during the interview which helps to direct the conversation toward the topics and issues of the study. A few fixed questions are included in the interview guide that are closely related to the theory on knowledge sharing and international innovative collaborations that are already described in the literature part and on the documents retrieved. Besides these fixed questions, additional questions may be asked during the interview if they are considered fundamental to better understand and deepen the topics.

3.4 Data analysis

The coding was performed manually by the researcher and the codes were structured according to the data structure described by Gioia et al. (2013). Firstly, knowledge from existing literature was used to generate the codes. The deductive codes are based on international collaborations and in particular knowledge sharing in the public sector. In addition to these deductively extracted codes, an inductive approach was used to identify information not covered by the existing literature. The interviews were developed as semi-structured interviews developed on the literature review of previous paragraphs and document analysis. After data collection and transcription, the Gioia method, by Gioia,
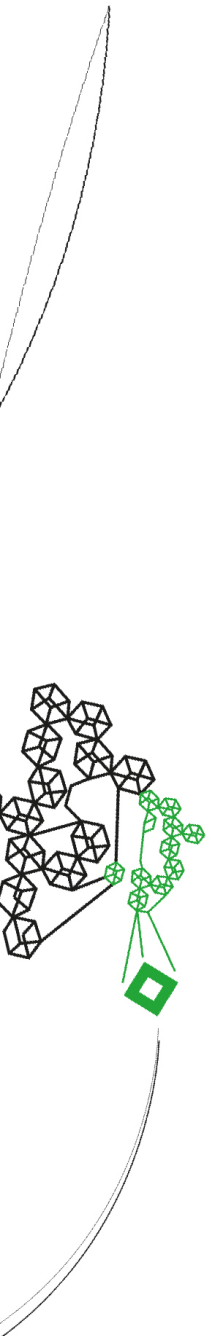
Corley and Hamilton (2013), is applied, which consists of 4 analysis steps. The first step consists of coding the interviews from transcriptions to first order themes. As reported by Locke Feldman & Golden-Biddle (2020), "coding involves the work of scrutinizing, reflecting on, and organizing the collected observations and relating them to theoretically relevant abstract characteristics, possible relationships, and research questions" (p. 6). Then, continuing the analysis, the next step is to look for similarities and dissimilarities between the first order themes in order to construct second order-terms. Finally, the investigation focuses on the possibility of developing the second-order terms into aggregate dimensions, which again reduced their number and provides the basis for constructing a data structure. At the end, a model can be constructed to explain the relationship between the aggregate dimensions obtained. Finally, the inductive and deductive codes were compared so that possible theoretical contributions could be identified with the aim of seeking an answer to the Research question. Further as mentioned before, triangulation of data is used which allows to use different methods of investigation, by combining inductive and deductive analysis, and different sources of data.

Deductive codes| **Aggregate dimension|** **2ⁿᵈ order theme|** **1ˢᵗ order themes: from quotes|**

Initiation phase

Reasons
- Same challenges/goals
- Biger voice
- Mutual interest
- Public value
- Specific topics
- Emergency and finance

Requirements
- University research
- Obligation to innoavte
- Private collaborations
- Communication
- Money and Time
- EU funding
- Knowledge sharing
- Trasparency
- Specific research

Challenges
- Public money
- EU funding
- Values
- Geography
- Regulations
- Funding
- Knowledge codification
- Culture
- Financial differences

Contribution
- Involve the right people
- Company culture
- Technology
- Research
- Partnership/ Memebership
- Initiativeness
- Expertice
- Organizational Network

International collaborations — **International innovative collaborations**

Deductive codes| Aggregate dimension| 2nd order theme| 1st order themes: from quotes|
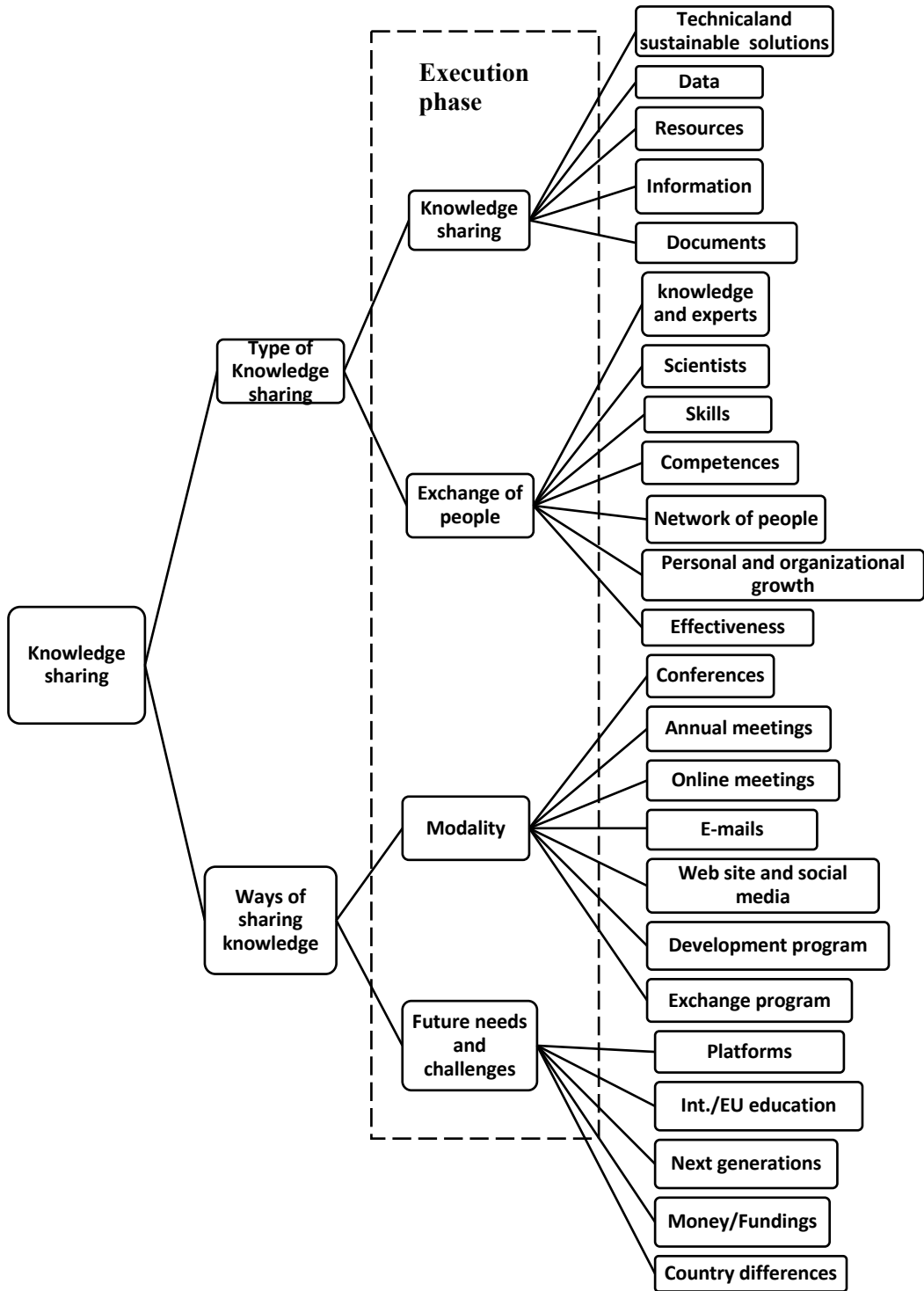
Figure 2: Data structure (continue)

Deductive codes| Aggregate dimension| 2nd order theme| 1st order themes: from quotes|

Deductive codes	Aggregate dimension	2nd order theme	1st order themes: from quotes
Knowledge Acquisition	Acquisition	**Acquisition and implementation phase** Org. learning	Different and broader perspective / Openess / International / Knowledge from the exchange of experts
Knowledge application	implementation	Modality	National Agenda / National meetings / Share knowledge within the company / Translate and communicate within the national context
		Results	Improved Systems / Better solustions / Network of people

Figure 2: Data structure (continue)

The same method is applied to analyze the documents and the four steps of the Gioia method are applied (see appendix II) in order to have a comparison between the interviews and the documents. From the data analysis, the results are structured as a combination of interviews and documents. The main focus is on the interview analysis and elements from

the document analysis are added/highlighted when different and fundamental for the analysis.

4. Results

Firstly, a general overview of why organizations collaborate internationally, what is considered important during collaborations and the main barriers countries face during collaborations is given in section 4.1. Section 4.2 presents the findings on knowledge sharing during international collaborations, delving not only into the type of knowledge shared, but also how it happens and what needs to be done to improve the process. Section 4.3 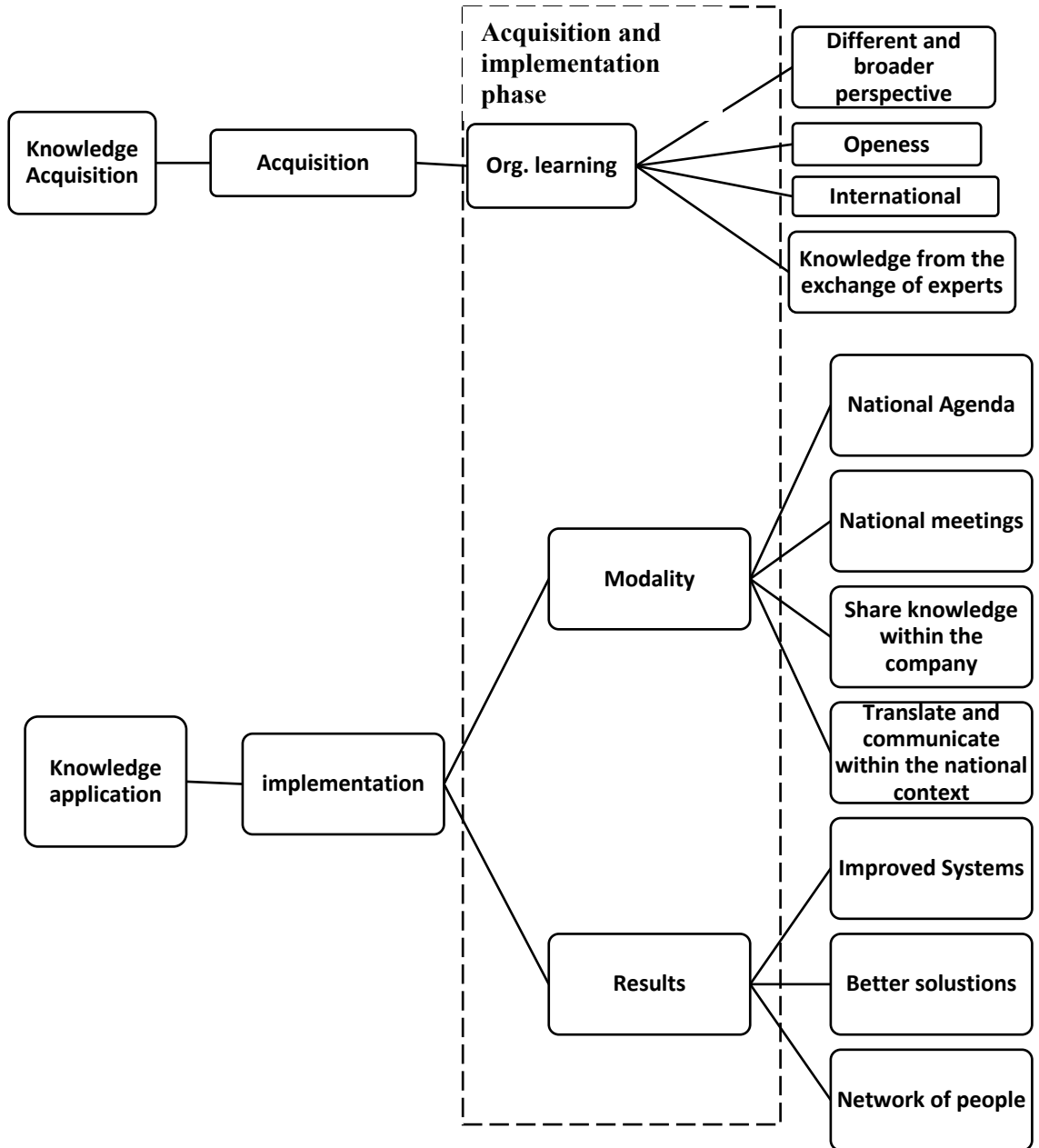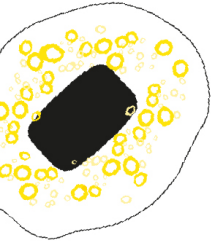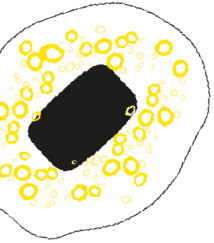reports findings on international social capital, examining the benefits and challenges. Section 4.4 then reports on the knowledge gained during international collaborations, focusing on the benefits and organizational learning. Section 4.5 reports on international organizational capital, highlighting the contribution of different countries during collaborations. Finally, section 4.6 is dedicated to the application of knowledge.

4.1. International innovative collaborations
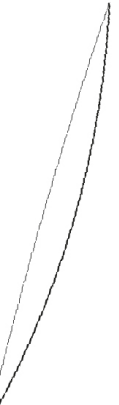
To answer to the research question is important at first to understand how these collaborations are taking place, the main reasons for collaborating internationally, what the main challenges that organizations are facing and how each organization/country can contribute during these collaborations. These elements are fundamental and are grouped as an initiation phase which represents international innovative collaborations. Defined in this study as novel ways of collaborating with international partners they are considered fundamental to increase innovation and acquire new valuable knowledge from different countries which can help on improving the public service. Indeed, clearly defining the four aspects can lead to better and effective collaborations.
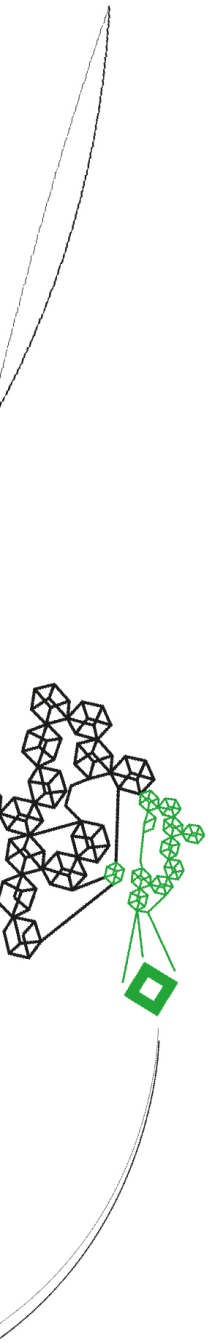
4.1.1 Reasons for collaborating internationally

Both interviews and document analysis show that the main reasons to collaborate internationally are more than one and they are fundamental for innovation and knowledge sharing. A reason to collaborate is to have the same goals and objectives and thus collaborating can make them achieve faster. Many Interviewees highlighted the importance of sharing knowledge, innovation and research in order to achieve the same goals internationally. One of them explained that: *"Is very important to share knowledge and innovation but as well to share research on all kind of topics. Is important because all countries have the same challenges for the future"* (Int.1).

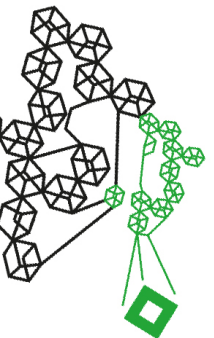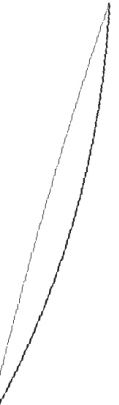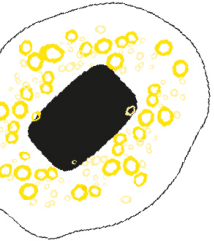From the interviews emerged also that organizations collaborate internationally because of emergency situations and for finance. In the public sector and above all in the fire rescue service there are a lot of emergencies that happens that brings organizations together to solve the problems. Another reason to collaborate is money and finance. They are important in order to make collaborations happen and to develop new ways of dealing with emergencies. Not all the organizations have the fundings to do investments on research and innovation. Therefore, collaborating and bringing knowledge together internationally can lead to both increase the fundings and save money because maybe another country already did research on a specific topic. Indeed: *"There needs to be a certain emergency that we say, "ok we have to do something about this topic, otherwise we cannot cope with this topic, or otherwise people get killed or die. And secondly has to be, again, finance to bring these experts together to develop something new."* (Int.1).
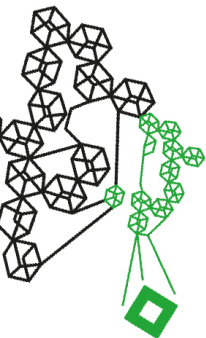
Another interviewee explained that when start collaborating internationally there must be a mutual interest from the parties *"well, first of all, it's about to settle where we are alike. So, you could say the mutual interest has to be checked before you start of joining in."* *(Int.5)* which means that everyone needs to gain something from the collaborations and this needs to be checked before the collaboration starts. This means looking at similarities, same goals, needs and interests.

4.1.2 Requirements to be part of international innovative collaborations

When organizations collaborate internationally there are some fundamental aspects that are required and considered important. From the analysis of the data emerged that during international collaborations elements such as communication, money and time, knowledge sharing, training programs, research and private collaborations are fundamental. Communication is important since is the first step that needs to be taken in account when it comes to knowledge sharing and it leads to different ways of connections and discussions that can improve international collaboration. *"But it's also, uh, where there is a lot of communication and discussion and international connections in different ways." (Int.4).* Connected to communication the results show that another important element required is transparency and being clear from the beginning not only how organizations want to collaborate but also resource availability in terms of time, people and money. This is very well explained by one of the interviewees: *"Full transparency on what you are trying to achieve with the collaboration and how you are planning to achieve it. Because we have a lot of good intentions in the international environment, but sometimes there are, limitations, time limitations. So, I try to be always very clear on what I want to work with another organization and how is my time frame and my timeline and how much human resource and money I can devote to it." (Int.8)*

Sharing knowledge internationally is fundamental because other organizations/countries thanks to their different regulations can bring a lot of new knowledge which is important for innovation. In some countries is mandatory to do research in fire service and this means that collaborating and sharing knowledge with these countries can save money, time and effort to other countries. Therefore, money and time con be used to do research on new topics or further develop what is already known by increasing innovation and public value. This is explained very well by the interviewee: *"[...] because is in their legislation that there is mandatory to do research on fire service and we did not know. So, they brought a lot of knowledge in that project [...]. That is important because you can start a project in your country for two or 4 years and another two or 4 years you see that in another country they already did. I think is very important to share the knowledge for innovation." (Int.1).* Therefore, sharing knowledge is fundamental within international collaborations.
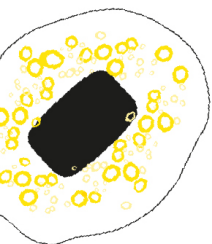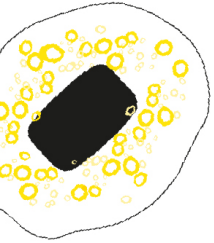
After defining the reasons and some of the requirements another important point is the involvement of private companies. They can play an important role within the collaborations because "if you have a big project, *you have a lot of companies involved and hopefully you can cover all the expertise areas needed to use within the projects."* *(Int.2).* Besides private companies, universities are considered important during the collaborations because of research and scientific approval of it, indeed *"I think that is very important for us to, is evidenced based, when we also have universities involved when we do some kind of innovation to get the scientific approval of things as well. I really like the university approach;" (Int.2)*

Another important requirement is budget from the European union because some countries have no time and money to be involved within international collaborations. Public organizations are primarily funded by the state and therefore EU can play an important role as one of the interviewees explained: *"More budget from the European_union, is mostly about budgets. We have countries in the southern part of Europe like Greece, Cyprus, Slovakia, Croatia, Slovenia, they don't have money. Bulgaria and Romania they want to be part of these projects, but they mostly have no time no money. Is mostly about money and getting people that they have enough time to work on the projects." (Int.1)*

4.1.3 Challenges

International collaborations indeed can bring a lot of benefits in term of knowledge sharing and innovation but of course challenges and barriers can make it difficult. For example, differences on values, geography and culture. Each country has its own values and way of doing and seeing things. When collaborating internationally is necessary to take in consideration other people/countries values. This is not easy to do when you worked in the same way for many years and therefore implies changing the way of doing things and not everyone is willing to do that. One of the interviewees explained that there is *"A difference in the values, how we see things, what is important." (Int.2).* In the fire rescue service, the differences arise also on the type of building and regulations that each country have. This is due to geographical positions, weather conditions and thus different type of regulations on building construction but also on how to extinguish fire and to deal with emergency

situations. An interviewee explained that even in Europe there are different types of regulations and buildings depending on whether they are situated in the northern or southern part of Europe: *"we have a completely different way of building in the northern part of Europe than they have in the southern part because the conditions are different, both the weather conditions and regulations is very different." (Int.4)*
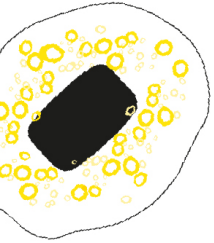
Another difference and barrier is again finance because within international collaborations there are different countries that can join but they cannot contribute a lot with money. Indeed: *"Fiancé is a problem, because you have poor countries and rich countries." (Int.1)*. Furthermore, when we talk about international collaborations within the public sector then of course there is public money involved which implies that organizations have to provide a service that justifies the money spent. This implies also that public companies when investing money in innovation then this innovation needs to provide a public value by improving the service that they provide.

"Actually, when you are a public service, you have an obligation to make sure you are able to provide the service needed for the money." (Int.2)

Another challenge that emerged during the interviews but also during the document analysis is the language. Even thought that during international collaborations everyone can talk English there is the need to translate research, documents and knowledge that every country does in their own country and language: *"The most difficult problem is to translate everything in English, because not every research is in English." (Int.1)*.

Another challenge during collaborations is that sometimes organizations need to convince countries to be part of a project or a collaboration: *"Is a problem to get the right people." (Int.1)*. This problem does not appear during projects funded by the European commission because they help on involving different countries and thus make them collaborate and create a network internationally. Indeed, there is not the necessity to explain to different countries about the importance of the project or to convince them being part of the collaboration. Indeed, one of the interviewees: *"I think there are a lot of good things on having fundings by the EU commission because you get some projects that probably you wouldn't have done by yourself." (Int.2)*. However, European fundings are considered both as a positive factor which leads to money and to an easily country participation and as a negative one because of administration which implies time and effort to explain how the
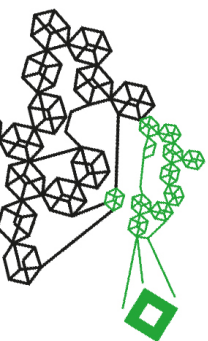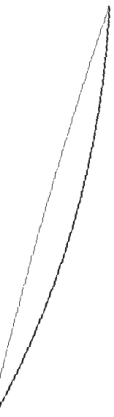
fundings are spent. Innovation is risky and not every time you have good results of research on a specific topic. And sometimes happens also that some EU projects are not in line with the goals of the organizations within the international collaborations and therefore there is not an incentive for them on being part of these projects.

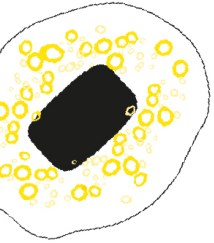*"Is very difficult to get funding from the EU commission". (Int.1)*

"There is also a huge amount of administration connected to those projects." (Int.4)

4.1.4 Contribution from the collaborators

All the organizations have their own knowledge, and each of them are part of different international programs and projects. They indeed create their organizational network, and they contribute to international collaborations by bringing their knowledge, experience, technology, research and some of them take initiatives. In each country the organizations have their rules and way of dealing with public service. They have different ways on how to prevent fire, different experiences and they try to exchange these experiences with the other organizations. Indeed: *"what we do is trying to get our way of doing things into these projects. The way of thinking on how we can prevent fire, how can we use our experience with collaborations with the citizens to put in these projects too." (Int.2)*. This can be beneficial and help other organizations when the same problem or situation occurs. They also bring a lot of knowledge thanks to the research that they do in their country and sometimes take initiatives in projects. One of the interviewees explained that: *"The role that the organization has in Europe is that we had, we take initiatives to start projects and we have a lot of knowledge in research and that topic (Fire service)." (Int.1)*. Even if some of the countries sometimes are not particularly active in exchanging knowledge, they do exchange people and indeed *"We are not normally an active partner as an association, but we send, or we appoint our fire officers to be part of different programs." (Int.4)*

Each organization have their own expertise in different topics and research that when shared can be of fundamental value for innovation and public value. And of course, this is considered the best part from the countries because they can show and share their best experts, knowledge and skills. Indeed, *"I think that the best part of being part of a project*
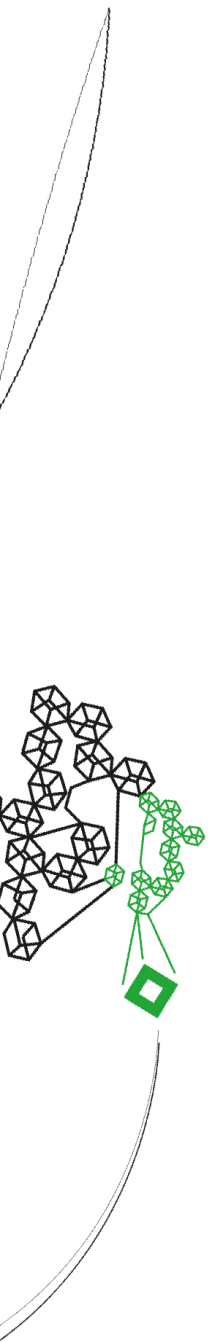
is that you can contribute to the projects with the expertise that you have within your organization.” (Int.2)

Another important aspect is that when collaborate internationally, organizations bring all the knowledge that they gain from other collaborations, and they can be a strong influence and voice for organizations that does not have the fundings or resources to be international. Some of the organizations are representative of the organizations in the fire service of their country and what they try to do is : *“be the voice and act as the voice of all the fire services in our country and in this capacity and in this responsibility bring to them resources, knowledge and experiences that they wouldn’t be able to get by their own either because they do not have the funds or the experience or the resources to navigate the international environment.” (Int.8)*

4.2. Knowledge sharing and execution phase

After defining the aspects of the first phase the second phase can be defined from the results. This phase is defined as execution and comprehends four elements/2nd order themes: knowledge sharing, exchange of people, modality and improvements and challenges. The first two codes can be grouped on types of knowledge sharing which from the results are both explicit and tacit. While the last two elements, modality and improvements and challenges, are grouped as ways of sharing knowledge by focusing not only how knowledge is shared but also on challenges and improvements for the future.
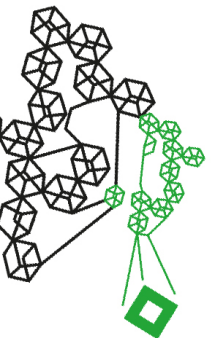
4.2.1 Type of knowledge sharing

The knowledge shared is both explicit (technical and sustainable solutions, data, resources and information) and exchange of people which can be defined as tacit (knowledge and experts, scientists, skills and competences, education). In general, what is shared coincides in the two analyses, and it is important to do it in order to make sustainable services for the public: *“we share knowledge, the experience from fire service, from how we are going to make a more sustainable rescue service, it could be data it could be everything.” (Int.2)*

Knowledge sharing or explicit knowledge: besides technical and sustainable solutions which are explicitly shared; "*I think they are divided into a couple of things that are most important to share, but I think in the technical side equipment's, how to develop sustainable solutions is one of the most important." (Int.2),* data are one of the most important things that is shared because they can be used to compare with the data of other participants/organizations and therefore use them for future improvements. *"The other thing is data. The data you get, you generate from your organization, how to use them and how can you benefit from them in the future and that's also why/ how can you inspire and also to compare." (Int.2)* They share information and documents also via e-mail and this is considered part of explicit knowledge sharing. *Emails and exchange of documents of course." (Int.3).*

Exchange of people or tacit knowledge: from both documents and interviews is clear that organizations exchange experts and employees within the collaborations. The results show benefits of forming international networks and not only sharing knowledge but also people, which means skills, competences and tacit knowledge. There is the exchange of experts in different kind of topics "*Is already done, we have experts meeting on drones, voluntary fire fighters, parking garages, fire data. And then we look for the institute that has a lot of knowledge about that topic. And then we put it all together and we tell what the goal is of the meeting and what we want to have as an input and outcome, and this is working." (Int.1).* They also have people that are working in another organization for a long period indeed "*Actually, we have a fire fighter from my brigade that at the moment is going to Australia to stay there for one year and I have an Australian fire fighter coming up here to stay with us for one year to exchange the knowledge." (Int.2).* Thus, each employee can share their own skills, knowledge and ways of extinguishing fire within the host organization and by learning as well within the organization. Knowledge that after the periods ends is then of fundamental value. The exchange of people is done also *"I think it ended up like 8 different scientists and people with knowledge that came together for a couple of days and presented each other's knowledge and we tried to make a white copy kind of document." (Int.5)* Therefore, is not necessary to do long term exchanges of experts because the important is to define the topics, requirements and inputs and outputs and it results into an effective collaboration and knowledge sharing. Exchanging people leads

first of all to a personal growth for the individual because he/she gains new knowledge by collaborating into the expert meetings or working in another country/organization, but it leads also to an organizational growth because they bring new knowledge and skills that stays within the organization.

4.2.2 Ways of sharing knowledge

It is important to understand not only the type of knowledge that is shared (paragraph 4.2.1) but also how organizations that are involved in international collaboration share knowledge (modality) and what are the needs and challenges that they are facing during this phase.
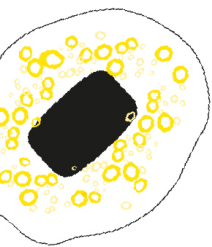
Modality: From both document analysis and interviews is clear that knowledge is shared and is done via annual meetings, online meetings, and conferences. Further they do it via e-mails, exchange of documents, publishing on websites and social media, development program and exchange program. *"We actually meet twice a year, we have our council meetings, and these is also time to socializing, getting to know each other and to talk about other things than the fire rescue service." (Int.2)*

Online meetings also are used frequently because of distance technology can really help to communicate more frequently *"It is happening most of the time via the Teams meetings. Emails and exchange of documents of course." (Int.3).* Furthermore the use of websites and social media is fundamental to share knowledge and to communicate innovation "If we want to have communication about a new innovation the professional voice has the web site, social media, there are communication experts in that group."(Int.1).

To share knowledge there is not only the use of exchanging people/ program but also a development program which as explained by one of the interviewees consists of "*participants from 14 countries, and 2 from the USA and they talk to each other they work together in projects. Especially on the topic of sustainability on the future. And at the end is just to exchange knowledge. To get people from different countries connected in the alumni network and we can use young people who comes to be a part of innovation projects." (Int.1)*
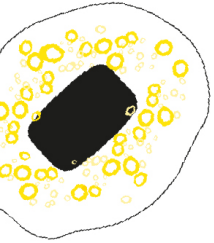
Future needs: However, when was asked what is needed to improve knowledge sharing during international collaborations from the interviews emerged that platforms,
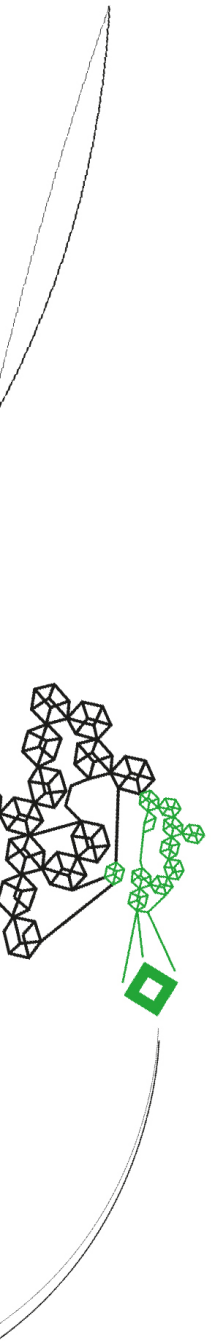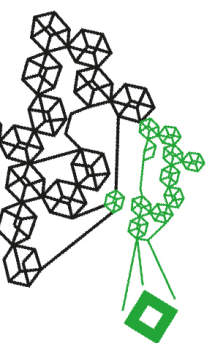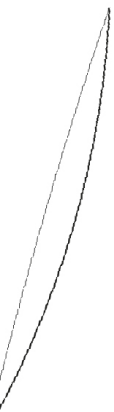
international education and to prepare the next generations to the future challenges is needed. Having a platform where to share knowledge can increase knowledge sharing and at the same time doing it on a simple and faster way. A platform where everyone can not only share their knowledge but also their personal networks in different fields. Indeed, emerged that "*Having some platforms where sharing knowledge, where you can gain the network, where you are able to get personal connections because they want, at least on the chief level you need to have some personal network to have the collaborations going.*" *(Int.2).* Another important point that can increase and improve knowledge sharing on having a better collaboration, communication and understanding of practices, values and different countries is to have an international education, where then everyone can acquire the knowledge and share it internationally but above all bring it to their own country to improve public value. Indeed, *"the education is very national, so we don't have any international education or a European education for working in the fire rescue service."* *(Int.2)* and therefore there is the need to develop an international education. From both analysis there is a development program which is part of the leadership program with the aim of exchanging knowledge mostly about sustainability in the future. There is the aim to develop a higher education because: *"that is about leadership to prepare the next generations for the challenges of the future and the next generations_works more in different countries, works and learns in different countries."* *(Int.1).* From the document analysis emerged that motivation from members and inputs are required when knowledge and experience is shared because: *"Sharing knowledge and experience can only succeed with the input of all member countries."* *(doc.1)*

Challenges: However, challenges like money, differences in rules, education, insurance, salary and job substitution can make this process difficult. Indeed, the participants explained this clearly: *"The problem is if we have an expert in some topic and lives in another country and we ask to come to an expert meeting and we do that for 1 or 2 weeks and he leaves his job and the chief say I have to replace him, and who is going to pay for the travel car, for the hotel. That is mostly the problem."* *(Int.1).* Therefore, is not easy to do the exchange of people between countries due to the differences they have, and this can be a problem and a limitation in knowledge sharing and for innovation. Is then considered useful to think about some questions that arise from one of the interviewees: "*But there*

was a lot of work getting this exchange going because is not easy with the different rules, can you move free within the borders? What kind of education, insurance do you have, is the salary the same?" (Int.2).
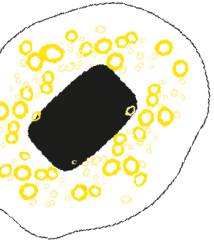
4.3 Knowledge acquisition

When organizations collaborate and share knowledge, it leads to new knowledge that permits to improve systems/products, to better solutions and to a larger and international network of people. Collaborating internationally is important because: *"in the end, something camas out, we have better systems to inform people, to connect people, or to give them and to tell them what to do." (Int.1).* Is not only about having a new product or a new process but collaborating leads to acquiring new knowledge, experience and connections that improves the way of working and how to interact internationally within collaborations. There is a grow for the company but also for the people involved within the collaborations. *"For as you said, sharing both knowledge and innovation. And I think that you as a person, you grow as a professional, you grow and your home country, and your home fire services will grow from what you learn_when you collaborate internationally, it's just. [...] You really, you really benefit from it." (Int.4)*

4.4 Knowledge application

As seen in the previous paragraph (4.3) knowledge is acquired during international collaborations. From the results emerged that the knowledge acquired from organizations can be applied within the collaborations but also at the national level during national meetings, sharing the knowledge within the company and translate and communicating information and documents within the national context. Some of them make agreements within the collaborations to discuss what acquired in the international context into the national meetings: *"We have the agreement that every delegate of every country, the conclusions we have, the projects we start we have to put it also in the national agenda as well." (Int.1).* Another way of applying knowledge is to reform the company's business model to improve public value in their own country. This means that the knowledge acquired is actually introduced and used to change the way of doing and delivering the
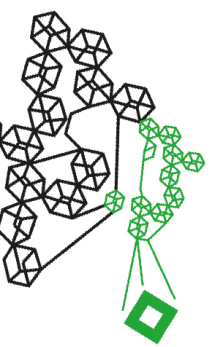
service: *"And we what I tried to do is try to reform our business models in my municipality to gain social impact or societal impact I, meaning, I would like the life to be better for all those who lives in my municipality." (Int.6)*

Some of the countries use specific systems to introduce and apply the knowledge is to share what you gain during the international collaborations and meetings by training people on their country and inviting them to share it with colleagues. One of the interviewees explained this very well: *"Well, for us, when we do this cascade system on which the person that exceeded have direct access to the to the international experts have to train people in their own countries. So, we try to promote that basis and has a multiplying effect on the rest of the Community" (Int.8)*
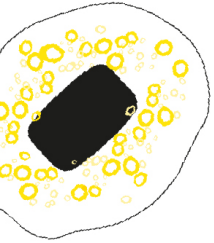
4.5 Results overview

To explain the relationship between the aggregate dimensions obtained during the analysis, a model was constructed (Fig. 3). The figure is constructed by taking into consideration not only the analysis of the interviews and documents, but also deductive codes/notions extracted from the existing literature. In fact, all the elements described and analyzed in the previous sections of the results are incorporated within the model that aims to represent how the final codes/aggregate dimensions relate to each other. As can be seen from the figure, the model is constructed as a process consisting of three basic steps:

Initiation phase: consists of defining criteria on why to collaborate and what are the requirements to collaborate internationally. Therefore, during this phase each participant needs to be transparent on clearly communicating their contribution and limitations on time, resources and money, which are also part of the main barriers.

Execution phase: after the initiation phase, the execution phase can begin, which consists of the most important aspect of international innovative collaborations, i.e. knowledge sharing and how to share it. The results show that the main objective is knowledge sharing, which in this case is both explicit and tacit. The execution or mode is also an important element and, as can be seen, knowledge is shared through meetings, conferences, e-mails, etc. However, improvements (such as platforms for international education and new
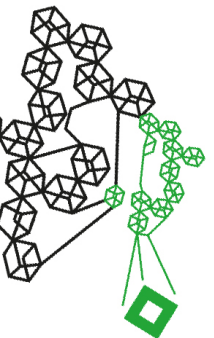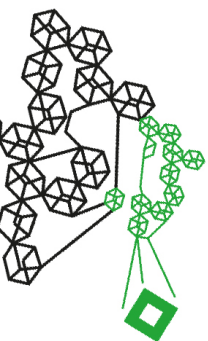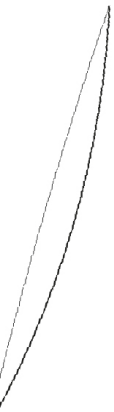
generations) and challenges, such as differences between countries, must be taken into account at this stage.

Acquisition and implementation phase: the last phase concerns the acquisition of knowledge and its subsequent application as a consequence of knowledge sharing in the implementation phase. Indeed, knowledge sharing in the international context leads to a broader and more open approach to learning for organizations, which can then use it in the context of collaboration but also within their own organization. This results in improved systems and solutions and the formation of a wider network of people. This can mainly be done by sharing knowledge, translating and communicating research, objectives and competences within the organization in a national and international context. Therefore, knowledge sharing also takes place at this stage. Indeed, in order to ensure that the knowledge gained during international collaborations is applied, it is necessary to share it not only within the individual organization, but also in the national and international context, so that other organizations/stakeholders act to achieve the objectives.

These three phases are important as they show the mechanisms that public organizations by working together and sharing knowledge within an international environment use to achieve their public goals. Therefore, it can be defined as a process or mechanisms by which knowledge is shared within international collaborations in the public sector.
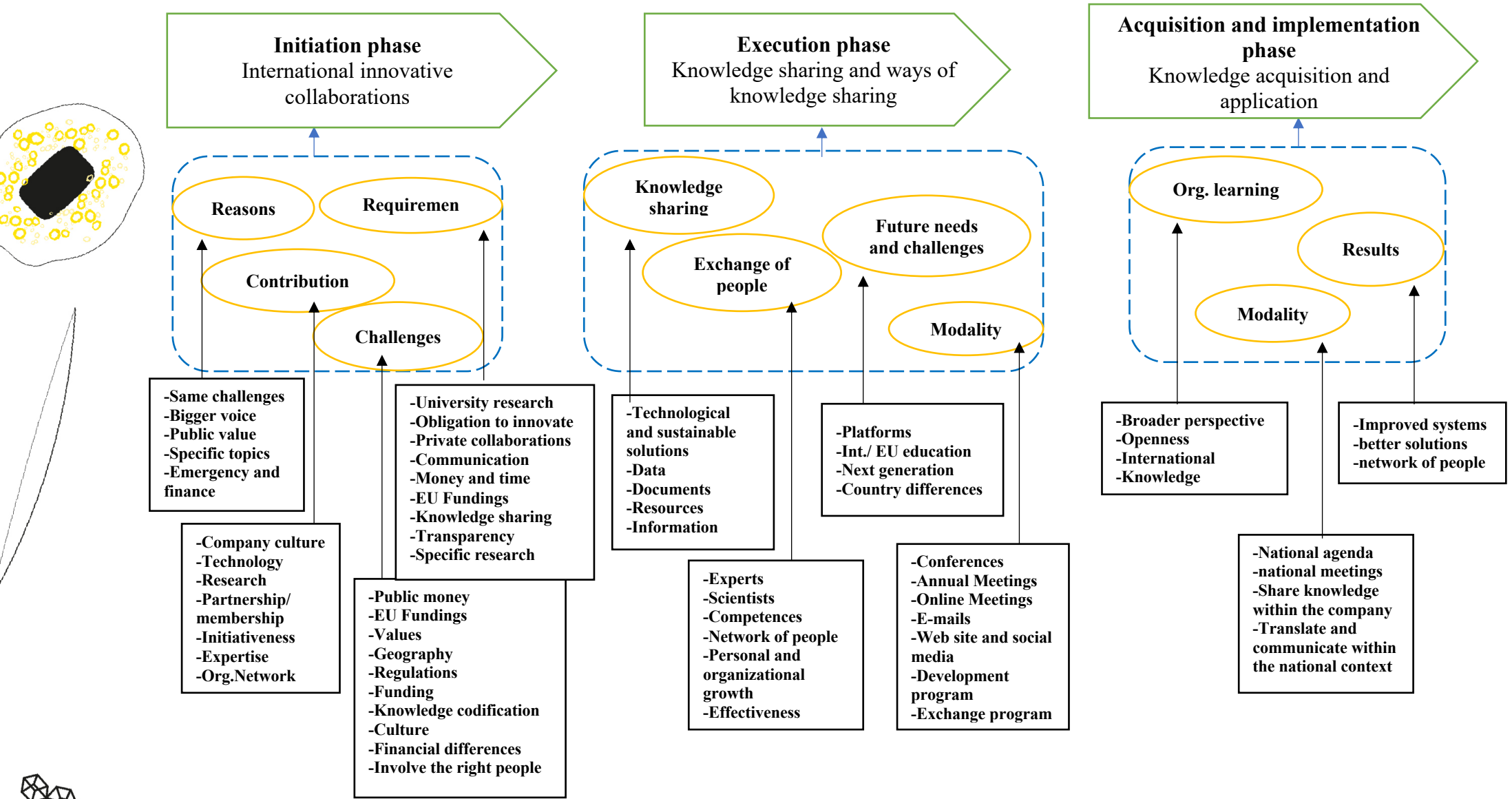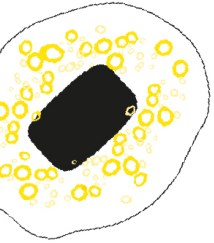
Initiation phase
International innovative collaborations

Execution phase
Knowledge sharing and ways of knowledge sharing

Acquisition and implementation phase
Knowledge acquisition and application

Reasons

Requiremen

Contribution

Challenges

Knowledge sharing

Exchange of people

Future needs and challenges

Modality

Org. learning

Results

Modality

-Same challenges
-Bigger voice
-Public value
-Specific topics
-Emergency and finance

-University research
-Obligation to innovate
-Private collaborations
-Communication
-Money and time
-EU Fundings
-Knowledge sharing
-Transparency
-Specific research

-Technological and sustainable solutions
-Data
-Documents
-Resources
-Information

-Platforms
-Int./ EU education
-Next generation
-Country differences

-Broader perspective
-Openness
-International
-Knowledge

-Improved systems
-better solutions
-network of people

-Company culture
-Technology
-Research
-Partnership/ membership
-Initiativeness
-Expertise
-Org.Network

-Public money
-EU Fundings
-Values
-Geography
-Regulations
-Funding
-Knowledge codification
-Culture
-Financial differences
-Involve the right people

-Experts
-Scientists
-Competences
-Network of people
-Personal and organizational growth
-Effectiveness

-Conferences
-Annual Meetings
-Online Meetings
-E-mails
-Web site and social media
-Development program
-Exchange program

-National agenda
-national meetings
-Share knowledge within the company
-Translate and communicate within the national context

Figure 3: Overview of the results
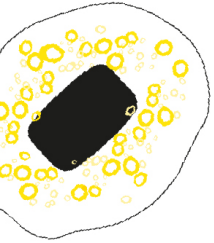
5. Discussions and conclusions

5.1 Discussions

5.1.1 International innovative collaborations

It is already known that knowledge sharing in intercompany collaborations is fundamental for innovation (Owen-Smith & Powell, 2004; Lino et al., 2020). The results show that the different mechanisms of knowledge sharing in an international context in the public sector leads to international innovative collaborations which are defined in this study as novel ways of collaborating with international partners they are considered fundamental to increase innovation and acquire new valuable knowledge from different countries which can help on improving the public service.

When collaborating internationally, the involvement of different organizations from different countries, the combination of different knowledge and its dissemination through international networks are important for innovation and public value. This is in line with Hartley et al. (2013), because the creation of international knowledge networks implies that the knowledge shared is much broader, as each country and organization bring its own knowledge into the collaboration and is useful for improving and developing new innovations. In line with Verburg et al. (2011) international innovative collaborations are strategic networks, because there is a selection of highly qualified people (experts) distributed organizationally and geographically and the study extends it by taking into consideration the public context. The main reason why public organizations collaborate internationally is that they have the same goals and together they can achieve them faster by exchanging knowledge, resources, data and people. Furthermore, the results highlight the importance of elements and barriers such as resources, country differences, involve the right people/stakeholders in line with Hartley, (2013). However, the study extends it into an international context by highlighting the importance of knowledge sharing within collaborative networks for innovation and therefore to improve public value. Not only resources like money and time affect the international collaboration but also differences in
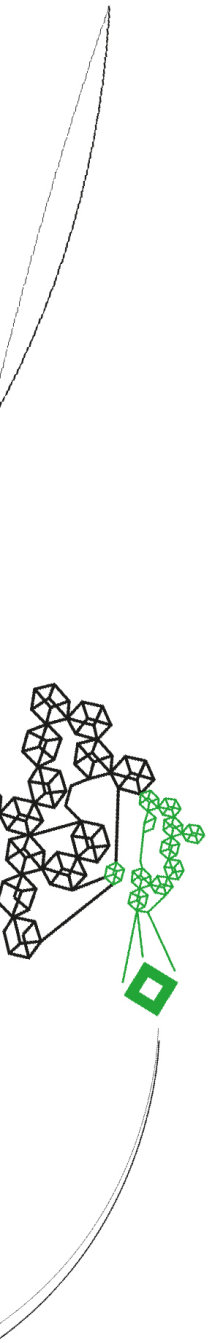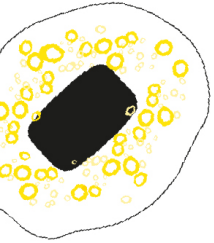
values, geography and culture in each country can also affect the effectiveness of collaboration. When collaborating internationally, these elements must be considered, but this is not easy due to the services and emergencies that organizations such as fire brigades have to deal with. The results also show that despite these barriers, public organizations can learn more from international collaborations than from domestic ones, because the knowledge of international collaborators may not be available domestically. This is in line with what is stated by Lino et al. (2020) and by extending it by looking into the public sector which helps to save resources in research, fundamental and scarce, that other organizations have already done.

5.1.2 Knowledge sharing and innovation

Knowledge sharing is considered important during interorganizational collaborations. The results show not only the importance of sharing knowledge within international innovative collaborations in the public sector but also the mechanisms of doing it in such contexts. First of all, the importance of knowledge sharing is not only in the general expansion of knowledge for the organizations and stakeholders involved within the international collaborations, but it leads to better systems, processes (innovation) and collaborations. This is important because it helps improving the value for the public which is the fundamental goal of public organizations. The results show that knowledge sharing is happening through meetings but also via e-mails, exchange of documents, using websites and social media and thanks to the development program and exchange program. The different mechanisms and ways of sharing knowledge explained by the results are of fundamental value for both the knowledge management theory and for the participants involved within the collaborations. They are sharing both tacit and explicit knowledge and both are important for creating new knowledge and this is in line with (Van Den Hooff & De Ridder, 2004; Kamasak & Bulutlar, 2009). The study extends it by showing not only what kind of knowledge is shared and their relevance, but they highlight how to share knowledge within international collaborations, but most importantly is that they do it to make and improve sustainable services for the public. Furthermore, the three phases described in paragraph 4.5 show that knowledge sharing within international
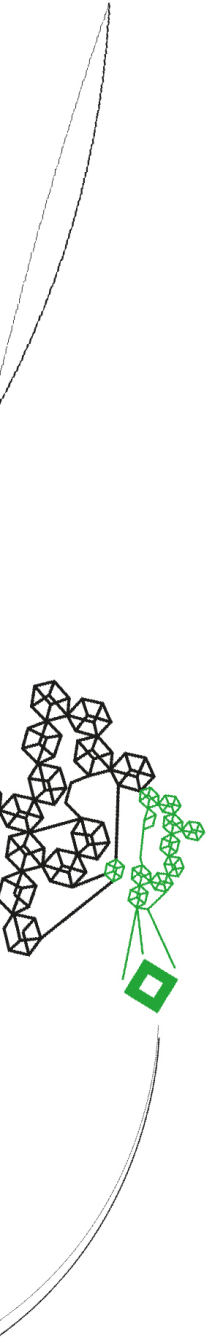
collaborations leads to a process in which the mechanisms of knowledge sharing are highlighted. They indeed, explain not only what type of knowledge is shared but also how and during which phase the exchange is done.

Sharing knowledge leads to an overall increase on the knowledge stock of each company involved into international innovative collaborations. Therefore, knowledge sharing plays a fundamental and direct role within international innovative collaboration in the public sector. Public organizations collaborate to achieve a common goal which is that of increasing public value and thus each information, knowledge, data, experts shared are of fundamental relevance on achieving that goal.

Knowledge sharing at international levels, despites the many challenges which can slow down the process, is helping public organizations and countries to understand that collaborating for the same goals can improve not only systems and products but can improve the public service which is of fundamental value.
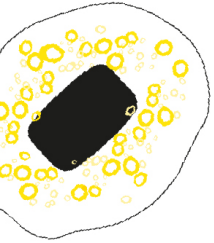
5.2 Conclusions and implications

5.2.1 Theoretical implications

The study aims to provide and contribute to the literature with new and useful insights into international collaborations in the public sector and in particular the mechanisms of knowledge sharing through international networks. These mechanisms, described in a three-step model, are important because they not only explain how and why to engage in international collaborations, but also highlight the importance of knowledge sharing and its mechanisms in an international context in the public sector. Understanding how international networks are formed, what kind of knowledge they share and how they share it can expand the literature on knowledge management.

This study confirms the direct role of knowledge sharing in organisational innovation (Wang & Wang, 2012) and the positive influence on it (Yesil, Koska, & Büyükbes, 2013), extending it to an international context in the public sector. This is because when explicit
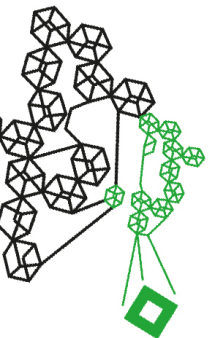
and tacit knowledge is exchanged through expert exchange programmes, people transfer expertise within the collaborating organisations, improving and growing knowledge and consequently innovation.
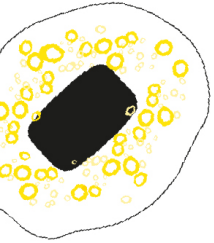
Furthermore, the study provides new insights into the theory of knowledge management in an international context. By focusing on knowledge sharing and its mechanisms, the study provided a three-step model that allows us to understand not only what kind of knowledge is shared, but also how and when it is shared. This contributed to a better understanding of the aspects of knowledge sharing, not only by examining the positive effects, but also the challenges that can occur in the particular context of international collaborations in the public sector.

5.2.2 Practical implications

These insides are useful for public organizations because they can help them to understand and encourage knowledge sharing in international collaborations but above all to overcome adversities and barriers concerning knowledge flows with different countries and cultures with the aim of improving public value. Therefore, when organizations within the public sector decide to go internationally, they need to take in consideration differences between countries such as values, regulations, geography, culture and language. Translating documents and research can help and lead to a more effective knowledge sharing and international collaboration. Communicating and being transparent with the partners/collaborators on goals, resources and knowledge is fundamental to avoid misunderstandings and therefore improving knowledge sharing.

The study provides useful information on why to engage in international collaborations which is that of not only because organizations may have the same goals and/or challenges but collaborating internationally can save both money and time. This is due to the fact that each country and organization does research in certain topic and exchanging that saves time and money for other countries. The study provides useful information on how to share knowledge which can be via live and online meetings but also by sharing documents, data
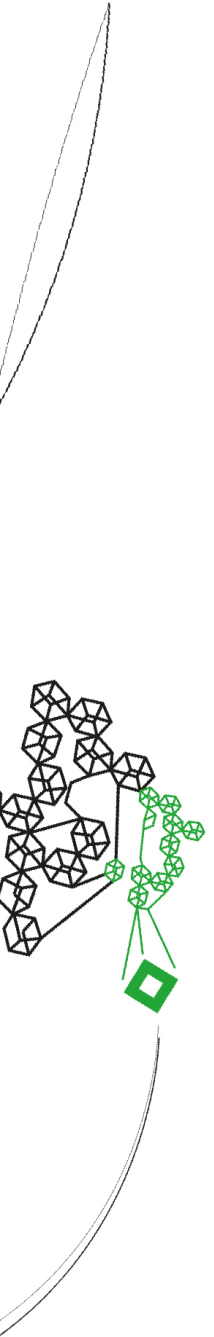
and people. Sharing knowledge and experts leads to an improvement and to an increase on knowledge and consequently innovation.

5.3 Limitations and future research

The study provides and contribute to the literature with new and useful insights regarding international collaborations within the public sector and particularly on knowledge sharing through international networks. However, the results must be interpreted carefully and expanded with future research.

First of all, the selection of interviewees does not represent all the employees involved within international collaborations as, except for two organizations, only one person per organization is interviewed. Therefore, expanding the sample selection can provide new insides regarding international collaborations. The study clearly provides reasons and barriers that public organizations are facing by sharing knowledge within international collaborations. It would be also interesting interviewing people part of the exchanging program and developing program they have. This can expand not only the literature on knowledge sharing but also can give insides to the organizations that organize these programs on how to motivate and support employees to take part of the programs and share knowledge.

The research may be useful for those involved in international collaborations because it could help them to understand and encourage knowledge sharing in international collaborations but above all to overcome adversities and barriers concerning knowledge flows with different countries and cultures with the aim of improving public value. However, more countries especially form the southern part of Europe and not part of Europe or emerging countries should be involved within the research (Scuotto et al.,2020). This can bring new insides on barriers and why to collaborate and share knowledge internationally as they are more brought to exploit external knowledge. Another factor to be taken in consideration is that the organizations taken into account are from the fire service, except for one which is a municipality. Therefore, looking into other public services and other organizations involved in international collaborations (such as
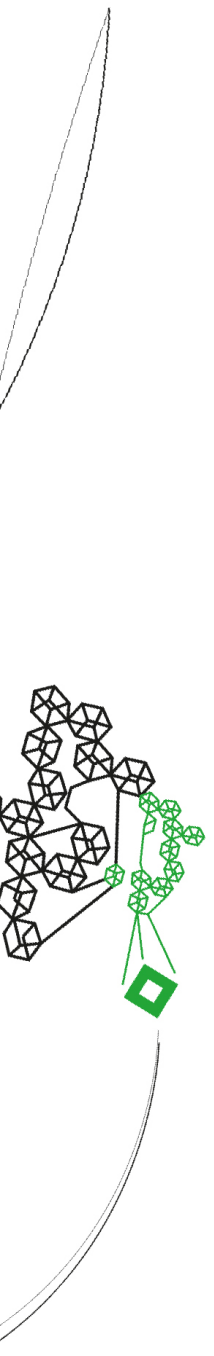
Universities and private companies) and how they share knowledge and collaborate internationally can be of fundamental importance for the literature but also for the organizations on giving new insides regarding the topics.
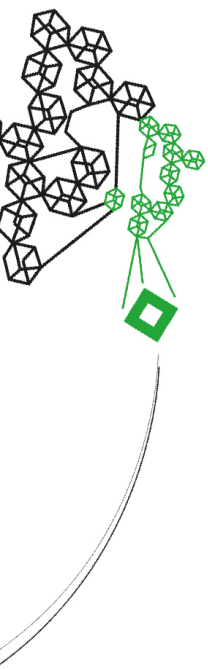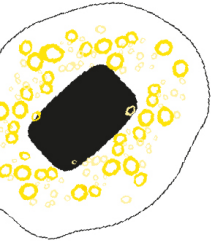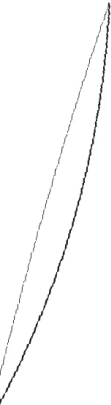
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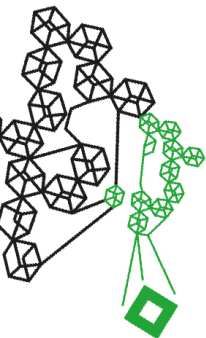
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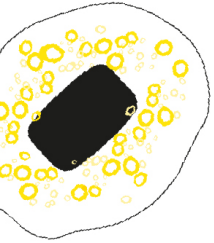
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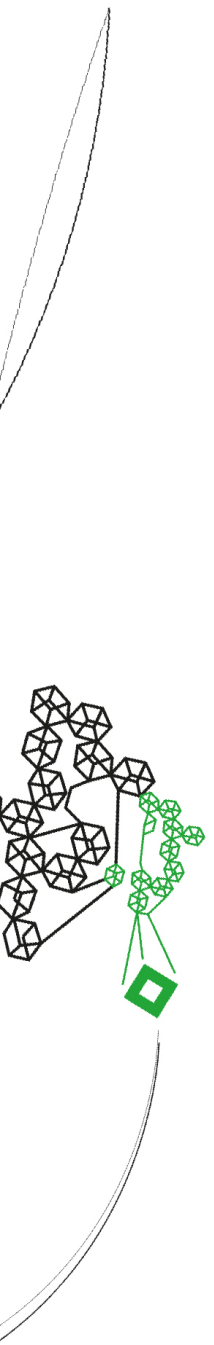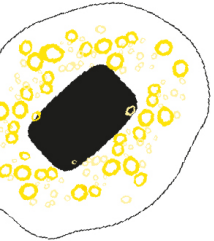
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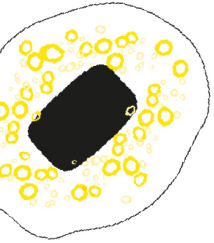Cinar, E., Simms, C., & Trott, P. (2022). Collaborative public sector innovation: An analysis of Italy, Japan, and Turkey. Governance, 1–22. https://doi.org/10.1111/gove.12673

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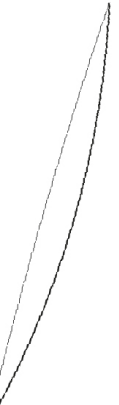
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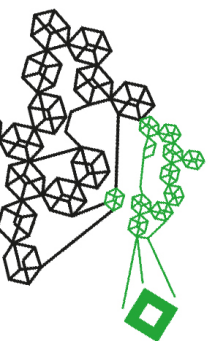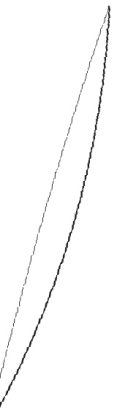
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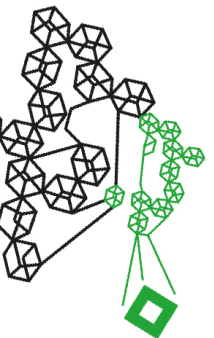
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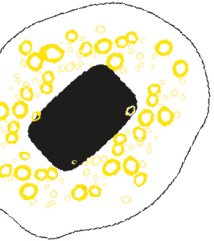
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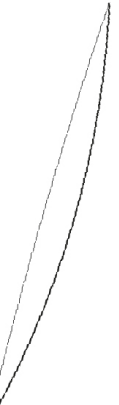
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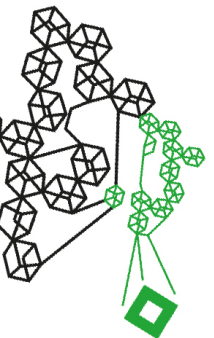
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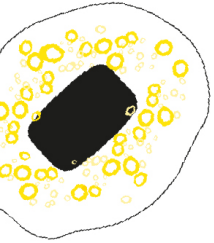
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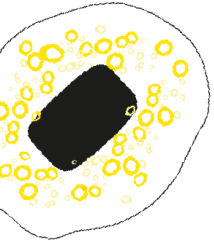
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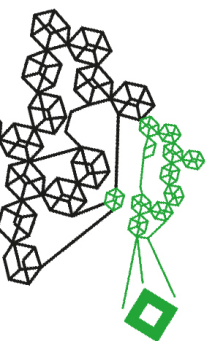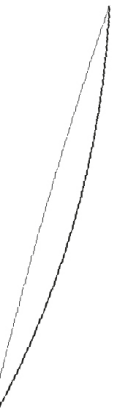
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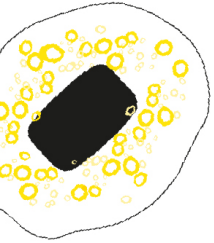
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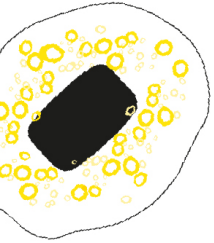
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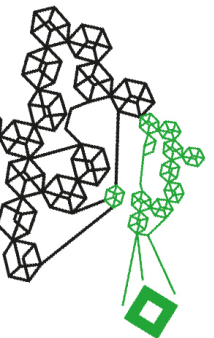
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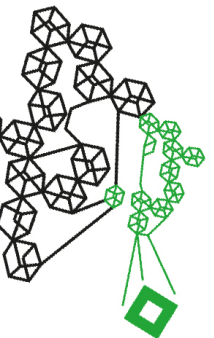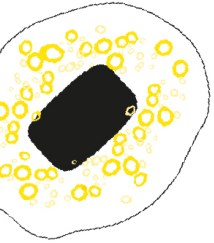
Appendix
Appendix I: Interview

- **1- Importance of International projects/collaborations and goal**

  -How important they are for innovation and public safety/value?

  -Which projects/collaborations are more important and why?

  -What are the benefits and challenges of the funding by the European commission/ parliament?

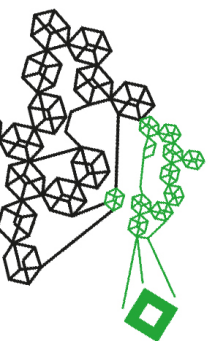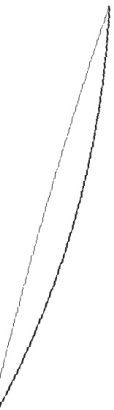- **2- International Innovative Projects/Collaborations**

  -What is the role of the organization in these projects/ Collaborations?

  -In which projects have you been involved, and in which are you involved at the moment?

  -What can be considered important or required if you work in international innovative projects?

  -Why are you involved in international innovative projects? What are the main reasons?

  -Some of the projects are financed by the European commission can you elaborate why they are so important and how they are structured?

  -How are these projects organized, structured? What happens once they are over; can you please explain this with an example?
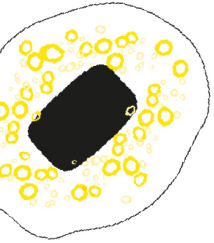
- **3- International collaborations between people**

  -Can you please elaborate on how do they work together?

  -In what way do people collaborate on those projects?

  -How many people are involved, from which countries? How often do they "meet"?

  -What are the benefits and the challenges of these collaborations for innovation?

- **4- Knowledge sharing for innovation (how is this happening now?)**

  -What do people share when involved in international collaborations?

  -How do they share knowledge?

  -I really liked the idea of exchanging experts, but I can imagine that people may not be interested/resistant to work in another country (family, language, age, culture etc). What do you think about this?

  (-Can you elaborate on how that is done and what are the benefits now in terms of knowledge sharing for innovation?)

  (-If not, can you elaborate on how you are planning to do that?)

  -How are ideas shared between countries? And between people?

-What are benefits of knowledge sharing/ innovative projects of various countries?
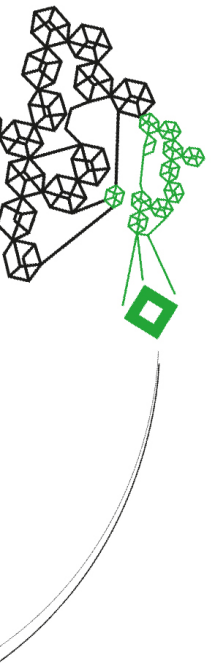
-What is needed to foster and actively involve country members to share knowledge/innovation?

- **5- Difference between national and International Innovative collaborations**

-Can you please explain what are the most important differences between national and international collaborations in terms of innovation?

-How can the international innovations/knowledge be introduced into the national context?

-From your experience, would you encourage people to engage in international projects/collaborations and why?
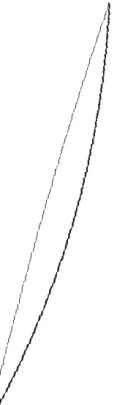
Appendix II: Document Analysis

International collaborations

- **Goal**
  - Common goal
  - Adress future challenges
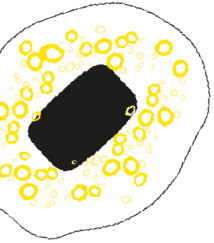 - Strong voice
  - Public value
- **Challenges**
  - Identify the right partners
  - Involve countries
  - Languege
  - Inconsistency of shared information
  - Time and money
- **What is needed**
  - Motivation
  - Transparency
  - Communication
  - Standard criteria
  - Standard procedures and instructions
  - External and internal partners

Knowledge sharing

- **Explicit**
  - Practices
  - Dilemmas and solutions
  - Information
  - Data
  - Resources
  - Education
  - Experts
  - Experience
- **Tacit**
- **How**
  - Web-site
  - Meetings
  - Communication plan
  - Megazine
  - Conferences
  - Periodic news letter
  - Social media
  - Periodic congress
- **Requirements**
  - Motivation from members
  - Inputs
  - International education