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Understanding the boost for knowledge sharing in the front-end

*A single case study about motivation to cross-functional share knowledge in the front-
end*

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Abstract

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Keywords: Front-end innovation, knowledge sharing, motivation, cross-functional communication, conditions, knowledge management, fuzzy front-end, high-technology firms, innovation process

Research Questions: 1. What factors influence employees to share knowledge cross-functionally in front-end activities? 2. How do these factors form conditions which motivate employees to share knowledge cross-functionally in front-end activities?

Methodology: The research is a single case study based on an abductive approach. The main data was collected through qualitative semi-structured interviews, which were analyzed by using the concepts of Gioia et al. (2012) to build up first order concepts, second order themes, aggregated dimensions and finally the grounded theory.

Theoretical perspectives: The theoretical focus of this study is the front-end phase of innovation. This perspective is connected to knowledge sharing and cross-functional communication. Additionally, motivational theories in the context of knowledge-sharing and front-end are incorporated to answer the research questions.

Conclusions: The study contributes to the research fields of front-end innovation, motivation and cross-functional knowledge sharing. In the findings, different factors were found that influence employees to share knowledge. Further, interrelations between these factors were examined to give an understanding of different conditions. Here, ten conditions were identified which motivate employees to share knowledge cross-functionally in the front-end phase. Further, the findings and discussion give managerial implications for how companies can increase the motivation among employees to share knowledge cross-functionally in the front end.

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Carl-Johan Herslow

Max-Joseph Wild

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1. Introduction

The aim of this chapter is to give the reader an overall understanding of the research area and its issues. The reader will be introduced to the topic in the background, followed by the problem discussion, which will give a deeper understanding of the reasoning behind the problem and the research questions. Afterwards, the purpose of this research will be presented to create a clear view of what the study will aim for.

1.1 Background

Today's global economy is driven by the technology industry and most of the world's largest companies, in terms of turnover, are high-technology firms. The technology industry is driving productivity among other industries and the development of technology is therefore crucial for the modern society (CSIS, 2017). A big issue for companies in the 21st century is to gain new market shares while maintaining old ones and therefore keep the business alive and stay profitable. For many years, nearly all firms have to move in a hostile and rapidly transforming environment and have to become more flexible and efficient to survive at the market (Rothwell, 1994). Through the bulk of competition and price fights it is hard for companies to handle the growth of the market and the economy, which was already described by Schumpeter (1934) quite early in the 20th century. Schumpeter (1934) states that there is a need for change and newness, hence an innovation process. Further, he argues that innovation can be achieved through recombination to create a disequilibrium on the market, which can also be seen as product innovation.

To internally innovate in companies is not elaborated in detail by Schumpeter (1934) but is nowadays well researched by a lot of authors. This includes anything from front-end innovation (Koen et al. 2001), innovation after the product launch, often referred as service innovation, and why knowledge sharing between departments is crucial for success in the innovation process (Stock, Totzauer & Zacharias. 2013).

A common view is that innovation is only the ideation process or everything about one specific idea. However, innovation cannot be seen as one moment in time or as one element, it is a process that has to develop over time (Cooper, 1990; Rothwell, 1994). Hansen & Birkinshaw (2007) describe the different parts of the innovation process of product innovation in detail and stress to look at it in a more holistic way. According to the authors, the innovation process

starts even before the idea generation, which is also explicitly described by Koen et al. (2001) as the front-end. The front-end is the phase that takes place before the formal NPD process where an idea or opportunity is recognized, which represents the base of every product development process and project that is launched (Khurana & Rosenthal, 1998; Koen et al., 2001; Smith & Reinertsen, 1991).

To guarantee a successful innovation process many factors have important roles. According to different authors, cross-functional communication is described as something crucial for knowledge-sharing in the field of innovation (Belliveau, Griffin & Somermeyer, 2002; Lawson et al. 2009; Cometto et al., 2016; Lin, 2007) and pivotal for gaining value from the innovation process (Moenaert et al., 1995). Particularly, previous research describes knowledge-sharing in the front-end phase as one of the key-factors for innovation success and that uncertainties can be reduced by increasing the sharing of knowledge between different departments (Belliveau et al. 2002; Peltola & Mäkinen, 2012).

1.2 Problem discussion

In early stages of the innovation process, particular in the front-end, the integration and collaboration influence the process and therefore also the direction of the NPD (New Product Development) (Florén & Frishammar, 2012; Peltola & Mäkinen, 2012). Koen et al. (2001) describe different factors as part of the environment around the five key elements of the front-end and include the organizational capabilities, business strategy, the enabling science and the outside world. The outside world includes everything that is not directly part of the organization, for instance customers and competitors (Koen et al. 2001). The employees in the organization communicating with the outside world could therefore be seen as highly valuable for the front-end processes for different reasons. The insights that they get in their everyday working life can be very valuable for the other elements in the processes and for the R&D department in an early phase of the NPD. Therefore, it is important for the management to make sure that employees participate in front-end activities so that insights, knowledge and opinions can be shared. Herstatt, Verworn & Nagahira (2004) describe the front-end as the part of the innovation process that is the most complex and difficult to manage, but on the other hand the part where huge opportunities exist to improve and increase the innovation level of a firm. Subsequently, it is important for the management team to understand that the front-end and the formalized NPD process are very different in their characteristics. Therefore, they need to be handled in different ways, which includes communication, control and systems. Hence,

the management team should see the front-end and the formal NPD processes as two separated issues even if they are highly connected in practice (Kirsch, 2004).

One of the opportunities in the front-end is described by Koen et al. (2001), who underline the importance of various interactions between different functions within the organization during the front-end phase to share important information and insights. Further, cross-functional collaboration between the R&D department and other departments is by Song, Montoya-Weiss & Schmidt (1997) described as to what extent the R&D department is exchanging information and knowledge among other functions within the organization. This topic is highly relevant, due to a lot of implications on a company, such as on the communication (Pinto & Pinto, 1990), the culture (Gupta, Ray & Wilemon, 1986) and the innovation process (Stock et al., 2013; Luca & Atuahene-Gima, 2007). According to previous research, proper cross-functional communication in the front-end will lead to a better understanding of the process and to more successful NPD projects (Moenaert et al., 1995). Moreover, cross-functional communication can also be seen as a process that fosters learning among employees through knowledge-sharing.

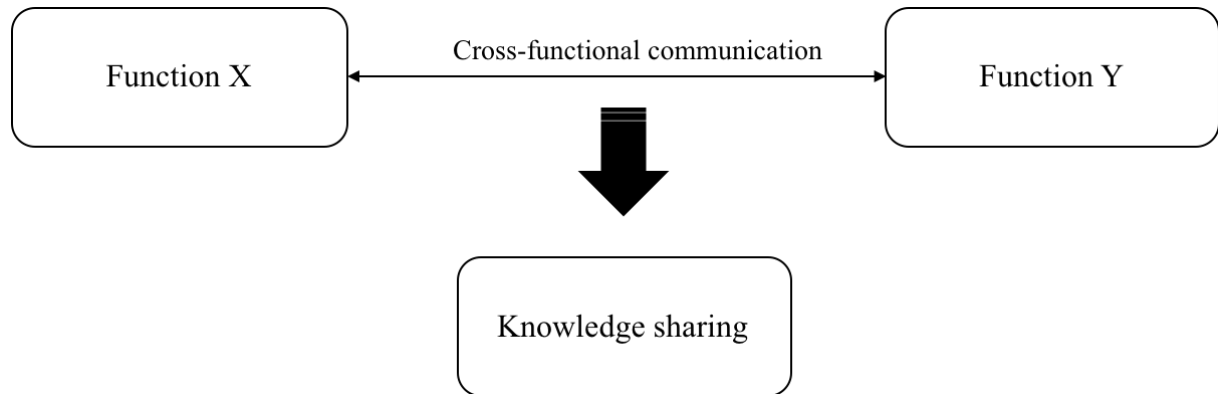


Figure 1: Cross-functional communication and knowledge sharing

When employees are communicating cross-functionally it enables the sharing of knowledge (Belliveau et al., 2002; Lawson et al., 2009; Cometto et al., 2016), which can reduce risk and increase the innovation performance, if done in the front-end phase (Moenaert et al., 1995).

Jassawalla & Sashittal (1999) point out that it is crucial to first enable proper exchange between the employees, before demanding for collaboration. The authors stress that collaborative behavior is a complicated phenomenon that has to be learned by the employees. One of the enablers for collaborative behavior is interaction between the employees, which also includes

the need to foster thought-out communication mechanisms, that should carefully be formed by the management. This confirms that cross-functional communication can to some extent be monitored by the management, hence the level of knowledge-sharing. If an organization makes the front-end activities more valuable by increasing knowledge-sharing, collaboration and cross-functional perspectives, this can be the key for competitive advantage in innovation performance. To achieve this competitive advantage, it is crucial to motivate the employees to share their knowledge with others.

This is also described by Amar (2004) and Lin (2007), who point out that the motivation of employees has an impact on the extent and the way they are sharing knowledge within the organization. For instance, Grant (2007) stresses that employees are more motivated, if their actions are more meaningful to them personally and if they impact others positively, which is also described as intrinsic motivation (Ryan & Deci, 2000). However, independent of the nature of motivation the research shows that the influence of the employees' motivation on knowledge sharing has several factors, which are widespread and not narrowed down on the front-end yet. Therefore, we see a gap in the literature concerning sharing knowledge in the front-end context.

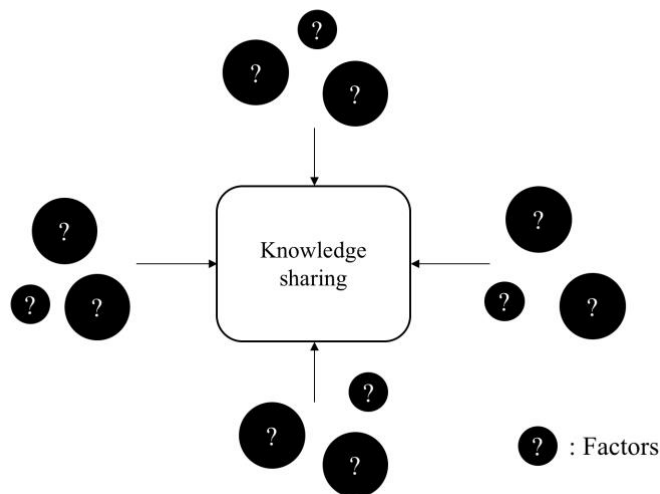


Figure 2: Problem formulation 1

Previous research shows that front-end activities are crucial for the success of innovation (Florén & Frishammar, 2012; Peltola & Mäkinen, 2012) and that knowledge-sharing is

affecting these activities positively (Moenaert et al., 1995; Olson et al., 2001; Gillpatrick, 1987). The understanding of conditions that motivate employees to communicate cross-functionally, hence sharing knowledge in front-end activities, will therefore be of great value for both managers and academia. The front-end phase is, as stated above, hard to manage and complex, but research proves that cross-functional communication and knowledge sharing can to some extent be monitored and influenced by the management. However, Florén & Frishammar (2012) emphasize that the front-end phase should be regarded differently from the rest of the innovation process. This indicates that the motivation to share knowledge in the front-end should be studied separately.

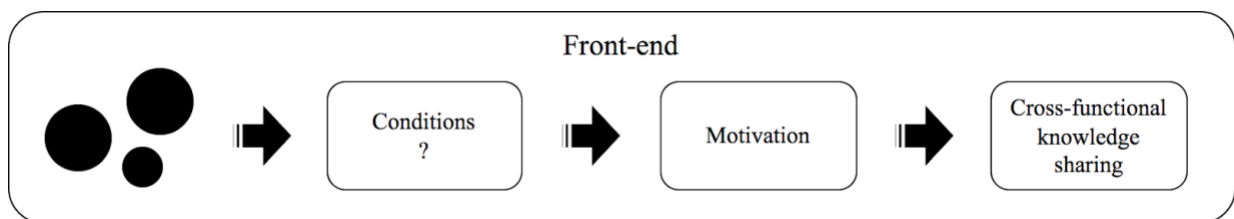


Figure 3: Problem formulation 2

1.3 Purpose and research questions

According to the discussion above, we aim to focus this research on factors that influence employees to share knowledge in the innovation process, more specially in front-end activities. Further, the aim is to study how these factors form conditions, which motivate employees to share knowledge in the same context. This will be done by using the existing research on motivation related to knowledge sharing in the context of the front-end. Further, the literature describes cross-functional knowledge sharing as crucial in the front-end for the innovation success. Therefore, the study will examine the employees' motivation for sharing knowledge cross-functionally.

Concluding, this study will focus on the following research questions:

1. *What factors influence employees to share knowledge cross-functionally in front-end activities?*
2. *How do these factors form conditions which motivate employees to share knowledge cross-functionally in front-end activities?*

Previous research has studied factors that enables knowledge sharing and also conditions that motivate employees in a broader perspective and not directly related to the front-end. As described, it is proven that knowledge sharing in front-end activities is increasing the innovation capability. Hence, it is of value to understand the specific conditions when employees are motivated to share knowledge in the front-end phase.

The result of this study will give implications to managers on which conditions to focus on, to be able to increase cross-functional knowledge sharing in front-end activities. Therefore, the research will give implications of which actions to take to be able to increase an organization's innovation capability.

The contribution for academia of this research is to further develop the understanding of the front-end, cross-functional knowledge sharing and the innovation field as such. Therefore, it contributes to the existing literature, through adding a qualitative study of the *fuzzy* front-end, which is mostly described as not formalized and hard to manage, under the aspect of the motivation for knowledge sharing.

1.4 Case company

The case company is a technology enabled service company and is one of the world market leaders in the security and alarm industry. In the recent convergence of the connected home and smart alarms, it operates in the heart of the Internet of Things space. To be able to keep being the market leader, the company is very innovation focused. The firm has two large innovation sites where most of the R&D activities take place. Further, the company is working with a well formalized stage-gate process for new projects and most of the activities can be related to the front-end phase.

The innovation sites are partly separated from the rest of the organization and therefore cross-functional knowledge-sharing is a common phenomenon. Further, the innovation center is very focused on the development of new products and services, while sales, marketing and operations are much more customer-focused. Hence, the knowledge base in the functions can be described as very diverse. Employees within the company are motivated to share knowledge cross-functionally, therefore we see the case company as a suitable case for our study. Summarized, the case company has a great focus on innovation with different knowledge bases and with a formalized stage-gate model. This gave us the opportunity to examine front-end activities and employees, who are motivated to share knowledge cross-functionally.

1.5 Outline of the thesis

In this thesis chapter 1: *introduction* examines the background and the problem discussion. Thereafter, chapter 2: *literature review* presents the used literature to face the described subject matter. Subsequently, chapter 3: *methodology* focuses on the approach and methods of how the topic is examined. Afterwards, chapter 4: *results* illustrates the outcome of the research, whereas chapter 5 - *discussion* goes into the meanings of these results. Finally, chapter 6 - *conclusion* draws implications and limitations of the research.

2. Literature review

The literature review will give an introduction to the concepts that are used within this research. Firstly, the front-end is described, followed by the concept of knowledge sharing in the innovation process. Afterwards, motivation in relation to knowledge-sharing will be presented and discussed. Subsequently, the focus will be on motivation.

2.1 Front-end

The innovation process is one of the most discussed topics in the research field of business and management, but also other sciences. To get an understanding of the process it is necessary to look at the different components of the process.

To describe the innovation process, a lot of literature refers to the front-end and the NPD process (Koen et al., 2001; Florén & Frishammar, 2012; Koen et. al, 2014a; Koen et. al, 2014b). The front-end can be described as the phase where opportunities are discovered (Koen et al., 2014a), ideas are created and developed and finally where it is decided if a company will go on with an idea or not (Koen et al., 2001; Florén & Frishammar, 2012). In greater part of the companies, the front-end takes place in informal organizational settings (Florén & Frishammar, 2012) and is described as the fuzzy state of the innovation process (Koen et al, 2001). Florén & Frishammar (2012) and Peltola & Mäkinen (2012) stress that the front-end is highly important and has a big influence on the outcome and performance of the following NPD process. Hence, the front-end is the phase where it is decided in which direction a company heads, but also if a company is successful or not. Because the front-end takes place in informal organizational settings (Florén & Frishammar, 2012), which also can be seen as the fuzziness of this phase, it differs a lot compared to other phases. Therefore, the front-end has to be regarded differently than the other well formalized processes of an organization.

If an idea is finally selected in the front-end process and gets the decision of a “Go”, the other parts of the NPD will follow, which are a lot more formalized (Florén & Frishammar, 2012). The exact relation between the front-end and the NPD is discussed by a lot of authors, who are arguing for different ways to connect the two concepts (Kim & Wilemon, 2002). Because this research mainly focuses on the front-end, this debate is not from high relevance. According to Cooper & Kleinschmidt (1987), the NPD is seen from a management perspective, one of the crucial challenges, while at the same time it is often perceived as a high risk for the company. It is also shown that the risk of failure for NPD is high and therefore managers are often

interested in the success factors for NPD (Ernst, 2002). One well-used concept for NPD is the stage-gate process developed by Cooper (1990; 2008). This process is both seen as a conceptual and operational road map for how a company can take an idea and realize it. Thereby, the stage-gate process gives the company a structure for how the idea will be turned into a successful project in different steps.

Finally, the end of the stage-gate process, the NPD (Cooper, 1990) and also the product innovation process (for products) is the launch/commercialization of the product (Florén & Frishammar, 2012; Peltola & Mäkinen, 2012).

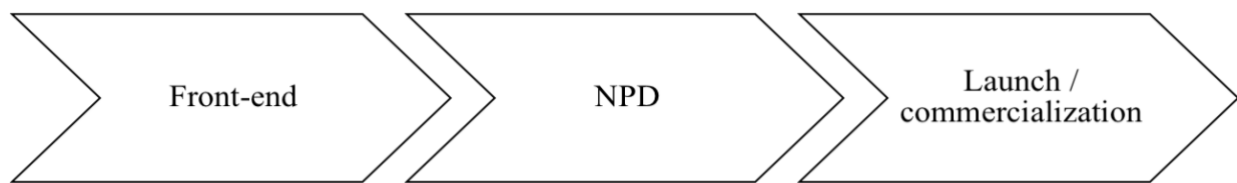


Figure 4: Innovation process

As described above, the very first phase in the NPD process is often referred to the front-end (Khurana & Rosenthal, 1998; Koen et. al, 2001; Smith & Reinertsen, 1991). The front-end has been well researched since 1991 (Cooper, 1990; Leifer et al., 2000) and is seen as a non-linear, hence a circular, process where different elements, factors and activities will lead to more formalized steps in the NPD. Koen et al. (2001) and Koen et al. (2002) introduce the New Concept Development that breaks down the front-end in three parts. The wheel, the engine and the rim.

Firstly, the wheel consists of five main elements; the *opportunity identification*, *opportunity analysis*, *idea genesis*, *idea selection* and *concept and technology development*. Also, Cooper (1990) and Urban & Hauser (1993) are discussing early and late activities in the front-end such as early *opportunity recognition* and the *late idea generation*.

The five mentioned elements span the front-end innovation and are driven by the so-called engine. It is important to notice that these elements have no set order but are influencing each other through circulation. The described concepts by Koen et al. (2001) were the basis for later work of Koen et al. (2014b), which also concentrates on the different main activities that can be done in the front-end. Here, Koen et al. (2014b) distinguish between incremental and radical

innovation, which will not be explicitly focused in this research, because the angle of this thesis is on the overall front-end activities of an organization.

As the second part, Koen et al. (2001) include leadership and culture as the parts of the engine which impels the five elements, respectively activities. Koen et al. (2014a) further investigated in the different characteristics of the engine and set the parts of the engine as the organizational attributes. The authors illustrate the five parts as the *senior management commitment, vision, strategy, resources* and *culture* and prove that these parts provide 53% of the explanation of the front-end performance.

Thirdly, the rim, also referred as influence factors, represent the environment in which the front-end innovation process is moving. The parts of the rim are the *company's business strategy, the competition, organizational capabilities* and *technologies* (Koen et al., 2014a).

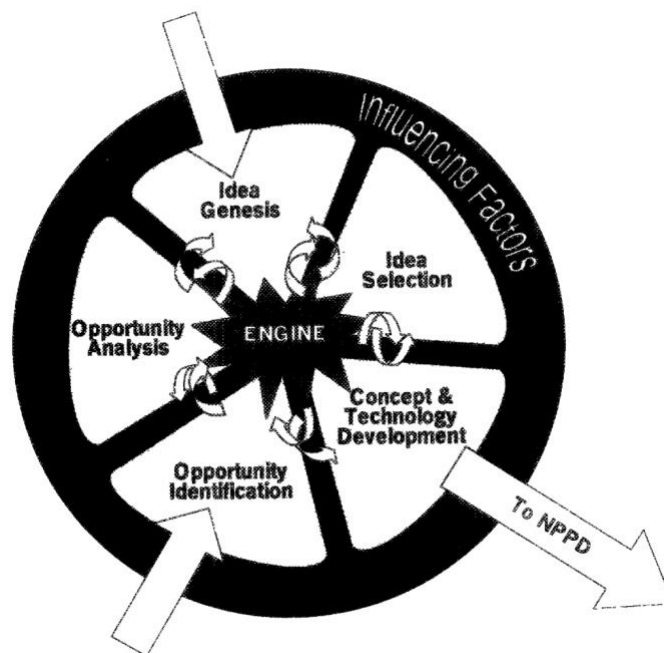


Figure 5: Front-end (Koen et al., 2001, p.47)

The so far presented literature of the front-end has a high emphasis on the success factors of the front-end. Hence, Florén & Frishammar (2012) argue that the initial focus of a firm regarding the front-end should be the outcome. That means that a company, thus the management, should have in mind which potential outcome of front-end activities is expected, which then should be transmitted to the employees. This is a crucial step by dealing with the

fuzziness of the front-end, because it is very important for employees to know which outcomes are expected and what they should aim for in this unstructured phase. This is also a good indicator for the employees if they are performing well in front-end activities, which then can be a motivational factor for them. Florén & Frishammar (2012) narrow down the outcome to the *corroborated product definition*, which can be explained by the product concept and the product definition. Both outcomes should be kept in mind while executing the activities to ensure that the activities lead to desired goal of the front-end.

As the second step, the authors advice a firm to set the activities that should be conducted to come to the described outcome. Here, Florén & Frishammar (2012) go in line with Koen et al. (2001). All authors describe opportunities as the starting point and the idea selection as the end of the front-end. In their model, Florén & Frishammar (2012) set three key activities in the front-end: *idea and concept development*, *idea and concept alignment*, and *idea and concept legitimization*. The concept of the five activities used in this research (Koen et al., 2001; Koen et al., 2014b) were described above, but still the work by Florén & Frishammar (2012) is going hand in hand with the selected concept and confirms our choice of the concept.

Thirdly, it is inevitable that the management has in mind that common pitfalls come up while dealing with the front-end and therefore it is necessary to provide a set of countermeasures for these pitfalls (Florén & Frishammar, 2012).

The main issue that exacerbates the work with the front-end is its fuzzy nature. Kim & Wilemon (2002) describe the front-end as intrinsically non-routine, dynamic, and uncertain and identify the main differences to more structured processes in organizations, like the NPD phase. Due to the early stage of the front-end, the ideas and concepts are often very vague, which implies that a formalization is often hard and that the front-end is difficult to study (Murphy & Kumar, 1997). The conclusion of this is that the front-end is different from other processes in an organization and cannot be fully formalized.

A way of tackling this issue is to further look at the concept of cross-functional communication and knowledge sharing. Different authors that are active in the research regarding the front-end, stress different kind of important aspects to take into consideration when trying to improve this early phase. For instance, Moenaert et al. (1995) describe the importance of the communication between the different departments in the front-end activities. This communication will enable better concept development and also market and customer insights, combined with the internal capabilities.

2.2 Knowledge sharing in the innovation process

Communication between different functions in an organization is often referred to as cross-functional communication, which is one of the main enablers for knowledge and information sharing (Moenaert et al., 1995; Song, Neeley & Zhao, 1996; Sherman, Berkowitz & Souder, 2005). Further, communication has a long history of being the enabler for successful NPD (Gillpatrick, 1987; Souder 1981). There are many reasons for why communication is important in the process of developing new products or projects in the organization. One main cause is described by Pinto & Pinto (1990). They argue that it is crucial that the employees working with NPD have to get information from a lot of different areas, both internal and external. For a successful NPD, information from the market, customers, developers and distributors need to be coordinated and shared, and lastly summed up by the managers in the organization. For clarification matters we state for this research that we see and define cross-functional communication as an enabler for knowledge sharing, which means that the cross-functional communication is inducing knowledge sharing (Lin, 2007).

Moenaert et al. (1995) state that the communication between the R&D and marketing department is crucial for reducing the risk in the early phases of the innovation process. In both departments uncertainty will be reduced, if employees receive information from each other during the development phase. This uncertainty will give the corporation a better ground for the decision, if they should proceed with a project or not, but it also increases the success rate for a new product on the market (Moenaert et al. 1995). Further Moenaert et al. (1995) state, that the communication between the departments is more crucial in the beginning of the NPD and less important when the product and its features are set. The communication flows should therefore be intensified in the beginning of a new project and the organization should make sure that both departments have been involved in the initial stages (Moenaert et al., 1994). Further Olson et al. (2001) depict that both the technical and market uncertainty, can be decreased in the front-end by cross-functional communication. When different functions communicate with each other, they start to collaborate and share knowledge (Belliveau et al., 2002) and can therefore reduce the uncertainty earlier in the innovation process. If the uncertainty is reduced early in the innovation process, the success rate of NPD will increase (Gillpatrick, 1987). Lin (2007) confirms this and describes that an organization's innovation process involves an extensive knowledge sharing process. Hence, if an organization creates

good knowledge sharing mechanism, the innovation capability will increase and therefore the company will gain competitive advantage.

2.2.1 Cross-functional communication to transfer knowledge

Moenaert et al. (1994) discuss the most important factors for how the communication can be increased between departments. Firstly, they stress that the project formalization and decentralization will give the departments better opportunities for formal communication among the different functions. Secondly, the authors describe that the more flexible the roles of the departments are, the better the communication flow will be. Moreover, Song et al. (1996) outline that teamwork and good relations between employees at different departments will increase the cross-functional communication. Here, Cometto et al. (2016) describe that it is not only about how much employees are communicating, but it also highly relevant to get them to communicate valuable information. The problem for a lot of companies is that they spend a lot of time to increase the cross-functional communication, however they are not focused on what kind of information and knowledge is transferred. This quality of the communication is according to Cometto et al. (2016) affecting the trust among the employees, the commitment and the effectiveness in the communication. If there is too much communication, this can send out signals of less trust to the receiver. Hence, if employees are communicating vague information and irrelevant knowledge, this will affect the effectiveness of cross-functional communication negatively. Therefore, it is important for managers to make sure that there are mechanisms for employees to share valuable knowledge and information between the functions. Further, Cometto et al. (2016) conclude that valuable information often is communicated when the employees within the different departments have the same objectives, in terms of common goals, that can be strengthened by incentives. Additionally, Chow & Chan (2008) state, that these shared goals make employees to share more knowledge within their network

Kogut & Zander (1993) illustrate the challenge of how to transfer internal knowledge within a corporation or across borders and name *codifiability*, *complexity* and *teachability* as several issues that have to be included to enable sophisticated KMSs. Codifiability describes in what extent knowledge is tacit and articulated in documents, which often means that older knowledge is easier to codify than newer knowledge. Complexity is the number of interacting critical elements that have to be used to explain one particular entity or activity. Lastly, teachability depicts simplicity of teaching knowledge to new employees. The framework shows

some useful insights of the challenges that come up with knowledge transfer and also reveals important data of interconnections between the three elements.

Complementary, Cummings & Teng (2003) stress the critical role of the *transferability* of knowledge within a company. Especially the exploitation and transfer of knowledge from the R&D department to other parts of the company face two main issues; the *articulability* and the *embeddedness*. Both factors have an impact on the transfer success and influence the exchange of knowledge within the company. Articulability describes the extent of how knowledge can be verbalized, whereas embeddedness explains how many knowledge elements and related sub-networks have to be transferred to the recipient to enable a proper usage of the knowledge. Finally, Burt (2004) outlines brokerage as the key to overcome structural holes that can be described as a lack of linkage between groups. Brokers are people who connect these different groups and allow an information exchange between them. They are kind of mediator and serve as cohesion between different parts of a company, which enables the evolvement of social capital through the conjunction of ideas. Obviously, it is not only about merging ideas from different areas, but also to enable the assembling of different knowledge fields, cultures and beliefs.

2.2.2 Culture and knowledge sharing

Research shows that an organization's culture is highly related to the fact if knowledge is shared and the way it is shared. Firstly, it is important to make clear what organizational culture is: Park, Ribiere & Schulte (2004) describe organizational culture as the shared basic assumptions of an organization while moving in an environment with different influence factors. In the existing literature there are different approaches and models of showing the connection between the organizational culture and knowledge sharing. Here, the main question is which concepts and factors belong to the culture and which do not. An example for a mapping of these factors is provided by Witherspoon et al. (2013). As a first factor the authors state communication that focuses on the nature of the existing communication in the organization. The second factor is the participation and the degree in how far employees believe they have something to say, when it comes to the decision-making process. Thirdly, there is the subjective norm, which belongs to the beliefs of employees towards other employees. As a fourth factor Witherspoon et al. (2013) describe social trust, which depicts the confidence of individuals in others' honesty and reliability. The fifth factor focuses on the organizational commitment, hence the employees' commitment into the organization they are working in. The

social network is the sixth factor, which concentrates on the existing links of employees within the organization. Following, shared goals describe in how far employees trust in the common goals in the organization. As eighth factor the authors mention knowledge management and resources that are provided by the management. Finally, the organizational support of knowledge sharing mirrors the extent in how far the management promotes knowledge sharing.

2.2.3 Informal cross-functional communication and knowledge sharing

Both informal and formal cross-functional socialization influence knowledge sharing among employees. Lawson et al. (2009) state that the main element in socialization is the communication and interaction between people. Further, the authors argue that informal socialization is more important when it comes to knowledge sharing in cross-functional teams. In relation, Chow & Chan (2008) argue how the employees' social networks can contribute to attitudes towards knowledge sharing. These social networks depend on an employee's personal relationships to colleagues and can be seen as one of the enablers and drivers to share knowledge within this network.

Moreover, Lawson et al. (2009) confirm that higher level of knowledge sharing will increase the performance in the NPD and later financial performance. Hence, informal socialization, where communication is a main element, increases knowledge sharing, which later leads to better product development.

Pinto & Pinto (1990) also investigate informal communication between employees, who are involved in NPD, and argue that it is crucial to build up relationships between different departments and positions in the organization. This informal communication will create a better accessibility between employees from different departments and with different levels of authorities. The informal communication can be enhanced by creating physical areas in which the employees can connect and communicate on an informal level (Pinto, 1989). Another way for an organization to increase the level of informal communication is to create formal evaluations and rewards for the employees connected to these activities, which will foster this behavior among the employees (Souder, 1988). According to Pinto & Pinto (1990) the informal communication within the organization will also increase the trust among employees. Further, they stress that formal meetings will help to gain focus on the tasks and the decisions of employees. Here the authors underline the importance of informal and formal communication in the NPD. Sicotte & Langley (2000) discuss the informal communication in parallel to the horizontal communication in the organization. A higher degree of horizontal communication

will lead to more innovative successful projects and horizontal communication is often a result of informal communication. Sicotte & Langley (2000) also point out that a lot of successful projects depend on the team members' relationships rather than on formal processes. However, information systems and planning also play a role to foster horizontal communication. If a company manage to do this, the risk for abundant communication among the employees or between departments will decrease.

2.2.4 Knowledge sharing and front-end innovation

The front-end is as mentioned above a crucial part for the overall success rate of the NPD and therefore also the innovation capability of the company. It is in the front-end, where technical and market uncertainties can be reduced (Moenaert et al., 1995) and different ideas, concepts and opportunities can be tested from different perspectives, before entering the formal NPD process (Peltola & Mäkinen, 2012). Belliveau et al. (2002) describe that it is better and easier to impact the innovation during the idea phase, compared to impact it during a more formalized process. Therefore, it is beneficial for an organization to reduce uncertainties in the front-end. Through cross-functional communication, knowledge about the market and technical aspects can be shared and taken into consideration, which will reduce the uncertainty. Further, cross-functional communication and knowledge sharing are highly important in front-end, because it can give a better overview of the customers and their needs, which can bring value to the organization in terms of successful projects on the market (Peltola & Mäkinen, 2012).

2.2.5 Models and enablers for knowledge sharing

Although this thesis focuses on the conditions for knowledge sharing in the front-end phase, it is crucial to get an understanding of different models, describing conditions and enablers for knowledge sharing in more general. In this context, Lin (2007) presents a framework, where he presents three different factors that influence knowledge collecting and donating in organizations; *individual factors*, *organizational factors* and *technology factors*. As individual factors the author describes the enjoyment in helping others and knowledge self-efficiency. Under enjoyment in helping others Lin (2007) introduces an altruistic view, when it comes to knowledge sharing. Self-efficiency focuses on the individuals and the belief in their own ability to contribute to something with their knowledge. As the organizational factor the author describes the management support, which motivates employees to share knowledge. Here, it is important that the management provides an enabling climate that excites employees to donate

and collect knowledge. This finding is also supported by Yeh, Lai & Ho (2006), who describe management support as the most important driver for knowledge sharing. Finally, Lin (2007) describes technology factors, such as the deployment of information and communication technologies, which leads on the one hand to knowledge collecting, but not to knowledge donating.

Another model that explains knowledge sharing with a different approach is the model by Yeh et al. (2006). Their focus is mainly on knowledge management within organizations, but knowledge management is defined as the stimulation of the creation of knowledge and the sharing of it. Here, they also focus on the motivation of mutually sharing knowledge with each other. As the first enabler for knowledge management the authors state the *corporate culture*, which is described as the core beliefs and the values of company, and as most important the creation of a culture of sharing within the organization. Secondly, they see *people* as on the one hand the creators of new knowledge, but also the ones who are responsible to share this knowledge. Thirdly, *information technology* is seen as a supporter to transfer the knowledge which is initially created by the people. Hence, information technology can be seen as a facilitator for knowledge sharing. Finally, *strategy and leadership* is about having goals, a vision and the ability to direct people in a desired way. Summarized, Yeh et al. (2006) describe these factors as knowledge management enablers, which will then lead to more effectiveness in organizations.

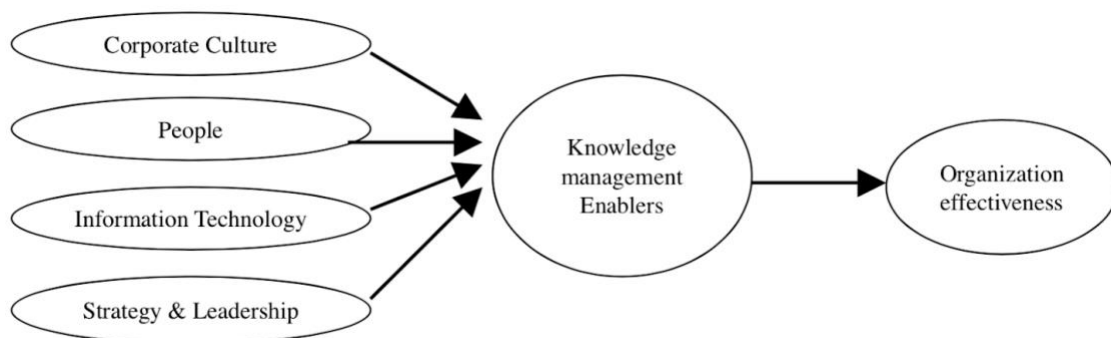


Figure 6: Knowledge management enablers (Yeh et al., 2006, p.800)

2.3 Motivation

According to a large extent of researchers, employees tend to care and value, to make a positive difference for people around them (Everett, 1995; May, 2003; Quinn, 2000). When employees get the opportunity to make a positive difference for others, the motivation to take action will increase (Grant, 2007). For further understanding it is important to define motivation and how it is used in this research. The basis of research on the theory of motivation goes back to Maslow (1943), who focuses on five basic needs of individuals. Here he also distinguishes between deficiency needs, which are needs that occur due to deprivation, which again evokes the motivation to satisfy the need and growth needs that are based on the motivation to grow as a person. One of these growth needs are the cognitive needs (Maslow et al., 1987) that are characterized by the desire of individuals for knowledge and understanding, curiosity, exploration and the need for meaning and predictability. Building up on this we integrate the view of Herzberg (1968), who states that employees should be motivated and pushed forward on their own, instead of forced by the management. We adapt this view and call the concept intrinsic motivation (Ryan & Deci, 2000).

When motivation is discussed in the research, the concepts of intrinsic and extrinsic motivation are very present. According to different authors (Ryan & Deci, 2000; Deci, Koestner & Ryan, 1999), the distinction between the two types of motivation is the reasoning behind an action. To get a better overview the following section will distinguish between the two types of motivation in more detail.

Ryan & Deci (2000, p.55) define intrinsic motivation as “an activity for its inherent satisfactions rather than for some separable consequence”, whereas extrinsic motivation focuses on an outcome that is not directly linked with the motivation itself. As the words intrinsic and extrinsic imply, the motivation comes from inside an individual for the prior and from externally for the latter.

When the motivation is intrinsically, Ryan & Deci (2000) state that the reasoning behind that is the fun and the challenge behind a task, which is also inherently fixed in the nature of humans. However, Ryan & Deci (2000) stress that some people are more intrinsically motivated by an explicit task than others. This can be led back to the different constellations of humans in their external environments. From the view of Herzberg (1968) this intrinsic motivation arises through achievement, the recognition for achievement, the work itself, having

responsibility, individual growth and advancement. Further, he concludes several managerial implications, called “job enrichment”, on how to improve the intrinsic motivation from a management side. A good example for how to intrinsically motivate employees is proposed by Grant (2007). He states that employees get motivated when they feel that their actions and identities are significantly connected to other people. Subsequently, the author underlines the importance for organizations to focus on conditions, where employees are motivated to care about others. If the employees get to impact other people positively, these actions will feel meaningful for them and will create a higher level of motivation. According to Grant (2007), this can be achieved by creating well-designed jobs, what again refers to a job design architecture that builds up on relations to others. Hence, employees should have meaningful personal contact and close interaction and communication with others in the organization. Related to the job design architecture, Amar (2004) describes that firms need to develop an environment for employees that makes sure they are motivated to engage and share their knowledge. This is because knowledge, which the employees have in their mind, can be a huge asset for a company, especially the ones that have to use a lot of knowledge in their processes, services and products.

To motivate employees at their work to share knowledge, Amar (2004) therefore describes different types of sources: The job itself, the outcome of the job and the organizational system. These types are again highly related to extrinsic and intrinsic motivation (Amar, 2004). In line with Amar (2004), Lin (2007) states that employees that feel good about helping others and like to share their knowledge will be more motivated to gather and provide knowledge to others. Moreover, Lin (2007) underlines that the employees’ confidence and their perceived competence level will also influence the motivation of sharing knowledge with other employees. Hence, if employees feel confident and competent in a certain topic, the willingness to share knowledge will increase. Further, Amar (2004) describes one way for the management to make sure that the employees feel important, motivated and in control. The management should set up clear goals for the employees so that they later can set up own goals. This will ensure that the employees’ goals are in line with which the overall organization should achieve.

Extrinsic motivation is according to Ryan & Deci (2000) mainly externally driven, hence the individual’s environment can influence its motivation. Here, Ryan & Deci (2000) distinguish between “the personal endorsement and a feeling of choice” and the “compliance with an external control”. Lin (2007) and Jeon, Kim & Koh (2011) refer to extrinsic motivation as rewards that are based on reciprocal benefits. These rewards could be monetary, but also public

recognition and other rewards that are not directly linked with the motivation itself (Ryan & Deci, 2000). As an example, Lin (2007) states that knowledge sharing is on an extrinsic level, if the employee takes a decision or an action on the base of what input it takes and what outcome is expected, hence a cost-benefit analysis. Lin (2007) concludes in his research that rewards, such as salary incentives, bonuses, promotion incentives or job security, only foster temporary compliance of employees and do not motivate employees long-term to share knowledge.

3. Methodology

In this chapter the reader will get the understanding of how the research was conducted. Therefore, the research ontology and epistemology will be presented and discussed depending on the social constructive view and interpretive philosophy. Further, the qualitative design and approach will be presented, followed by a brief description of the research process. Afterwards, the data collection process and analysis will be discussed and argued for. Lastly, the criticism and reflections will conclude the chapter and give the reader a transparent view of the used research methods.

3.1 Design and process

3.1.1 Epistemology and ontology

Our research focuses on in-depth understanding of a phenomenon in a case company, which can be seen and interpreted as a set of social constructs (Bryman & Bell, 2011). These social constructs emerge from the organization's structures, culture and objectives. Therefore, this work follows an interpretive philosophy (Bryman & Bell, 2011), which means that the data that was collected, in our case through observations and interviews, is not entirely objective. Because this study focuses on social constructs, we could not be fully objective and therefore we need to work with methods that take this into consideration (Bryman & Bell, 2011). By following an interpretive position, the aim was to get as close as possible to the reality, when analyzing the collected data and to look at the phenomena from the social actors' view (Bryman & Bell, 2011).

In the research we studied an organization and its departments, and therefore examined different groups of people in terms of both organizational and social aspects. The social actors within these departments and the other actors around them affect the overarching constructs by their actions. This goes in line with the ontological position, the constructionism (Bryman & Bell, 2011; Alvesson & Sköldbberg, 2017). Further, the departments could be seen as different constructs and studied separately, but in our case the interactions and interrelations between them were the social phenomenon. The case company is not an objective, rather it was built up by social interactions and the company's culture that is always evolving (Bryman & Bell, 2011).

3.1.2 Research approach and design

The nature of our research could be best described as an abductive approach, which is a mix of a deductive and inductive approach. A deductive approach would mean to base the research on theory, whereas an inductive research implies that theory is build up as an outcome of the actual research (Bryman & Bell, 2011). According to Alvesson & Sköldbberg (2017) and Saunders, Lewis & Thornhill (2012), an abductive approach starts with building up constructs and concepts that are not existing in the literature yet. By relating these constructs and concepts to existing theory, it was possible to give these findings a reasoning, but it was still possible to stay flexible in the research process. For our research it was necessary to get the practical inspiration of the case company and then develop it with the existing theory, because the exact problem was not defined yet, when we started to examine the organization. This is what Bryman & Bell (2011) also describe as the iterative process of research, which means that a back and forth is often necessary to narrow down the scope and to find the right methods to investigate the scope.

Initially, we started with a more inductive approach by observing and examining the case company to get good insights of how the organization works and what problems and challenges exist. Thereafter, by using theories from the research, hence a deductive way, we narrowed down the problems and challenges in a more scientific and also more specific way to get input in how other authors examined the research field. Further, based on the practical and theoretical input, it was possible to describe the main problem and set the research question. Subsequently, by gathering and analyzing data through a qualitative research we were able to closely examine the research question.

To study conditions that motivate employees to share knowledge in front-end activities, it was crucial to gather detailed information and insights about factors influencing knowledge sharing, to be able to understand the relation to the employees' motivation and the specific conditions that foster the motivation. Further, this research concentrated on the front-end phase, which is to some extent a complex mix of activities. Therefore, a qualitative research was the best option to proceed with, because with this approach it is possible to examine in-depth and very detailed. (Bryman & Bell, 2011). Furthermore, qualitative research has the advantage, compared to quantitative research, to collect information about individual experiences from employees and to be a lot more flexible, when more data is needed. Finally, to understand the employees and to find out under which conditions they share knowledge, we needed to get deep answers and

be able to follow-up on questions. Hence, it was an advantage to have a reciprocal interaction with the participants to increase the value of the gathered data (Bryman & Bell, 2011).

Further, this work was based on a case study design with a focus on a single organization. A single case study is a good way to examine complex problems in a company by getting deep insights and rich data, despite a strict time limit (Bryman & Bell, 2011). Moreover, Bryman & Bell (2011) distinguish between different types of foci on cases; a single organization, a single location, a person or a single event, whereas we were studying a phenomenon that was occurring in a single organization. The study examined a relation between conditions and employees' motivation to share knowledge and as Bryman & Bell (2011) describe a case study, the emphasis on intensively study situations and its settings. A case study is also one of the methods in the qualitative approach, where several methods can be combined like observations, semi- and unstructured interviews and company documents. Further, Yin (2003) makes a distinction between different types of cases to easier understand the purpose of the case; the critical case, the unique case, the revelatory case, the representative case and the longitudinal case. The representative case was referring to when the researchers aimed to explore a case that can describe an occurring situation. Our case study was therefore a representative case study and was further aiming to create deeper understanding of a phenomenon that could be generalized. Bryman & Bell (2011) are also describing that the case study design is an appropriate way to give insights that later can be adapted to more situations or organizations; not only the studied case. Lastly, the interviews, observations and company documents were conducted and collected under a limited period of time, which qualifies the study as a cross-sectional study (Bryman & Bell, 2011).

3.1.3 Research process

To be able to study the phenomenon from an interpretive and abductive view, qualitative data was collected. The process started out with observations, followed by unstructured interviews (Bryman & Bell, 2011) to get a good overview of the company and its situation. Therefore, we also looked intensively into company documents and previous research that was conducted on the company, which gave us a broad understanding of the company. The initial stage of collecting qualitative data was combined with an iterative research review (Bryman & Bell, 2011) to get closer to our research topic and aim. This is not completely in line with Gioia et al.'s (2012) approach regarding the literature review, where the authors suggest the researchers

to not get too close to the previous research. But we believe that the knowledge we gained through the iterative process in the early stage gave value in terms of deeper understanding of the topic. This process was also favorable in terms of linkage between the theoretical concepts and the collected qualitative data.

Because the organization is split up in two different geographical locations, most of the initial observations and unstructured interviews were made in the R&D department. This was followed by collecting insights from the marketing and operations department (M&O). We acknowledge that this might have had an effect on how we perceived the organization in the early stages of the research, however we organized unstructured interviews through a visit of the other departments and completed a potential lack of information and insights through video-call interviews to anchor our view regarding the collaboration between the departments. Therefore, in total 30 unstructured interviews were held before proceeding with the next step in the data collection.

The main data was collected by conducting semi-structured interviews (Bryman & Bell, 2011). These were held with the help of an interview guide (Bryman & Bell, 2011) created by the knowledge of the relationship between the theoretical concepts and the initial data collection. The interview guide was first tested by conducting a pilot interview (Bryman & Bell, 2011) with one of the employees at the company. By holding the pilot interview, we got some useful feedback and did some minor adjustments to the questions. Afterwards, we conducted eight interviews and transcribed all of them. These transcriptions therefore became our main source of data. The data was later analyzed in line with Gioia et al.'s (2012) framework on how to analyze data. This process gives the reader full insight in how we as the researchers have analyzed the interviewees' expressions, language and own words. Further, the findings, also referred as factors, from the data analysis were discussed in relation to the existing theory. Through looking deep into the literature, but also at the interrelations between the findings, which actually influence the motivation of employees to share knowledge in the front-end phase, the conditions became clear. As conditions, we see the interrelations between the factors and in how these interdependencies motivates the employees to cross-functionally share knowledge in the front-end.

3.2 Data collection

The aim of this section is to make the data collection process as transparent and understandable as possible. The data collection process consists of different parts and starts with describing the unstructured interviews. Afterwards, the procedure with the pilot interview is explained, which is then followed by stating how the semi-structured interviews are conducted and the justification of the semi-structured interview guide.

3.2.1 Unstructured interviews

To be able to get an overview over the case company and to identify potential employees for the semi-structured interviews, we conducted 30 unstructured interviews (see Appendix D). Therefore, we interviewed employees with different responsibilities from several departments to get broad and valuable insights for our research. For these interviews we had prepared some overall topics that we wanted to bring up with the interviewee, but the asked questions varied. Hence, the interviewee had the chance to speak freely, and we as researchers could pick up on interesting topics by bringing up follow-up questions. In line, Bryman & Bell (2011) describe that the researcher preferably prepares some given topics and then let the unstructured interview be more of a conversation. This technique gave us a broad understanding of the business and how the different employees were connected to our research topic. Further, the unstructured interviews created a network within the case company and gave us better accessibility for our semi-structured interviews.

3.2.2 Sampling

To figure out potential interviewees it is important to sample the right way. The main sampling criteria in our research were the interviewee's department, cross-functional activities and if the participants take part in front-end activities. Bryman & Bell (2011) call this sampling method purposive sampling, what means to select interviewees in a strategic way, instead of randomly choosing participants, with the advantage to pre-selected different characteristics of the participants.

With cross-functional activities we drew the link to our assessment and categorization in how far interviewees communicate and share knowledge across departments. Therefore, we analyzed the unstructured interviews and various other data that we received from employees and through company documents, to carefully select interviewees that communicate cross-

functionally. With taking part in front-end activities we refer to the activities that are described in the literature review. To be able to identify employees that take part in front-end activities, we started looking at their job design and again at the unstructured interviews.

To get a holistic view on this study, the interviews were conducted with both managers and employees. However, with managers we do not mean the top-level management, but employees that have more responsibilities than “normal” employees. This makes them important for the study, because they are the ones who have an effect on the conditions that this research is about and therefore they might have another view on these conditions.

Further, based on the unstructured interviews the assumption was made that the department of the employees also plays a crucial role in how far somebody is involved in cross-functional communication. This research focuses on the front-end in a cross-functional context, therefore it was fundamental to select different departments that take part in front-end activities. Previous research indicates that R&D activities and departments that operate close to the market are the most important for the front-end phase (Moenaert et al., 1995). Through conducting unstructured interviews, the following departments were selected: At the case company the R&D department fulfilled the criteria for operating in the front-end phase. Further, we identified two departments operating close to the market; the marketing and operations. Due to their close collaboration and to the fact that they are serving the same criteria in the research, we chose to merge them in this study. Therefore, half of the eight people work at the R&D department, whereas the other work at the M&O department. Due to the selection of managers and employees, we made the split even between the departments, hence two managers and two employees from each department (see *Table 1* for list of semi-structured interviews).

Other criteria, for instance the age, gender, origin, position, background and the time the employee works at the company was kept in mind during the process to provide reliable data.

Through intensively working in a case company, the access to interviewees in different backgrounds and departments was warranted and because of the company size it was possible to select participants from a big pool of employees.

Number	Department	Position	Location	Date
Pilot	R&D	Manager (Head)	Office	2018.03.28
1	R&D	Manager (Head)	Office	2018.04.10
2	M&O	Manager (Head)	Video interview	2018.04.12
3	R&D	Employee	Office	2018.04.12
4	R&D	Employee	Office	2018.04.17
5	M&O	Manager (Head)	Video interview	2018.04.18
6	M&O	Employee	Video interview	2018.04.18
7	M&O	Employee	Video interview	2018.04.19
8	R&D	Manager (Head)	Office	2018.04.19

Table 1: Semi-structured interviews

3.2.3 Pilot interview

Bryman & Bell (2011) suggest that researchers, who conduct interviews, should pre-test or pilot the interview questions before completing the actual interviews that are used for the data analysis. The main reasons for this was to be able to adapt the questions so that the answers are rich and to avoid closed questions. Further, Bryman & Bell (2011) underline that pre-testing the interview also allows the researchers to know if there are any questions that are hard for the interviewee to understand. Therefore, we conducted one pilot interview with one of the employees at the case company, which gave us valuable insights and feedback on the questions. The employee chosen for this was a good representative for the used sample with a valid position in the company.

Moreover, the pilot interview gave us insights of some needed clarification in the phrasing of the questions. Due to validity reasons, the pilot interview was not taken into account when analyzing the data.

3.2.4 Semi-structured interviews

The actual interviews had a semi-structured form. The big advantage of semi-structured interviewing is that it offers the possibility to the interviewers to be flexible in the process of interviewing and to ask follow-up questions if needed (Bryman & Bell, 2011). Moreover, Bryman & Bell (2011) highly recommend recording the interviews to be able to listen to them afterwards. That was very useful, because it gave us the chance to analyze the interviews in more detail and allowed us to be more attentive and reflective during the interviews.

Each semi-structured interview was based on the same interview guide, which served as a guideline through the interviews and helped to enable a consistency between the different interviews (Bryman & Bell, 2011). However, it was crucial to be aware of not leading the interviewee in a certain direction in the discussion to prevent bias by the interviewers. Therefore, we were aware of not asking leading questions or influencing the participants by gestures that could lead in one specific direction. Hence, we created questions that were as neutral as possible to guarantee the reliability of the research. Furthermore, it was important to give the interviewees enough time to answer and leave room for questions if something was not clear to them (Bryman & Bell, 2011).

The interviews were conducted by two people, one as the interviewer and one as the observer. The roles stayed the same during all interviews to provide consistency. Here, the interviewer went through the interview guide and asked the questions, whereby the observer only served as passive part and documented when the participant reacted conspicuously or something else happened that could not be caught by the audio recording. Further, the observer had to be aware that all points of the interview guide are covered and that the interviewer is in the right direction. If not, the observer had to intervene to ensure that the mentioned issues are regarded (Bryman & Bell, 2011).

Finally, it was very important to set a quiet location for the interviews. Therefore, we booked meeting rooms in the case company to ensure that no one was disturbed by noise or distracted by the environment (Bryman & Bell, 2011). To conduct the four interviews with the sales, marketing and operations department, it was necessary to do video-call interviews, due to the different location of these departments. Here, it was crucial to ensure a perfect connection and that the session is recorded. In the video-calls we also booked meeting rooms for the interviewees, as well as for the interviewers, to guarantee uninterrupted interviews. For both the personal and the video-call interviews, we had a strict organization of scheduling the meetings with the interviewees, organizing the setting and the equipment. Further, we included some slack, if something would have gone wrong.

3.2.5 Interview guide

The questions of the interview guide (see Appendix II) are build up on each other, hence it was not obligatory to ask every question. This is because we wanted to warrant flexibility during the interview and we assumed that some participants need more support during the interview while others need less. Further, we created the questions by thinking from the interviewee's

perspective and how we thought the participant will reply to these questions to find answers to the research question (Bryman & Bell, 2011). Moreover, we were aware of asking questions that are comprehensible and avoided to use technical terms (Bryman & Bell, 2011). Especially when we asked about the front-end, we avoided to use this term, because everybody has a different definition of the front-end. Hence, we decided to ask questions that did not directly name the front-end to make sure that the employee is not influenced by a specific word. If it was not possible to prevent technical words, we minded explaining the terms to ensure clarity.

To lead the interviewee in the research area we want to examine, we created an interview guide that consists of four main categories, whereby each category contains several questions related to our research.

The first category focused on some general questions. Here, the primary goal was to give the interviewee basic information about the research, but also to get some basic information to confirm our sampling criteria. Further, we made it clear to the interviewee that all questions in the interview aim for examining the front-end of innovation and are seen in a cross-functional context. According to Bryman & Bell (2011), this proceeding is also valuable to create a relaxed atmosphere for all participants in the interview and to make everyone more comfortable in the situation. In this section it was crucial to clarify sensible issues, like asking the interviewee for the allowance to record and explain that the interview can be anonymized afterwards. Finally, the recordings will be deleted, when the research is finished (Bryman & Bell, 2011).

The second category started with focusing on our specific research, hence we asked about the interviewee's general knowledge sharing activities. Here, we proceeded from two perspectives. Firstly, we wanted to examine the participant as knowledge sender and secondly as knowledge receiver. Afterwards, it was very important to find out what kind of knowledge is shared, how it is shared and with whom it is shared. Additionally, by asking with whom (here we ask on a department-level) the participants are sharing knowledge, it was possible to confirm the assumption about the degree of cross-functional communication of the interviewee.

After examining the interviewee's activities of knowledge sharing, the third category was oriented to find out why the participant shares knowledge in the organization. In this category we aimed for indirectly asking for intrinsic and potential extrinsic motivators of sharing knowledge.

In the last category we explicitly drew the link to knowledge sharing in the front-end, and once again made sure that the interviewee relates to activities in the front-end.

3.3 Data analysis

When it comes to the data analysis all researchers have to choose a well-fitting method to analyze the collected data. When looking into the literature, there are two approaches that are used in almost all qualitative research. The approach of Eisenhardt (1989) demands to start without theory and hypotheses and a very broad research question, which makes the research very flexible and adaptable. In contrast, Gioia et al. (2012) propose the grounded theory, which means to start with the existing literature without judging it (Gehman et al., 2017). In this case, there is lack in flexibility, but there is huge advantage by knowing which theories already exist and how other researchers approach certain research areas. In this research, this insight was necessary to narrow down the problem, which includes the possibility to use the literature as inspiration. As a result, we were able to formulate the research area by using the existing literature and to confirm that our research is not examined yet.

In line with the grounded theory, the collected data was analyzed by using the concept of Gioia et al. (2012) to ensure qualitative rigor in this research. According to Gioia et al. (2012) it is necessary to in-depth analyze every single interview by a certain pattern to gain the most value of the data. Gioia et al.'s (2012) approach is based on the following steps: 1. initial coding, 2. creating first order concepts, 3. creating second order themes, 4. building aggregated dimensions. Some authors propose to analyze the data by using only three steps, which implied to skip step 2 or 3. However, Gioia et al. (2012) and Bryman & Bell (2011) recommend having this one more step to increase the value and validity of the outcome.

According to Gioia et al. (2012), the first step is to do a general coding of all eight interview transcripts. When doing the coding, the two researchers did this separately to make sure that the individual perspective was kept. To not generalize the data early in the process we kept the interviewees' own words and expression at this stage. This gave us a good overview over the collected data together with the fact that the data was not interpreted by us. Instead, the language and exact expressions were kept. Further, there was the need to be able to go back and follow to who said and expressed what.

From the researcher's perspective, the whole process can feel overwhelming, but Gioia et al. (2012) underline the importance that the researchers should not put too much effort into the grouping of the expressions and terms.

After coding the eight interviews we got 206 quotes, which then were the ground for the second step in the process. From the quotes we looked at similarities and categorized them into which Gioia et al. (2012) call first order concepts. This gave us the opportunity to narrow down the data and to create 104 relevant first order concepts. We created the first order concepts individually to increase the credibility (Bryman & Bell, 2011; Gioia et al., 2012). We as researchers therefore gave the analysis two perspectives, which according to Gioia et al. (2012), gives the research a stronger outcome. At this stage we also tried to link the first order concepts to previous research and theories to be able to link our research questions to possible explanations. After concluding the first order concepts, we created 17 second order themes. These second order themes made it easier to get an overview over the findings and to proceed with the data. Lastly, we summarized the second order concepts into 6 aggregated dimensions. These dimensions were created to give the interviewees' expressions a more generalized meaning. According to Gioia et al. (2012), this step is a way for the researcher to show the most relevant findings in relation to the research questions.

Because we had done a literature review before doing the analysis of data, there was a risk that this affected our way to categorize the concepts. We had this in mind when analyzing the data and tried to let new concepts occur. It also helped that the interviewees' own words were kept as long as possible until the second order concept was created. On the other hand, the literature review was important for us when coming up with the aggregated dimensions to be able to keep the focus on the research topic.

The process of analyzing data suggested by Gioia et al. (2012) gives the reader insight in the steps that we as researchers have done (see *Figure 7* for approach by Gioia et al.). It also gives the reader the opportunity to follow our reasoning and see how we used the interviews' expressions and understandings, which increases the transparency of the research.

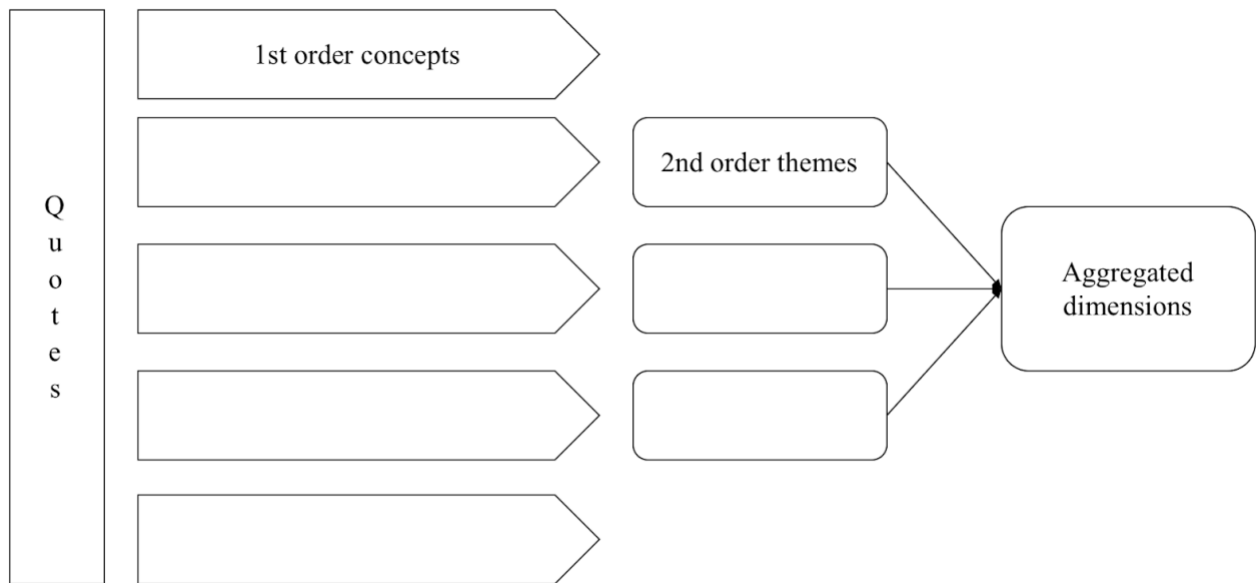


Figure 7: Approach by Gioia et al. (2012)

3.4 Criticism and reflection

3.4.1 Ethics

Ethics played a crucial role in this research. When dealing with the ethics, we followed the guidelines by Diener & Crandall (1978). The authors stress four important categories, which accompanied this research from the start to the end. However, there are certain ethical issues that were not considered in detail, due to the type of this research.

1. *Harm to participants*: During the unstructured and semi-structured interviews it was crucial to keep the participants anonymous, due to some sensible data from employees. This anonymization succeeded internally as well as externally.

2. *Lack of informed consent*: As part of the conduction of the interviews, it was a crucial part to give the participants as much information as possible to inform them in what kind of research they were participating in. Here, we minded to not disclose too much information to make sure that the participants are not influenced.

3. *Invasion of privacy*: Some parts of the interviews, for instance motivation, contained private data. Therefore, we minded telling the participants to disclose only data that they want to disclose.

3.4.2 Credibility, transferability, dependability and confirmability

To judge the quality of the research, it was crucial to look on several issues that approve this research. The following part serves additionally to guarantee this quality. However, other parts in this chapter already contain some of these issues and will not be repeated here.

The chosen approach to do this examines the trustworthiness of the research and was developed by Lincoln & Guba (1985), who stress credibility, transferability, dependability and confirmability as criteria (Guba, 1981)

Credibility: According to Lincoln & Guba (1985), it is crucial to ensure that the outcome of the research is credible. This means that the data should match to the findings and the final result. To guarantee this credibility, we aimed for disclosing our working process and acting as transparent as possible. Further, we minded having enough interviews to draw proper and valid conclusions.

Transferability: This criterion explains in how far the outcome of this research can be transferred into another context. As explained in this chapter, this research was conducted as a single-case study in a high-technology firm. Hence, we assume that the learning outcomes of this study can be transferred to other cases that are dealing in a tech-environment. Moreover, we believe that this research is generalizable to a certain extent, due to the assumption that the front-end is a concept that can be found in all companies. It is important for the reader to take into consideration that we studied a phenomenon in one social construct and that some of the findings might be different in other constructs. However, we were trying to analyze our data from a general perspective and have always had in mind our position as researchers in the case company.

Nevertheless, we acknowledge the uniqueness of the front-ends in different industries, which implies that a direct transferability cannot be given.

Dependability: Dependability, often referred to as transparency, lays a focus on how far a proper documentation happens during the whole research process. Therefore, every interview was recorded and transcribed. The process of dealing with the insights of the case company, the documents, the field notes and the procedure with the data were clearly documented, and if important, attached in the appendix. Further, this process was also audited by seminars with other master students and two academic supervisors, whose input also served the dependability.

Confirmability: To serve the criterion of confirmability, we focused on being as less influencing as possible in the interviews and in writing this thesis. Especially in the interviews, one of our main goals was to ask no leading question to get an outcome that has a high value

and is valid. Obviously, there is in some extent subjectivity, but through being aware of this in every step of this research, we ensure a high objectivity.

Additionally, we want to mention that we had to conduct four out of eight interviews by using video-calls, due to the accessibility of the interviewees. According to Bryman & Bell (2011), this might lead to a miss of important reactions and feelings that the interviewee shows. However, every video-call was prepared thoughtfully through guaranteeing a good internet connection for both the interviewee and the interviewers, to ensure a comparability to the live interviews. Further, we believe that our findings and results were not directly affected by conducting some of the interviews as video-calls, but this still should be taken into consideration by the reader.

4. Findings

The following chapter focuses on the findings of the gathered data from the conducted interviews. Here, the aggregated dimensions are described by showing the data structure and the interdependency to the second order themes and to the representative quotes. The findings are structured in six aggregated dimensions, which in total include 17 second order themes. These 17 second order themes are seen as factors that influence employees to cross-functionally share knowledge in the front-end phase.

4.1 Aggregated dimensions

Figure 8 shows the matching between the aggregated dimensions and the second order themes.

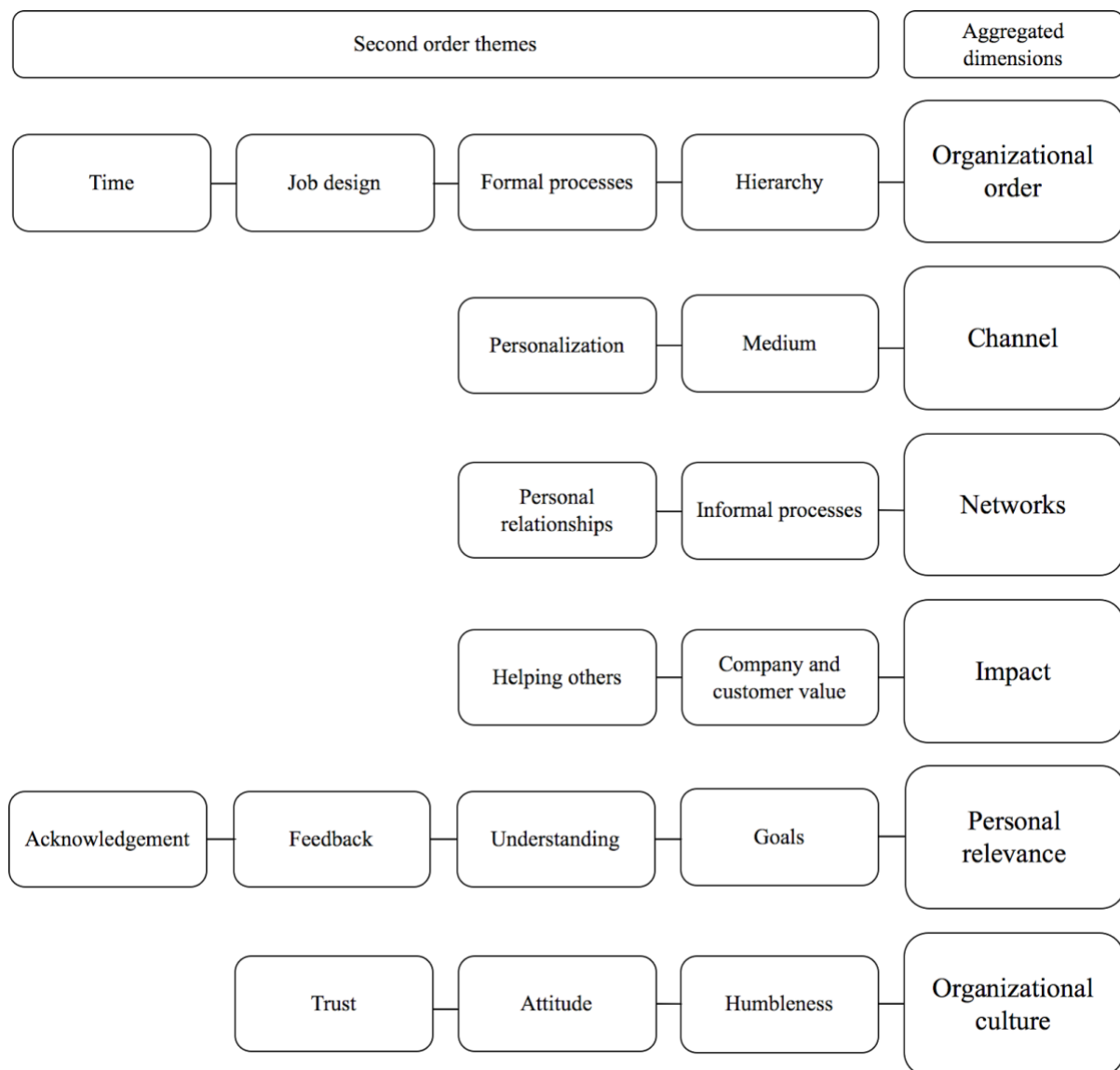


Figure 8: Aggregated dimensions

4.1.1 Organizational order

The first aggregated dimension consists of the second order concepts; *hierarchy, formal processes, job design* and *time*. This dimension explains all factors that influence the employees to share knowledge, which relates to how the organization is ordered. In the data, we could identify different factors that are related to how the company is structured, therefore the factors presented below are on an organizational level. The findings show that a lot of organizational factors affect employees to share knowledge in the front-end.

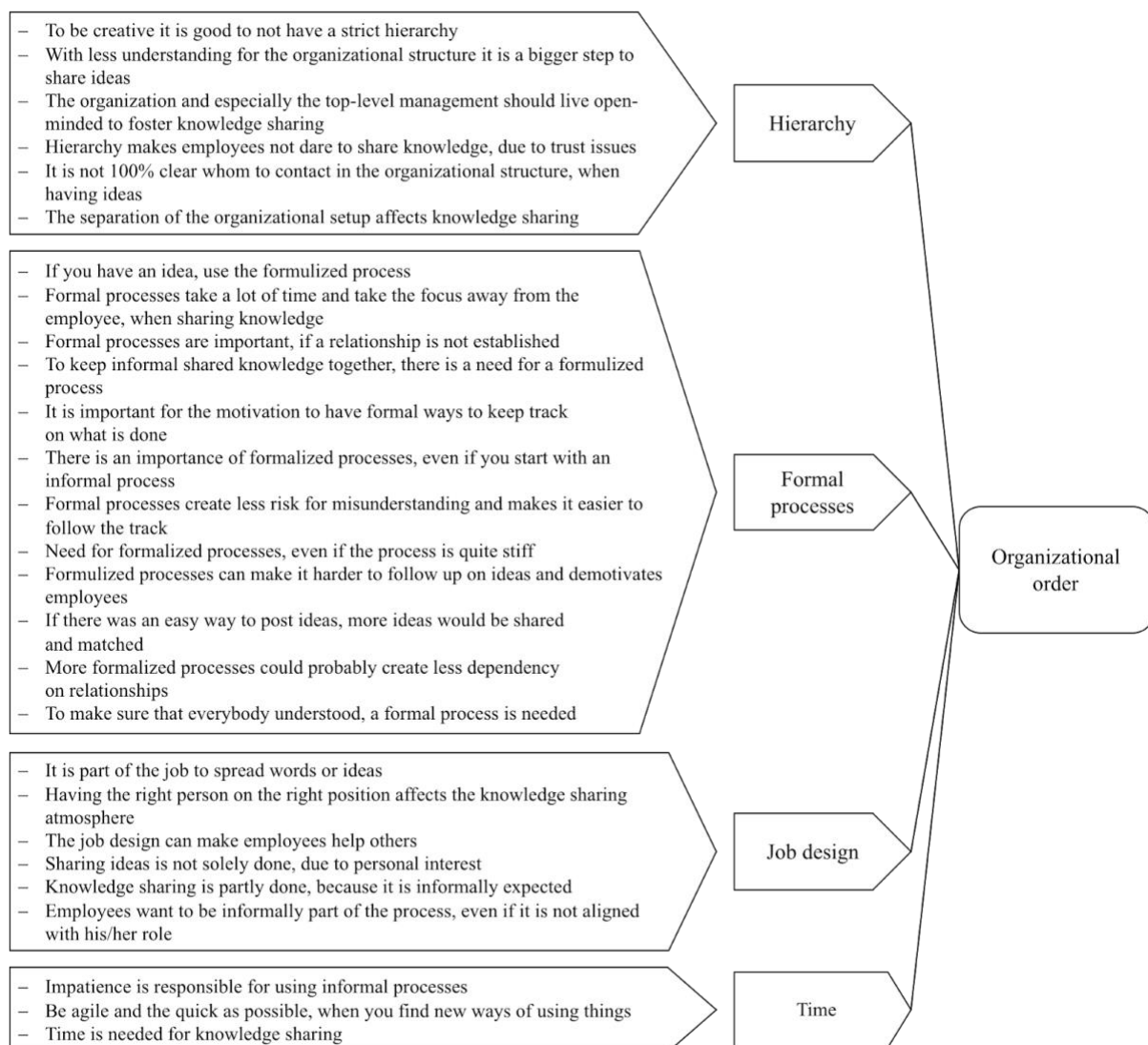


Figure 9: Data structure - Organizational order

Hierarchy

The way the organization is structured is a factor that several of the interviewees mentioned as something that could affect them share knowledge. If employees do not understand the

organizational structure, there is a “bigger step” to share knowledge and insights in the front-end phase. With organizational structure employees refer to the transparency of who is responsible for which working area and how people are linked with each other. For instance, it is important for some interviewees to know who reports to whom. The need for transparency arises, because employees do not know who to contact in the organizational structure, if an employee has a good idea, valuable insights or helpful information. This can in some cases hamper knowledge sharing in the front-end phase. Further, the hierarchy is a factor that can make employees not dare to share knowledge in the front-end phase. Here, respondents referred to the hierarchy as something that can impede “creativity”. The respondents also explain that knowledge sharing can be harder in the front-end, because these activities might not be part of their role or that you might need to share knowledge with someone in the organization you do not know how to reach. Lastly, the data indicates that the top of the hierarchy, hence the management, needs to live open-minded to be able to foster knowledge sharing in the front-end. Therefore, it is important that managers inspire their employees to share knowledge, which again can increase their knowledge sharing activities.

“I think that is one point that is partly missing in the organization. I think it is not a 100% clear whom you should direct your ideas and insights”.

Formal processes

The findings indicate that formal processes in front-end activities can make employees to share knowledge between each other. The employees expressed that the early phases of the innovation processes usually consist of informal activities and that the formalized processes can help them increase their understanding. Further, the differences between the employees from various departments could make it more difficult to share knowledge without some kind of formal activities. Further, some employees explained that they mainly share knowledge with whom they have a relationship within the organization. Through having formal processes, the respondents stated that it is easier to share knowledge and that this could make knowledge-sharing less dependent on relationships. Moreover, employees stated that formal processes are good for capturing value from informal ways of sharing knowledge in the front-end phase. Here, part of the interviewees stated that even if the sharing of knowledge started with an informal contact, there is a need of a formal process in later stages. The employees described that it often works well with informal processes in the beginning of the front-end phase, whereas formal processes are better in later phases to capture ideas. On the other hand, some

of the interviewees also indicated that if there is a formal and easy way to share insights and ideas, this will give them a better reason for them to do so. Another aspect that one of the interviewee's brought up was that it is important for sharing knowledge in the front-end phase to have the opportunity to keep track on what is already done and formally shared. However, somebody else stated that the formalized processes sometimes can make it harder to follow up and that these processes could create less sharing of ideas and insights. Moreover, formal processes were mentioned as something "stiff" and that it can make the whole knowledge sharing process "take more time" in the early stages of the innovation process. Lastly, the data indicates that formalized processes can make sure that all employees get understood when sharing knowledge.

"But I think we need formal ways as well, to keep track on what we are actually doing, and I think it's important for us to see that if we want something we actually get it...but I think it's important for us, or for me as well as person, to say that if I'd file things, that it ends up in something".

Job design

The fact that sharing knowledge and insights in the front-end is part of the employees' job design was continuously mentioned among the interviewees. The role that employees have, was referred to as one of the reasons why they share knowledge and insights in the early phases of the innovation process. The job design is also seen as a reason to help others, and therefore also share knowledge with other employees. On the other hand, the data shows that sharing ideas is not only done because of the job design or role, but also due to personal interest. Therefore, some employees want to be informally part of the processes where knowledge sharing takes part in the front-end, even if it is not part of their role. Another aspect is the importance of having the right person in the right position and that this could affect the knowledge sharing process. Mostly, interviewees referred to the atmosphere for knowledge sharing and that it becomes better, if "the right person has the right position". This was described as something even more important for the front-end, because it might be unclear who is responsible for what in that stage of the innovation process. Lastly, the interviews show that sometimes there is an informal expectation on employees to share knowledge and insights.

"I think it's always part of my job. I have run weekly team meetings with every product manager and I kind of try to spread the word, ideas or testing new things."

Time

Time is a factor that the respondents referred to as a crucial aspect for sharing knowledge in the front-end. If employees feel like they are very busy, this was mentioned as something that can affect them to share ideas, insights or information. Most of the activities in the early stages of the front-end are informal, which also means that, due to time issues, their daily tasks will be prioritized. Hence, if the employees do not feel that they have time to participate in front-end activities, they might share less knowledge. Linked to this, some of the interviewees mentioned that they want to be able to share their ideas and thoughts in a more time efficient way. Therefore, informal processes are a faster way to share knowledge in the front-end, if compared to formal processes. Further, employees also stated the need to be agile and quick, when finding the best solutions in the early stages of the innovation process. Here, brainstorming was mentioned as one aspect where knowledge sharing has to be done in a fast and agile way to enable better knowledge sharing.

“But the challenge we have is that we have no time; nobody has time to do this.”

2. Order concept	Representative quotes
Hierarchy	<ul style="list-style-type: none"> – “I don't think it's 100% clear to everyone who should actually take care of it.” (<i>refers to shared ideas and knowledge</i>) – “I would definitely say that the organizational setup and the setup that we have with local marketing and sales organization, and then a global product innovation organization, affect the way that this works, definitely.” (<i>refers to knowledge sharing</i>)
Formal processes	<ul style="list-style-type: none"> – “If you have a great idea, I would like to do this yeah! Here's the template please fill it out and send it to me. And I will make sure it ends up where it should be.” – “Yes, it is hard to make sure that everybody has understood everything. But usually the *refers to the template* that includes the epics or cases user scenarios is usually understood by all.”
Job design	<ul style="list-style-type: none"> – “I think it's always part of my job. I have run weekly team meetings with (...) all product managers and kind of trying to spread the word, ideas or testing new things developed.” – “So yeah, they expect me to kind of contribute to it, but I learned it's not kind of stated anywhere I would say. It's more like informally expect that kind of.”
Time	<ul style="list-style-type: none"> – “(...) so basically our impatience, a lot of times on the marketing side, that the idea we came up with, we would rather launch it tomorrow. And in that sort of impatience, we're calling the person who can help us make it happen as soon as possible to get their opinion (...).” – “Meetings I would say, sit down together and work and it should not be like half an hour meetings or one hour meetings it should be that you kind of sit down together for a while and work and have ideas.”

Table 2: Representative quotes - Organizational order

4.1.2 Channel

This aggregated dimension includes *medium* and *personalization*, which relate to the used *channels* when knowledge is shared and give some indications of how these channels affect employees to share knowledge in the front-end phase of innovation. The findings show that the medium used for sharing knowledge can affect them to share further knowledge. On the other hand, we could also see a great importance of the need for personalization in the channels to augment the employees' knowledge sharing activities. Hence, this aggregated dimension implies that the channel used for sharing knowledge in the front-end can highly impact the employees to share their insights, ideas and thoughts.

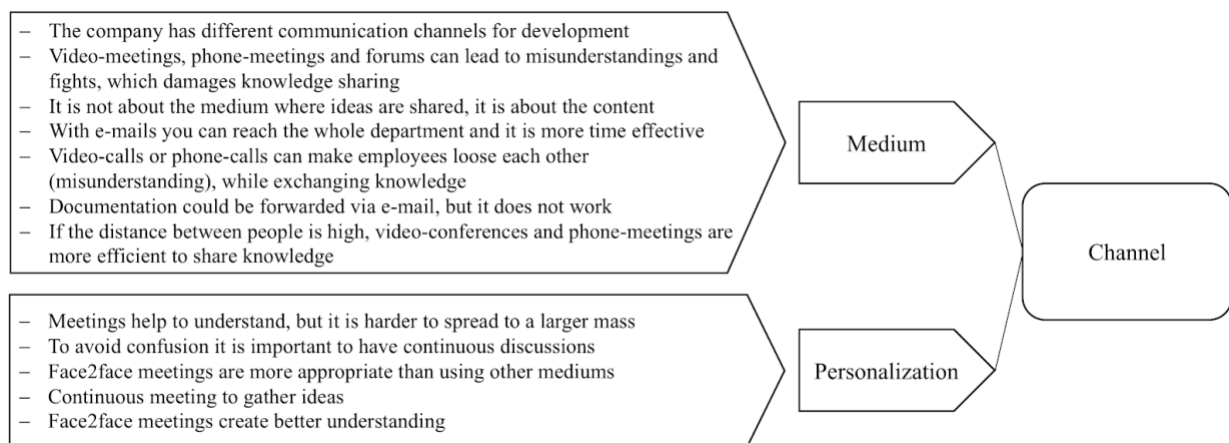


Table 3: Data structure - Channel

Medium

The medium for sharing knowledge was shown being a factor that can impact the employees to share knowledge in the front-end phase. Firstly, some interviewees stated that video-meetings and phone-meetings can create misunderstandings while sharing their ideas. This affects them to further share their ideas, information and insights. Further, employees sometimes think it is a bigger barrier to ask questions and get further understanding of new ideas or insights, when having phone-meetings and video-meetings. In contrast, some of the interviewees emphasized that video and phone meetings are needed to talk about ideas and new insights, especially when the physical distance between them is high. However, some interviewees state that the use of these mediums during the front-end phase could make them lose each other and therefore affect their knowledge sharing activities with others.

In some cases, e-mail is referred to as a medium that makes it possible to reach out to a larger mass and it is more time efficient than other mediums. On the other hand, different participants

do not recommend e-mail when transferring knowledge during the front-end. The reason behind this is that the shared knowledge might not be picked up from the receiver, hence the sender spread knowledge for nothing. Summarizing, the findings indicate that the choice of the medium has an effect on the employees and if they share knowledge between each other during the front-end phase of innovation.

“And if you're at the phone and in the worst scenario you don't realize that you have lost them. Because you can't see them. And that is always a huge risk that people stop to communicate.”

Personalization

One factor that was brought up by all interviewees was the personal interaction when sharing knowledge in the front-end phase. Most of the times this was related to face to face meetings and how these meetings enable better knowledge sharing and make it easier to receive it. If there is personal interaction when sharing knowledge, it creates “better understanding”. Moreover, a lot of ideas, insights and thoughts that occur in the early phase of the innovation process might be hard to understand or interpret. Therefore, respondents stress the importance of being able to ask questions and want to see that the receiver understand the knowledge that is shared. Therefore, the understanding is a very important factor for the respondents to share knowledge and insights in the early phase of the innovation process. Further, the data indicate that it is crucial to have face to face meetings and discussions continuously to gather ideas and insights. However, even if face to face meetings were referred to as the “most appropriate” medium to share knowledge in the front-end phase, it makes it harder to reach out to the larger mass. A reason for employees to use face to face meetings to share knowledge was mainly because of having a personalized way of sharing knowledge.

“And that is also much easier to sit in the same room. If you have somebody on the phone and other things, then it is kind of much tougher to share the feeling you are having and also explain that this is super cool, and it's this fun.”

2. Order concept	Representative quotes
Medium	<ul style="list-style-type: none"> - “And that’s also much easier to sit in the same room. If you have somebody on the phone and other things, then it’s kind of much tougher to share the feeling you’re having and also explain that this is super cool. And this is fun.” - “Sometimes we have had a kind of a forum open where we can post with things and communicate. I wouldn’t say always but sometimes it ends up in disasters people misunderstand each other and they start to fight in the forum and that damage.”
Personalization	<ul style="list-style-type: none"> - “Okay, you need to have a face to face meeting! That’s the key for everything.” - “It is easier to make sure when we sit in the same room that you understand me. Because if I say something you don’t understand, I will see you in the faces.” - “But I wont use text when it comes to workflows because it’s very hard to get the full picture. And it is very easy to create misunderstandings.”

Table 4: Representative quotes - Channel

4.1.3 Networks

This aggregated dimension relates to how networks of employees influence them to share knowledge in the front-end. *Informal processes* are one factor that creates networks, but also depends on the employees’ networks to occur. To be able to participate in informal processes the employees need to have a network, however, the informal processes can also be a way to extend the employees’ networks. In the findings we could also see how personal relationships are highly connected to the employees’ knowledge sharing extent. Further, employees’ *personal relationships* are an important way to build up their networks in the organization. Therefore, these relationships are on one hand an enabler for building up networks, but on the other hand they are also a driver for employees to share knowledge in the front-end.

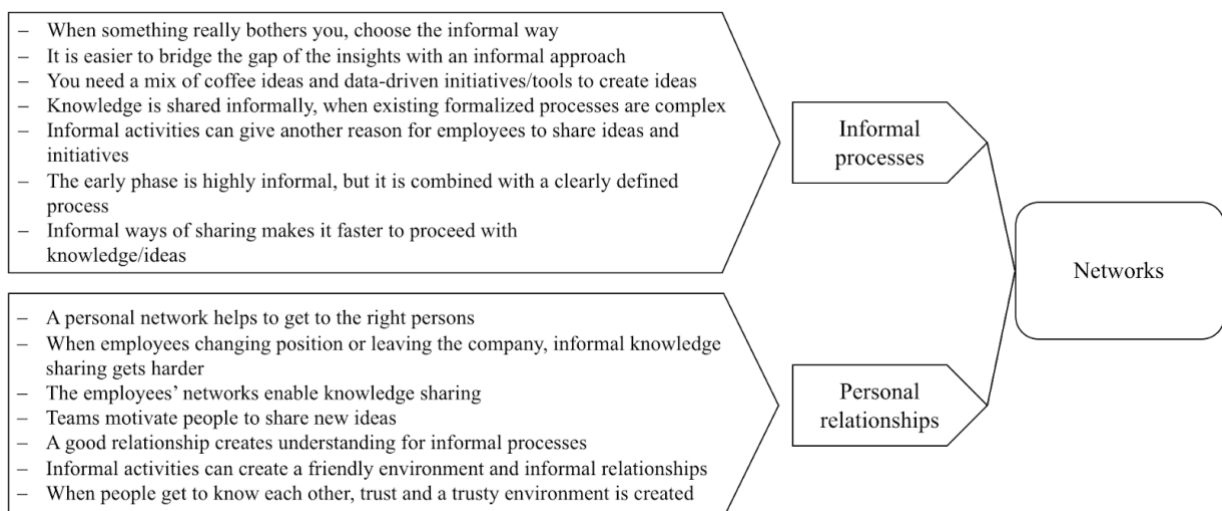


Figure 10: Data structure - Networks

Informal processes

Informal processes were referred to as something “crucial” in the early phases of the innovation process to be able to capture value early. Firstly, the findings show that informal activities can give employees another reason for sharing insights, ideas and thoughts in the front-end phase. Some respondents argued that informal ways “make it faster” to share this knowledge, which can affect them to spread it. However, if employees recognize that they are not able to share in a time efficient way, this can make them stop sharing their knowledge in the early phase of innovation. Further, the front-end phase is described by several of the interviewees as “highly informal”, however there is a need to combine these informal processes with formal ones later on. Another finding is that if formal processes of knowledge sharing are too “complex”, informal ways for sharing knowledge are used. In line with that, the respondents described the importance of having both “coffee ideas” and “data-driven initiatives and tools” to create new ideas. The interviewees underlined that informal processes make it also easier to capture insights and get employees to share knowledge in early phases of the innovation process. One argument for using informal processes in the front-end phase is that you want to get as much outcome as possible and then narrow down the scope.

“And yeah, thinking about it and you go outside the office and take a beer and have a dinner. Normally you have to hear things about new ideas and new initiatives that they haven't shared during the whole day. So, I think informal is good.”

Personal relationships

The employees that have a good network in the organization were referring to it as something that creates more sharing of knowledge and insights in the front-end. One of the reasons stated, is that it makes it easier to know who to share knowledge with. Moreover, a good relationship with someone creates “better understanding” for informal and fuzzy processes under which knowledge is shared. One of the respondents also described the situation when employees are changing position or leaving the company as a factor that makes it harder to informally share ideas and insights. Further, some respondents state that informal activities can create “informal relationships” and a “friendly environment” while participating in front-end activities. Both the informal relationship and the friendly environment are later referred to as enablers for sharing insights and knowledge in the front-end phase.

Moreover, if employees get to know each other, this can increase the trust between them and therefore create a “trusty environment”. Here, some employees state that they share new ideas,

if they are working in teams and if they can exchange their thoughts in this team. The respondents explain that personal relationships create an environment in which they “dare” to ask a lot of questions, and therefore this increases their understanding for each other. Further, asking questions is described as something very important in the early phase of the innovation processes, because opportunities, ideas and insights might not be clear to everyone. One of the respondents also argues that the relationship to others makes it easier to question people’s thoughts without letting them feel that the employee wants to “kill” their idea.

“So, of course I still use them as my network to spread ideas, to spread culture and engagement for different types of questions and impacts.”

2. Order concept	Representative quotes
Informal processes	<ul style="list-style-type: none"> – “If we were solely depending on a formal sort of process to do that, I’m sure we would not have been able to do it as fast.” – “No that could be in formulating in the corridor or if I have some time, sometimes it’s better to if you have an idea that you don’t think you should try. But maybe somebody else should try and then you can just sit down and take a coffee and discuss accurate with them. It doesn’t have to be kind of this formal meetings.”
Personal relationships	<ul style="list-style-type: none"> – “I have been around in a company for a very long time and I know a lot of people. So I have a network so it’s easy for me to find someone. I even have the operation managers in some countries that I have been the boss for, 8-9 years ago. I know people that’s my biggest advantage.” – “Then you can kill the motivation for people, so it’s better to create a team and then kind of together come to a conclusion, how to drive that but if there are new and ideas that you think, could be a new product idea, or a new way of something else.” – “Yeah, the obvious answer is. It’s much easier to understand people you work with because you know them you know how they work.”

Table 5: Representative quotes - Networks

4.1.4 Impact

All the interviews imply in one way or another that it is important for employees to have an impact while sharing knowledge in the front-end phase. For some it is very important that their activities have a positive influence on the *value* of the *company’s customers* and the *company* itself. A second driver within the aggregated dimension is *helping others*. Here, it is crucial for employees to support others with their front-end activities and being in some way collegial.

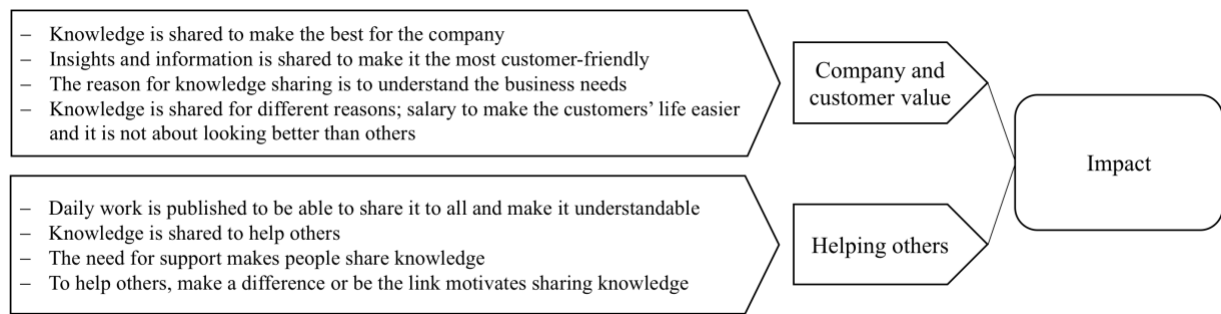


Figure 11: Data structure - Impact

Company and customer value

For both employees and managers, an important driver to share ideas, thoughts and insights, is to make the company's customers "happy" or "satisfied". They argued that they are spread knowledge to improve the customer experience, products and services. They also stated that if the front-end activities positively influence the outcome for the customer, they share more knowledge in the future. The respondents referred to this as a combination of a professional and personal level and that on both levels you want to "be there for the customer". From the interviewees' perspectives these factors are going hand in hand with each other, because if the value for the customer is increased there is also a value for the company. The value for the company is also perceived as a reason to spread knowledge in the organization. Moreover, the respondents indicated, that it not necessarily always has to do with the customer, but everything that brings the company forward can "give energy to participate" in front-end activities.

"I kind of always have one purpose and that is the customer, ... to make sure that the customer gets the right information, to make sure that we do things in the most customer-friendly way."

Helping others

The main part of the respondents stressed that their extent of sharing ideas and thoughts about opportunities is highly connected to the effect on others. Especially when employees see the chance to help others to develop their thoughts and ideas, they share their own knowledge about these topics. Here, it is also about creating an understanding for the receiver, helping others to grow and being able "to make a difference". Another main reason to help others in the early phases of the innovation process is the need of support from others, which means that some employees help others to get support to develop their own ideas. This help can be seen as an

activity that aims for a reciprocal knowledge exchange, where both parties can benefit from. Summarized, for many of the respondents the feeling while helping others makes them to share knowledge, which is related to the front-end.

“Maybe I'm not the person that is given the solutions, but maybe I can give them a hint of what we want... So, and it's really satisfying for me.”

2. Order concept	Representative quotes
Company and customer value	<ul style="list-style-type: none"> – “I would say everything that brings this company or this group forward gives me energy to, to participate, of course.” – “At the end it's to making the company perform better. I will say, but I also would like people to kind of grow.” – “At the end of the day it's customer happiness.”
Helping others	<ul style="list-style-type: none"> – “I will say, but I also would like people to kind of grow.” – “Maybe I'm not the person that is given the solutions but maybe I can give them a hint of what what we want and people having other skills could develop what we want. So, and it's really satisfying for me.” – “Yeah, both help others and in the sense that someone else project and you could add.”

Table 6: Representative quotes - Impact

4.1.5 Personal relevance

The fifth aggregated dimension *personal relevance* includes *goals, understanding, feedback and acknowledgement*. These four second order themes are all relevant for the employees to share knowledge in the front-end. Although the concepts can be seen on an organizational level, we observed that the influence on the second order themes depend on the interviewees themselves. However, we see a common pattern in the data: This pattern is to have common goals, getting an understanding why knowledge is shared in the front-end, getting feedback on shared knowledge and receiving acknowledgement for sharing knowledge in the front-end phase.

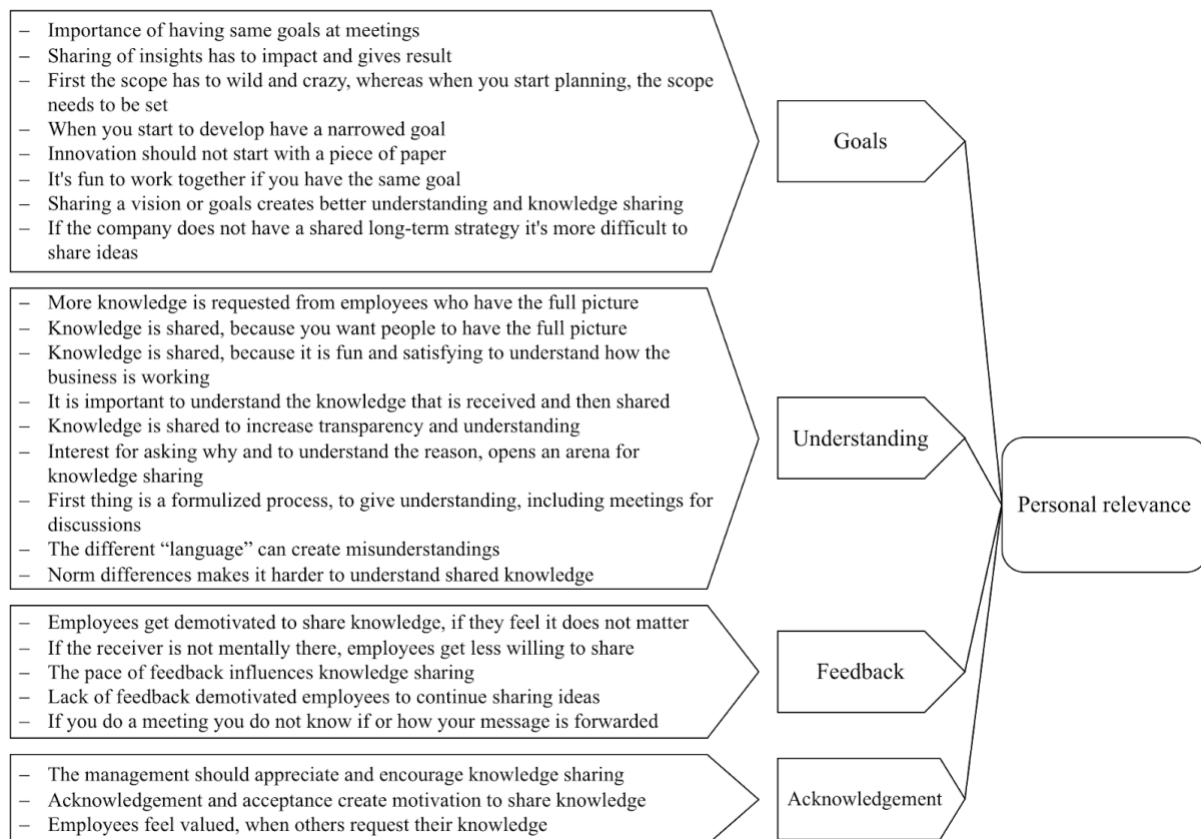


Figure 12: Data structure - Personal relevance

Goals

Shared goals and vision were mentioned from several of the interviewees as something important to create better understanding and to foster knowledge sharing in the front-end phase. In the beginning of the innovation process, the goals and vision should be broad and later get narrowed down to foster sharing of knowledge and insights: "First the scope has to be wild and crazy, but when you start planning, the scope needs to be set". Further, the respondents gave examples of how common goals during meetings that are front-end related can make employees share more ideas, thoughts and insights. These common goals create better understanding when knowledge is shared during the meetings. Another reason for common goals is the "fun" of working together. The respondents argued that if you have a common goal in the front-end and you can follow the processes, it makes it on the one hand more fun to work together, but it is also more fun to share knowledge. Here, the employees expressed a clear need for common goals and that it is essential to create them already in the early stages. Additionally, a common vision was explained by the respondents as a factor that makes it easier to work in the same direction. Even if you have different insights, the understanding for

employees will be better under a shared goal or vision. However, one of the interviewees mentioned that the innovation processes should not start with a piece of paper. Instead of pushing and forcing innovation, it should come naturally. Further, sharing of insights and knowledge has to impact and give results, which was also connected to set up goals and be able to see what is accomplished. Lastly, if the company does not have a shared strategy some employees stated that it is “more difficult” to share ideas in the front-end.

“If you are on a common mission with a common goal to create something good, then you share your knowledge.”

Understanding

Understanding can be seen as a second order theme with different facets. Firstly, it is very important for employees how the business and the company is working to share knowledge. Here, it is from great importance that employees understand that their ideas and insights, hence their knowledge, is actually used by the organization and also valuable for it. Further, it is noticeable that it is crucial for employees to have a good view on the “full picture” of the company. Secondly, it plays a pivotal role for employees to understand the shared and received knowledge. For them it is not only about sending and receiving it, but also to see the sense and meaning behind the shared knowledge. If this understanding and meaning can be guaranteed, employees see it as “fun” and “satisfaction” to share further knowledge. Thirdly, a factor that can hamper the understanding of knowledge in the front-end phase is a differently used “language” of the knowledge sender and receiver. Here, employees referred to as a different terminology, but also to a norm difference between the participants. A fourth aspect mentioned by interviewees is the understanding of their knowledge for others. It is important for employees to be, on the one hand transparent, and on the other hand to make others understand when ideas and thoughts are shared. Here, two respondents also mentioned that they want to understand why they should share their knowledge, hence it is important to have a “reason” to do so. Finally, two respondents stressed the need for a formalized process for sharing knowledge in the front-end. The referred process is about registering an idea and to capture the background and a general understanding of it. Afterwards, a personal and iterative discussion is needed to get out the full value of the shared idea and to provide further understanding.

“It gives you some different kind of motivation and what I'm trying to say with that is that everybody needs the full picture to understand why I'm supposed... why should I do what I'm

doing here. What's the reason for doing this? So, you need the full picture, that's what's driving me to create the duties.”

Feedback

Feedback is seen as anything that comes as a response when knowledge is shared and received. Therefore, employees see it as important that if knowledge is shared in the front-end, it also “has to matter”. If this is not guaranteed, some of the interviewees do not want to further share knowledge. This also arises if it is not sure how the shared knowledge is documented and forwarded. Moreover, the pace of getting the feedback has an influence on employees on the further sharing of ideas and insights. Feedback is also crucial at the moment knowledge is shared, which means that the knowledge receiver has to show interest and has to be “mentally there” when the sender shares knowledge. This is from great importance because the knowledge is often in a very fuzzy stage and is hard to document and codify. The respondents imply that feedback can be provided through different channels and actions. On the one hand, there is the direct feedback during the knowledge sharing process and on the other hand, there is the follow-up after this process.

“It's more that you want to see the effect. And you want to see the actions from the insights you share. If you share and share and there is no action taken up on the information that you share... In the end you just stop sharing.”

Acknowledgement

A reason for employees to share knowledge in the front-end is the received acknowledgement and acceptance that might come through the participation in these activities. Acknowledgement can come from different directions, like the management or other employees. For some interviewees it is very important that the management appreciates it when own ideas and thoughts are shared in the team, which then encourages further knowledge sharing. Further, one respondent described that there is no need for a “reward” when sharing knowledge. But when you see you have contributed something, this can be a “reward itself”. On the other side, other employees feel more valued if their knowledge is requested by others and this knowledge is then used to build up new ideas and projects. This makes them share more of their knowledge with persons who requests it.

“I feel valued, if questions like that is directed to me. I think that's what I would like to happen, that's why I'm here,... to give that knowledge.”

2. Order concept	Representative quotes
Goals	<ul style="list-style-type: none"> – “You are on a common mission with a common goal to create something good, then you share your knowledge or your share your insights and sometimes you have the same insights (...).” – “It is satisfying (<i>refers to knowledge sharing</i>). It is because it is one step closer to the goal always and also creates a understanding of how we work. Which I think is super important.”
Understanding	<ul style="list-style-type: none"> – “I think it's super important that everybody has the full picture.” – “I mean I've been with people that have been quiet when I've asked and asked to understand. I'm not questioning the things, but I would like to understand so I can get on board. I mean, that's not kind of motivating and and then I never understood the kind of pitch and I'm lost. “
Feedback	<ul style="list-style-type: none"> – “I think the purpose is usually quite clear. It's more that you want to see the effect. And you want to see the actions from the insights to share. If you share and share and there is no actions taken up on the information that you share. In the end you just stop sharing.” – “I guess the challenge sometime when it comes to certain things is that it's a bit slow to get the response or the feedback. The feedback, it doesn't really come by itself. And we usually don't know that much before a product or service is coming, which means that we can't always reply to customers in a professional way.”
Acknowledgement	<ul style="list-style-type: none"> – “I feel valued, if questions like that is directed to me. I think that's what I would like to happen that's that's why I'm here, is to to give that knowledge.” – “Yes of course I get happy if someone say I am doing a good work. And it's always nice to hear. So yeah, if someone says good, I enjoy that. I know for sure or sorry I'm convinced that the work I do is critical or crucial to make it successful project. That it self, the acknowledgement is a reward it self. That is also why I am so motivated to do this.”

Table 7: Representative quotes - Personal relevance

4.1.6 Organizational culture

As *organizational culture* we refer to as the developing and existing behaviors and values within the organization. These values and behaviors can be seen on a personal, hence an individual, level, but also from a more collective view. Therefore, the three second order themes; *humbleness*, *attitude* and *trust*, can be embedded in this aggregated dimension. All three second order themes belong in a way or another to how the organization is built up from a cultural perspective and show different characteristics of the organization and the people within this organization. The findings indicate that these factors influence employees to share knowledge in the front-end in one or another way.

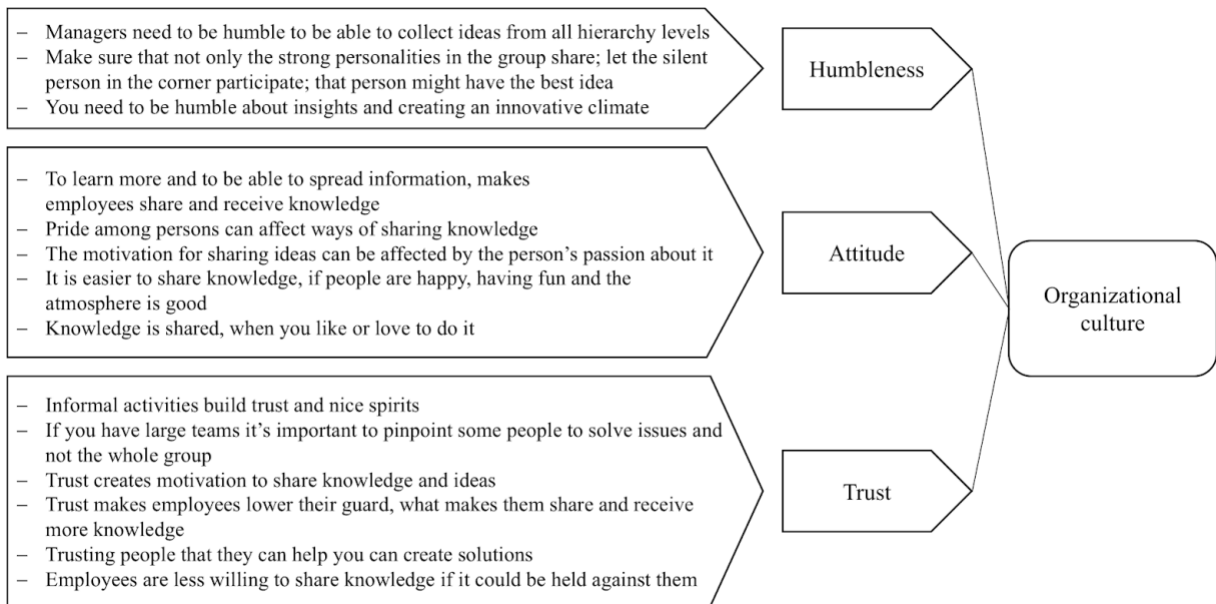


Figure 13: Data structure - Organizational culture

Humbleness

To make sure that knowledge is shared among employees in the front-end, the respondents argued that it is crucial for employees to be humble. Here, they especially referred to the management and managers that have to be “humble” to be able to collect ideas and thoughts from all levels of employees within the organization. According to the respondents, the management has to be humble make employees to share their knowledge, especially if there is a strict hierarchy. Further, the responses indicate that if employees are humble, the creativity to come up with new ideas increases. This was also referred to as a more innovative climate, which can be killed if not everyone has the feeling that knowledge can be shared freely. Here, the data also shows that it is important to ensure that strong personalities “do not take over” and that the “silent person in the corner” get her/his voice heard, because he/she might come up with the best idea, insights or thoughts. Moreover, one respondent also underlined the importance that the “roof should be high up” and that you do not kill the curiosity in the early phase of the innovation process. Hence, if you do not have that openness, employees might share less knowledge.

“If you are strong you need to be humble.”

Attitude

The attitude as a factor for knowledge sharing in the front-end is far-reaching. Firstly, some employees want to share their ideas and insights because they see a learning behind it. This learning is seen as a value for themselves and what they actually can use for their own but is also something that they can later share with others. The value of the knowledge, related to early phases of the innovation process, is highly important for them and can contribute to the development of own ideas and concepts. Secondly, many interviewees referred “passion”, “fun”, “love and like” to share or being “happy” as reasons for sharing knowledge. Sharing own ideas, thoughts and the ambition for new opportunities can on the one side create a “fun” environment, but on the other side can make employees to exchange knowledge in the front-end. Here, it is important to underline that some employees stated that some of the mentioned factors make it easier to share knowledge. For instance, if both knowledge sender and receiver, are happy and passionate about what they are doing, more knowledge will be shared. One of the participants confirmed this by stating that if “you have passion for what you are doing”, you need fewer people to tell you to share insights and ideas. Here, the employee means that nobody has to tell him to share his thoughts, but it comes by itself through the passion and the fun. In contrast, “pride” among some employees can hamper and impede knowledge sharing in the front-end. This pride can arise because some employees feel the need to protect their own ideas and thoughts and see it as an advantage when having knowledge that others do not have.

“The basic driver is if you like what you're doing, you love to talk about it and share it.”

Trust

Various employees referred to trust as one of the main factors that influence them to share knowledge in early phases of the innovation process. This means that trust is a requirement for them to share their ideas and insights and to participate in other activities in the front-end. If this trust is build up between employees, this will “lower their guard” to share their thoughts and knowledge about the opportunities they see. Hence, a lot of potentially sensitive knowledge is shared when trust is existing. One of the interviewees underlined this by stating that if this employee shares ideas, there is a possibility that the knowledge “can be held against” oneself. This implies that there is a need for trust when employees should share and receive their ideas, insights and the opportunities they see. Further, one participant argued that trusting people helps to create solutions. When trust is existing, the interviewees stated that more questions are

dared to be asked and more knowledge will be shared. The respondents also mentioned that informal activities can increase trust among employees and create a friendly environment for knowledge sharing in the front-end. Finally, some respondents stated that the work in smaller teams fosters the creation of trust, which again will make employees feel that they share their ideas and thoughts in a more friendly and unforced environment.

“I mean, I am motivated by feeling like I’m trusted and that the people listen. I’m not motivated by people kind of not trusting or kind of not threatening but kind of putting pressure.”

2. Order concept	Representative quotes
Humbleness	<ul style="list-style-type: none"> – “But that is also high level management...Is there actually a hierarchy. The most powerful should be the most humble.” – “Sometimes there are very strong personalities in the groups and then you may have to make sure that they don't take over the whole discussions, you make sure that even a silent person in the corner, they might have the best idea. So make sure that they also get their voice heard.”
Attitude	<ul style="list-style-type: none"> – “...basic driver is if you like what you're doing, you love to talk about it and share it.” – “And it's always nice to learn more, I would say. So if (...)I get new information, then maybe from the innovation team, maybe there is relevant information that I can spread forward in the Swedish organization. So it's a benefit for everyone, of course.”
Trust	<ul style="list-style-type: none"> – “I’m motivated by feeling like I’m trusted and that the people listen. I’m not motivated by people kind of not trusting or kind of not threatening, but kind of putting pressure.” – “Yeah, I mean... the more you trust the more you can kind of lower your guard and then you (...) be able to receive more about if you share something with me. If I trust you, I can more easily just relax and listen what you say, instead of trying to find things to say that I can shoot down so.”

Table 8: Representative quotes - Organizational culture

5. Discussion

The following chapter shows in detail the analyzing of the findings by using the literature review. Based on the collected data and the findings, there was need to interrelate the aggregated dimensions and second order concepts with each other to get a better understanding of the factors and the final conditions. Relations can be seen between most of the aggregated dimensions, whereas some relations appeared more crucial than others. Through looking deep into factors and their interrelations, we were able to derive different conditions that will be presented below.

We want to notice that the interviews and the findings are based on an interview guide that is focused on cross-functional knowledge sharing in the front-end. Therefore, we assume that this will be kept in mind by reading this chapter. However, if there was the need for more elaboration on the cross-functional and front-end context, the argumentation was underlined by using quotes and literature.

5.1 Grounded theory framework

Below, *Figure 14* shows the grounded theory framework

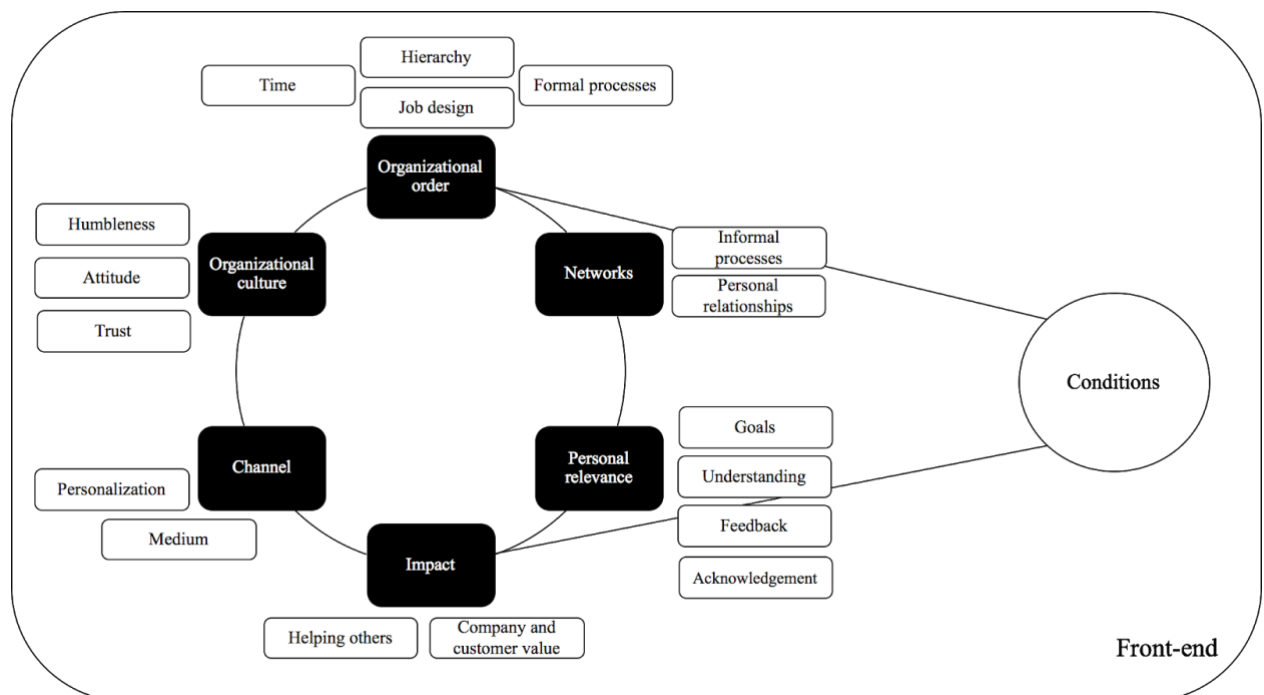


Figure 14: Grounded theory framework

5.2 Personalization of organizational structure and processes

The answers of the respondents indicate that there is a need for a clear perception of the organizational structure and a clear understanding whom to contact when employees have an idea or insights.

“I think it's not a 100% clear why you should direct your ideas and insights (...).”

Further, the findings show that formal processes could enable better knowledge sharing and decrease the dependency on relationships. However, Grant (2007) describes that the employees' motivation will increase if there is a good job design architecture that focuses on building relationships to others. In this context, the respondents emphasized the fact that the personal interaction through meetings is highly important for their motivation to share their knowledge with others.

“(...) you need to have a face to face meeting! That's the key for everything.”

This implies that the organizational order, in terms of structure and formal processes, should be shaped by focusing on the personalization of the channels that are used for transferring knowledge during the front-end phase. This also goes along with Kim & Wilemon's (2002) view that describes the front-end as non-routinely and therefore as a stage where different channels of communication are needed. Here, the understanding of whom to contact will be an important basis for these personal interactions when knowledge sharing takes place. However, our findings indicate that the usage of e-mails and video-calls can also be a way for employees to reach out to a larger mass and in a more time efficient way when they want to spread their knowledge within the organization.

“(...) you can e-mail the whole department and make sure that everyone gets at least the possibility to take part of information.”

Because the front-end phase is highly informal (Florén & Frishammar, 2012) we conclude that it is not only about the aspect that employees know whom to contact. The employees also need to be able to reach out to other employees under these informal activities to get motivated to

share knowledge in the front-end phase. If they do not know whom to contact or if they are not able to contact employees, the data implies that the motivation to share knowledge decreases. Further, the findings show that formal processes can be used to capture value from informal processes, whereby personal meetings are seen as a favorable option for this. This is partly backed up by Grant (2007), who describes that employees need to feel that their actions are highly connected to other employees. On the other hand, Sicotte & Langley (2000) describe that employees who are working in teams are more depending on the relationships than on the formal processes. Therefore, we strongly believe that the unique nature of the front-end phase and its informal structure (Koen et al., 2001) creates a need for some formal processes to capture the value from ideas, thoughts and insights. However, these processes have to be created including personalization. And even if the front-end is fuzzy and hard to manage (Koen et al. 2001), one way to increase the employees' motivation to share knowledge is to create a clear understanding of the organizational structure with the opportunity for employees to reach out on a personal level but also to a larger mass.

5.3 Balance of formal and informal processes

Respondents referred to informal processes as a time efficient way to share knowledge during the front-end phase.

“If we were solely dependent on a formal sort of process to do that, I'm sure we would not have been able to do it as fast.”

Further, employees also stated that time is a crucial factor for sharing knowledge in the front-end phase.

“(...) it should not be like half an hour meetings or one hour meetings it should be that you kind of sit down together for a while and work and have ideas.”

Sicotte & Langley (2000) state that horizontal communication is an outcome of informal communication. If the company manages to plan and implement the right information system for horizontal communication, the risk for abundant communication will decrease. Hence, too much communication can be seen as something that is time-consuming and will therefore decrease the employees' motivation to share knowledge in the front-end phase. On the other

side, while communicating horizontally, it is important to include different departments in the front-end phase to increase the innovation level in the company (Moenaert et al. 1995). Therefore, informal processes can be seen as a way to foster horizontal communication across departments and as an opportunity to decrease the amount of time spent on abundant knowledge sharing. Lastly, Souder (1988) emphasize informal communication can be increased by creating formal incentives which are connected to the informal communication, what also was confirmed by our data.

Pinto & Pinto (1990) stress that it is crucial to make sure that employees build up relationships with people in different departments in the organization to enable better cross-functional communication. Further, the authors argue that this can be done by informal communication to create better accessibility both between departments and in different levels of authority. Here, our data shows the importance of how hierarchy can decrease the motivation to share knowledge and therefore informal processes and networks can ensure that relationships are built up within hierarchies.

“So, we've been struggling a bit because we have gotten information we would like to share and he don't dare to share it, because he needs to check with his manager and that is kind of demotivating.”

This also goes hand in hand with Grant (2007), who states that employees need to have well-designed jobs that are built up on relations with other employees. Concluding, informal processes create relationships within hierarchies that can later motivate employees to share more knowledge in the front-end phase.

Further, most of the respondents described that there is a need for informal processes to share knowledge early in the front-end phase. Later in the process, some of the interviewees underline the importance of having more formal processes to capture the full value from ideas, insights and thoughts. Florén & Frishammar (2012) describe the front-end phase as fuzzy and the later stages of the NPD as much more formalized. Therefore, we see the importance to continuously motivate employees to share knowledge in the later stages of the front-end phase. Therefore, it is crucial to provide these formal processes. This also goes in line with Amar (2004), who states that employees need to be in control when they share knowledge. Hence, formal processes can be one way to make sure that employees have more control and a better understanding.

*“Yes, it is hard to make sure that everybody has understood everything. But usually the *name of an internal formalized process* that includes the epics or cases, user scenarios is usually understood by all.”*

5.4 Having the ground that creates the feeling of impact

Many of the interviewees described that they get motivated to share knowledge when they feel that they are helping others.

“(...) I also would like people to kind of grow.”

Here, we see the relation to what Lin (2007) describes as one of the individual factors for sharing knowledge; to help others. Further, the data shows that the job design motivates employees to share knowledge to help others.

“I think I get a salary to make my work and make my best when I'm working and if that means to help A, B, and C do their job better (...).”

This implies that it is important to align the job design to support employees, to help others while sharing their knowledge. Hence, by doing this, the motivation to share knowledge among the employees will increase.

Feedback, which is part of the personal relevance, was mentioned by several interviewees when it comes to the willingness of sharing knowledge. Further, it is crucial for the employees' motivation to share knowledge to see that their activities have a positive influence on the customers or the company.

“And you want to see the actions from the insights you share.”

This goes in line with Herzberg's (1968) theory where he claims that intrinsic motivation appears through individual growth and achievement. When employees can help others and see that the company benefits through their actions, this motivates them to share ideas, insights and thoughts. Here, we also see a relation to the formal processes, because respondents referred to

formal processes as a way for them to understand and being able to follow the shared knowledge.

“(...) to get everyone else within the innovation on board and understanding, sort of the reason why we want to do, what we want to do.” (refers to documentation)

From the data we can conclude that this aspiration towards having an impact and the need for feedback is highly linked to the desire of acknowledgement.

“I feel valued if questions like that is directed to me. I think that's what I would like to happen, that's why I'm here (...) to give that knowledge.”

Amar (2004) describes this issue through the need of the management to make sure that the employees feel important and motivated. This we see as one form of acknowledgement when sharing knowledge. In relation, Florén & Frishammar (2012) also underline the importance of making clear what potential outcome of front-end activities is expected to deal with the fuzziness of the front-end phase. If this is ensured, employees better know how they actually contribute in the front-end and are therefore more motivated to share their ideas and thoughts. Another important aspect that we could see in the data was the time aspect. If employees do not feel that they have time to help others, the data indicates that the motivation gets negatively affected.

“But the challenge we have is that we have no time nobody has time to do this.” (refers to understanding of other people)

Finally, through analyzing the data and the literature, we see that the organizational order, the impact and the relation between the concepts have to be regarded from a front-end perspective. Firstly, we want to stress that the fuzzy nature of the front-end (Koen et al., 2001) highly influences the organizational order, because the time, the job design and the hierarchy are not always totally clear. Secondly, Florén & Frishammar (2012) stress the issue of focusing on the expected outcome, which is quite hard during the front-end phase because the outcome is not always clear. Hence, the impact might not always appear clearly, which can influence the motivation of employees to share knowledge. The fact our data implicates is that it is important

to make the job design and hierarchy clearer to employees and ensure that they have time to participate in front-end activities and create impact.

5.5 Comprehension for fuzziness

The data shows that interviewees described formal processes as needed in the front-end phase and as a way to make them to be able to follow information that has been shared.

“It turned out that trying to use informal way wasn't working (...). We use the more formal approach in that area, so to speak.”

Further, the motivation among employees is positively affected if they understand that their knowledge is used within the organization.

“I mean I've been with people that have been quiet when I've asked and asked to understand. I'm not questioning the things, but I would like to understand, so I can get on board.”

This is both related to the employees' need to feel important and in control to get intrinsically motivated to share knowledge (Amar, 2004). On the other hand, Lin (2007) also describes that employees track the input in terms of shared knowledge and might compare it to the outcome of knowledge sharing activities. This implies that there is both a level of intrinsic and extrinsic motivation, when setting up formal processes and making sure that the employees understand how their shared knowledge is used (Ryan & Deci, 2000). Moreover, the respondents also underlined the importance of receiving knowledge and being able to give feedback when it comes to knowledge sharing in the front-end.

“It's more that you want to see the effect. And you want to see the actions from the insights you share.”

Here, the informal structure of the front-end arises (Koen et al. 2001), which leads to the need for in-depth and personalized feedback to create better common understanding of the shared knowledge.

This also relates to the employees intrinsic (Amar, 2004) and extrinsic (Lin, 2007) motivation, in terms of that the employees want to get feedback on their knowledge sharing activities, but

also that they can expect a certain outcome. The data shows that feedback and understanding can be seen as part of what Cometto et al. (2016) underline as the managers' task to make sure that employees share valuable knowledge and information. It is crucial that employees understand why they should share their ideas and thoughts and therefore they want feedback on their activities. The management should be able to control this because this knowledge might be very valuable for the company. Hence, this confirms what Florén & Frishammar (2012) state: The management should think about the outcome of the front-end activities and communicate this to the employees. By doing this it is easier to deal with the fuzziness of the front-end and make it more structured to some extent (Koen et al., 2014). This also goes in line with what our data is indicating: Employees want to see a purpose of their sharing of knowledge to get motivated to do so.

5.6 Importance of trust

“So, we've been struggling a bit because we have gotten information we would like to share, and he don't dare to share it, because he needs to check with his manager and that is kind of demotivating.”

By looking at the data, for some of the employees it is not clear which ideas and insights they should share in the organization with others, because they do not fully trust the knowledge receiver. However, Cometto et al. (2016) stress the importance for trust in the organization as a crucial condition for being able to share knowledge. This potential lack in trust arises on the one hand because knowledge in the front-end phase is formulated and not spread yet (Florén & Frishammar, 2012). On the other hand, it shows a lack of trust between different employees and a lack of knowledge about the organizational hierarchy and responsibility structure. The gap is mainly seen across departments, because the sharing of knowledge regarding the organizational order is often not pushed across the boundaries of the functions (Pinto & Pinto, 1990). Further, the data shows that people get demotivated if there is a lack of trust and the possibility that there is pressure, which can be built up through a lack of a clear order in the organization.

“I'm not motivated by people kind of not trusting or kind of... not threatening but kind of putting pressure.”

On the other hand, the employees' trust into the organizational order can motivate them to exchange knowledge because they know that certain employees have a big influence through their job design and through their level in the hierarchy.

“I trust some of them more, because I know this person could help me and understands and maybe have the position to actually push this a little bit.”

Further, our data also shows that it is important that employees are humble when they share and receive knowledge, especially the management. If the atmosphere is not humble, employees get less motivated to share knowledge.

“But that is also high-level management...Is there actually a hierarchy. The most powerful should be the most humble.”

“If you are strong you need to be humble. But no of course you have been in a meeting where there's a strict hierarchy and if there is a very high-level manager driving and not accepting there or that, it's not a creative atmosphere (...).”

We see a relation to the research by Pinto & Pinto (1990). Informal communication fosters relations across hierarchy levels. This means that if managers create better relations with their employees and are aware of being humble, this will make employees feel more comfortable to share knowledge. This is also backed up by Grant (2007), who describes that employees' motivation will increase if they positively impact other people and if they see that their actions are meaningful.

Concluding, it is crucial to build up a culture where trust is existing between employees, but also in the organizational order. Humbleness is also an important factor for more knowledge sharing in the organization because it creates trust. As a result, the motivation of employees to spread ideas, thoughts and insights within the organization increases. That is the reason for Koen et al. (2001) to stress that the culture is an important driver for the engine, which impels the different front-end activities and make them work. This again can lead to better performance in the front-end phase of innovation.

The importance of low guards and questions

“I mean, the more you trust, the more you can kind of lower your guard and then you can really listen ... to be able to receive more.”

As mentioned above and according to the data, trust is described as an important condition for employees to share knowledge in the front-end and is often created when employees have some sort of relationship to each other.

In the literature the front-end is described as a very important phase of the NPD, where uncertainties can be reduced early before a project goes in to the formalized NPD process (Moenaert et al. 1995 & Belliveau et al. 2002). Belliveau et al. (2002) and Olson et al. (2001) also underline that cross-functional communication of knowledge about the market and technical aspects can reduce these uncertainties. Therefore, we see great importance in trust being built up among the employees early in the innovation phase. When this trust is established among employees, more knowledge will be shared, and employees will also ask more questions.

“I will say... creating this kind of trust, so that you dare to ask.”

Looking at the data and the fact that relationships and networks can enable trust, which further leads to better knowledge sharing and more questions asked, implies that it is important to make sure that employees participating in the front-end have good relationships. Through good knowledge-sharing and communication in the front-end, Olson et al. (2001) state that more uncertainties can be reduced and therefore the innovation level will increase. In line, Lawson et al. (2009) state that a higher level of shared knowledge will increase the innovation level in the company.

Further, our data shows that trust is built up when employees get to know each other better and that smaller teams can create more trust.

“If we hadn't created this kind of small team that you trust you would never come to those discussions to conclusions.”

“So, my lesson learned from this is that spending time on getting people to know each other and create a trust and a trusty environment.”

Therefore, it is important to build up trust among employees by forming smaller teams and let employees get to know each other.

Finally, the data shows that the network of employees also serves as an enabler to spread the culture within the organization.

“So, of course I still use them as my network to spread ideas, to spread culture and engagement for different types of questions and impacts.”

This is also what Chow & Chan (2008) describe as the attitude to share knowledge through the network.

5.7 Need for informality

The data shows that personal interactions such as face to face meetings are a better way to share knowledge.

“(...) you need to have a face to face meeting! That's the key for everything.”

This finding goes in line with the research of Cummings & Teng (2003), who stress the importance of transferability of knowledge. Face to face meetings can make it easier for employees to understand, ask questions and therefore being able to use the shared knowledge properly.

“We understand this topic, we understand what we're talking about, because (...) I have had a discussion for two weeks, so it's like you see a Netflix series, four or three seasons right? You know everything in the fourth to start. But if you're bringing in a buddy or a friend in the fourth seasons, that person will ask question.”

However, according to the respondents, meetings are not always the initial way to share knowledge in the front-end phase. Many of the employees refer to the informal processes as the first step of exchanging knowledge.

“To be very honest, my experience so far is that the process is very informal. It's not necessarily a very clearly defined process.”

“(...) you go outside the office and take a beer and have a dinner that normally you have to get to hear things about new ideas and new initiatives that they haven't shared (...) during the whole day. So, I think the informal is good.”

The fact that many of the front-end activities are taken place under informal settings is something that Florén & Frishammar (2012) underline as well. Here, we see a strong link between the employees' motivation to share knowledge in our data and previous literature about the front-end. Pinto (1989) refers to this informal communication also as an enabler for better accessibility within the organization. Further, the author states that physical arenas for informal communication can increase this informal communication. This implies that employees get motivated to share knowledge through using informal communication channels when it comes to the front-end phase. As stated, this informal communication is also an enabler for a better accessibility in the organization (Pinto, 1989), which allows the deployment of better networks. Here, our data shows that the internal network can further motivate employees to share knowledge.

“So, of course I still use them as my network to spread ideas, to spread culture and engagement for different types of questions and impacts.”

These findings can be also confirmed by the research of Grant (2007), who states that motivation of employees increases if they feel that their actions are connected to other people. Additionally, by creating physical arenas for employees to communicate informally, Pinto (1989) argues that the employees' informal connections will increase. Here, the literature also shows the need of a broker that interacts as a connection point between employees and therefore enables better knowledge exchange between them (Burt, 2004). These brokers can on the one hand interact across functions and on the other hand within a department. The importance of brokerage is also apparent in our data (Burt, 2004).

*“If I were to send an idea to innovation, I would send it to *name*, no matter what it's about. And then I would shortly describe what it's about and ask him to kindly advise me to the right person.”*

Connecting the view of Grant (2007), who states that it is crucial to have reliable contact points in the organization and the role of the mediator, we conclude that brokerage is an important part to motivate employees to share knowledge.

Even if our findings show that meetings can be seen as a formal process, respondents sometimes referred to meetings as an informal arena where employees meet face to face and in which they feel more comfortable while sharing knowledge.

“If you have somebody on the phone and other things, then it's kind of much tougher to share the feeling you're having and also explain that this is super cool.”

Concluding, the personal interaction, informal arenas and the internal network are three important factors for the employees' motivation to share knowledge in the front-end. As described, the factors are highly interrelated, affect each other and lay the ground for a condition.

5.8 Adequate channels

Our data shows that employees get motivated to share knowledge when they feel like they can help others. This goes in line with the conclusion by Lin (2007) about one of the individual factors; enjoyment of helping others. To be able to understand each other when sharing knowledge in the front-end phase, face to face meetings are referred to as a better forum among the interviewees. Herzberg (1968) describes this understanding as one important aspect for individuals to be motivated. Therefore, we see the importance of using the right channel, so that employees sense that they are helping others. As the data shows, through video and phone-calls there might be confusions and misunderstanding.

“And if you're in the phone and worse in worth scenarios that you don't realize that you have lost them.”

This indicates that even if employees want to help others and have a positive impact, different channels can cause misunderstandings, which will lower their motivation to share knowledge. Here, the literature and the interviews indicate that the knowledge relating to the front-end

phase is hard to formalize and structure (Koen et al. 2014a) and therefore the challenge is to make it understandable for the receiver.

The value of personal feedback

From the data and the previous discussion, it is clear that the personal relevance is a condition for knowledge sharing. Here, the understanding and feedback are fundamental parts for the personal relevance of people. From the data we also conclude that the understanding and feedback depend to some extent on the channel that is used to transfer knowledge.

“Face to face is the best, and then video and then phone and then something else.”

“In a video-call this is the same thing, but you have, there is a barrier when you to talk to a video camera and hopefully have somebody on the screen, you can see that you're more distance. So, if I pitch an idea and I would like them to pitch back it's more is a bigger barrier.”

Because it is not always clear how to transfer knowledge in the front-end and because of the front-end's fuzziness and complexity (Koen et al., 2014a), employees tend to use different channels to give the shared and received knowledge a meaning. Feedback is also seen as a crucial part when it comes to knowledge sharing in the front-end because the activities in the front-end underlay an iterative process, where going back and forth combined with new inputs is very important (Koen et al., 2001). The data shows that especially personalization makes it easier for employees to grasp front-end knowledge and creates the willingness to give feedback.

“I think you understand the other side.” (refers to face-to-face meetings)

Here, Cummings & Teng (2003) see the problem of the articulability and Kogut & Zander (1993) the problem of complexity and teachability. They state that it is in general very hard to articulate knowledge properly to make others understand it, whereas the cross-functional boundaries make it even harder. However, our data implicates that personalization can make the shared knowledge, concerning the early phase of the innovation process, more understandable and employees more willing to give feedback. Further, the findings also show

that the usage of text-based mediums makes it harder for employees to understand what the knowledge sender means.

“But I won’t use text when it comes to workflows because it’s very hard to get the full picture. And it is very easy to create misunderstandings.”

Summarized, understanding is an important factor when it comes for people to share knowledge. This was already showed by Maslow et al. (1987). They state that individuals have a need of meaning and understanding in their actions. Hence, we see the personal interaction as an important factor for the motivation of employees to share knowledge in the front-end phase. Here, the feedback is highly connected, which is also shown by Grant (2007): The importance of the connection of people’s actions to other people, which then will increase the motivation.

5.9 Relevance of relationships

Further, the respondents described that it is easier to share knowledge when they have a relationship with other people and if a friendly and trusty environment exists in the company.

“People don’t trust each other really due to legacy things. So, my lessons learned from this is that spending time on getting people to know each other and create a trust and trusty environment.”

We can see that the creation of relationships with others enables a friendly environment. This can be connected to the enabling climate that Lin (2007) refers to as one of the organizational factors. Grant (2007) also touches upon that: The management should focus on a climate where employees get motivated to care about others. Therefore, our data indicates that there is a relation between building networks, hence relationships, and the feeling of wanting to help others. To create conditions that support employees to build up relationships will not only itself motivate them to share knowledge, but will also create a willingness to help others, which later is a motivational factor (Lin, 2007). Finally, our data also shows that most of the relationships built up are done on an informal level.

“(...) after the game people often laughed, they created this kind of friendly environment by just small things like that. Make sure you go out and drink a beer and have some dinner together.”

Here, we see that this makes employees understand each other better when knowledge is shared in the front-end phase. This is highly connected to what Florén & Frishammar (2012) describe: Front-end activities do mostly take place in an informal setting. Concluding, both our data and previous literature (Pinto & Pinto, 1990; Lawson et. al, 2009) imply that the creation of informal relationships is a great way to build up networks in the company. Later, this can create a stronger feeling to help others and therefore increase the motivation of employees to share knowledge in the front-end phase.

5.10 Goal congruence

“If you share that, I believe it's a lot easier to sit in that meeting. You come up with some ideas, you have some ideas.” (refers to having common goals and visions)

The findings indicate that common goals and a shared vision between employees enable knowledge sharing in the front-end phase. This is also supported by Cometto et al. (2016), who argues that information is more communicated when people have the same objectives. Further, Amar (2004) states that goals are crucial for the motivation of employees. Our data implies that the motivation, when having the same goals, highly depends on other employees, hence the network.

“I don't say how we get there, or we find out in the journey, but we are more or less having the same goal. Then normally it's fun to work together. And if they know playing games you do it together.”

Here, it is important that employees can experience that the people with whom they have personal relationships share the common goals, which then creates better motivation. This is also emphasized in Chow & Chan's (2008) research: Shared goals make employees to share more knowledge within their network. We see this as a very important relation in the front-end, which is confirmed by the view of Koen et al. (2014a). They state that the vision is an

important aspect when it comes to front-end activities. Further we can see that personal relationships also create better understanding among employees.

“It's much easier to understand people you work with because you know them, you know how they work.”

The conclusion from the data is that it is fundamental to build up a network and to get to know each other to fully grasp the meaning of someone's shared knowledge. Especially when it comes to the front-end, it is crucial that this understanding is ensured because it is often very hard to define the concepts clearly, due to the front-end's fuzziness (Florén & Frishammar, 2012). As stated earlier, this is an important factor when it comes to motivation of employees to share their knowledge (Maslow et al., 1987).

5.11 Need for a positive environment

Another enabler for knowledge sharing described in previous research is self-efficiency and the way employees believe in their own ability to contribute (Lin, 2007). Our data shows that the attitude and the acknowledgement among employees is important for the motivation to share knowledge.

“(...) If people think they understand that, this is a good thing! And I feel like this is a good thing that makes me happy. Then people will feel like: Oh, he is happy about something and then it's much easier to just share it”

“That itself, the acknowledgement, is a reward itself. That is also why I am so motivated to do this.”

Here, we see a relation to the employees' self-efficiency: If employees get feedback and get acknowledged on what they do in the front-end phase where it sometimes can be hard to see the contribution (Florén & Frishammar, 2012), it can create a better attitude among the employees. Even if it can be challenging for the management to see the outcome of front-end activities (Florén & Frishammar, 2012), it is important to make sure that the involved employees get acknowledgement on what they do to further foster a positive attitude. Moreover, the positive attitude that makes employees to share more knowledge together with

the importance of getting feedback from the receiver is highly connected to the motivation of employees to take action. This is especially the case if they feel that they can make a positive difference for others (Grant, 2007).

“(...) I think the bigger influence is just that you like what you're doing. And there are a lot of people also liking what they are doing, and you do it together.”

If employees feel that there is a positive attitude around them and that the receiver of the shared knowledge is mentally there and participates in the knowledge sharing process, the data implies a higher sharing of knowledge.

“I mean, I'm motivated by feeling like I'm trusted and that the people listen.”

Further, Moenaert et al. (1995) underline the importance of sharing knowledge cross-functionally and that employees understand each other while sharing. This implies that if trust is established and fostered in the culture of an organization, the understanding among employees will increase. Here, Yeh et al. (2006) emphasize that a culture of knowledge sharing is one of the fundamental factors that enable better knowledge sharing. Because the front-end phase is characterized as fuzzy, informal and hard to manage (Kim and Wilemon, 2002), there is on the one hand the need for trust, and on the other hand the importance for an understanding of the shared knowledge. Concluding, we see a strong interrelation between the trust in the culture, the understanding among employees and the level of shared knowledge.

5.12 Summarized conditions

Figure 15 shows the above discussed conditions in context of the grounded theory framework.

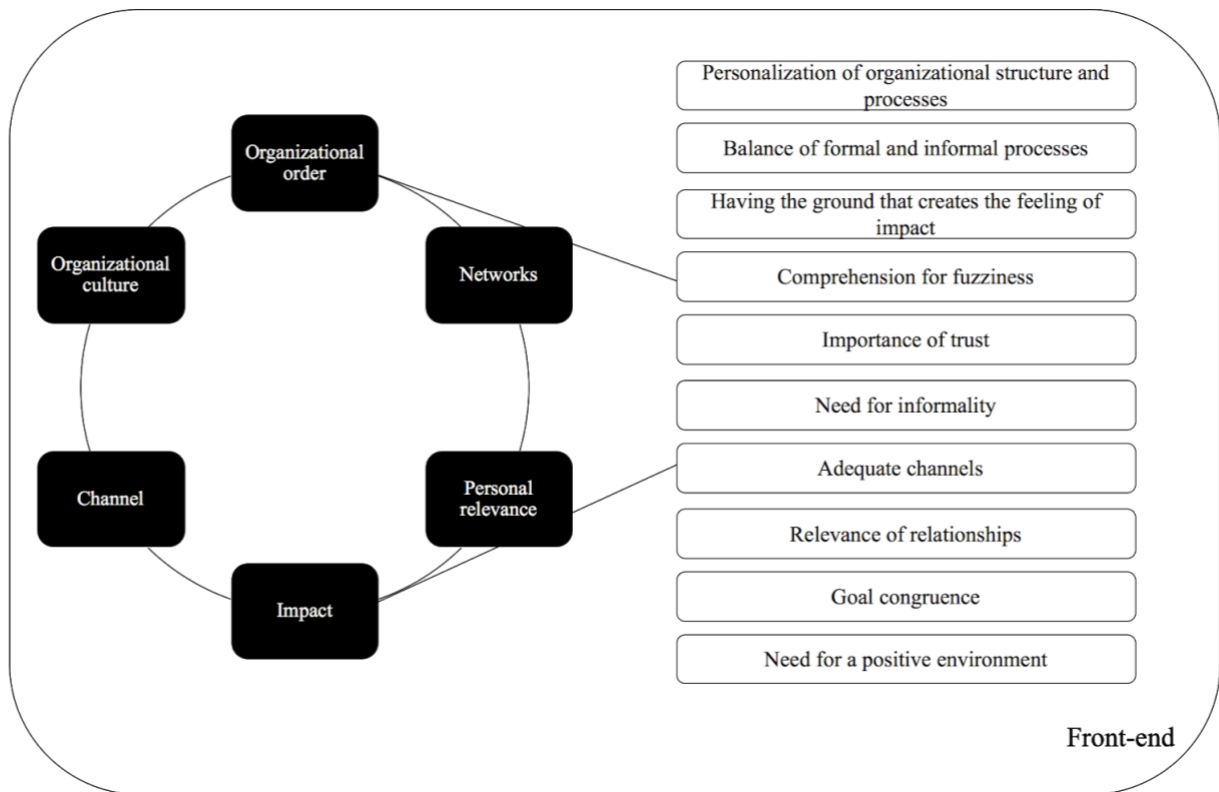


Figure 15: Concluded conditions

6. Conclusion

In this chapter we first conclude the conducted research and will emphasize its contribution, followed by managerial implications. Afterwards, limitations are underlined, and possible future research is described.

The aim of this research was to first identify factors that influence employees to share knowledge cross-functionally in the front-end phase. Secondly, we aimed to examine how these factors form conditions that motivate employees in this context. Due to the unique nature of the front-end phase and the importance of knowledge sharing for creating better innovation performance, we saw the need to contribute to the front-end literature. Further, this was a great opportunity to give indications to managers on how to better handle and manage the front-end. To be able to carry out this research we therefore found a case company operating in the high-technology industry with a focus on innovation. Hence, this study also provides further understanding of the complexity in high-technology firms and the integration of different departments and processes of companies in the industry.

The first contribution of this study is to give better understanding and add value in terms of qualitative in-depth insights about the front-end phase. In previous literature, the front-end is described as unique, compared to the rest of the innovation process. More detailed, the front-end is mainly described as complex, hard to manage and fuzzy. Even if we figured out that this is the case, we believe our study gives further indications on how the front-end is working and therefore how to reduce complexity.

Secondly, the research contributes to the motivational theory in terms of getting a better understanding of the factors influencing the employees' motivation to take part in front-end activities. Therefore, interrelations between the different factors were examined to give deeper comprehension of how the conditions are influencing the motivation of employees.

Lastly, this study contributes to previous research, which shows that cross-functional communication and knowledge sharing can be monitored by the management. Our research reveals how this can be done in the front-end phase of the innovation process. Because better knowledge sharing in the front-end increases the innovation level of a company, this creates value, both for companies and academia.

6.1 Managerial implications

Firstly, the conditions show that there is a need to balance informal and formal processes in the front-end to motivate employees to share knowledge. The informal processes and interactions give a purpose for employees to act in the very initial stages of the front-end. However, formal processes can capture value and create understanding from the informal processes. Further, the analysis showed that the informal processes can create a better atmosphere when sharing knowledge, both in terms that employees get to know each other across functions and also across hierarchies. Therefore, formal processes are needed to give the employees a way to proceed with the shared knowledge during informal processes. Therefore, conditions in the front-end should be shaped to keep up a balance between formal and informal process and the motivation to share knowledge.

Secondly, the creation of trust is one of the overarching conditions that motivates employees to share knowledge in the front-end. Our research shows that this is especially important in the front-end, when knowledge is shared across functions, because employees will be more comfortable to ask more questions and be more open to share information. Trust can be fostered through informal interactions between employees and through relationships with each other. Another factor that creates trust is the work in smaller teams. This also leads to the opportunity of building relationships more easily. Moreover, it is important to build trust to ensure that shared knowledge is forwarded. Here, the analysis shows that this can be done by processes, the management and the relationships between the employees.

Thirdly, we could see the importance of showing employees the impact of their shared knowledge. Due to the nature of the front-end it can be hard to see the outcome of activities but on the other hand it is important to show acknowledgement, to have a good attitude and to create processes where employees can see how far their shared knowledge actually matters. This also relates to the findings that employees want to help others and want to contribute to the company. If employees get the feeling that they can help others and contribute to the company, they are therefore more motivated to share knowledge. Hence, it is important to create conditions where employees can see the impact of what they share in the front-end phase.

Lastly, the conditions show that it is crucial for the management to clarify the organizational order and make sure that the employees know with whom to share their knowledge with. This

also refers to the mapping out of brokers that are transferring knowledge cross-functionally. By ensuring that the employees know whom to share knowledge with, their motivation will increase. Our analysis shows that this is also playing an important role in the informal process, so that the employees feel that they know in which direction they should go. Further, it is important that employees have an arena for knowledge sharing. Here, the data implicates that personalized channels are beneficial in the early phase of the front-end. However, there should also be an opportunity for the employees to be able to spread their knowledge through mediums such as e-mails and phone/video-calls to be able to reach out to a larger mass.

6.2 Limitations

Our research is based on one single case study in a company acting in the high-technology industry. This brings some limitations to our research. Firstly, it is possible that our findings and conclusions might look different if more cases were taken into consideration. Further, the front-end phase can differ depending on the industry, which should be a note for the reader when looking at our findings and conclusions. Another potential limitation to this study is that we, the researchers, have been part of the company when collecting the data. Therefore, there is always a risk of getting biased when analyzing the data. However, this is a common risk when conducting a case study (Bryman & Bell, 2011). Hence, we always kept this in mind while analyzing the data. Another limitation with this research is that the front-end is a very informal part of the innovation processes, which is hard to study. This is affecting both us as researchers and also the interviewees who participated in this study. We could identify some challenges during our interviews, for instance in terms of understanding of the terminology used. Therefore, we had to clarify this for some interviewees, based on our literature review.

6.3 Future research

This section will show implications on our suggestions for valuable future research in the field of this study. Therefore, we see three different main components, where more in-depth research would create better understanding when it comes to the motivation of knowledge sharing in the front-end.

Firstly, there is the need to go deeper into the concept of motivation. From the literature review and the data analysis we can see the tendency that the special characteristics of the front-end have an impact on the type of what kind of motivation influences the employees. Particularly,

we see that there is a tendency that intrinsic motivation dominates the extrinsic motivation when it comes to knowledge sharing in the front-end. The distinction between the type of the motivation would be an important contribution to know in how far the management should go for extrinsic and intrinsic motivators.

Secondly, during this research it became clear that there are different typologies of knowledge in the front-end. Here, it seems to be valuable to distinguish the shared knowledge according to the different activities in the front-end. Hence, opportunity identification, opportunity analysis, idea genesis, idea selection and concept and technology development are possible criteria to look more in-depth on different factors and conditions that motivate employees to share their knowledge in these activities.

Thirdly, this research did not examine the kind of shared knowledge. Hence, we propose that future research should focus on the type of knowledge. For instance, it could be analyzed if the knowledge is tacit and explicit (Nonaka et al., 1998) and how these typologies relate to the conditions and factors in the front-end.

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8. Appendices

8.1 Appendix I

Number	Date	Position
1	2018.01.19	R&D
2	2018.01.19	R&D
3	2018.01.19	R&D
4	2018.01.22	R&D
5	2018.01.22	R&D
6	2018.01.24	R&D
7	2018.01.26	M&O
8	2018.01.26	M&O
9	2018.01.26	M&O
10	2018.01.29	R&D
11	2018.01.30	R&D
12	2018.01.30	R&D
13	2018.01.30	M&O
14	2018.02.01	R&D
15	2018.02.06	R&D
16	2018.02.12	R&D
17	2018.02.13	M&O
18	2018.02.13	R&D
19	2018.02.15	M&O
20	2018.02.22	R&D
21	2018.02.23	R&D
22	2018.02.26	M&O
23	2018.02.26	M&O
24	2018.02.26	M&O
25	2018.02.27	M&O
26	2018.02.27	R&D
27	2018.02.28	R&D
28	2018.02.28	M&O
29	2018.03.05	R&D
30	2018.03.19	R&D

8.2 Appendix II

1. General questions

A brief introduction

Short introduction about ourselves

Aim of the interview and thesis

Allowance to record

Clarify that the interview is anonymous

What is your educational background and previous working experience?

How long have you been working in the company?

What position do you have in the company?

Could you shortly describe your main responsibilities?

2. Front-end activities

What is your role in the *innovation* work at the company?

Could you describe what kind of *activities* you are participating in during the *innovation process*?

Who are you working with in the *innovation* process?

How does the *work and situations* look like before an idea is starting to get formally developed? (proceed into the stage-gate process, before gate 1)

With *whom* are you working with in these situations?

Are there any situations where you *share knowledge* in these above-mentioned situations?

What *knowledge* do you *share* or *receive* in these situations and what do you believe make you do this?

How would you describe the *conditions* around the situations where you *share knowledge*?

3. (Cross-functional) knowledge-sharing

How do you *gain knowledge* from other functions?

Could you describe the situations when this is happening?

Which of these situations refers to activities in the innovation process before gate 1?

How do you *share your knowledge* with others (over functions)?

Could you describe what kind of *knowledge* this is?
With whom do you *share knowledge*? (What departments/positions)
From whom do you *receive knowledge*?
What type of *knowledge* is this? (Both sharing and receiving)
How open are you to *share knowledge* with other employees?
What are the *reasons* for you to *share knowledge*?
Are you *sharing knowledge* under informal conditions?
And if so, with whom and what kind of *knowledge*?

4. Motivation/ knowledge-sharing in front-end activities

What is the purpose for you to *share your knowledge* with employees from other functions? (in front-end activities)
How do you feel when *sharing this knowledge*?
When are you not open to *share knowledge*?
What *would make you share knowledge* in these situations?
How do you feel when you *receive knowledge* from employees from other functions? (in front-end activities)

5. Clarification

How do the management influence your way of *sharing knowledge*?
Can you describe the personal *drivers* that make you *share knowledge*?

6. Additional questions

Under what conditions would you *share* (more) knowledge in the innovation process before gate 1?
What is the benefit of *knowledge sharing* in the innovation process, according to you?