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Knowledge Management in a High-Risk Organisation

A Case Study on an Aviation School

by

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Abstract

This qualitative research aims to observe, understand and provide an overview regarding the knowledge management processes at a high-risk organisation such as an aviation school that does not have an established knowledge management system, but has reported zero accidents during its 35 years of operation, achieving an excellent safety record that demonstrates its high level of reliability. The research follows an interpretive tradition and more specifically the hermeneutic approach. Empirical data was collected by interviewing and observing instructors at the aviation school, as well as by collecting company's documents, aiming to answer how knowledge is created and shared among instructors at a high-risk organisation such as an aviation school and what factors encourage or hinder knowledge creation and sharing between instructors.

Our findings suggest that culture is a contextual factor positively affecting the instructors' high level of trust, identity, perception of time as a constraint, as well as how conflicts are not allowed to escalate at LUSA. Further, we suggest that LUSA's culture positively influence instructors to share knowledge throughout informal (discussions, voluntary mentorships) and formal (meetings, shadowing, research groups) practices, which are facilitated by technological systems and manuals. Concluding, this thesis contributes to theory and practice by providing a detailed description of all the practices and factors of a small high-risk organisation operating with excellence. Despite not having an established knowledge management system, the organisation continuously shares knowledge through an open and sincere culture that focuses on safety and embraces sharing and learning, influencing the instructors' self-view and encouraging knowledge sharing attitudes.

<u>Keywords</u>

knowledge, knowledge management, knowledge creation, knowledge sharing, aviation, high-risk organisation, high-reliability organisation, aviation school, organisational culture, identity, self-view, safety.

Acknowledgments

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1 Introduction

The introduction chapter presents an overview of the thesis and its directions so that the reader is provided with such material that will enable him or her to better comprehend the context of the thesis. Hence, this chapter refers to the background of the thesis and the problem statement that assisted in guiding the literature review and empirical research. Subsequently, it introduces the aims, objectives and research questions of the thesis, while it also explains its purpose and contribution towards knowledge. Finally, it summarises the outline of the study, to prepare the reader in terms of what follows throughout the context.

1.1 Background and Problem Statement

In a world where organisations, in the aviation industry particularly, carry activities in high-risk environments, it is in our interest to investigate how knowledge is managed, in terms of knowledge creation and sharing. Knowledge has proved to be a contributor to a company's competitive advantage, as well as it has been associated with the evolution of economy (Hislop, Bosua & Helms, 2018; Schultze & Stabell, 2004). What is more, knowledge links with education, learning, sharing, innovation and advancement (Alvesson & Kärreman, 2002, p. 282). Thus, we seek to conduct an empirical study at "Lund University School of Aviation" (LUSA), an aviation school that is part of Lund University. LUSA attracted our attention, as it is a small organisation without a specific knowledge management system in which employees are required to follow established procedures that relate to knowledge sharing and creation, but it has managed to succeed, reporting zero accidents during its 35 years of operation, making LUSA a high-reliability organisation. Particularly, LUSA is a pioneer in a new way of training future pilots, since students start flying as second officers in established companies like Norwegian and SAS, before being completely certified with the "Multi-Crew Pilot Licence" (MPL); a licence only offered by LUSA, in Sweden. Hence, instructors have the responsibility to provide students with substantial capacities and skills to respond to the industry requirements. Having an effective knowledge management process among the instructors can lead to the accomplishment of the mission, which is to form future pilots, and be seen as an example for other schools that might also want to implement this new way of training future aviators.

An aviation school without an established knowledge management system but with such success, exposed to the risks that the aviation industry carries, as well as having to deal with inexperienced students that have serious responsibilities before being certified pilots, seemed an interesting case for us, and rare at the same time. Thus, we were intrigued to choose it as our focus organisation, and learn more about it.

Based on LUSA's background, and its potential to cause deaths or in general, physical consequences when safety failings within the organisation occur (Perrow, 1999; Paice, Aggarwal & Darzi, 2010; Weick & Sutcliffe, 2011; Sanchez-Alarcos, 2016), it can be considered a high-risk organisation. One of these organisations' priorities is to be reliable, which means being able to achieve the unusual capacity to produce quality collective outcomes repeatedly (Hannan & Freeman, 1984). In our case, the operational reliability reflected in LUSA's excellent safety record kept during its years of operation makes it also a high-reliability organisation. Hence, LUSA's features lead to the intrigue to identify what characteristics help the school obtain such a distinguished safety record, despite the risks that it has to face during its daily operations. Additionally, we were curious to examine what measures the school has taken in pursuit of error-free performance, and its relation with knowledge management practices.

Culture and learning are factors that help the process of decreasing and controlling the risks and uncertainties in high-risk organisations that prioritise safety over short term efficiency (Weick, 1987; Roberts, 1989; McBriar et al., 2003). However, effective learning processes such as trial and error learning cannot be implemented in these organisations due to the potentially disastrous consequences associated with mistakes (Aase & Nybo, 2005). Likewise, the search for safety has led to high levels of standardisation and approaches to knowledge management that sometimes disregard social and contextual aspects needed for effective transfer of knowledge (Aase & Nybo, 2005). Therefore, it becomes interesting to analyse how high-risk organisations, and more specifically LUSA, reaches effective knowledge management among its flight instructors while performing all the standardised procedures required to maintain a safe operation.

In high-risk organisations, where failures can lead to catastrophic consequences, difficulties arise during the learning process due to less available data from previous mistakes (Weick, Sutcliffe & Obstfeld, 2008). Authors like Roberts (1989), Westrum (1992), Rochlin (1993), Landau and Chisholm (1995), Pidgeon (1998), or Weick, Sutcliffe and Obstfeld (2008) have suggested different options like detailed analysis of near failures, or encouraging the report of errors, to improve the knowledge management processes in these organisations. Equally, since learning is vital for safe organisations (Pidgeon, 1998), a culture that encourages employees to ask challenging questions, seek for clarification, and share observations in the search for different perceptions will facilitate the communication of safety-critical knowledge (Weick, 1987; Owen, 2001). More specifically, aviation has used its own and other high-risk industries' experiences to improve the learning process experience. Studies about the correlation between knowledge management and aeronautical products development have been conducted (Zhengfeng, Jinfu & Yan, 2007). Likewise, Wilkesmann and Wilkesmann (2011) studied the transfer of explicit and tacit knowledge between experts and novices at an airline. Furthermore, Patrick (2018) identified the importance of academic and flight training instructors to improve students' performance. Thus, these studies have developed knowledge regarding the topic of knowledge management in high-risk organisations and more specifically the aviation industry, highlighting that experience and knowledge can assist in managing high-risk organisations, limiting the likelihood of mistakes.

Nevertheless, most of these studies have been conducted in big organisations. Since LUSA is a small organisation without a formal knowledge management system, but with an excellent safety record and good reputation among aviation schools, we identified a gap that we would like to fill with this thesis by studying the knowledge sharing processes between the school's instructors. Hence, our interest lies in this study, as the accomplishment of LUSA to maintain constant reliable operations reflected in its excellent safety record, without an established knowledge management system remains a mystery for us.

1.2   Research Aim, Objectives and Research Questions

In this thesis, we aim to investigate how knowledge is created and shared among instructors at a high-risk organisation, such as an aviation school, as well as to examine what factors encourage or hinder knowledge creation and sharing between the instructors. Thus, by conducting empirical research at "Lund University School of Aviation" (LUSA), we intend to answer the following questions:

How is knowledge created and shared among instructors at a high-risk organisation such as an aviation school?

What are the factors that encourage or hinder knowledge creation and sharing between instructors at an aviation school?

1.3   Research Purpose and Knowledge Contribution

The purpose of our research is to explore and describe how the knowledge sharing and creation process is managed between instructors at Lund University School of Aviation, and what aspects affect it. This study does not aim to raise critiques regarding the practices of the organisation that we intend to study, nor do we want to propose a recipe expected to guarantee success regarding knowledge management at aviation schools. What we intend for, is to broaden the understanding in terms of how knowledge is created and shared among instructors at an organisation like LUSA, with its previously described characteristics.

The literature review reflects that there is no lack of research surrounding the field of knowledge management. Similarly, the characteristics of high-risk organisations have also been identified, and research has been conducted to study the importance of culture and learning to create and share safety-critical knowledge. However, we seek to study a small high-risk organisation like

LUSA, that without having a formal knowledge management system has managed to sustain on-going reliable operations.

The knowledge gained in our thesis can be relevant for scholars investigating the field of organisational studies related to knowledge management since different factors that can affect the knowledge sharing processes in aviation schools are analysed and can be used as a source of further information. Likewise, organisations and companies existing in a similar context as the one studied in this thesis, that can associate themselves with the school's procedures and way of functioning, can benefit from a deeper understanding of the knowledge processes of a reliable aviation school. Furthermore, the aviation safety field can find this study relevant, since identifying the characteristics of this zero-accident organisation can help increase awareness of features that may positively affect safety, leading to standards' improvement regarding flight safety at aviation schools.

1.4   Outline of the Thesis

So far, this chapter introduced an overall idea of the thesis, referring to its background, and problem statement, as well as its aim, purpose, research questions and knowledge contribution. This section serves as an outline that introduces what will follow in the next chapters. In more detail, chapter 2 refers to the theoretical background, or else, literature review. Mainly, it consists of existing theory related to knowledge management, such as a general introduction to the concept of knowledge, the two perspectives of the epistemologies of knowledge, knowledge creation, and factors that contribute in knowledge sharing processes. In addition to this, chapter 2 includes theory regarding high-risk organisations and reliability, with a specific emphasis on aviation. What is more, it examines the theory of knowledge management in such high-risk organisations, focusing again on aviation.

Moving on, Chapter 3 revolves around the methodology of the thesis. To begin with, it refers to the philosophical grounding, which is followed by the research approach, research design and data collection. In more detail, it describes that qualitative research was used to answer the research questions, following the hermeneutics approach of the interpretive tradition. In

addition to this, it mentions that it followed an abductive approach, as it relied both on theory and empirical data, such as interviews, observations, and documents, collected throughout the research at LUSA. Further on, the chapter refers to validity and credibility, data analysis and finally, limitations.

Chapter 4 presents the empirical findings that were collected during the research at LUSA. Specifically, it presents a description of the stories offered by the instructors about their everyday experiences, facilitating an increased insight into the school, as well as it provides the foundation for the next chapter's discussion. Chapter 5 follows with a discussion about the findings, linking them to the theory from chapter 2. Finally, a conclusion is provided in chapter 6, summarising the context of the thesis, as well as reflecting on the findings and discussion. In addition, it presents the contribution of this study, its practical implications, and recommendations for future research. The outline of the thesis is illustrated in figure 1.

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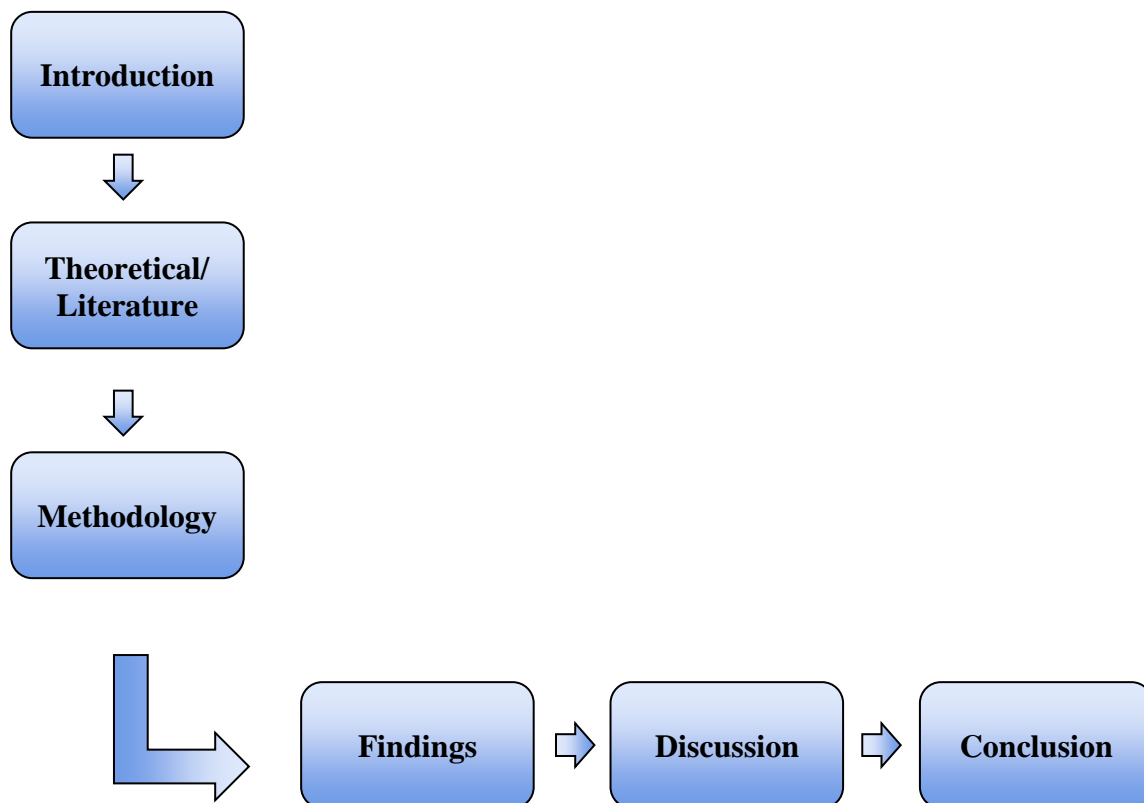
Figure 1 Thesis Outline

2 Literature/Theoretical Review

The literature review of the thesis focuses on the topics of knowledge management, high-risk organisations and aviation in order to get an understanding about the main theoretical concepts which are relevant for this study in a logical sequence. The first part covers the topic of knowledge management. Specifically, it firstly refers to knowledge in general, and subsequently, it compares the two perspectives of the epistemology of knowledge, as well as explicit and tacit knowledge. Further on, it uses the SECI framework of Nonaka (1994) to explore the process of knowledge creation, while referring to the critiques of the framework. It also examines different factors that impact on knowledge sharing attitudes, with a particular focus on culture, which includes aspects such as trust and conflicts, time, identity, and personality. To note, intrinsic and extrinsic motivation, as well as advantage and disadvantages of sharing knowledge will be mentioned. The second part entails the concept of high-risk organisations and how reliability becomes a crucial aspect for them. Following this, a description of how aviation can be identified as a high-risk organisation is explained. Finally, the importance of knowledge management in high-risk organisations, and more specifically in aviation is illustrated. The research presented in this chapter will function as the grounding for the analysis and discussion of the empirical material in chapter five.

2.1 Knowledge in General

Since the past years, there has been an association of knowledge with the evolution of economy, surpassing society's focus on manufacturing (Schultze & Stabell, 2004; Hislop, Bosua & Helms, 2018). This is due to the fact that the way resources are converted into products or services depend on acquired knowledge and the ability to transmit it to the resources (Schultze & Stabell, 2004). Knowledge has become an important topic for organisations, making learning a substantial consideration in the company's processes as it can result in different outcomes (Hislop, Bosua & Helms, 2018). Notably, the management of knowledge impacts on the company's competitive advantage (Argote & Ingram, 2000; March, 1991; Crossan, Lane & White, 1999). What is more, it is worth to mention that the topic of knowledge management has been linked to education, progress, innovation, learning and sharing as it can contribute on the way they are managed (Alvesson & Kärreman, 2002, p. 282). Nevertheless, it needs to be

specified that knowledge management has various statements of meaning as published books and articles define knowledge management dissimilarly (Hislop, Bosua & Helms, 2018). The different perspectives of epistemologies and ontologies result in different definitions of knowledge, generating different meanings and facets (Jonsson, 2013; Nonaka, 1994).

2.2 Epistemologies of Knowledge

In terms of the epistemologies of knowledge, there are two primary perspectives (Hislop, Bosua & Helms, 2018; Schultze & Stabell, 2004; Jonsson, 2013). The first one is the objectivist perspective and the second is the process-based perspective (Hislop, Bosua & Helms, 2018; Schultze & Stabell, 2004; Jonsson, 2013).

2.2.1 Objectivist Perspective and Explicit Knowledge

The objectivist perspective perceives knowledge as static and an object that can be codified, stored, as well as shared among others (Hislop, Bosua & Helms, 2018). In this case, knowledge can be possessed or held by an individual who expresses it in an objective and explicit way (Cook & Brown, 1999). This is what Schultze and Stabell (2004) refer to as dualism, in which "either/or" taxonomies are emphasised, and objects are identified separately. In addition, the authors claim that assumptions about the world and relationship of cause and effect are knowable and deterministic, as well as there is no room for opposing views since any sign of contradiction is blamed on contingency models that are not enough developed. Additionally, to this, Jonsson and Tell (2013), support that the objectivist perspective of knowledge is referred to KM1.0 as it concerns the management of knowledge through codifying, storing and sorting with the help of mechanisms, tools and databases.

Explicit knowledge can be transmitted systematically in a recognised language (Polanyi, 1966 cited in Nonaka, 1994, p.16). Moreover, this type of knowledge associates with the "know-what" and it is knowledge that can also be derived from texts, books, documents and any other written source (Bratton & Gold, 2012).

2.2.2 Process-based Perspective and Tacit Knowledge

In the process-based perspective, knowledge is considered as a process that resides and belongs to the individual (Hislop, Bosua & Helms, 2018). It relates to the processes of doing, either individually or in a group (Cook & Brown, 1999). Additionally, it is constructed in social phenomena and actions, as well as it is incorporated or embedded in factors that revolve around the individual such as their beliefs, culture and background (Yanow, 2004). Furthermore, Schultze and Stabell (2004) consider a duality in this case, which emphasises on "both/and" theories of practice, as well as on the mutual constitution of phenomena. Moreover, they argue that assumptions on the world are continually changing and are not entirely knowable, assumptions about cause and effect relationships arise and are cyclical, as well as paradoxes, and opposing views exist.

Further on, Jonsson and Tell (2013) state that the process-based perspective is recognised in KM2.0 as it relates to social interactions such as conversations that aid in the progress of knowledge. The concept of knowledge in the process-based perspective can link to the situation of "knowing", as it makes reference to "the epistemological dimension of action itself" and "the epistemic work that is done as part of action or practice, like that done in the actual riding of a bicycle" (Cook & Brown, 1999, p.387). In addition to this, "knowing is dynamic as it can be affected by the constant change" (Cook & Brown, 1999, p.387).

What is more, processual knowledge is tacit (Hislop, Bosua & Helms, 2018). Tacit knowledge relates to "know-how", which is the knowledge that is developed and practised through an individual's experience and actions (Smith, 2001). Hence, Nonaka (1994), characterise it as a feature that is immersed and involved in a particular situation. Another important consideration regarding tacit knowledge is that it consists of technical as well as cognitive aspects (Nonaka, 1994). Particularly, the author explains that technical aspects focus on particular skills, practices and actions that are involved in a particular situation. On the other hand, the cognitive aspects emphasise on mental models, which consist of paradigms, patterns and perceptions, that people have in their mind, and therefore perceive the world and act according to each person's mental model (Johnson-Laird's, 1983 cited in Nonaka, 1994, p.16). In terms of tacit and explicit knowledge, Nonaka's SECI model can be used, to observe how knowledge can be created and shared. More detail on the model is provided below.

2.3   SECI Framework

Nonaka's (1994) framework of knowledge creation, which is recognised as SECI, is a framework that advocates how new knowledge is created in the organisation through the application of tacit and explicit knowledge. More specifically, based on the author, the acronym of SECI stand for four distinct modes consisting of "socialisation", "externalisation", "combination" and finally "internalisation", in which knowledge can be created in the processes of each mode where knowledge conversion occurs. As a matter of fact, Nonaka (1994) describes that SECI is a spiral framework, with socialisation being the starting point of the process of knowledge creation. Additionally, the author claims that the framework aids in gaining a competitive advantage since knowledge is created continuously as well as exploited, and therefore it helps in keeping ahead of rivals. The four modes of SECI framework are further described below, and SECI's framework can be observed in figure 2. Additionally, an example of how product developers at the Matsushita Electric Company intended to develop a machine that kneads dough in the right way, will be illustrated for a better understanding of the model (Nonaka, 1991).
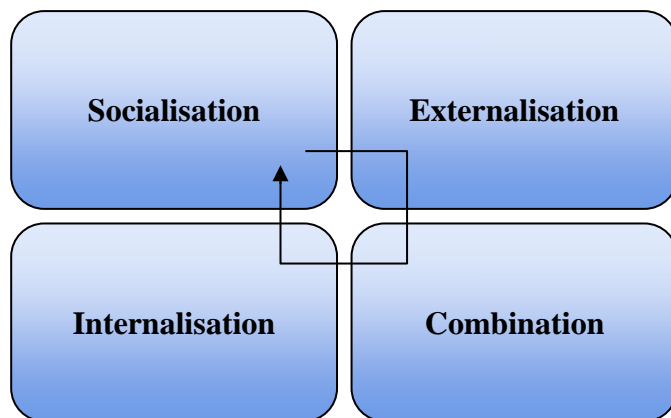
Figure 2 SECI Framework (Nonaka, 1994)

Socialisation: In the mode of socialisation, tacit knowledge is emphasised, as knowledge is transferred from tacit to tacit during interaction and relations among people (Nonaka's, 1994). In this case, Nonaka (1994) highlights the importance of experience. Examples of such interaction can be acts of observing, practising and trying to imitate other people's actions that aid in learning tacit skills (Nonaka, 1991). In terms of the example of the product developers at the Matsushita Electric Company, Ikuko Tanaka, a software developer at the company, suggested to use "The Osaka International Hotel", which was famous for baking the best bread

in the city, as a model example to help them deal with the problem of kneading dough (Nonaka, 1991). Therefore, Tanaka herself went to the hotel and by observing and imitating the tacit skills of the head chef, she integrated them into her own tacit skills.

Externalisation: In the stage of externalisation, tacit knowledge is converted into explicit knowledge, which is a result of an individual sharing knowledge to another group with the support of communication and other various tools, creating newly created knowledge which later on, people can codify and store (Nonaka's, 1994). In externalisation, it is essential to highlight the importance of metaphors, analogies and models since metaphors associate opposing views and ideas, analogies help in dealing with the opposing views, while models demonstrate the newly created concepts (Nonaka, 1991). As an outcome, knowledge can be then communicated and found physically or digitally written, for instance in texts, documents, books, manuals or computer machines (Nonaka, 1991; 1994; Jonsson, 2013). Regarding the example of Tanaka, her ability to communicate and explain her tacit knowledge regarding the way bread is made, shows how her tacit knowledge is converted into explicit knowledge, which her team can then use (Nonaka, 1991). Nevertheless, the limits need to be considered since it is impossible to put tacit knowledge into words and make it fully explicit Nonaka (1991).

Combination: The mode of combination concerns the transfer of explicit knowledge, which may result from meetings and (telephone) conversations for instance, to explicit knowledge, involving the update, re-categorisation and exchange of knowledge, by using various mechanisms, leading to the emergence of new knowledge from a group to the organisation (Nonaka's, 1994). Put in other words, Nonaka (1991) refers to the collection and combination of explicit knowledge that in turns becomes new knowledge. Referring to Tanaka's example, the combination is seen when Tanaka's team regulate the knowledge and codify it in books and manuals (Nonaka, 1991).

Internalisation: The stage of internalisation entails that explicit knowledge is converted into tacit knowledge, which occurs when an individual makes use of and practices explicit knowledge (Nonaka's, 1994). As a matter of fact, the stage where internalisation is observed is linked to the processes of learning (Nonaka, 1994). Regarding the employees at Matsushita Electric company, they refer to explicit knowledge to further develop their tacit knowledge (Nonaka, 1991). As the framework is spiral, the process starts again, this time at a more advanced level (Nonaka, 1991).

To conclude, the framework of SECI demonstrates how knowledge can be shared and created in an organisation through the use of explicit and tacit knowledge (Nonaka, 1991; 1994). Nevertheless, it has been criticised for several reasons that are presented below.

2.3.1 Critiques on SECI

Several critiques have been raised in terms of the SECI framework. To begin with, Gourley (2006), characterises the examples provided in SECI as unconvincing and ambiguous, as well as he claims that it is unnecessary to refer to a process like the transfer of knowledge, since people can learn by doing, and the acquirement of new skills can occur nevertheless, despite having contacts that are direct and personal. Furthermore, Gourley (2006) explains that this phenomenon can be described as "learning by doing on the one hand, and to designing new tasks on the other" Gourley (2006, p. 1421). In addition to this, considering that tacit knowledge is the root of new knowledge, he questions the reason why socialisation should be the first stage of knowledge creation. He justifies the statement by explaining that the internalisation mode can be the starting point of knowledge creation since in internalisation tacit can also convert to explicit, and therefore to new knowledge. Moreover, he adds that the starting point can also be the modes of combination and externalisation due to the fact that in combination explicit knowledge can be produced creatively with the use of new ideas and imagination, while in externalisation a "source" of activity is solely needed, concluding therefore that tacit knowledge is present in that case.

Another critique that Nonaka's (1994) SECI framework has received concerns the separation of tacit and explicit knowledge (Hislop, Bosua & Helms, 2018). In addition to this, Gourley (2006) argues that it is impossible to convert tacit knowledge into explicit fully. Taking into consideration this critique, it was restated in a response that tacit and explicit knowledge are not separated but are sequential (Nonaka & Von Krogh, 2009).

Further on, an additional critique has attracted the attention regarding the influence of the Japanese culture on the SECI model (Hislop, Bosua & Helms, 2018). Likewise, it is argued that there are limits to Nonaka's (1994) SECI framework due to the fact that the Japanese culture impacts on the incorporation of knowledge, as the framework illustrates representation of Japanese values and business practices (Glisby & Holden, 2003). In fact, it is supported that the

values that are common in Japan such as high collectivism, high uncertainty avoidance, considerable power distance and masculinity, reflect on the behaviour and assumptions on the four modes of SECI (Hong, 2012). As a result, this can harm organisations in other countries that share different cultural values as they may be less likely to accept the SECI model (Hislop, Bosua & Helms, 2018).

2.4   Factors that Affect Knowledge Creation and Sharing

As mentioned, knowledge management is considered to be related with the willingness of an individual to share knowledge (Alvesson & Kärreman, 2002, p. 282), a process in which individuals share ideas, recommendations, explicit and tacit knowledge (Bartol & Srivastava, 2002), as well as in which a party learns from another party (Argote et al., 2000). Nonetheless, several factors impact the phenomenon of sharing and hoarding knowledge and thus complicate the procedure (Hislop, Bosua & Helms, 2018). Influenced by Hislop, Bosua and Helms (2018), the literature review of the thesis draws upon the factors of culture, trust, conflicts, time, identity and personality, linking them to intrinsic and extrinsic motivation, as well as advantages and disadvantages that individuals participating in knowledge sharing initiatives consider.

2.4.1   Culture

The culture of an organisation consists of the values, beliefs, norms and ideas that are embraced and promoted within the organisation, its identity, and the behaviour of the employees (Rashid, Sambasivan & Johari, 2003). When talking about the cultural level, it means emphasising informal meanings, beliefs and understandings (Alvesson & Sveningsson, 2016). It is worth to mention that organisational culture impacts on the company's success as it helps in understanding the context in which the corporation runs, as well as in comprehending the behaviour of the managers (Rashid, Sambasivan & Johari, 2003). Alvesson and Sveningsson (2016) argue that perceiving organisational culture as the most crucial aspect to guarantee success is an exaggerated view, but agree that organisational culture remains "a central aspect behind a range of organisational topics such as commitment and motivation, prioritisation and resource allocation, competitive advantage and organisational change" (Alvesson & Sveningsson, 2016, p. 40).

Culture can also be perceived as a social glue, meaning that informal and non-structural means such as values, beliefs, norms, ideas and understandings that are promoted in the culture, have the power to control the organisation (Alvesson, 1993). Notably, it encourages employees to identify with organisational values and objectives and therefore influencing an emotional bound that in turn increases employees' commitment, loyalty and devotion towards the organisation (Ray, 1986, p. 294). In fact, it is suggested that culture emerges from human interpretation, and therefore it is socially constructed (Alvesson, 1993).

Organisational culture can influence employees' attitude and contribute towards knowledge sharing by establishing an environment, in which social norms emphasise on the significance of knowledge sharing (Cabrera & Cabrera, 2005; De Long, 1997). This can be done by stressing the importance of knowledge to the employees, encouraging employees to share their knowledge with the organisation, creating a socialised atmosphere in the company, and incorporating processes that stimulate knowledge to be generated, shared and legitimised (De Long, 1997). Furthermore, organisational culture can contribute towards knowledge sharing by promoting a working environment that embraces values such as caring and trust, motivating and encouraging individuals to share knowledge with each other (Cabrera & Cabrera, 2005). As the theory focuses attention on people's' relationships, trust and conflicts are elements that need to be considered.

2.4.1.1 Trust

The importance of trust is highlighted since it has a positive relation with knowledge sharing in the organisation (Cheng et al., 2008; Cabrera & Cabrera, 2005). It is argued that trust contributes to better exchange relationships (Cheng et al., 2008). In fact, the more trustworthy the receiver is perceived, the higher the chance to share knowledge with that person (Hislop, Bosua & Helms, 2018). To expand, McAllister (1995) distinguishes two types of trust, including cognitive-based and affect-based. The author supports that the first one concerns how trustful a person is regarding their ability to accomplish something, while the latter one is about the emotional trust that is built from the social tie that exists between the knowledge sharer and the knowledge receiver. Also, emotion plays a vital role when it comes to trust since the betrayal of trust produces anger and other negative feelings, while reciprocity leads to happiness and positive feelings (Hislop, Bosua & Helms, 2018).

What is more, in situations where members feel that they are part of a group and identify with each other, it is more likely that the willingness to share is increased (Ryan and Deci, 2000). As a matter of fact, where trust is recognised in groups, knowledge sharing is facilitated, as well as the identity that members within a group share is strengthened (Rosendaal & Bijlsma-Frankema, 2015). This occurs because individuals have more trust in others and are more willing to participate in knowledge sharing activities, having a positive attitude towards them when they identify with a group (Hislop, Bosua & Helms, 2018).

Nevertheless, it needs to be mentioned that the trust and relationships of individuals can be affected by conflicts generated in the organisation, impacting on their engagement in knowledge sharing and creation (Hislop, Bosua & Helms, 2018). Hence, the literature review focuses on conflicts as well.

2.4.1.2 Conflicts

Conflicts involve different views and struggles that arise among two parties, and in the organisational context they are divided into three forms, including relationship/affective conflicts, task/cognitive conflicts and process conflicts (Panteli & Sockalingam, 2005). The authors explain that the first one considers personal clashes and arguments causing antagonism and bitterness among individuals, while the second one refers to disagreements on how things should be better carried out to achieve the company's objectives. In terms of the third one, they explain that it concerns conflicts regarding different views about roles and responsibilities. Further on, various tensions arise from the way the employer treats an employee's knowledge, which in turn may affect an individual's willingness to share knowledge, while conflicts among groups that emerge from people's differences, personalities, attitude, or even antagonism can also impact on the decision to share knowledge or not (Hislop, Bosua & Helms, 2018). As a result, conflicts, particularly relationship/affective conflicts impact the relationships among people, which in turn can harm trust, communication, as well as the feeling of togetherness and group identity, shaping a behaviour that is unwilling to take part in knowledge sharing activities, causing inefficiency and ineffectiveness, as well as a decrease in intrinsic motivation (Panteli & Sockalingam, 2005). Nevertheless, it needs to be added that there are occasions where task conflicts can help increase group performance and innovation when management takes proper action on them (Han & Harms, 2010; De Dreu, 2006).

In terms of the treatment of an employee's knowledge, it is also crucial to mention the significance of procedural justice and the sense of psychological ownership. Procedural justice, which is part of the organisation, regards the employees' perception of fairness when it comes to what procedures were used and what actions were taken to decide on the allocation of resources and other distributions (Paauwe & Broselie, 2007). As a result, social harmony, commitment and trust are enhanced, leading to the maximisation of organisational performance (Kim & Mauborgne, 2005). Psychological ownership is when employees have rights regarding the information and equity of the organisation and can exercise some influence, enhancing employees' commitment and performance (Pierce & Furo, 1990). Hence, procedural justice and sense of procedural justice are essential because they impact on trust and commitment, as well as a high perception of fairness makes it more likely for individuals to engage in knowledge sharing (Hislop, Bosua & Helms, 2018).

2.4.2 Time

Based on theory, time is considered to play a role in the process of sharing and creating knowledge (Hislop, Bosua & Helms, 2018). According to Bartol and Srivastava (2002), there are four mechanisms of knowledge sharing that consist of an individual sharing knowledge to organisational databases, formal socialising and networking with other teams and departments, informal socialisation among people, and finally communities of practice in which people voluntarily engage in knowledge sharing processes. Nevertheless, sharing knowledge requires time (Hislop, Bosua & Helms, 2018). Consequently, it can be viewed as a disadvantage since a person sharing knowledge will need to sacrifice some amount of time to share what they know to another person or group (Hislop, Bosua & Helms, 2018). Despite this drawback, it is worth to mention that people still participate in knowledge sharing processes because of intrinsic and extrinsic motivation (Hislop, Bosua & Helms, 2018).

Intrinsic motivation concerns the internal, psychological and non-monetary elements, that influence people to do something, such as feelings of happiness, contentedness, meaningfulness, accomplishment, contribution and satisfaction that can be viewed as the intrinsic rewards resulting from actions of sharing knowledge (Ryan & Deci, 2000; Thomas, 2009; Hislop, Bosua & Helms, 2018). For instance, people who feel empathy and are proud of what they know, are more likely to be happy to share knowledge (Hislop, Bosua & Helms,

2018). On the other hand, people who are afraid of losing power when it comes to knowledge sharing are not intrinsically motivated to share (Hislop, Bosua & Helms, 2018).

In terms of extrinsic motivation, it can relate to extrinsic rewards that people receive in turn of the knowledge that they share, involving monetary and non-monetary elements that affect the willingness of an individual (Ryan & Deci, 2000; Hislop, Bosua & Helms, 2018). Extrinsic benefits are controlled by the external environment and may include tangible and monetary elements such as financial rewards and bonuses, as well as non-monetary elements like the working environment (Thomas, 2009).

2.4.3 Identity and Personality

'Identity' is a term that refers to people's attempts to create a stable and coherent idea of who they are and what they can do (Brown 2015; Sveningsson & Alvesson, 2016). Someone's self-view, which is reflected on at some time during life, aims to understand how different contexts can affect self-perception, objectives and self-understanding (Sveningsson & Alvesson, 2016). Furthermore, identities appear in social contexts, and the term 'identity' can be used to describe collective and individual level situations and circumstances, making it possible to link it with concepts such as organisational identity, individual identity or social identity (Sveningsson & Alvesson, 2016). In this study, interviewees usually described how they see themselves in terms of personality traits as a way of presenting their attributes and characteristics, which is why we explain below the relationship of personality traits with knowledge sharing.

The personality and traits of a person should also be discussed as they can affect their behaviour and decisions towards the act of sharing (Hislop, Bosua & Helms, 2018; Jadin et al., 2013). More specifically, it is argued that some traits are positively associated with a knowledge sharing attitude (Cabrera & Cabrera, 2005; Mooradian et al., 2006; Matzler et al., 2011). Particularly, focusing on Matzler et al.'s (2011) five-factor personality model, five broad personality traits have been identified as facilitators that form the personality of a person including openness to change, extraversion, neuroticism, conscientiousness, and agreeableness. In more depth, the authors explain that openness to change involves characteristics such as imagination, creativity, and curiousness. Further, they relate extraversion with sociability, enthusiasm and assertiveness, while they describe that neuroticism is used for negative emotions such as anxiety, guilt and anger. Finally, they add that conscientiousness is a trait that

involves carefulness, hard work, reliability and self-discipline, while agreeableness is a trait of someone trustful, generous, forgiving and collaborative. According to Cabrera & Cabrera (2005), it is argued that openness to change is associated with attitudes towards knowledge sharing, while based on Mooradian et al. (2006), it is claimed that agreeableness is related with a willingness to engage in knowledge sharing. Nevertheless, the topic of personality is not researched in depth and does not have definite conclusions about the association of personality and willingness to take part in knowledge sharing processes (Hislop, Bosua & Helms, 2018).

Further, personality remains a subjective factor as at times people may be influenced by the situation and context, and therefore form an attitude accordingly (Marcus & Kitayama, 1998). Nonetheless, it is still worth to consider personality as different authors have previously studied it, and identifying those traits could represent benefits for the organisations (Hislop, Bosua & Helms, 2018). In fact, it is supported that the personality traits mentioned in the five-factor personality model are related in different criteria for job performance (Goldberg, 1993). Furthermore, it is argued that the five-factor personality model is useful in categorising empirical findings, as well as in examining the relationship of different personalities with various criteria in personnel psychology, particularly in human resource practices such as selection, performance appraisal, training and development (Mount, 1991, p.23 cited in Goldberg, 1993, p.32).

In this section we have reviewed the theory related to knowledge management, specifically knowledge in general, the two perspectives of the epistemology of knowledge, as well as explicit and tacit knowledge. Likewise, we explained the SECI model to explore knowledge creation and different factors that affect knowledge sharing attitudes. Bearing in mind the aforementioned concepts, and our research questions that seek to investigate how knowledge is created and shared at high-risk organisations, and more specifically at an aviation school, the upcoming section focuses on high-risk organisations and how knowledge is managed, starting with its definition and the importance of reliability.

2.5 High-Risk Organisations and the Importance of Reliability

High-risk organisations are associated with complexity, dependence, and the potential to create catastrophes or significant public harm (Perrow, 1999; Paice, Aggarwal & Darzi, 2010; Weick & Sutcliffe, 2011). Since they have very limited time for recovery from failures, safety failings within these organisations can be catastrophic. According to Weick (1987), reliability is a more pressing problem than efficiency in high-risk organisations. Nevertheless, that grading does not always occur, since pressure towards increased efficiency can be self-imposed when an acceptable level of reliability is reached (Sanchez-Alarcos, 2016). Many activities such as nuclear and petrochemical industries, aviation or spacecraft share the concept of high-risk organisations (Bierly & Spender, 1995; Perrow, 1999; Sanchez-Alarcos, 2016), as they have one point in common: "a lack of reliability can lead directly to the loss of life, ecological disaster and, in general, physical consequences" (Sanchez-Alarcos, 2016, p. 1).

Weick (2003) describes how these disasters are tragic because they do not only destroy lives but also reputations, trust, confidence, the illusion of control and legitimacy. For example, on February 1, 2003, the space shuttle Columbia disintegrated in a catastrophe that killed its crew and caused NASA to suspend space shuttle flights for more than two years as it investigated the reasons of the accident. According to the Columbia Accident Investigation Board (CAIB) (2003), the physical cause of the accident was a rupture in the thermal protection system on the leading edge of the left wing, caused by a portion of the insulating foam that hit the wing during the launch, but the CAIB also identified that the accident was a cause of long-term organisational problems. Farjoun and Starbuck (2005) explain human, organisational and political processes that led to the disaster. The authors extracted generalisations that can be useful for organisations engaged in high-risk ventures to prevent future catastrophes or make them less likely.

As already discussed, reliability has a high degree of importance in high-risk organisations (Weick, 1987; Weick & Sutcliffe, 2011). Reliability is commonly defined as the "unusual

capacity to produce collective outcomes of a certain minimum quality repeatedly" (Hannan & Freeman, 1984, p. 153), which aims to maintain performance with an absence of unexplainable, unwanted or unanticipated discrepancies (Hollnagel, 1993). Organisations with excellent safety records, where operational reliability faces short-term efficiency as a major goal (Roberts, 1989), and that have taken a variety of measures in pursuit of error-free performance, are identified as high-reliability organisations (HRO) (Weick, 1987; LaPorte & Consolini, 1991; Roberts, 1993; Antonsen, 2009; Paice, Aggarwal & Darzi, 2010). Some characteristics of these organisations are the strategic prioritisation of safety, a constant preoccupation with failure, permanent training often through simulation, strong cultures that facilitate vigilance and reaction to potential accidents or commitment to resilience (LaPorte & Consolini, 1991; LaPorte, 1994; Weick, Sutcliffe & Obstfeld, 2008).

2.5.1 Aviation as a High-Risk Organisation

On December 17, 1903, Wilbur and Orville Wright successfully made the first flight with a powered and controlled aircraft (Freedman, 1991). However, less than five years later aviation took its first fatal victim. On September 17, 1908 Lt. Thomas E. Selfridge was the first person to die in an aeroplane crash during a flight with Orville Wright. A foul in the rudder control wire caused Wright to lose control of the flyer and crash, killing Selfridge and seriously injuring Orville (Warnock, 2002).

The characteristics associated with high-risk organisations and the hazards that the aviation's activities entail were evidenced since the first flights. As Perrow (1999) claims, there are inherent risks of flying that will always be present due to the nature of the activity. Physical and psychological threats with severe consequences are faced daily by employees due to characteristics of aviation such as high-speed and high-altitude flight (Mitchell & Leonhardt, 2010).

The aviation industry cannot allow risks to materialise. Consistency and safety are expected, which make aviation companies search to be high-reliability organizations (Mitchell & Leonhardt, 2010). Through the use of human factors, awareness and checklists, these organisations have significantly reduced human error and mistakes (Brennan et al., 2018).

According to the International Civil Aviation Organisation (ICAO) (2018), 2017 was the safest year ever on the record for aviation, with a global fatality rate of 12.2 fatalities per billion passengers. More specifically, Liberty University and AOPA Air Safety Institute (2019) evidenced that flight training in the United States is gradually becoming safer as the overall accident rate has decreased 35 per cent from 2000 through 2015.

Now that the relation between high-risk organisations and aviation has been explained, the next section delves into the subject of knowledge management in these type of organisations and more specifically in aviation, so as to identify what practices and measures related to knowledge management can contribute to excelling in the industry.

2.6   Knowledge Management in High-Risk Organisations

Due to the potentially disastrous outcome associated with errors, high-risk organisations are excluded from some effective learning processes such as learning from mistakes and failures or trial-and-error learning (Aase & Nybo, 2005). Without these tools, organisations commonly rely on traditional models of information gathering and dissemination. Such approaches sometimes disregard contextual and social aspects needed from a learning perspective of organisational knowledge (Aase & Nybo, 2005); but from the safety standpoint, these formal models and high level of standardisation are seen as necessary due to the high-risk environment (Bierly & Spender, 1995; Aase & Nybo, 2005). Then, each organisation needs to analyse its specific characteristics and possible organisational flexibility to effectively cope with uncertainties to prevent system failure (Grote et al., 2009). The Columbia case illustrates how ineffective learning from previous accidents with common causes (Apollo 1 in 1967 and space shuttle Challenger in 1986) can lead to failures and possibly catastrophic consequences (Farjoun & Starbuck, 2005).

Nevertheless, risks and uncertainties in high-risk organisations that emerge from human's decisions and occur as a result of the progress of human knowledge (Gephart, Van Maanen & Oberlechner, 2009), can be decreased with the support of culture and learning (Weick, 1987; McBriar et al., 2003; Nævestad, 2008; Paice, Aggarwal & Darzi, 2010). According to Weick (1987), safety-critical knowledge can be more easily communicated through organisational culture, providing the opportunity to avoid trial-and-error learning (Antonsen, 2009). On the

other hand, a lack of a safety culture within these organisations can lead to catastrophes such as the nuclear reactor accident at Chernobyl or the disaster at the Union Carbide Plant at Bhopal, where organisational culture was identified as the main root of the accidents (Roberts, 1990; Antonsen, 2009).

In high-reliability organisations, adaptive learning and reliable performance are enabled through a cognitive infrastructure (Weick, Sutcliffe & Obstfeld, 2008). The authors explain that in these organisations, where failures are a rare concurrency, the learning process becomes more difficult since there is less available data. Hence, it is a challenge to convert these "less than ideal learning conditions into ground for improvement" (Weick, Sutcliffe & Obstfeld, 2008, p. 39); a detailed analysis of near failures, encouraging the reporting of errors, making the most of each report, or learning from the failures of others can be valuable. Examples of positively rewarded self-reporting errors are described by Westrum (1992), Rochlin (1993) or Landau and Chisholm (1995). Similarly, leadership in high-risk organisations should consider the costs of safety measures against accidents versus monetary or live costs when accidents materialise, recognising that the "expenses of training are lower than the cost of accident aftermath" (Roberts, 1989, p. 123).

Members in high-risk organisations usually possess skills that help prevent the missing of relevant information or short-sighted solutions to problems (Weick, 2001; Nævestad, 2008), and are beneficial during knowledge management processes. According to Owen (2001), these skills include seeking clarification, asking and provoking challenging questions, sharing observations or seeking different perceptions. Since learning is a vital purpose of safe organisations (Pidgeon, 1998), such characteristics can facilitate reaching this objective as employees working with risks are expected to possess the expertise to deal with problems as they occur (Perrow, 1999).

As indicated previously, encouraging the report of errors and promoting a culture of trust within the organisation can help develop and retain the resources provided by human knowledge. The sharing of safety-critical information can be accomplished by creating an environment where employees can 'confess' their mistakes only to improve safety and not to allocate blame, overcoming obstacles for organisational learning related to safety issues such as guilt, blame and power (Pidgeon, 1998; Richter, 2003).

However, controlling the factors that can hinder safety learning, should not be the only objective for high-risk organisations. According to Richter (2003), collecting data on accidents, near-misses and reports can be identified as traditional learning related to safety, becoming a single-loop learning strategy, with continuous individual learning through a coherent organisational framework (Hislop, Bosua & Helms, 2018). Similarly, the previously described skills usually possessed by the members of high-risk organisations could generate a double-loop learning type, where existing norms, theories or assumptions are questioned and reflected on (Hislop, Bosua & Helms, 2018). Moreover, a combination of safety culture with these skills could lead to a deutero-loop learning, the highest level of learning, where the process of learning and reflection itself is questioned (Hislop, Bosua & Helms, 2018).

2.6.1 Knowledge Management in Aviation

As statistics show a significant improvement in aviation safety levels, the intention to manage knowledge effectively has not been alien to the scope of aviation. Since knowledge can become a crucial wealth generator (Hislop, Bosua & Helms, 2018), intense learning has led to safety development (Sanchez-Alarcos, 2016). According to Sanchez-Alarcos (2016), accumulated own experience and actions not directly linked to aviation have led to learning opportunities. For example, lessons from the space field are useful to design new models of aeroplanes without incurring in the costs and risks that a complete and own development would represent, or to avoid repeating mistakes that have caused accidents like the space shuttle Columbia. The author explains that these reasons and opportunities can justify the success of air safety via continuous learning and improvement. Nevertheless, it is essential to take into account one of the basic elements of learning, that the information from one system must flow easily from a system to the other and within the system itself; if not, the experiences would not be as contributive. (Sanchez-Alarcos, 2016; Hislop, Bosua & Helms, 2018).

New product development to generate aeronautic products for the aviation industry and its correlation among knowledge management has been recognised. Zhengfeng, Jinfu and Yan (2007) studied Chinese aviation enterprises and scientific research institutions, identifying a positive effect on new product development performance for companies implementing a knowledge management method; also how the process is affected by structure and culture factors. Likewise, Shan, Zhao and Hua (2013), by using data collected from aviation firms in China, described the impact of quality management practices on the knowledge creation

process. For the authors, factors such as employee involvement, employee training, benchmarking, vision statement, and product design, have a significant direct impact on the knowledge creation process. On the other hand, their analysis showed other quality management practices, such as customer focus, or recognition and rewards, that do not have a direct impact on knowledge creation.

The airlines, as high-risk organisations that deliver the final service to the public, also have identified how knowledge management is essential for safe and successful operations, as well as for systems' improvement (Kwong & Lee, 2009; Stene, Danielsen & Valle, 2014). Therefore, Wilkesmann and Wilkesmann (2011) studied activities that would encourage knowledge transfer between novices and experts at Lufthansa, a German airline company. The authors made a differentiation between novice and expert levels of knowledge, with experts having developed "know-how" in a determined field of knowledge, while novices position themselves more towards facts ("know that"). Hence, there are information asymmetries between experts and novices, making the former reflexive, evaluative and autonomous in their daily activities, whereas the latter tends to act more or less based on rules (Wilkesmann & Wilkesmann, 2011). The transfer of explicit and tacit knowledge can fill the knowledge gap presented by this situation, which is the driver to the knowledge transfer. In the example of Lufthansa, the authors show how the company deals with knowledge transfer processes between experts and novices through the use of e-learning and knowledge management technology.

In the actual world, pilots usually have their own laptops or easy access to internet resources through their cell phones, which facilitate novices' achievement of formal and informal competencies. However, technologies such as e-learning can create opportunities, but only a strong learning culture will lead to organisational learning and innovation (Wilkesmann & Wilkesmann, 2011; Hislop, Bosua & Helms, 2018). In a more specific way, Bawazeer (2018) researched the relationship between pilots' performance and knowledge management implementation. The author recognised upper management support as a critical factor in building up a knowledge management culture.

Numerous studies have predicted a shortage of qualified pilots around the world. Boeing and Airbus, the world's largest manufacturers of commercial aircraft, expect a demand of more than half a million pilots over the next 20 years (Boeing, 2015; Airbus, 2018). Then, the aviation industry must find a way to achieve the number of pilots required in the coming years, making

flight schools a crucial element in the equation of training and qualifying these pilots. Patrick (2018) acknowledges the importance of academic and flight training instructors to the improvement of student's performance since they provide not only education but also inspiration, mentorship and guidance. The author explores the organisational resources, knowledge and motivation needed by flight schools to improve students' performance while reducing time and training costs. Similarly, different organisations around the world are partnering to develop best practices for improving flight training. For example, the Federal Aviation Administration (FAA) is working with the aviation academic community through the Aviation Accreditation Board International (AABI) and the University Aviation Association (UAA) to leverage expertise, improve safety and develop the flight training industry (Federal Aviation Administration, 2018).

2.7   Chapter Summary

This chapter has presented the existing literature that is relevant to this thesis research. The theoretical review started with a section on knowledge management, which covered the concept of knowledge and the two perspectives of the epistemology of knowledge, as well as explicit and tacit knowledge. Next, Nonaka's (1994) SECI framework was used to explore the process of knowledge creation, and different factors that impact on knowledge sharing attitudes were examined.

Since we aim to study how knowledge is created and shared at an aviation school, with the previously described concepts in mind, we delved into the concept of high-risk organisations, emphasising on the aviation industry and the different practices related to knowledge management that are applied in this specific kind of organisations aiming to achieve excellence and improve the safety records.

In order to develop an in-depth analysis, the literature review presented in this chapter is the foundation for the analysis and discussion in chapter five. In the next chapter, the thesis' methodology is presented to describe the process of collecting and analysing the empirical material.

3   Methodology

Our purpose in this thesis is to observe and describe how knowledge is managed, in terms of knowledge creation and knowledge transfer in a high-risk organisation such as an aviation school. In this chapter, we focus on the methodology used for the thesis. Therefore, we first delve into epistemological and ontological considerations, and subsequently, we refer to our chosen research tradition. Particularly, we explain the interpretive tradition, focusing specifically on the hermeneutics approach. In addition to this, the abductive approach is discussed as both theory and empirical data are used for this thesis. Moving on, we talk about the research design and data collection, as well as about validity and credibility and our plan of analysis. Finally, we mention the limitations that we have identified throughout the process.

3.1   Philosophical Grounding

Ontology and epistemology are related with research, since it deems to be essential for one to understand the ontological and epistemological assumptions of the methodology and methods, so as to enable linkage and better comprehension of the research's findings (Scotland, 2012).

Ontology is the study of being and existence, meaning that it studies theories of what reality is, as well as the perception of how things are and work (Scotland, 2012). Such theories can be different and unlinked with each other (Rawnsley, 1998). On the other hand, epistemology is the philosophy that is concerned with the theory of knowledge, meaning that it studies "what it means to know", searching for how knowledge emerges, is owned and transferred (Scotland, 2012, p. 9). Some processes of epistemology involve for instance beliefs, perceptions, constructions, reflections and imagination, which contribute to what humans know (Rawnsley, 1998). Knowledge and its discovery are subjective (Scotland, 2012), and knowledge management's literature highlights the nature of knowledge that is subjective, tacit and socially constructed (Alvesson and Kärreman, 2001).

Since we chose to follow an interpretive tradition for our study, we need to consider the ontological and epistemological assumptions that come with it. Having in mind the epistemological perspectives of knowledge; objectivist perspective and practice-based

perspective (Hislop, Bosua & Helms, 2018), the interpretive tradition considers that reality is socially constructed, meaning that knowledge is produced as a result of humans' interpretation of reality (Prasad, 2018).

For our study, we do not aim to raise critiques regarding the practices of the organisation that we intend to study, nor do we aim to create a recipe with the best practices to achieve effectiveness in knowledge management at aviation schools. What we aim for, is to broaden our understanding in terms of how knowledge management is carried out at an organisation with the characteristics of LUSA. Nonetheless, our previous academic studies help us be critically informed to analyse our findings without accepting statements at face value. Also we hope that our thesis will contribute and provide help in the world of organisations, and particularly aviation, as well as it will raise awareness about the operation of the processes regarding how knowledge is handled.

3.2   Research Approach

In this thesis, we conduct qualitative research, which strives to comprehend and make sense of human behaviour, drawing attention to qualitative data such as interviews and observations (Prasad, 2018). As mentioned earlier, the thesis will focus on the interpretive tradition, and more specifically on the hermeneutics approach. In-depth, the centre of interest of the hermeneutics approach lies in the interpretation of a text, such as transcripts of interviews, texts, documents, statements and other written material (Prasad, 2018). What is more, it intends to identify what is hidden behind the words that are articulated in the language (Scotland, 2012). An essential element of the hermeneutics tradition is the hermeneutic circle, in which the focal point states that to understand the part the researcher needs to understand the whole, and the other way around (Prasad, 2018). In other words, to understand the meaning of the text, as well as make sense of phenomena in a broader view, it is essential for the researcher to know the broader context of what is written, and therefore on the organisation's background (Boell & Cecez-Kecmanovic, 2013). In this case, with our theoretical knowledge on knowledge management, as well as the expert knowledge on aviation due to the practical experience of one of the researchers, we hope to have a better comprehension of our research and findings.

Further on, our research follows an abductive approach, which is a combination of the inductive and deductive approach. In more detail, the inductive approach focuses on empirical material that assists in creating a new theory, while the deductive approach, on the other hand, uses theory as a guideline and then examines phenomena and makes arguments on the empirical material (Ali & Birley, 1999).

3.3   Research Design and Data Collection

As we are focusing on qualitative research, and particularly on the hermeneutics approach of the interpretive tradition, we conducted empirical research at an organisation that is an aviation school, known as "Lund University School of Aviation" (LUSA). In order to find an organisation to conduct the research, we tried to identify one that is a high-risk organisation, thus LUSA. The reason is that, we consider LUSA as a high-risk organisation, as well as a high-reliability organisation due to its operations in a high-risk environment, and since it has reported zero accidents. Hence, we were interested in exploring how LUSA manages knowledge in such an environment, in which a mistake carries catastrophic consequences.

To approach LUSA, we contacted the head of the school and arranged a meeting with him, in which we were informed about the aviation school and the way it functions in general. Through our qualitative research, by gathering empirical data such as interviews from instructors and observations (Prasad, 2018), as well as company's documents, we aimed to answer our research questions, and therefore understand how knowledge management is created and shared in a high-risk organisation like the aviation school and what factors motivate or stop instructors from sharing knowledge. In this case, we followed the abductive approach as we were guided by the theory on knowledge management, as well as we used empirical data to make arguments (Ali & Birley, 1999).

To collect our data, we scheduled 10 interviews (9 face-to-face meetings and 1 via skype), in which we interviewed each male and female instructors individually. In terms of the interviews, they were conducted in English, and they were semi-structured, meaning that we prepared key questions influenced by the theory of knowledge, which allowed additional follow-up questions, enabling the interviewees to respond to the questions freely. What is more, as English was not the native language of the instructors, we slightly modified the interviewees' quotes,

so that grammar makes sense. Despite the modification, the content and meaning of the quotes remain the same (Ricoeur, 2016 cited in Alvesson & Sköldberg, 2009).

Furthermore, the empirical research lasted about two months, in which we conducted interviews, made observations, collected company's documents, and analysed them. It needs to be noticed that the interviewees were aware of the nature of the research and that they were recorded, as informed consent is an essential ethical consideration (Allmark et al., 2009). In addition to this, the interviewees' names were changed into pseudonyms that fit both genders, to ensure privacy and confidentiality to be protected from exposure (Richards & Schwartz, 2002). A list with the interviewees' pseudonyms is found in table 1 in the appendix. Nevertheless, there is a limitation regarding complete privacy as the interviewees are known to us, as well as what they say might still expose their identity and therefore be recognised to some (Saunders, Kitzinger & Kitzinger, 2015; Allmark et al., 2009). Additionally, some of the interviewees also hold managerial positions such as Deputy Head of Training, Chief Flight Instructor or Chief Theoretical Flight Instructor, which are not specified to guarantee anonymity.

With reference to the observations, we observed instructors during their lunch and coffee breaks to enhance our understanding, since relying on interviews might carry risks due to the fact that the interviewees may not be willing to share information, or they might follow a guideline regarding what they should share with the interviewers (Sveningsson & Alvesson, 2016). Hence, we tried to be reflective in terms of what was presented to us and not accept everything as truth (Schaefer & Alvesson 2017). In addition to this, we had discussions with the flight school's technicians and the programme administrator, who have been part of the school for over fifteen years and are witnesses of the organisation's culture. Subsequently to the collection of the empirical data, we transcribed the interviews and then analysed them, as well as the observation. The process of data analysis is described in section 3.5.

Considering the hermeneutic approach, it needs to be mentioned that particularly the practical experience of one of the writers was used to facilitate in collecting and analysing the empirical data (Prasad, 2018; Boell & Cecez Kecmanovic, 2013). The accountable manager also expressed this enablement; for him, the instructors' answers were sincerer because they could feel identified with one of the researchers' background as they could speak using technical terms more freely without having to explain each acronym.

Finally, a very encouraging and exciting aspect throughout this process was the enthusiasm exhibited by our respondents. They expressed interest and motivation to be part of this study and looked forward to reading the final results.

3.4 Validity and Credibility

This thesis aims to offer insights and contribute to the field of knowledge management in high-risk organisations. Consequently, by writing this study, we aim to produce a report that convinces the reader of the validity and merit of the analysis (Braun & Clarke, 2006). Even though the use of concepts such as validation and credibility in qualitative research has been debated (Bryman & Bell, 2011), we analyse them as a tool to evaluate this qualitative research.

In reliable research, the results need to be trusted (Biggam, 2015), reproducing consistent findings that could be replicated by other researchers on alternative occasions (Saunders, Lewis & Thornhill, 2012). Hence, we tried to reduce factors which could adversely affect the interviewees' performance by offering the instructors an open atmosphere during the interviews. We started the discussions with a short introduction about one of the researcher's background to encourage talking about the flight instruction process; by doing this, we expected to generate an identification between both parties and lead to a more relaxed environment. To avoid producing false responses from the participants or giving 'textbook answers', we presented a short description of the project, explained that our intention was not to 'evaluate' the school, and told them that any identifying information would be removed to guarantee anonymity. Likewise, the interviews were conducted in private meeting rooms.

When the research community finds a study acceptable, it can be identified as a valid research Biggam (2015). Alvesson and Sköldberg (2009) highlight how qualitative research is connected with high levels of subjectivity. Since this study emphasises the interpretation of empirical data, providing some insight into whether our research can be deemed valid or not is relevant. Creswell and Poth (2017) describe how this validation can be strengthened when the qualitative research contains a thick, detailed description, and Beck (1993) states that rich excerpts from the transcripts will increase credibility. Therefore, when presenting and analysing the findings,

the reader is provided with an extensive amount of excerpts from the empirical material. Likewise, the case study methodology described in this chapter offers the reader a thorough demonstration of the methods and strategies used to collect and analyse the data.

Noble and Smith (2015) argue in favour of more than just one researcher conducting the codification of the empirical material. Hence, our empirical material was coded by the two researchers, which allowed us to have different perspectives to interpret the data and to reduce personal biases addressed in the limitations section of this chapter. Furthermore, our supervisor not only guided us, but also provided his valuable perspective to find possible aspects that we could have overlooked.

The question of how to evaluate and interpret data is addressed by Alvesson and Sköldberg (2009) under the concept of source criticism. By adopting a more critical approach, we tried not to take the interviewees' statements at face value, since aspects like their position in the organisation could influence their answers. Additionally, identifying congruent statements within the context they were given was a priority for us, aiming to preserve a reflective and critical attitude throughout the process.

3.5 Data Analysis

To prepare the empirical material before its analysis (Kvale,1996), the first step was to transcribe the empirical data (interviews) and consider our observations, as well as LUSA's documents that we had collected. Then, we independently "spent time with the material" (Rennstam & Wästerfors, 2018, p.83) by repeatedly reading the transcripts to identify patterns and assure a non-influential interpretation of the qualitative material. During this sorting process, we addressed the 'problem of chaos' (Rennstam & Wästerfors, 2018), where the data is still in disorder by starting to divide the information between the utility that it would have for each of our two research questions. At the same time, we took notes highlighting specific quotes that we felt could prove useful in other phases of the analysis.

Secondly, we started working together to discuss our findings, recognise key concepts and codify the material to break down the data into more specific categories, enabling us to identify

repetitive themes between the practices described by the instructors (Alvesson & Sköldberg, 2009; Styhre, 2013). Our focus was foremost to identify the most interesting patterns and overlapped themes, as well as to link them to the theoretical questions and the knowledge management literature. Also, we identified themes that despite being interesting, did not fit in the scope of this thesis by reviewing the notes and data produced previously.

Finally, during the process of arguing (Rennstam & Wästerfors, 2018), we discussed about our findings and self-interpretations in order to answer our research questions. Likewise, with the help of excerpts from our own empirical material, we argued and justified our interpretations to contribute to existing theory (Swedberg, 2012) about knowledge management in high-risk organisations, and more specifically in aviation.

3.6 Limitations

We acknowledge that our study has certain limitations and challenges that we needed to overcome to produce credible results from the qualitative material. These are the limitations that we identify in this thesis:

Limited timeframe for the study: The time limitation restricted the amount of collected data and affected the research since it limited the extent to which we could conduct and analyse the information. The timeframe we worked with was challenging as it affected the number of instructors we were able to contact since some of them could not be interviewed during the available time that we had.

Cultural differences when interpreting our study: We recognise that we focused our study on Swedish instructors. Therefore, some cultural differences may occur when comparing the flight school that we analysed to similar academies, for example, in third world countries.

Possible language barrier: The interviewed flight instructors were not native English speakers, which could have affected their ability to express details freely. To reduce this issue, we tried to avoid using vague terms. Similarly, we were aware that sometimes the language used by the researcher is not the same as the one used by the respondent (Dutton & Dukerich, 2006),

especially with aviation technical terms, but fortunately, since one of the researchers is also a pilot, it facilitated the understanding of the answers.

Lack of previous qualitative research experience: The researchers had not conducted previous academic qualitative research and were not familiarised with the process. However, the research methods course and the constant support and guidance from our supervisor during the process helped overcome this situation. In the same way, as novice researchers, this closed supervision meant that we did not work in isolation and helped us reduce the risk of misinterpreting the data (Richards & Schwartz, 2002).

Possible bias and objectivity: We acknowledge that preconceptions derived from previous experience (one of the researchers had been a flight instructor for six years) and knowledge acquired from our studies might have given us a biased perspective. However, those biases were recognised and used to self-reflect and create an honest narrative for the reader (Creswell, 2003), while trying to carefully interpret the meanings of the data throughout the context where it was collected (Alvesson, 2010). Likewise, to raise the level of objectivity, the material was initially analysed independently, and then we got together to compare our findings, so the researcher who had no connection with the aviation industry was not affected by the other's preconceptions. Moreover, we tried to be critical and question our findings without immediately believing what was presented to us (Schaefer & Alvesson, 2017), and identified the decision of choosing a topic that is personally engaging to one of the researchers as a strong source of motivation throughout the research work (Styhre, 2013).

3.7 Chapter Summary

In this final part of the chapter, we provide a summary of our methodology. During this study, we have tried to present our empirical findings to the reader convincingly and credibly, which can facilitate its interpretation. Therefore, we first delve into epistemological and ontological considerations, and subsequently, we refer to our chosen research tradition. Following the interpretive tradition, and more specifically the abductive approach, we have tried to identify the array of the mystery presented in this thesis, especially the issue of how knowledge between instructors is managed at a flight school in a way that allowed it to achieve an excellent safety

record reporting zero accidents. During the analysis of the data, we followed a hermeneutic approach to make sense of the information that we had collected during semi-structured interviews, observations and company's documents. Finally, we mention the limitations that we have identified throughout the process.

4 Empirical Findings

Our aim is to observe and describe the management of knowledge, as well as the factors that motivate knowledge creation and sharing at a high-risk organisation, such as an aviation school. To answer our questions, we conducted qualitative research at a company, as we have mentioned earlier in the previous chapter. The next section introduces the company that we focused on for conducting our qualitative research, so as to provide the reader with material for a better comprehension of the context and the findings. Subsequently, we mention the findings that we collected throughout the interviews, observations and documents of the aviation school.

4.1 General Information about the Aviation School

Lund University School of Aviation, also known as LUSA, is an aviation school located in Ljungbyhead, Sweden. LUSA was established in 1984; however, it was incorporated as part of Lund University in 1998, operating under the "Faculty of Engineering" (LTH). Through this connection, LUSA has the opportunity to participate in various research groups, publishing work to the public.

LUSA aims to achieve constant improvement on the training provided to students, as well as it strives to provide them with knowledge, skills and the attitude, that will allow them to build a successful career in the aviation industry (LUSA, 2019). As a matter of fact, LUSA is the only aviation school in Sweden that offers the "Multi-Crew Pilot Licence" (MPL), allowing students to start flying as second officers in partner companies like Norwegian and SAS, that are established aviation corporations.

The values of the aviation school embrace humbleness, professionalism and engagement, which demonstrate how both employees and students should act towards partners, guests, and (possible) competitors (Lund University School of Aviation, 2018). Furthermore, the aviation school prioritises flight safety, education, economy, and time, as well as it emphasises the importance to follow the organisation's procedures and manuals. What is more, the proposed culture encourages the learning from safety-experience, the careful analysis and questioning of procedures, as well as the active participation in conferences that are related to flight safety.

The organisational structure at LUSA, illustrated in figure 3 (Lund University School of Aviation, 2019), demonstrates the positions that exercise control in the aviation school. Particularly, it shows the accountable manager to be in charge of the compliance manager, the safety manager, the head of training and the technical director. In addition to this, the head of training is in charge of the chief flight instructor, who is responsible for the flight instructors, and the chief theoretical knowledge instructor, who is responsible for the theoretical knowledge instructors.
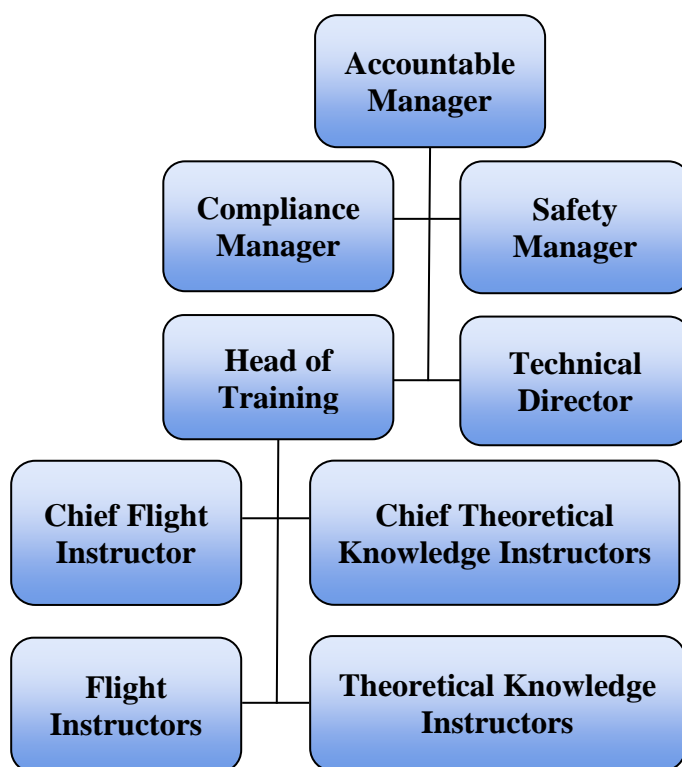
Figure 3 Organisational Structure (Lund University School of Aviation, 2019)

There are currently 20 employees at LUSA, including hourly ones, who are mostly men, Swedish and with a different age range. What is more, the employees are experienced and come from diverse backgrounds like the Air Force, commercial airlines and other aviation schools. What is remarkable for this high-risk organisation is that it does not have an established knowledge management system, but during its 35 years of operation it has reported zero accidents. Maintaining these high-standards regarding flight safety is not usual for an aviation school due to the inherent risks that are related to aviation, as well as to the fact that instructors deal with very inexperienced students who can potentially cause catastrophes with their

mistakes. Being able to keep this zero-accident safety record is remarkable and makes LUSA successful in terms of high-reliability.

4.2   The Working Environment

In this section, we present how instructors describe and live the aviation school's working environment. A significantly large part of the instructors' statements during the interviews and the observations referred to the daily culture they experience. After having spent time with the material (Rennstam & Wästerfors, 2018), we identified repetitive responses provided by the interviewees related to how the school's culture influences the knowledge creation and sharing processes. The key findings related to the topic were recognised, and the next subsections present those core cultural characteristics: Freedom of speech, reciprocity, 'the trusting aviation school' and work-related conflicts reduced as a result of the working environment. We consider these findings as cultural expressions since culture is embodied and expressed through the above characteristics.

It is important to note that LUSA does not have a formal knowledge management system, but instructors express that they share their knowledge in a constant basis, influenced by different aspects related to the school's organisational culture. Alex explains that *"We don't have everything written down, how to talk to students, I don't think we have written that students should start the debriefing, that's so natural, I don't think we have written that. But our culture says it's natural that you start the talking"*. Daniel supports Alex by saying that *"the culture is that we share even if the school doesn't emphasise it. So it's more like we want to share with each other. And so we don't want to keep the information for ourselves. So I would say that it's the culture amongst flight instructors."* Furthermore, Fred thinks that despite knowledge sharing not being promoted specifically at school, instructors do it regularly, he says he *"can feel it"*.

The core values at LUSA are humbleness, professionalism and engagement, permeating how staff and students act in their daily lives (Lund University School of Aviation, 2018). When asked, instructors approved those core values, emphasised that they embrace and agree with the decision-making process at the school, while always respecting other people's ideas. Robin explains that *"We're trying to educate and do all the things with respect to other people. If*

they're 20 years old, if they're 60 years old, it shouldn't matter." This idea is supported by Sam, who states that *"I really feel that senior instructors respect me and pay attention when I speak no matter how long I have been in the school or if I am a woman or a man."*

4.2.1 Freedom of Speech

LUSA's Safety Management Manual (2018) addresses the topic of culture within the organisation. It acknowledges that instructors operate in a highly standardised world, but at the same time encourages critical questioning from employees, students and partners. Previous decisions can be reconsidered as long as they are well supported by good and sound arguments (Lund University School of Aviation, 2018). Equally, to ensure that safety is of the highest possible level, instructors are always expected to dare to question the methodology to change procedures and learn from other safety-related experiences.

Instructors feel that the communication process works in the right way at the school, which encourages proposing new ideas and good practices that could be implemented for all the other instructors. Robin believes that *"you're able to communicate without any problems, without, for example, having someone telling you ' that's not the way to do it', they are always listening, and you can discuss things quite freely".*

Regarding the possibility of learning from others' experiences, Lund University School of Aviation (2018) identifies the school culture as a "just culture", where punitive actions linked to safety events shall not be considered in the first parts of the mitigation plan. The instructors reflected on how important this aspect is for them, and identified that reporting their own mistakes is a vital part of the learning process equation. All the interviewees, no matter their instructing experience, agreed on not being afraid to report their own mistakes since their errors are experience for the others. For example, Alex explains that *"it should be ok to write a report, to do that by yourself, I totally messed up today, what can I learn from it? yeah, don't do this and I learned this".* In the same way, Eliot confirms that *"If I make a mistake. Yes. I can tell you. If I, with my experience can go out and [say] I did this today, I think that is good. And I can, there's no problem to do that. And I don't think they would fire me".*

4.2.2 Reciprocity

Another aspect of the culture within LUSA was identified when the instructors talked about their motivations to share their knowledge. Instructors expressed that they expect reciprocity during their discussions, as Daniel explains:

> *"Well, for me, it's like you find something when you learn something, and then want to share and show it to colleagues and friends, and have a discussion about it. So I think that's maybe the part that drives me in the discussion, that I get some answers and some experiences from my colleagues."*

The interviewees also expressed the intrinsic motivation that leads them to share their knowledge and experience with younger instructors and students; the way culture is embodied and expressed in the working environment influences such behaviour. For example, Robin explains it by stating that "*if you can share experience that might not be in the book, that's a great thing, if I can do that verbally or by showing students how to fly and so on. That's, that's fantastic. A fantastic feeling".* Likewise, the instructors agreed that other external rewards, like financial bonuses, would not increase their willingness to share. In fact, Fred says that *"We don't have that culture. We're not talking about money here"*, while Robin perceives *"the feeling of communicating the knowledge"* as a reward.

Furthermore, instructors demonstrated an interest in improving the organisation by sharing their knowledge. For example, Chris hopes that *"everyone that is working in the organisation is interested of sharing because of some reasons, one of them is being able to share because you want to improve the overall organisation".*

4.2.3 The Trusting Aviation School

To start presenting our findings related to the level of trust at the organisation, we describe a situation that was evidenced throughout the observations. During one of our first visits to LUSA, the head of the school showed us the hangars (the place where aeroplanes are kept), simulators and study places. While we were passing through one of the classrooms, we ran into one of the senior instructors, who was conducting a debriefing with a student. Before formally

introducing us, the manager, in a serious tone, instructed us to speak loudly, almost shouting when talking to the instructor because he had hearing problems due to his age. He said it loudly so the instructor could hear. It must be noticed that having hearing problems is a very delicate situation for a pilot and if it was a reality he would not be flying; the manager clearly had an intention of joking with the instructor about a very delicate problem. When their eyes met, both released a genuine laugh, and the instructor replied with another joke about the head of the school. Only after having finished making fun of each other, we were introduced to the instructor and continued our visit to the facilities of LUSA.

This situation shows warmth and friendliness between managers and subordinates at the school, allowing us to identify how comfortable they feel talking to each other and how these expressions demonstrate that the school's culture comes through in their daily interactions by generating such feelings of warmth and friendliness, which as well indicates high levels of trust at LUSA. During the interviews, instructors said that they trust their superiors to discuss different situations, as Fred says *"I have no problem to go into an instructor or even my bosses and talk together and if I have a problem we can solve it. So I think trust is very high"*. Likewise, Robin mentions that *"the guys who are working here and are the bosses…they are very good, they know what they do"*.

More specifically, the instructors expressed that the level of trust between them was high and highlighted its importance to encourage the sharing process. Robin thinks that *"the level of trust between the instructors is high, we share opinions all the time"*. For Chris, trust seems to be vital for effective communication as he questions himself *"How am I going to communicate with someone if they don't trust me?"*. Fred summarises these beliefs by expressing that *"it doesn't work if you don't trust each other"*.

Further on, some instructors share the same background at the Air Force and an airline; all of them agreed that this situation increases the level of trust between them and makes sharing easier. In the following quote, an interviewee retells the story:

> *"We have known each other for 40 years. We have been at the same place flying the same aircraft. And after 40 years, especially you have done all that with flying in the Air Force, you have to trust each other… We can talk [to each other] in another way"* (Eliot).

4.2.4 Work-Related Conflicts Reduced as a Result of the Working Environment

Conflicts at organisations do occur, LUSA is not the exception, and the interviewees are aware of that. However, the instructors think that conflicts are not usually personal, but more related to daily activities at work. In fact, the instructors' openness and the sincere working environment that result from cultural embeddedness, help keep a low possibility for conflicts to escalate. Daniel explains that *"it's mostly about some organisational or sometimes particular flying lessons, but not on the private place, I would say mostly like it's work related."*

Similarly, the instructors express that when conflicts arise, the respectful culture at LUSA influences how they handle the situation, not allowing the conflict to increase its dimensions to a level where it can affect flight safety. The head of the school believes that they have not had a situation that has threatened LUSA's safe operations. Nevertheless, he is aware that *"conflicts or tensions between the instructors just makes them less interested in sharing with everybody"*. Since conflicts in high-risk organisations can have safety-related consequences and lead directly to the loss of lives, LUSA's culture increases the possibilities of solving even small discussions through open and sincere communication, as a respondent explains:

> *"There might be some small conflicts, but I don't think there are. Because if it gets to a great problem, then you have to, actually, you can't work together with other people if there are big problems with conflicts. It can't be in a flight school, No"* (Robin).

After having detailed the different findings in which culture is embodied, we can identify how the school's culture is a highly influential factor of the knowledge processes at LUSA. Aspects such as instructors expressing not being afraid to report their mistakes or suggest new procedures, the high level of trust not only among the interviewees but also with their managers, and how the conflicts are solved through open and sincere communication, let us determine how in this case, LUSA's open and distinct culture allow instructors to feel identified with the established values and procedures, permeating positively all the daily activities related to knowledge creation and sharing. In the next section, we present the principal findings of the current study associated with the instructors' self-view and their perception about the school.

4.3 People

In the following, we present our findings related to how instructors characterise themselves and their perception of LUSA. When the interviewees wanted to describe some of their attributes and capabilities, they usually drew upon personality traits to present themselves. Hence, we find it essential to show the reader those specific characteristics, as they allow to identify the instructors' self-perception. Similarly, we describe how instructors talk about the company. Based on their responses, it would be possible to establish the level of identification with LUSA and analyse its impact on the knowledge processes.

To start with, George, the head of the school states that *"it is right to say that we have some common characteristics in our instructors".* For him, instructors are constantly sharing and looking for learning opportunities, and these common traits are identified during the recruitment process, which facilitates their adaptation to daily life at the school. He mentions that *"I think if we had done a fairly good job of recruiting the instructors. It's almost like a self-playing piano, really is".* Likewise, instructors expressed that they are achievement-oriented towards teaching with quality and producing quality pilots, as Eliot states *"We're working together, and we're going to the same goal".*

In more detail, being curious seems important to Alex and Chris. The former says that *"I would say that I am curious and open-minded; if someone asks me I have no problem in sharing my experience".* Similarly, Chris explains that he enjoys reading, watching documentaries, and listening for podcasts permanently since he says *"I am interested, I am interested in other organisations, other people, how they are doing, how they are living their life, how they are working".* Daniel, Eliot, Taylor and Fred also consider themselves to be open-minded and social. For example, Eliot explains that *"I think to be an instructor is how you are as a person. I think it's being open-minded! I think that is a good way to be a good instructor, to be open-minded. I hope I am".* Likewise, Eliot, Taylor and Fred believe that this is a trait not only possessed by them but that it is shared by most of the instructors; for Eliot *"most of the guys [instructors] are open-minded"*, and Taylor agrees by stating that *"sharing is not difficult at our school, we are very open-minded, we must be".* Daniel also identifies that *"most of the instructors are quite social".* Furthermore, for Robin, being open-minded is also a characteristic

of the Scandinavian culture and highlights that *"I never go behind your back and talk something about it. We don't do that."*

During the interviews, when instructors were reflecting about themselves, humbleness and modesty were also identified. For Brook, Fred and Chris, these are common characteristics among the instructors. When talking about knowledge, Chris explains that *"it is not a competition who knows most"*. Further on, Brook says that "*it shouldn't be a pride in knowledge"*, while Fred believes that *"we [the instructors] are not proud here"* to support that he does not identify an instructor who thinks is better than the others. More specifically, Alex expresses that *"I hope I am humble, so I don't tell others of my experience, unless they ask for it, because I don't have to tell today I had a really good session, I got a lousy student, he ended up the best one after I'm done with him, I don't do that"*. Likewise, Fred does not like to brag in front of others, he states that *"when I'm away from the school, I'm with my own friends. I never talk to them like oh, I'm an instructor at Ljungbyhead, I'm an instructor"*.

Further on, Chris explains his attempts to be empathic with new instructors joining the school by claiming *"I was already putting myself in her shoes...basically, I know what you are going through and I wanna help you as much as I can"*. He also highlights the importance of being approachable by saying *"I think we also remind ourselves to be more approachable, you know, if you can see that someone is new and needs some help or support"*.

Finally, the traits of altruism and generosity were also identified despite not having been explicitly expressed by the instructors during the interviews. For example, Eliot explains *"It is a way of paying back or something like that. I received so much from the air, from SAS, and learned so much. So I feel good, I feel comfortable to share my experiences with other instructors"*. In the same way, Robin expresses that *"Actually, I don't need the money. But I need the feeling of communicating the knowledge. That's my reward, actually. Although I get paid, of course"*.

4.3.1 The School's Perception

During the conversation with the instructors, they positively talked about the company, reflecting on pride towards the organisation. Aspects like having a high reputation, being

attractive to other flight instructors, focusing on quality rather than quantity to avoid becoming a 'factory', or having structured processes and documentation, were some of the insights provided by the instructors when they described their perception about LUSA. For example, interviewees express their feelings regarding this matter in the following quotes:

"To me, when you can, when you feel you can transfer knowledge, from experience to newbies, to new pilots. That's a great feeling, then you feel proud. And also proud when you see how the school is working by the documentation they have and the way they are teaching things. Yeah, I feel proud of that." (Robin)

"It is so good. It's so nice to be here. I love this place. I think it's a very good place to be. And I love it. It's different. It's the reason why I'm here. I think it's rather easy to have instructors here. So it's a good school. It's a very good school. With good instructors". (Eliot)

George, the head of the school also talks about how his instructors feel identified with a school that is perceived with a good reputation and has been operating for 35 years without accidents. When asked about the challenges of attracting and retaining the instructors, he had the confidence to express that the instructors feel part of a successful organisation, which affects how identified they are with the school and suggests that the retention of instructors is not a difficult task:

"They [the instructors] never leave us, if they have started they never leave, so I think that is the answer. No leaving, no leaving, I want them to leave and they don't (laughs). It was a joke, but in a joke there is always some kind of hard facts in it".

In this section, the instructors' self-view and perception about the school have been explained, representing a high impact on knowledge sharing and creating processes due to the level of identification and the personality traits expressed by the interviewees. These characteristics affect the instructors' willingness to share, and its analysis is presented in the discussion chapter. The section that follows moves on to consider the specific practices at LUSA that explain how knowledge is managed among the instructors at the organisation.

4.4 The Process of Creating and Sharing Knowledge Between the Instructors at LUSA

To begin with, through our findings we identified informal and formal practices of knowledge creation and sharing, as well as support systems of those practices such as technological systems and manuals. The former one includes discussions that occur for instance during lunch and coffee breaks, as well as voluntary mentorships. The latter one involves various meetings, shadowing and observing other instructors, as well as research groups. We conclude on the practices mentioned above and consider technological systems and manuals as support systems of these practices because when we were categorising our empirical material, we found that instructors continuously referred to those practices. Hence, we tried to present the material in a way that sums up the instructors' responses, as well as to provide the reader with an organised overview of the findings. The formal and informal practices, as well as the support systems, are further presented below.

In addition, it is worth mentioning that we found overlap among the informal and formal practices, as they can co-occur, or overlap. Besides, we observed a strong relation of culture and identity as they influence and affect the process of creating and sharing knowledge. As a matter of fact, we consider culture to be the basis that forms the process of knowledge creation and sharing, influencing the informal and formal practices, as well as encouraging the usage of support systems.

4.4.1 Informal Practices

As mentioned, informal practices involve discussions and voluntary mentorships. In this case, we consider their value and high impact on the processes of knowledge creation and sharing. This is because, such practices are not obligatory; however, they are still part of the organisation and exercised by the instructors due to the cultural influence and due to the instructors' identification with the organisational culture. Informal practices are further presented below.

4.4.1.1 Discussions

Our findings suggest that at LUSA it is common for instructors to discuss, especially during lunch and coffee breaks, as well as while waiting for example for the weather to improve before a flight session. During the discussions, instructors talk about diverse topics involving their social life, the school, and the students. Hence, they have the chance to socialise with each other, as well as to share knowledge and experience about important work-related issues. For instance, in terms of discussions during breaks, Daniel says that the topics "*would be mostly the most recent lessons we had...and mostly if it [the lesson] didn't go as I suspected or expected. So maybe if the student didn't do the performance I expected or that I met some other obstacles or something".* In addition to this, Brook expresses that knowledge sharing happens "*almost all the time in every discussion. I hope that at least you get a different kind of a person's point of view. That could be in the same way as your own or you get another's point of view".* Further on, Fred mentions that "*maybe every day we can share some experience, maybe talking about another student, that he did that and that, and okay, that was a good idea. I will check it out next time".*

4.4.1.2 Voluntary Mentorships

At LUSA, we found that mentorships are not an obligatory practice. Nonetheless, instructors voluntarily choose to mentor their colleagues, and usually the ones who are new to the aviation school. Thus, they support them to adjust to the new environment and learn organisational processes and procedures. For example, when a new instructor joined the aviation school, Chris offered to help. Support for this is found in his words as he said "*I know what you are going through and I wanna help you as much as I can".* Furthermore, Alex described that in his case he chose to ask questions from instructors whom he perceived as role models. Additionally, he referred to a situation in which he offered to be the mentor of a new instructor, and therefore he volunteered to help with problems related to students or teaching. Particularly, he said "*I' ve told her that I would like to be a mentor for her if she runs into some issues with students and how do I train this and this".* Likewise, the mentee explained that "*there won't be a structured mentorship that he will supervise my flights or anything like that. He will be on the basis that I would ask him stuff like that".*

It is also worth to mention that, mentorship has not been identified at an extended level by all instructors; however, interviewees expressed that they can ask for help from other instructors if needed. In fact, Fred commented on this issue as he said *"I didn't notice it [mentorship] when I arrived here. But yes, small kind of mentorship. When one of my colleagues was starting here, I have been here for two, three years when he was starting, and I think we backed up each other, I backed him up".* Once again, we can argue that voluntary mentorship is a consequence of a working environment that embraces feelings of friendliness, warmth and trust, encouraging sharing and helping each other.

4.4.2 Formal Practices

Formal practices include meetings, shadowing instructors and participating in research groups. Similarly to informal practices, formal practices also have a high impact on the processes of knowledge creation and sharing. However, the difference is that formal practices are structured and led by the aviation school. In addition to this, LUSA is required to follow particular practices, such as organising various meetings for example, since it is an approved training organisation. Hence, instructors need to follow some procedures which contribute towards their learning and influence them to share what they know with their colleagues during these situations.

4.4.2.1 Meetings

As it was mentioned earlier, meetings are one of the components of the formal settings to share knowledge, where instructors at LUSA discuss about the school, students, safety procedures, mistakes, as well as they inform each other about their topics and suggest ideas that could be implemented as good practices. Such meetings include morning briefings, general staff meetings and mandatory school meetings, periodic evaluations of students, and finally safety review board meetings.

To expand, during the morning briefings, which usually happen before flight training and last approximately fifteen minutes, instructors have the opportunity to discuss about the training, the aircrafts and the students. What is more, instructors answer questions, share experiences and talk about what has been tricky in previous sessions, as well as they share tips and warn each other about what to look after (Alex; Daniel).

Furthermore, there are staff meetings within the year, as well as mandatory school meetings that are established by the "European Aviation Safety Agency" (EASA) as being a part of an "Approved Training Organisation" (ATO). For instance, the aviation school organises staff meetings, which usually last for two weeks. Those meetings can involve all the flight instructors, as well as all the employees, including both the ground and flight instructors, the administrative staff and the technicians. Their purpose, as Brook expresses, is to *"standardise and talk about the flight and training organisation's needs and developments",* and as Fred states, to talk *"about maybe new procedures and about the students and about ourselves. And I think if we have some special experience from a specific flight or some discussion on how to improve procedures".* Further on, Chris adds that "*it's about trying to find solutions, it will be about a pedagogical teaching challenge, how do we solve it, it is often that kind of discourse we have".* As a result, Brook supports that *"in every meeting you would have kind of a knowledge exchange. It could be the same knowledge being treated back and forth or it could be that you learn something new".*

Next, the students' periodic evaluation is another meeting where instructors gather to talk about students' performance and competencies. As a consequence, they might identify new approaches inspired by the discussions about students, which in turn can be implemented at the school. Specifically, Alex explains that these reunions take place before the students' first solo flight, after they have finished the instruments period, before starting the Boeing 737 training and previous to the experience of flying at the airlines.

What is more, safety review board meeting is another way in which instructors gather to analyse and discuss issues that are related to safety. In more detail, both instructors and students can report for example a mistake or good practices, which are then discussed in these meetings. More detail regarding the process of reporting will be provided below when referring to technological systems.

4.4.2.2 Shadowing

Shadowing, observing and following other instructors during ground and flight instruction are another practice at LUSA. For instance, Daniel describes that instructors are encouraged to follow other instructors and "*sit in on each other's flight and simulator sessions"*, which is

something that they enjoy to do. Alex also supported this, as he says that they "*encourage even in the theory training, that the theory instructors go and join theory instruction so they can see how others train, so they can get inspiration for [their] own subject*". For example, Alex describes that for "*a take-off and landing training with a student, [the instructors] would sit in the back to see what [they] are doing*". As a matter of fact, the experience is very valuable for instructors as they emphasise on its importance. They interviewees explain that they can easily get theoretical knowledge from manuals and learn the basics, but experience, which is "*amongst [themselves]*" is needed in how to do things such as "h*ow to make the turn correctly, how-to do this calculation, how to correct the engine failure*" (Brook). What is more, Eliot highlights that instructors need the experience to know how to behave with students and create a learning environment, where students can be open, calm and able to absorb information.

4.4.2.3 Research groups with the university

As already mentioned, LUSA is part of Lund University. Therefore, LUSA collaborates with other institutions and participates in different research groups through the connection with Lund University. Thus, it contributes to finding different alternatives, that as a result, will improve the way of working. As a matter of fact, such findings can be published and presented at conferences. For example, Daniel mentions that LUSA connects with the "Humanitarian Laboratory" through the "Faculty of Engineering" (LTH) of Lund University. In more detail, he describes that "*they work with virtual reality and augmented reality, and also other technical stuff, and how that integrates with the humans. Like cognitive learning and processing*". Hence, he explains that they made a 737 cockpit, and tested it on 27 students enrolled at LUSA, who were then interviewed to talk about their experience with it. As an outcome, they aim to publish a paper about the topic and join a conference in Los Angeles. The purpose of it is to enhance the quality of education and improve time-usage in the simulator.

4.4.3 Support Systems

The support systems consist of technological systems and manuals, contributing to both informal and formal practices since instructors use them on both occasions. In our perception, support systems are valued with medium impact on the processes of knowledge sharing and creation, due to the fact that instructors prefer face-to-face interactions, in spite of having

available technological systems and manuals. Nevertheless, apart from obligatory usage, we found strong cultural influence as it promotes the usage of such technological systems and manuals, especially in informal and voluntary occasions. The aforementioned support systems are elaborated in the following sections.

4.4.3.1 Technological systems

Technological systems can be considered as a supportive tool for the instructors to report on issues, as well as it can be regarded as a source of knowledge and inspiration due to the fact that instructors use it to look at work of other instructors, such as presentations and other material that can provide help in their tasks.

In more detail, in terms of reporting, both instructors and students can file a safety and operational report, in which they can as well list their name on it if they wish to. For instance, Daniel explains that in the reporting system, instructors can refer to mistakes, lessons that did not go well, operations that are not as smooth as needed, or inform that time is not enough for some processes. For example, with culture influencing the behaviour of instructors, as it is embedded in and expressed through the working environment, an instructor may report a mistake he or she has made, to inform others, so that they can learn from it and avoid doing something similar in the future. Support for this can be found in Fred's words as he said "*I talk to them and then I will file a report on it. And I have no problem to write a report and put my name on it. Because if I do something wrong, a mistake, it's an experience for other*".

Furthermore, instructors may report an idea or suggestion that can be implemented at the school. For instance, if they have done something that they consider as a good practice, they mention it to their boss and other colleagues and write a report about it, which is then discussed in the safety review board meeting as well, apart from other meetings. It is worth to mention that reporting is done with the assistance of technology since instructors log in to an online website to report. In the quote below, Fred describes the process he follows when he has an idea to suggest:

> "*Step one, maybe discuss it with other instructors, or maybe go to talk to Brook and say, hey, I have a good idea. And we can talk about it. And if we agree that this is a good idea I write a report, and they will file it and then they will discuss it in the meeting*

higher up. And maybe it will be in the manual next time. For example, I was in Denmark flying with a student last spring. And we had a conflict with another aircraft. It was not that close. But it was a conflict. I went there to talk... And we filed a report on it and they changed the manuals, and of course of this incident [we can] avoid the same situation next time".

Moreover, LUSA makes use of Moodle, an open-source intranet system, in which instructors post material of their work such as presentations, as it has been already mentioned earlier. Therefore, instructors are free to use Moodle as an educational tool since it helps in enriching their knowledge, as well as it provides a source of inspiration. Particularly, Chris says "*I can basically go in and read other teachers' presentations...and I can be inspired by that".*

4.4.3.2 Manuals

Manuals are the other component of the support systems. LUSA's manuals include for instance the "Course Training Manual" (CTM) and the "Course Training Standards" (CTS), which describe the content and the standards of each flight and simulator session (Daniel). For instance, the CTS describes the session's objectives, scenario, preparation, as well as the weather and threats or dangers that instructors need to be aware of (Lund University School of Aviation, 2013). In addition to this, for the simulator sessions, instructors have guidance that explains in detail each session. With reference to the manuals, they can be accessed online through a website known as "lusa.webmanuals.ida", they are updated periodically, and instructors are able to comment on them if they believe that something can be improved. Particularly, Daniel mentions:

> *"We also have our manual system. So all our manuals, or operations manuals, and student, pilot study guides are online, so they are web-based, and we have a comment function in that. So when you read something in the manual that you don't think is correct, you can just write a comment, and the next time the person responsible is going to make an update".*

To add, apart from manuals, Chris mentions that instructors can take courses, go on seminars, and use the internet (also email other instructors) to gain further knowledge.

4.5 Time Constraints

During the interviews, one of the questions was about which obstacles were identified by the instructors to share their knowledge. The most recurrent answer was related to time. For example, Alex explains that *"We [the instructors] don't have the time, we don't have the time to sit and share the knowledge"*. For Daniel *"We [the instructors] don't have the time to meet each other, sit down and have those discussions"*.

The instructors who also have managerial roles, experience a particularly challenging 'lack of time' dilemma. By being flight instructors, they agree on the importance of having discussions to share their knowledge, but these managers also have other worries in their minds. In aviation, one could say that the easiest way to avoid accidents was not to fly at all, but then the company would not be fulfilling its mission; successful high-risk organisations need to be both profitable and safe. In our case, the instructors who also have leadership responsibilities, describe that since the school is part of the university, they do not have the same profitability pressure that other private aviation schools might experience. Nevertheless, in their positions, they feel the need to balance compliance with schedules and deadlines for flight courses and flight safety. Particularly, one of the instructors who experience this situation states:

"I would say the mostly...if we are to remain here [being a good school], we need to produce the will or the ambitions to have more discussions, more meetings but I have some sort of responsibility for the production line for the instruction, I need to keep the production. I kind of want to say yes to everything but then I have to move on the production line as well. So to keep everybody happy and to feel that we accommodate them".

Furthermore, the head of LUSA is aware that instructors find time as an obstacle to share their knowledge. He expresses that *"perhaps they say that I don't have the time to be sharing because we work so hard, we have so many hours in the air with the students so we can't have any time for sharing"*, and that *"perhaps many of them [the instructors] feel it would be good if we have more meetings, if we had more structured meetings"*. He understands these concerns and justifies them with the desire for self-improvement of the instructors. However, he believes that what encourages to share is the school's culture and questions if more formal meetings would represent better outcomes for the organisation. He reflects by saying *"we should perhaps not*

do it [the meetings] a little bit too long because it does not necessarily give you that more beneficial outcome just because that you're doing it a longer time".

Finally, instructors express their willingness to write down their personal teaching experiences and best practices if someone asks them to, in order to avoid the loss of knowledge when an instructor retires from LUSA, as it has happened before. Chris supports this by stating that *"it [the knowledge] has been lost many times"* when an instructor retires, however, time seems to be an obstacle to fulfil this idea. Instructors say that no one has asked them to write down what they believe is important about their tacit knowledge related to teaching how to fly, but also that finding the time to do it would be a challenge, as a respondent explains:

> *"If I had the time. Yeah, I would like to do it [writing down his personal experience]. I can teach you to become a flight instructor. And then during those lessons, I can share my experience. But yeah, if I had the time and if someone asked me I would like to run it"* (Daniel).

All in all, we can observe how time has a medium impact on the process of knowledge sharing and creation. Although it is considered as an obstacle by the instructors, the culture and the extent the instructors identify with it influence them towards sharing. As a matter of fact, in spite of wanting more formal meetings (that they do not have due to time constraints), instructors discuss continuously, share knowledge and learn from each other. Nevertheless, time is still an obstacle as it constraints instructors from offering more. Particularly, a few respondents expressed how time was an obstacle in terms of transferring their knowledge and making it available in a written form. Chapter 5 presents a further discussion about time.

4.6   Chapter Summary

Throughout the collection of our empirical data, we have managed to present findings that provide an insight on the way knowledge is managed at LUSA, and the factors that encourage or hinder knowledge creation and sharing between instructors at an aviation school.

The findings present various factors that can influence the process of knowledge creation and sharing, including elements of the working environment such as freedom of speech, reciprocity,

the level of trust within the organisation, and work-related conflicts. Further factors include personality traits that reflect on the instructors' self-view, as well as they demonstrate the instructors' perception of the school (feeling of pride). Particularly, we found that LUSA's organisational culture influences both the formal and informal practices, which are facilitated by technological systems and manuals, and are related to the process of creating and sharing knowledge. As mentioned, informal practices include discussions and voluntary mentorships, while formal practices include meetings, shadowing and research groups. Such practices allow instructors to create new knowledge, exchange experiences, mistakes, as well as ideas that involve the aviation school, the students and safety procedures. What is more, time constraints were identified to be an obstacle in sharing and creating, however culture is considered to influence instructors to still participate in activities regarding the creation and sharing of knowledge. More discussion on the findings, concerning how they link with knowledge creation and sharing, as well as how the factors mentioned above influence the processes will follow in Chapter 5.

5   Discussion

This section describes our analysis of the findings that were derived from the empirical data collected during interviews with instructors and observations at LUSA, and considering the company's documents. Those insights are examined in terms of the theoretical background responding to the questions on how knowledge is created and shared among instructors at high-risk organisations such as an aviation school (LUSA) and what factors encourage or hinder knowledge creation and sharing between them. Particularly, the discussion draws upon the SECI framework (socialisation, externalisation, combination and internalisation) to analyse the process of creating and sharing knowledge between the instructors. Equally, we examine factors that influence the instructors' willingness to share and create knowledge. We need to specify that we identify culture as a context that affects other factors including high level of trust, reduced conflicts, instructors' identity and time as a constraint, as well as that impacts on the process of knowledge sharing and creation and the usage of support systems. Hence, we consider it as a contextual factor since LUSA's activities and processes are an expression of its organisational culture.

By using the SECI framework we aim to contextualise this discussion so as to help the reader comprehend the analysis in terms of knowledge creation and sharing.

5.1   Socialisation - From Observing to Learning

To start with, as Nonaka (1991; 1994) explains, in the mode of socialisation, tacit knowledge is transferred to tacit through people's interactions, like observation and imitation. As a result of our empirical research and findings, we have identified some practices at LUSA that match with this mode. More specifically, as our findings suggest, instructors at LUSA are encouraged to shadow and follow their colleagues during flight and ground sessions, so that they can observe them. This demonstrates that they try to see and understand the way instructors perform, which is their tacit knowledge. As a consequence, they can be inspired, advance their knowledge and skills, as well as learn new things that contribute to their knowledge. As Eliot expresses *"it is hard to share with other individuals how to behave"*, suggesting that showing to others could be more effective.

In addition to this, instructors recognise the importance of experience, and therefore tacit knowledge, which aligns with the mode of socialisation (Nonaka, 1991). The focus on experience is due to the fact that explicit knowledge can be easily found in textbooks and manuals, while tacit knowledge such as *"how to make the turn correctly, how-to do this calculation, how to correct the engine failure"* is *"the most important"* as Brook stated. For instructors, an important way of learning and creating new knowledge is by trying to follow the others' actions. Hence, we can argue that through observing other instructors' tacit knowledge and integrating it to advance their own knowledge, knowledge creation occurs. The reason is that imitating and observing other instructors' actions can be the ingredient of progressing already required knowledge, which in turn is converted into explicit knowledge (Nonaka, 1991; 1994).

However, as learning occurs in the process of sharing knowledge (Argote et al., 2000), one can question whether instructors can actually learn by just observing and imitating others' experiences. Put in other words, even though knowledge can be shared and created by the interaction of individuals as Nonaka (1994) advocates, performing the same actions of another individual can be seen rather challenging. Particularly, just shadowing and observing other instructors' movements, for example, the way that an instructor teaches how to make turns correctly, cannot guarantee the successful performance of the observer; this would require continued practice and in the case of a flight instructor, previous theoretical knowledge. The tacit knowledge of an individual would still be difficult to be transferred as it is embedded within them (Hislop, Bosua & Helms, 2018). However, the observer would still have the chance to learn and form their own techniques. What is interesting is that this can result in different approaches that can enhance the progress of knowledge and other processes about the matter. To conclude, what an instructor has observed and integrated into their tacit knowledge can be in turn converted at an extend into explicit knowledge. This process is further explained in the following mode that is externalisation.

5.2 Externalisation - Communicating the Experience

Regarding the practices of LUSA, we have also identified the externalisation mode in which tacit knowledge is converted to explicit with the assistance of communication tools (Nonaka,

1994). To be more concrete, the interviewees referred to various occasions when instructors gather and get together in the organisation, such as meetings, research groups, informal discussions, and voluntary mentorships for example. During these gatherings, the instructors said that they discuss about experiences, mistakes, school, students, training sessions and safety procedures. Thus, it can be argued that instructors' tacit knowledge is converted into explicit knowledge, through communicating, expressing and articulating their knowledge, experiences and what they had learned from a mistake. Hence, there is a correlation with what happens during the mode of externalisation, as Nonaka (1991; 1994) describes.

What is more, instructors can gain and create additional knowledge when they talk about students. As found by Jonsson (2013), employees at Mannheimer Swartling share knowledge through group activities when talking about clients. Similarly, it can be argued that during discussions regarding students, instructors share knowledge and learn new things, such as better alternatives in terms of training sessions, teaching and interacting with students. Therefore, knowledge is created. In this case, we can see how by discussing with each other, instructors gain and create knowledge about essential matters such as issues concerning the school, students, training, and safety.

Moreover, the interviewees mentioned that employees use technological systems to report issues and post material so that others can use to collect information about different matters. Similarly, these actions can be seen as part of externalisation, as instructors can convert their tacit knowledge into explicit by transferring it into such systems, and having it written (Nonaka, 1991; 1994). As a result, knowledge can be created in the organisation, which is then accessible to other employees as it is stored in LUSA's databases (Nonaka, 1991; 1994; Jonsson, 2013). Furthermore, it is worth mentioning that reporting mistakes to influence learning is a practice that is encouraged by LUSA's organisational culture, and therefore that aligns with how knowledge is suggested to be managed in high-risk organisations like aviation schools (Roberts, 1989; Westrum, 1992; Rochlin, 1993; Landau & Chisholm, 1995; Pidgeon, 1998; Weick, Sutcliffe & Obstfeld, 2008).

5.3   Combination - Aiming for Improvement

The process of combining explicit knowledge at LUSA is mostly exemplified in the formal practices described in the findings chapter. Despite the high levels of standardisation required in the aviation industry (Bierly & Spender, 1995; Aase & Nybo, 2005), it does not mean that instructors at LUSA do not discuss the procedures that are established on the manuals, leading to changes and improvements. After having reviewed different school manuals that are used by the instructors, a permanent update, re-categorisation and exchange of knowledge (Nonaka's, 1994) are evidenced. Instructors are not only encouraged, but actually engage in suggesting modifications to the existing manuals by writing comments about them. Each suggestion is then revised and analysed by the instructor in charge of updating the manuals, as well as it is discussed during safety review board meetings; if the remark is viable, it will lead to an updated version of the manual, which in turns becomes new knowledge.

As previously discussed, LUSA's instructors report their own mistakes so others can learn from their experiences, but capturing external knowledge from other high-risk organisations also happens at the school. The safety network around the world has been strengthened through technology. Hence, global accident investigation reports are easily accessed by the safety department, which is responsible for analysing its relevance concerning the school, disseminating it, and if applicable, generating a change in established procedures. Likewise, the Federal Aviation Administration and other organisations have partnered to encourage this learning cooperation. This mutual support can lead not only to learn from errors but also to identify best practices, improve safety standards and develop flight training around the world (Federal Aviation Administration, 2018).

5.4   Internalisation - Applying Theory into Practice

At LUSA, instructors are required to read different flight manuals to keep their knowledge updated continually. After reviewing the explicit knowledge, instructors apply it to their daily work and practice it. Similarly, before obtaining the license that allows the pilot to start working as a flight instructor, different theory and flight tests are conducted to ensure the capabilities of the future instructor. This learning process is supported by the importance of 'learning by doing'

to help the instructor internalise the explicit knowledge learned during the flight instruction course, and transform it into his or her tacit knowledge.

During our visits at LUSA, we identified different levels of learning. The single-loop learning type is evidenced through traditional learning such as learning from manuals and then practising the knowledge learned. For Hagel and Brown (2017), organisations should encourage the creation of environments where new performance challenges arise and 'scalable learning' is achieved. At LUSA's, double-loop learning is evidenced by analysing how its culture and values are embedded within the instructors, which encourage them to continuously reflect and question the existing theories, assumptions and procedures. Likewise, when for example a student is not achieving the expected proficiency level, new challenges for the instructors appear, which are usually discussed in the established meetings or the informal daily discussions. Furthermore, we expect that this study will enable the appearance of questions and reflections about the learning process of the instructors, leading to a deutero-loop learning.

An important characteristic of LUSA relates to the possibility of creating new knowledge since the school is part of a university. LUSA has the opportunity to participate in different research groups as a way to build relationships based on trust with other organisations (Hagel & Brown, 2017). These boundary-spanning situations, which include collaborations between people with a different professional background, organisational identity or hierarchical position (Hislop, Bosua & Helms, 2018) can lead to innovation and discoveries not only in the aviation field. This situation is not usually experienced by private aviation schools and gives LUSA the immense opportunity to be part of something bigger than just teaching students how to fly an aeroplane. Similarly, LUSA can become a source of knowledge for other institutions. The characteristics of LUSA's knowledge creation and sharing processes can serve as a guide for other aviation schools that aim to achieve LUSA's safety record.

However, despite LUSA's characteristics and opportunities, there might still be a loss of knowledge when instructors leave the organisation. Chris explained that *"it [the knowledge] has been lost many times"* when an instructor retires. As already explained during the findings, we found that mentorships are not an obligatory practice at LUSA, but establishing a professional development program that includes mentoring could improve the process of knowledge transfer between novices and experts (Jonsson, 2013).

5.5 Summing up SECI

All in all, the four modes of SECI illustrate how tacit and explicit knowledge is converted and how instructors at LUSA share and create knowledge. In short, our findings conclude that in socialisation, instructors enhance their own tacit knowledge as a result of shadowing and observing their colleagues' tacit knowledge. In turn, as the mode of externalisation demonstrates, instructors communicate their newly improved tacit knowledge, and what they have learned from experience and mistakes to others during formal and informal gatherings or through technological systems and manuals. Therefore, new knowledge emerges as explicit knowledge becomes codified, stored, and accessible to organisational members. In the next mode of combination, such explicit knowledge is updated and re-categorised as a consequence of instructors' converting and updating manuals, generating new knowledge once again. Finally, in internalisation, instructors refer to and obtain the new knowledge to develop themselves through practice, which in turn can lead to the same process that the SECI framework presents. As a result, knowledge is constantly updated, improved, and created, as the spiral framework makes the process on-going, as well as each time it gets advanced (Nonaka, 1991; 1994). What is more, different boundary-spanning situations are developed every day because of the research groups of which LUSA is part of.

It is worth to mention that in the process of creating and sharing knowledge, several factors need to be taken into account as they influence the process. As a matter of fact, our findings suggest that culture is a contextual factor that positively affects trust, identity, and the way conflicts are handled. Likewise, time is expressed to be a constraint. However, culture motivates the behaviour of the individual to participate in knowledge sharing activities, becoming the basis that forms the process of knowledge creation and sharing at LUSA. In addition, instructors' initiatives and willingness to suggest ideas and report mistakes can be seen as expression of LUSA's culture. Further discussion on this matters is presented in the following sections.

5.6 Culture as a Contextual Factor that Encourages Knowledge Creation and Sharing

The findings from our empirical research emphasise the role that culture plays in the process of knowledge creation and sharing, as it affects LUSA's formal and informal practices, and the factors that motivate instructors to create and share knowledge with each other. In this section, we discuss how LUSA's culture is a contextual factor that affects the level of trust, the management of conflicts, the instructors' identity, and how they perceive time as a constraint to engage in activities in which they share and create knowledge.

To start, it can be argued that in the case of LUSA, culture can be indeed perceived as a social glue, since informal and non-structural means (values, beliefs, norms, ideas and understandings), like the informal practices regarding knowledge creation and sharing processes, are embraced in the organisational culture (Alvesson, 1993). As a result, such means influence the behaviour of instructors and encourage them to follow those informal practices that include discussions and voluntary mentorships in which instructors share for example experiences, mistakes, and ideas.

Furthermore, as previously mentioned, LUSA puts flight safety, education, economy and time first, as well as it has a culture that motivates employees to learn from safety-experience, participate in flight-safety conferences, and question and analyse procedures. In addition to this, it has formal practices like meetings, shadowing instructors, and research group in which instructors share knowledge, learn and create new knowledge. Therefore, LUSA's culture and social norms influence instructors towards knowledge sharing attitudes (Cabrera & Cabrera, 2005). In addition, this correlates with what De Long (1997) suggests; to highlight the importance of knowledge, motivate employees to share knowledge with the organisation, create a socialised atmosphere, and establish processes in which knowledge can be generated, shared and legitimised.

Further on, several interviewed instructors express that they enjoy working at LUSA as they like its culture and its working environment, which influence them towards knowledge sharing, concluding that LUSA's culture and working environment can be considered as extrinsic motivators (Thomas, 2009). Although instructors receive good financial benefits as expressed

by some respondents, they are not driven by money, and therefore it does not motivate them to share knowledge. In fact, the only extrinsic motivation is the working environment and the fact that they enjoy the culture and identify with it, which increases their commitment and devotion (Ray, 1986, p. 294); an interpretation that is additionally supported by the low staff turnover evidenced at LUSA.

Moreover, it is worth to mention that interviewees said that at LUSA there is no competition between instructors (Brook, Chris). In fact, respondents with managerial positions described that they do not feel threatened about losing their power and position to someone else. Hence, this leads us to the conclusion that culture without competition motivates instructors to share as there is no danger of being overpowered due to sharing knowledge with colleagues. As a matter of fact, in the aviation industry, where an individual's safety is in question and in the hands of another person's performance, as well as risks result from humans' decision and knowledge (Gephart, Van Maanen & Oberlechner, 2009), a culture aiming for everyone's development and learning is deemed to be crucial (Weick, 1987; McBriar et al., 2003; Nævestad, 2008; Paice, Aggarwal & Darzi, 2010).

In addition to this, instructors describe that at LUSA they have freedom of speech and are not afraid to share their thoughts and their mistakes with their colleagues. Moreover, through our findings, we identified feelings of friendliness, warmth, and comfortability among the instructors, indicating that there is a high level of trust, which can impact on instructors' willingness to share knowledge (Cabrera & Cabrera, 2005). What is interesting, is that LUSA's culture that embraces the reporting of errors to learn (Weick, Sutcliffe & Obstfeld, 2008; Roberts, 1989; Westrum, 1992; Rochlin, 1993; Landau & Chisholm, 1995; Pidgeon, 1998) aids in decreasing risks and uncertainties that the aviation industry carries, indicating that such actions contribute towards its success. In addition to this, LUSA's culture aligns with the idea that the purpose of sharing mistakes is to improve safety and not stimulate blame, guilt and power (Pidgeon, 1998; Richter, 2003), demonstrating once again a caring and trusting culture, encouraging employees to engage in knowledge sharing activities (Cabrera & Cabrera, 2005).

5.6.1 High level of Trust

With regard to how instructors expect reciprocity and see sharing as an opportunity to learn from others, it can be related to the high level of trust evidenced on the interviews and the

observations during our visits at LUSA. The instructors believe in the knowledge of others, reflecting the high trust among them and therefore encouraging the sharing process through relationships with better exchange (Cheng et al., 2008; Cabrera & Cabrera, 2005, Hislop, Bosua & Helms, 2018).

Similarly, instructors have trust in their managers, which facilitates communication and is another aspect that reflects LUSA's organisational culture. Creating an environment where instructors freely confess their mistakes correlates with the positive results found by Westrum (1992), Rochlin (1993) or Landau and Chisholm (1995), which present how an organisation can learn from mistakes reported by the employees.

5.6.2 A Culture that does not Allow Conflicts to Escalate

Let us now consider how conflicts between instructors are managed at LUSA. Instructors do not deny the existence of conflicts between them but express that they are usually work-related. Likewise, the school's culture influences the learned responses to different situations that if not treated properly could end up affecting delicate organisational aspects (Schein, 1985) such as flight safety.

Instructors are aware that conflicts can affect the knowledge sharing process, but since there are no relationship/affective conflicts at LUSA (Panteli & Sockalingam, 2005; Hislop, Bosua & Helms, 2018), the discussions that arise are solved through communication and do not seem to end up harming the trust or the group identity (Panteli & Sockalingam, 2005).

5.6.3 Instructors' Identity

Turning now to how instructors' self-perception can encourage or hinder knowledge creation and sharing between them, the findings presented in the previous chapter are used to discuss its impact on the knowledge processes. Firstly, we address the personality traits used by the interviewees to present themselves. Secondly, the instructors' reflections about their sense of organisational belonging are discussed to identify the way it affects their willingness to share.

We are aware of how personality remains a subjective factor since different situations and contexts can influence a person's attitude (Marcus & Kitayama, 1998). However, during the interviews the instructors usually drew upon personality traits to present themselves, attempting to create a coherent identity of who they are (Sveningsson & Alvesson, 2016). In spite of not being a socio-cultural factor that influences the knowledge sharing processes (Hislop, Bosua & Helms, 2018), certain personality traits can be positively linked with knowledge sharing attitudes (Cabrera & Cabrera, 2005; Mooradian., Matzler et al., 2011), and we identify that analysing those traits represents a value to this study since it can help managers make better decisions regarding personnel management.

Some of LUSA's instructors explicitly describe themselves as curious, open-minded, sociable, humble, empathic or approachable. We identified other traits such as being achievement-oriented, modest, altruist or generous while analysing and making sense of the transcriptions and observations from our fieldwork. Matzler et al.'s (2011) five-factor personality model explains how human personality can be seen as made of five broad traits (agreeableness, conscientiousness, extraversion, openness to change, and neuroticism), and how these characteristics can positively affect the person's willingness to share their knowledge (Hislop, Bosua & Helms, 2018). Hence, instructors' curiousness can be related to 'openness to change'. Empathy, trustfulness, modesty and "putting yourself in other's shoes" can be identified as traits of the agreeableness factor. Being 'achievement-oriented' is linked to 'conscientiousness', as being sociable is part of the extraversion element. These findings show us that the instructors' self-perception is characterised by traits that can positively affect their willingness to share knowledge about teaching how to fly to others.

In the same way, the instructors' reflections demonstrate an 'identification based' (Alvesson, 2000) loyalty to the institution. They show a strong sense of identity as being a member of LUSA, identifying themselves with the processes, goals and objectives of the organisation (Hislop, Boshua & Helms, 2018). These characteristics help in the creation of a learning culture, with a strong sense of community and in which the staff will believe (Jonsson & Foss, 2011; Jonsson, 2013). This situation, in which the instructors feel that they are part of a group and identify with each other, can lead to an increased willingness to share (Ryan and Deci, 2000).

We recognise that the traits used by the instructors to describe themselves and the ones we identified during our analysis are positive ones. However, the instructors do not seem to have

the need to follow a script regarding how to talk about themselves or the organisation (Sveningsson & Alvesson, 2016), instead we see these descriptions as a reflection of the level of identification that instructors have with the organisation, and these positive traits could be used by LUSA's management to implement practices such as mentorship.

What is interesting and should be considered is that traits like being humble can be double-edged. For example, attempts to be humble could lead to omitting the dissemination of good practices since an instructor could feel that showing his or her strengths to others could be seen as a symptom of arrogance. Then, LUSA's managers should be aware of the potential benefits and risks of the traits, incorporating learned lessons and best practices into organisational memory to foster LUSA's continuous organisational learning (Dalkir, 2005).

To sum up, we argue that all the positive traits previously described are an outcome of a culture that is embedded in the instructors, affecting how they describe themselves, as well as impacting on the instructors' identification with the organisational values and objectives while strengthening their commitment and loyalty to LUSA (Ray, 1986, p. 294). Table 2 summarizes the personality traits used by the instructors to express their self-view, as well as it illustrates the ones that we identified during our analysis.

Table 2 Personality Traits that Describe the Instructors' Self-view

INSTRUCTORS' SELF-VIEW	
DESCRIBED BY THEMSELVES	**IDENTIFIED DURING THE ANALYSIS**
- Curious - Open-minded - Sociable - Humble - Empathetic - Approachable	- Achievement oriented - Modest - Altruist - Generous

5.6.4 Time as a Constraint

Time is one of the factors that attracted our attention in terms of what encourage or hinder knowledge creation and sharing between instructors at LUSA. As stated by the instructors, time is found to be an obstacle, due to the fact that instructors would have to sacrifice their time in order to engage in knowledge sharing activities, such as codifying their own knowledge. However, in spite of being an obstacle, we identified that instructors actually like to share. Notably, a few expressed that they feel that they get back from sharing. This can correlate with theory and be seen as intrinsic motivation that results from one's job, generating positive feelings that are a consequence of actions related to sharing knowledge (Ryan & Deci, 2000; Hislop, Bosua & Helms, 2018).

Furthermore, as mentioned, the culture and the working environment can be considered as extrinsic motivators (Thomas, 2009) that motivate instructors to share and create knowledge. Hence, since instructors are pleased to work at the aviation school and identify with it, they engage in knowledge sharing activities despite time being an obstacle. Nevertheless, time is still a constraint in terms of having more meetings to discuss and share.

5. 7 Summing up the factors

This section has reviewed aspects that encourage or hinder knowledge creation and sharing between instructors. Particularly, we identify culture as a contextual factor that positively affects other factors such as trust, conflicts, instructors' identity and time. The high levels of trust between the instructors or how conflicts do not escalate on a personal level, reflect LUSA's open and distinct culture, which allows instructors to feel identified with the organisation and influences the process of creating and sharing knowledge. Similarly, since identity is developed in social contexts (Sveningsson & Alvesson, 2016), the instructors' self-view is affected by LUSA's culture and can be seen in the different personality traits used to describe themselves. Furthermore, we argue that the instructors' positive self-view, inner security and direction in LUSA's particular work context, fostered by the organisation's culture, could lead to "a source of friction, conflict, confusion and even personal crisis and breakdown" (Sveningsson & Alvesson, 2016, p. 244) in another aviation school with different characteristics. Finally, time is identified by the instructors as an obstacle to engage in knowledge sharing activities.

However, instructors enjoy sharing their knowledge, and therefore it is more easily permeated throughout the organisation both in formal and informal practices.

All in all, this section demonstrates how we consider culture as a contextual factor embodied in the working environment of LUSA, impacting on the aforementioned factors, as well as influencing instructors to engage with the practices of the process of creating and sharing knowledge as previously discussed by applying the SECI framework.
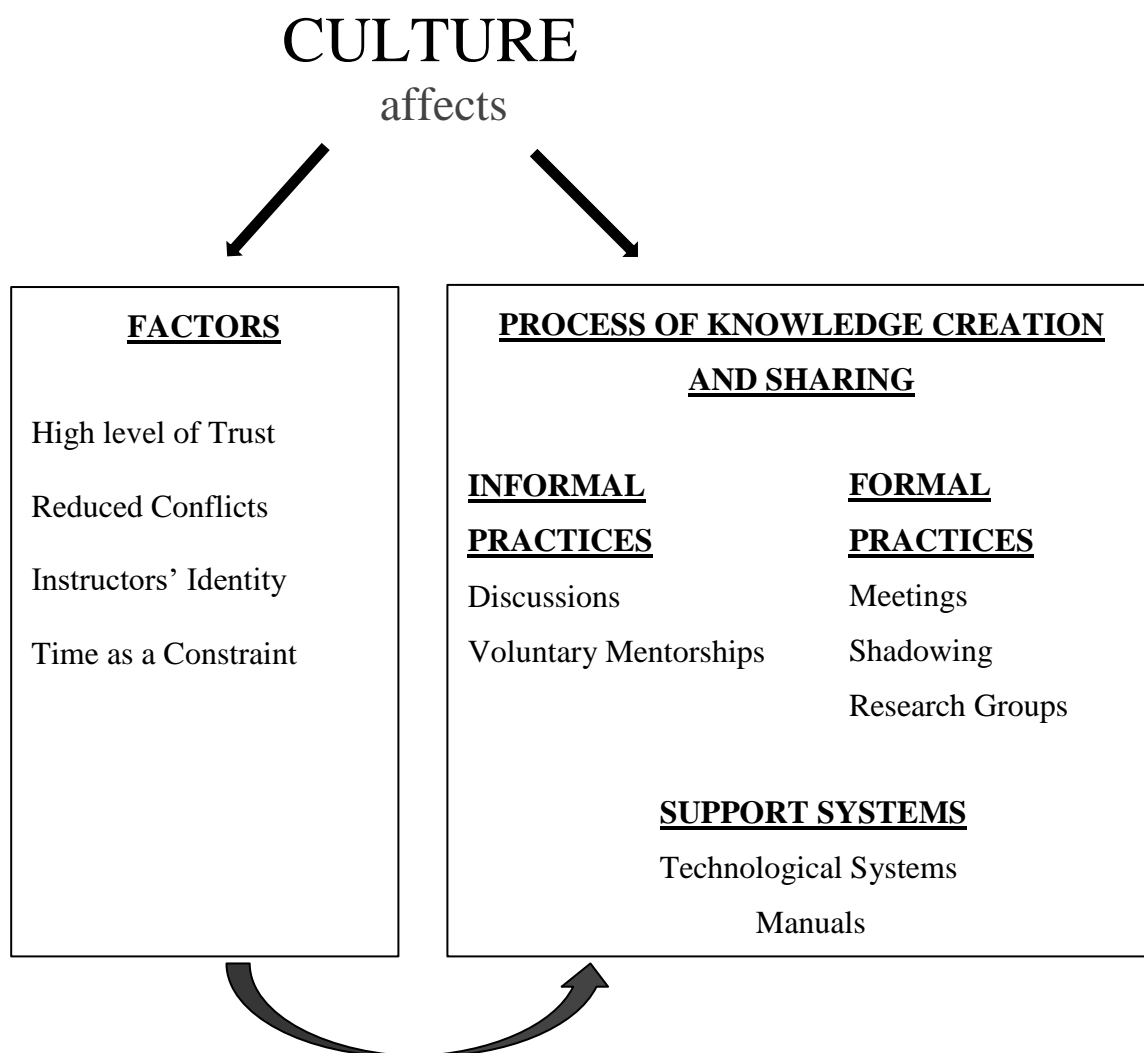
5.8 Chapter Summary

To conclude, this chapter drew upon the findings of the data collected throughout the empirical research. The findings were discussed with reference to the literature review, focusing on answering the research questions of how knowledge is created and shared among instructors at high-risk organisations such as an aviation school (LUSA) and what factors encourage or hinder knowledge creation and sharing between them. To answer the aforementioned questions, the discussion refers to the SECI framework, demonstrating how through the modes of socialisation, externalisation, combination, and internalisation, knowledge is converted from tacit to tacit, tacit to explicit, explicit to explicit, and finally explicit to tacit at this specific organisation. As a result of the conversions, knowledge is created as it is observed, communicated, recategorised, updated, and applied, generating new knowledge each time. It needs to be noticed that by applying the SECI framework we suggest that the activities that occur in the different modes are a consequence of a culture that forms the basis in the case of LUSA.

Further on, we identify culture as a contextual factor that affects the high level of trust, instructors' identity and perception of time as a constraint, as well as how conflicts are not allowed to escalate, impacting the instructors' willingness to participate in the process of knowledge creation and sharing. At the same time, since culture is a contextual factor, informal and formal practices, as well as the usage of supports systems are also embraced by the school's organisational culture, which contributes in influencing instructors' behaviour towards them. Instructors who are not afraid to report mistakes or suggest new ideas, the high level of trust not only among the interviewees but also with their managers, or the solution of conflicts through an open and sincere communication, are a reflection of LUSA's culture, which affects in a

positive way LUSA's daily activities related to knowledge creation and sharing. We also identified the instructors' strong identity towards the institution, which is also fostered by the organisation's culture and can be seen in the way the interviewees use personality traits to describe themselves.

Furthermore, time is seen as an obstacle to share. However, in spite of being a constraint, the fact that instructors like to share their knowledge and that culture influences such behaviour facilitates the sharing process in different settings. To end with, since LUSA's culture is strong, it also affects the instructors' identities. Hence, we reflected on how an instructors' self-view could be affected in a different work context. In the chapter that follows, we present how we fulfilled our research purpose and the final reflections of this study. A figure summarising the factors and process of knowledge creation and sharing at LUSA is illustrated below in figure 4.

CULTURE
affects

FACTORS	PROCESS OF KNOWLEDGE CREATION AND SHARING
High level of Trust	
Reduced Conflicts	**INFORMAL PRACTICES** — **FORMAL PRACTICES**
Instructors' Identity	Discussions — Meetings
Time as a Constraint	Voluntary Mentorships — Shadowing
	Research Groups
	SUPPORT SYSTEMS
	Technological Systems
	Manuals

Figure 4 Factors and Process of Knowledge Creation and Sharing at LUSA

6   Conclusion

Taking everything into consideration, this section concludes the research aims, objectives and findings. Subsequently, it refers to how this thesis contributes to research, as well as it discusses the practical implications of this study. Finally, it mentions suggestions in terms of future research that can aid in providing a better understanding of the topic.

6.1   Research Aims, Objectives and Findings

The research aims and objectives of this thesis are to examine how knowledge is created and shared at a high-risk organisation, as well as to analyse what factors affect the process of knowledge creation and sharing. Particularly, we sought to find answers by conducting empirical qualitative research at an aviation school, focusing specifically on the instructors. Our chosen school is LUSA, which is a high-reliability organisation as it has reported zero accidents during its 35 years of operation in spite of not having an established knowledge management system, intriguing us to solve the mystery behind its success.

As a result of our findings, we identified that at LUSA, instructors share and create knowledge during informal and formal practices, which are facilitated by technological systems and manuals. To sum up, informal practices consist of discussions and voluntary mentorships, while formal practices include meetings, shadowing instructors and participation in research groups resulting from collaboration with Lund University. By applying Nonaka's (1994) SECI model, we identified that LUSA's practices align with the modes of knowledge conversion, in which instructors' knowledge is shared, and therefore new knowledge emerges, as a consequence of knowledge's observation, communication, update, re-categorisation, and application that occur spirally.

Further on, we identified that the process of creating and sharing knowledge is affected by several factors that either encourage or hinder the process. Specifically, based on our empirical findings, we conclude that culture is a contextual factor positively affecting the instructors' high level of trust, identity, perception of time as a constraint, as well as how conflicts are not allowed

to escalate at LUSA. Also, we recognise that LUSA's culture positively influences instructors to share knowledge throughout informal practices, as well throughout the formal ones. It is worth mentioning that LUSA, as an approved training organisation is required to follow some procedures such as organising staff meetings, nevertheless, knowledge sharing happens due to the organisation's concern about safety, and influential culture that embraces knowledge sharing. What is more, the instructors' self-view demonstrates that they identify with the culture, as they use certain personality traits to describe themselves which align with LUSA's proposed culture. Finally, instructors express time to be the main obstacle for sharing; however, they choose to engage in knowledge sharing activities whenever is possible due to the strong culture that encourages sharing through the formal and informal practices.

6.2   Research Contribution

In this part, our insights are outlined to describe how this study contributes to the literature by providing a detailed description of how a small high-risk organisation, without a deliberate knowledge management system manages to maintain high-reliable operations while effectively creating and sharing knowledge between the flight instructors. Hislop, Busua and Helms (2018) explain how characteristics such as the nature of the environment where the businesses operate in, organisational size, or cultural diversity of the workforce affect the organisation's approach to knowledge management. In our case, identifying how LUSA's specific characteristics (like being a small organisation that is part of a public institution such as Lund University, with cultural homogeneity among its instructors, but which operates in the highly standardised and risky world of aviation) affect the knowledge management processes, attracted our attention to conduct this research.

From our first visits to LUSA, we identified that the organisation does not have a formal knowledge management system, and different interviewees admitted not having thought about the knowledge management processes between the instructors until we asked them. Nevertheless, LUSA's instructors regularly share and create knowledge, and this is mainly for two reasons. First, the school has different formal practices that are established by the "European Aviation Safety Agency" (EASA) for being an "Approved Training Organisation" (ATO), and different support systems for these established procedures aiming to maintain adequate safety standards. Although these situations were created with safety in mind and not

knowledge management, the latter permanently happens during those practices, which brings to the discussion the second aspect regarding LUSA's knowledge management processes: the open, trusting and sincere organisational culture that permeates all the school's instructors. Similarly, we argue that informal practices occur due to the influence of the school's culture. LUSA's culture has been widely described during this study, but what is more important is how the culture positively affects knowledge creation and sharing both in the formal and informal practices. In our opinion, if LUSA did not have such an influential culture, the effectiveness of the practices or initiatives that end up in knowledge creation and sharing could be negatively affected. Similarly, we argue that LUSA's culture affects the instructors' identity and the personality traits that they use to describe themselves, which could be dramatically affected if for example, an instructor had to change jobs and work in a flight school with different characteristics.

Furthermore, we identified that since LUSA is a public institution, instructors do not feel the pressure to 'produce' pilots as if they were a 'factory', a metaphor used by different interviewees to describe what LUSA is not. Instructors feel proud of how the school focuses on quality over quantity. Likewise, since the school is part of a renowned university, LUSA's possibility of creating new knowledge cannot be omitted. Considering informal and formal practices, LUSA's engagement in research groups create boundary-spanning situations that can lead to discoveries in different fields, which is a distinctive characteristic of this organisation and offers many opportunities in terms of innovation. Next, we present the different implications that our study might have for practice.

6.3   Practical Implications

In this section, we present the implications for practice that this study can offer. We are aware that our study foremost holds implications for small high-risk organisations, but that it also offers some implications that may be useful and beneficial for other organisations as well.

Firstly, our findings confirm that despite not having an established knowledge management system requiring people to follow procedures regarding knowledge creation and sharing, it can happen permanently at small organisations due to an embedded culture that influences

behaviour towards creating and sharing knowledge. In addition to this, organisations can have different support systems such as information technologies or manuals to encourage knowledge sharing between the employees, but in spite of just having facilitators available, their usage depends on how the employees' identity is aligned with the organisational culture, and how culture embraces their usage. Hence, high-risk organisations, which have numerous standardised procedures that could encourage knowledge sharing, should not forget that the success of those procedures or different facilitators depend on the employees' motivation and willingness to share. Additionally, such organisations should remember that the workers' identification with the organisation's culture, as a contextual factor, can overcome formalities, emphasising the importance of the cultural dimensions in organisations.

Secondly, we identify that high-risk organisations, which usually have several demands by the authorities that regulate each business, could intentionally use those established formal settings and create an environment that embraces the informal settings to engage employees in knowledge sharing activities, highlighting to them the importance of knowledge as a competitive advantage for the company, and as a means to manage high-risk situations.

Finally, awareness of the personality traits that employees' use to describe themselves, can help managers to understand their subordinates in a better way, and hence make better decisions regarding personnel management. Nevertheless, we are aware that our qualitative research of limited scope has several limitations, as mentioned in our methods chapter, which can affect these practical implications and the research contribution. In the next section, we will present different suggestions for future research.

6.4 Future Research

We hope that our findings contribute to research and provide a source of knowledge that the industry of aviation and its safety, further organisations, scholars and any other parties can make use of and benefit from it. Nonetheless, one still needs to consider the limitations that this study carries. Hence, we propose three suggestions for further research in order to provide a more solid understanding and deepen knowledge in this field.

To begin with, we propose the exploration of further organisations in the aviation industry, which share similar characteristics with LUSA, to examine the consequences of their culture and practices. Secondly, we suggest exploring organisations that belong in the same industry but have different characteristics, so that comparison can be made. Thirdly, we believe that it would be interesting to conduct research focusing on following an instructor in the aviation industry, who experiences different aviation schools with dissimilar characteristics. The purpose of such research is to analyse the effect that this change has on his or her identity. All in all, we hope that by conducting further research, the topic will become more and more developed, and thus help humans comprehend how high-risks organisations can follow LUSA's footsteps and succeed by managing knowledge effectively and efficiently.

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APPENDIX

Table 1 List of Interviewees' Pseudonyms and Job Description

INTERVIEWEE	NAME	POSITION
1.	George	Accountable Manager Head of the aviation school
2.	Alex	Flight instructor
3.	Brook	Flight Instructor
4.	Chris	Flight Instructor
5.	Daniel	Flight Instructor
6.	Eliot	Flight Instructor
7.	Fred	Flight Instructor
8.	Sam	Flight Instructor
9.	Robin	Flight Instructor
10.	Taylor	Flight Instructor