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Who is the Innovator? Strategic User Innovation in Swedish High-Tech Startups

A Multiple Case Study

by

Elise Chamberlain & Amelie Rüther

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Supervisor: Devrim Göktepe-Hultén

Abstract

Existing research acknowledges users as an important external source of innovation for firms, but mainly focuses on user innovation in mature firms. The aim of this paper is to understand why and how startups strategically integrate users in the innovation process. To achieve this purpose we chose an abductive, qualitative research approach and conducted a multiple case study on six Swedish high-tech startups. The analysis of the findings was further verified through interviews with three incubators who are experts for innovation processes in startups. Our empirical findings suggest that startups consider users a valuable source of feedback and claim to integrate them to assess business opportunities early to reduce the risk of inefficient investments. However, resource constraints hinder startups to utilize users throughout the innovation process. But the startups' intentions are not aligned with their actions because they mainly integrate users during the late testing stage, where they let them interact with the product and prioritize adjustments to the product based on their feedback. The most important criterion to select users to collaborate with is mutual trust. This paper provides startup managers with a guideline to understand why user innovation is beneficial and how they can strategically integrate users in their innovation process. Barriers that hinder startups to integrate users are mainly a result of poor execution and can be overcome if sufficient resources are allocated. It is important for startups to acknowledge that user integration does not mean that users become the innovator, as the startups have to remain in control of the innovation process.

Keywords: user innovation, user integration, external sources of innovation, startup, strategic innovation management, high-tech industry

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1 Introduction

Do users simply adopt innovations created by firms or are they more connected to the innovation process than we think? For instance, when over one hundred innovations were sampled for a study in 1976, results indicated that up to 80 percent of these innovations originated from *users* who generated, prototyped and first tested the ideas (Von Hippel, 1976). This finding raises the question of who the innovator actually is, the firm or the user, and how an innovation process that not only involves the firm but also integrates the user is achieved.

Innovation is "a process that begins with an invention, proceeds with a development of the invention, and results in an introduction of a new product, process, or service to marketplace" (Katila & Shane, 2005, pp. 814-815). This definition emphasizes that innovation does not only mean to have a creative idea, but also involves a, partly unpredictable, process until the new idea is introduced to the market. This process requires efficient *innovation management* on an organizational level (Brem & Viardot, 2017). Companies increasingly recognize the value of innovation management and understand that they have to constantly adjust to keep up with the fast-moving world (Brem & Viardot, 2017). Globalized markets increase the pressure of foreign competition and the rise of information technology accelerates the pace of business even more (Schilling, 2017). In order to be successful, organizations do not only have to be innovative continuously; they have to be better and faster at it than their competitors (Schilling, 2017).

Although firms typically innovate in-house as they have access to an abundance of resources, such as human or financial resources, they also exploit *external sources of innovation* to foster their innovation potential and remain competitive (Mortara & Minshall, 2011; O'Regan & Kling, 2011; Schilling, 2017). Research prominently highlights *user innovation* as one of the important external sources of innovation (Chatterji & Fabrizio, 2014; Franke 2014). The so-called 'user innovators' are individuals or firms who ideate, invent, develop, prototype or manufacture inventions themselves for the purpose of personal use, and are motivated by problems or unmet needs experienced in life (Franke, 2014; Von Hippel, 2017). By

integrating them in the innovation process, they can become a strategic tool of innovation for firms (Schilling, 2017).

User innovation is not a new topic. In 1776, Adam Smith was one of the first to document how users come up with inventions to facilitate their lives (Bogers et al. 2010). While early research described the contribution of users to product development and marketing as "important but peripheral" (Bogers et al. 2010, p. 858), research on user innovation took off with Eric von Hippel in the 1970s, who described users not only as facilitators for innovation, but as a *source* of innovation for firms (Bogers et al. 2010).

Despite the practical and theoretical relevance of the topic, it is not extensively researched how the process of user integration in innovation is actually conducted. Although scholars emphasize that user innovation is highly important for firms, there is no clear understanding which of the strategic tools to apply or at what stages of the innovation process users should be integrated. Furthermore, it is not understood how firms can select users, i.e. whether and which selection criteria apply to find the ideal user to innovate with. Also the costs and benefits of user innovation are an open debate. On the one hand, user innovation is labeled 'for free', because firms can search for existing inventions by users who are intrinsically motivated to innovate (Von Hippel, 2017). On the other hand, it is argued that user-related innovation requires large investments of internal resources, for instance large managerial efforts to organize for user innovation and handle these collaborations between users and firms (Lauritze & Salomo, 2017).

Also the potential differences of user innovation in the cross-section of firms are underexplored. Surprisingly, existing research mostly focuses on mature firms. However, there are clearly differences among firms concerning the level they benefit from user innovation and these drivers do not seem to be sufficiently researched (Chatterji & Fabrizio, 2014). Startups, for instance, typically do not have as many resources to organize for innovation as mature firms (Gu et al. 2016). However, paradoxically so, startups must be highly innovative in order to survive the early stages of their lifecycle and create a competitive advantage (Still, 2017). Therefore, startups are a natural setting and a suitable unit of analysis to examine the aforementioned research gaps.

This thesis aims at better understanding the field of user innovation by addressing unexplored research gaps. First, we examine the relevance of user innovation for startups and consider

reasons for and against pursuing user innovation, i.e. motives and barriers that influence the startup's decision to integrate users. Second, we explore strategies for startups to select and integrate users, and research at what stage of the innovation process startups should integrate users.

In summary, the purpose of this paper is to understand the role users play as an external source of innovation for startups by exploring why and how startups integrate users in the innovation process. The research question therefore encompasses two questions and four sub research questions:

1) **Why do startups strategically integrate users in their innovation process?**
    a) What are the motives for startups to integrate users in their innovation process?
    b) Which barriers hinder startups to integrate users in their innovation process?

2) **How do startups strategically integrate users in their innovation process?**
    a) Which criteria do startups use for selecting users to integrate into their innovation process?
    b) At what stage of the innovation process do startups integrate users?

These research questions are answered by means of an exploratory multiple case study of six Swedish high-tech startups and complemented by three additional interviews with incubators, who are experts for innovation processes in startups within the tech-industry, and therefore suitable to additionally verify the findings. Different views are compared by conducting semi-structured interviews with participants of the innovation process of startups. We choose the high-tech industry for this research because user innovation is highly relevant for the fast-paced environment of this industry (Chatterji & Fabrizio, 2014; Von Hippel, 1989).

This paper *theoretically* contributes to the field of user innovation by building upon the existing theories and applying the literature of user innovation to a startup context. The empirical findings support that there are compliance and differences between existing research, which mainly focuses on mature firms, and startups. Furthermore, this paper aims at presenting *practical* guidelines for founders and senior managers of startups who would like to understand why user innovation is beneficial for their firm and how they can strategically integrate users in their innovation process.

Since we chose an exploratory, abductive approach to our research, the case studies also revealed several interesting findings that are not directly related to the main research questions of this project. While these findings are important, addressing each finding in depth goes beyond the scope of this thesis. Hence, we acknowledge three limitations to our research. First, while current research does not explicitly differentiate between customer and end user innovators, our empirical research revealed that this differentiation is particularly relevant for B2B startups. In our case selection, we follow existing research and do not explicitly differentiate between B2B and B2C startups. Second, some interviews revealed general negative biases against user innovation among startup founders. While interesting, the potentially psychological aspect is outside of the scope of this research. Third, user innovation can be explored from the firm and the user perspective. We prioritized the firm perspective for this research. Why and how users innovate with startups is a fruitful avenue for future research, considering that startups do not have the same reputation as mature firms and have to find a way to attract users for collaboration on possibly radical inventions outside the user's imagination.

This thesis is structured as follows: the *second chapter* presents a comprehensive review of the existing literature on external sources of innovation, with a focus on external user innovation. The concepts, methods, and strategies related to user innovation are explored. Further, user innovation is related to the organizational context of startups. The literature review is concluded by identifying the research gaps and transitioning the various concepts into a conceptual framework. The *third chapter* presents the methodological approach and the applied research design to answer the research questions. Other aspects covered are the case selection, data collection method, data analysis as well as the strengths and limitations of the presented design. The *fourth chapter* presents the findings and discussion from the multiple case study on six technology industry startups in Sweden as well as three interviews with incubators. Finally, *the fifth chapter* concludes the research by presenting the main empirical outcomes, limitations, and suggestions for managerial implications and future research.

2 Literature Review

This literature review presents an analytical overview of the existing research regarding users as an external source of innovation in order to provide a research context and refine the topic at hand (Easterby-Smith el al. 2015); a general overview of the sections included into the literature review and how they are connected can be seen in Appendix A. The literature review is conducted as follows: First, an overview of the sources of innovation is provided, followed by the definition of user innovation. Then, strategies for integrating users are described, followed by the relevance of user innovation. Lastly, high-tech startups are defined and their challenges are explored. Concluding the literature review, the current research on user innovation as well as the gaps are summarized into a conceptual framework, which guides the empirical section.

2.1 Sources of Innovation

Innovation is defined as "a process that begins with an invention, proceeds with a development of the invention, and results in an introduction of a new product, process, or service to marketplace" (Katila & Shane, 2005, pp. 814-815). Schilling (2017) points at the rising importance of innovation for firms due to the globalization of markets, where pressure from external competition pushes firms to continuously innovate to protect their products and processes. She further states that the pace of innovation has increased due to the rise of information technology, as firms can produce products more effectively and efficiently. The two main types of innovation are product and process innovation (Serrat, 2017). Product innovations are realized in the outputs of a firm, through goods or services, whilst process innovations are embodied through the way a firm conducts its business (Schilling, 2017). In their product lifecycle model, Utterback and Abernathy (1975) propose that product innovation is more predominant in the early stages of the firm's life cycle, because firms invest more into research to develop product features which customers desire. Given that this thesis aims at analyzing user innovation in startups, which are in the early stages of their life cycles, this literature review focuses on *product* innovation.

One of the prominent ways of categorizing sources of innovation is to divide them into *internal* sources and *external* sources of innovation (Gu et al. 2016; Mazurkiewicz & Rudawska, 2016; Schilling, 2017; Von Hippel, 1988). Internal sources of innovation exist within the firm via its research and development activities, employee creativity, and in-house innovation (Gu et al. 2016; Mazurkiewicz & Rudawska, 2016; Schilling, 2017; Von Hippel, 1988). External sources of innovation exist external to the firm, via customer and user involvement, and collaboration with strategic partners such as universities, private and public nonprofits, government funded research, suppliers, producers, and/or manufacturers (Gu et al. 2016; Mazurkiewicz & Rudawska, 2016; Schilling, 2017; Von Hippel, 1988). Innovation is recognized as both a source of success for firms, as well as a competitive advantage and therefore the source of innovation is arguably a strategic choice for the firm to achieve a competitive advantage (Gu et al. 2016). Following is a more in-depth analysis of internal and external sources of innovation.

2.1.1 Internal Sources of Innovation

Internal sources of innovation occur within the firm, through the firm's employees and R&D activities (Gu et al. 2016). According to Schilling (2017), firms are excellent sources of innovation as they typically have more resources than a single individual, they are strongly incentivized to develop new products, and they have structured management system in place to oversee the innovation process. Mazurkiewicz and Rudawska (2016) emphasize the strength of the firm's own research facility as a source of innovation, such as laboratories, equipment, and technology departments, which lead to increased employee know-how.

Many firms regard their internal research and development departments as their most important source of innovation, as developing in-house can increase the absorptive capacity of the firm, or its ability to assimilate and utilize new knowledge (Schilling, 2017). However, current research suggests that successful firms do not solely utilize internal sources of innovation; rather they use multiple sources of information and ideas to innovate, such as users, networks of firms, universities, and private laboratories (Schilling, 2017). The importance of external sources of innovation will be explored in the following section.

2.1.2 External Sources of Innovation

External sources of innovation exist externally to the firm and include users, suppliers, producers, manufacturers, and collaboration with strategic partners such as universities, private nonprofits, and government funded research (Gu et al. 2016; Mazurkiewicz & Rudawska, 2016; Schilling, 2017; Von Hippel, 1988). O'Regan and Kling (2011) find that firms which seek to develop their innovation capability for business success are increasingly looking for external resources. According to Roberts (2001) the most common external collaborations for firms are with users, customers, suppliers, and local universities.

It was found that most inventions are in fact created by users. According to Von Hippel (1976), up to 80 percent of inventions originate from users, which illustrates the scope of user innovation. Therefore, users are considered one of the most important external sources of innovation (Chatterji & Fabrizio, 2014). They are experts in using products (Von Hippel, 2005a), which is why firms aim at finding a way to exploit users in a strategic way (Schilling, 2017). Roberts et al. (2001) emphasize the lack of studied perspectives on user innovation literature, particularly in relation to management research. Gu et al. (2016) add that few studies explore the role of user innovators in the innovation process in varied organizational settings. They propose that user input is one of the key factors that will allow them to achieve greater innovation performance. However, while the scholars focus on innovation performance, they do not cover how users should be strategically involved in the innovation activities to achieve said performance (Gu et al. 2016). The importance that scholars put on user innovation and its practical implications for firms is why the focus of this thesis is on users as an external source of innovation.

2.1.3 Definition of User Innovation

In the early 1970s researchers began to explore the relevance of user innovators (Bogers et al. 2010). Von Hippel (1976) was one of the early pioneers within the field stating that users being involved in inventing, prototyping and testing the invention had become an important source of innovation. His research formed the foundation for further in-depth research into this particular field.

Scholars do not use one common term to describe external user innovation: they refer to 'free innovators' (Von Hippel, 2017), 'consumer innovators' (Gambardella et al. 2017; Von

Hippel, 2017), 'customers' (Franke & Schreier, 2002) and 'user innovators' (Baldwin & Von Hippel, 2011; Bogers et al. 2010; Chatterji et al. 2014; Gambardella et al. 2017; Hienerth et al. 2012). Nevertheless, all of these terms are defined similarly through common characteristics. User innovators can be a firm or an individual who invent for personal use instead of profit making (Baldwin & Von Hippel, 2011; Franke, 2014). They are not solely consumers of the products; they themselves develop, prototype, or manufacture products that solve a perceived problem or fulfill an unmet need based on personal experiences (Baldwin & Von Hippel, 2011; Schilling, 2017; Schweisfurth, 2017; Von Hippel, 2017). Thus, they need to have a clear understanding of their personal needs, the opportunity to realize ideas and to create solutions, and the possibility to share these solutions with other users (Piller & West, 2014). User innovators are driven by intrinsic and extrinsic motivation: they want to improve their own situation (Shah, 2006), gain an innovative reputation among their peers (Shah, 2006), and feel recognized by firms who pick up and realize their ideas (Jeppesen & Frederiksen, 2006).

Research distinguishes between different types of external user innovators. Users can be part of consumer markets or industrial markets (Franke, 2014), also known as consumer and intermediate user innovators (Bogers et al. 2010). Consumer user innovators use consumer products and can be individuals (Bogers et al. 2010; Von Hippel, 2017), or multiple collaborating individuals (Bogers et al. 2010; Stock et al. 2016). Intermediate users are firms that are customers of another enterprise (Von Hippel, 2005a) and rely on equipment or components produced by this enterprise to complete their own goods (Bogers et al. 2010). Another type is the lead user, or users who recognize their needs earlier than peers within their target market (Jeppesen & Frederiksen, 2006; Von Hippel, 1986). The lead users' demands are ahead of trends and they adopt a pioneering role (Jeppesen & Frederiksen, 2006; Von Hippel, 1986).

There are several reasons for the rising popularity of user innovation. Advancing computer and communication tools provide increasing access to information (Roszkowska-Menkes, 2017). The Internet facilitates constant communication between firms and users, but also connects users to each other, stimulating idea diffusion and motivation (Baldwin & Von Hippel, 2011). Moreover, technologies such as digital and modular design production practices facilitate user innovation and decrease innovation costs (Baldwin & Von Hippel, 2011).

While most scholars use the term ‘user innovator’, they do not seem to further differentiate between customer, consumer, and user, although it is assumed that there must be differences depending on the perspective of the firm. Hence, it is concluded that the definition of user innovators is still ambiguous. Within the scope of this thesis, the term ‘user’ is used for clarity purposes.

2.2 Strategies for Integrating Users

There are several innovation strategies which aim at innovating by incorporating the user-centered approach, so that firms can ultimately benefit from user innovation. The strategies are not mutually exclusive, as many firms experiment with various methods (Franke, 2014). User innovation strategies include innovation processes, different methods for involving users and user selection criteria, which are explained in the following sections (Akgün et al. 2010; Arthur et al. 2006; Franke, 2014; Müller & Thoring, 2012; Schreier et al. 2012; Stock et al. 2016; Von Hippel, 2017).

2.2.1 User Innovation Processes

Innovation process models differ by their degree of user involvement and at which stages firms include users in the innovation process. In the following section, three different process models are introduced that all integrate the user at different stages.

In the *innovation funnel* suggested by Acklin (2010), the first stage of the model, idea generation, is the only stage which is open to external sources of innovation. From then on, research and development, market testing, and implementation, are all formally executed in-house (Acklin, 2010). If the users’s insights are not properly identified in the first stage, the firm runs the risk of developing a product which lacks a consumer market (Acklin, 2010). This traditional approach to innovation is problematic for startups, as they seldom have access to the resources required to conduct large-scale user research to filter through the ideas generated in the first phase (Acklin, 2010).

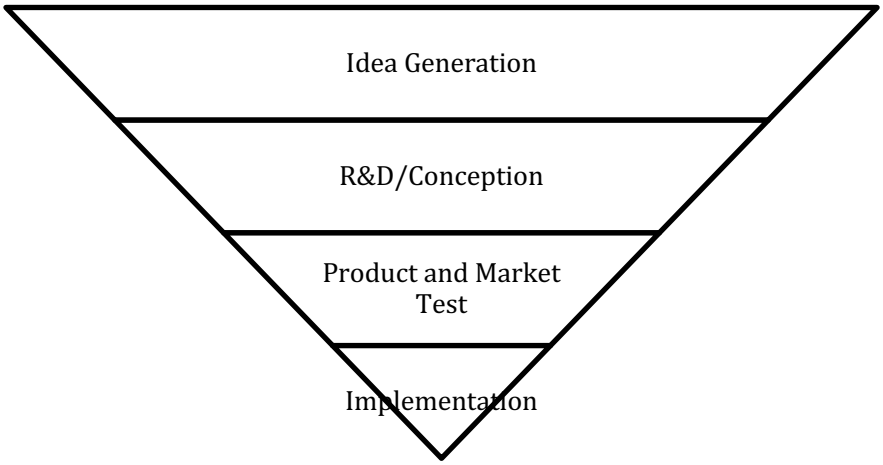

Figure 2.1 Innovation Funnel (retrieved from Acklin, 2010)

In Thomke and Von Hippels' (2002) *producer approach* to product development, the firm develops, designs, and builds a prototype in-house based on market research and then involves the user in the last stage, namely the testing phase. This trial and error phase is costly and it repeats itself until the final product is accepted and provides a solution to customers (Thomke & Von Hippel, 2002). Producers have many advantages in product development: employees in firms have specialized experience, are organized and highly skilled, and have access to R&D facilities (Hienerth et al. 2014). Simultaneously, firms are required to develop protection mechanisms to secure maximum profits resulting from the ideas created in-house (Von Hippel, 2017), such as patents or copyrights to prevent competitors from imitating and free-riding on own inventions (Von Hippel, 2005b). Producer innovation is driven by extrinsically motivated employees who aim at identifying consumer needs through market research at the core of the target market (Lilien et al. 2002; Von Hippel, 2017).

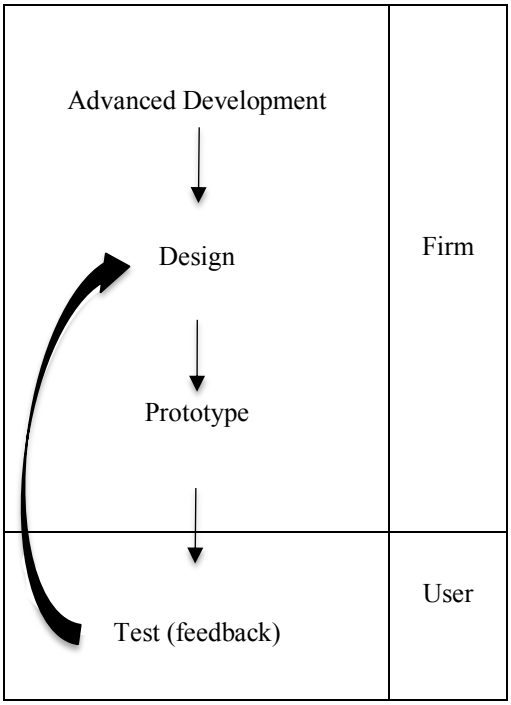

Figure 2.2 Producer Approach (based on Thomke & Von Hippel, 2002)

However, some authors propose an innovation process which puts more emphasis on the user throughout the entire process, rather than solely in the first or last stage (Still, 2017; Thomke & Von Hippel, 2002). In the *user approach*, firms conduct the advanced development stage and then involve users in the next three stages by providing them with tools to design, develop, and modify parts or the entirety of the product iteratively (Thomke & Von Hippel, 2002). This process uses users as product developers by collecting information on needs and ideas for solutions to problems (Lilien et al. 2002). Compared to the producer innovation approach, consumers are mainly driven by intrinsic motivation: they become innovative because they want to fulfill personal needs or another individual's needs and enjoy the learning and development process (Von Hippel, 2017). In contrast to producers, who benefit from the sales of a product, users aim at benefitting from the actual use of the product (Von Hippel, 2005b).

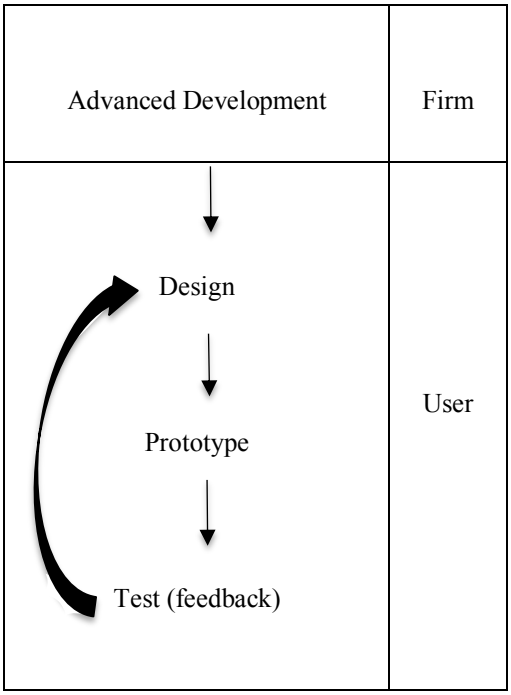

Figure 2.3 User Approach (based on Thomke & Von Hippel, 2002; Still, 2017)

Although the three processes have varying names for their stages, they have the following stages in common: idea generation, advanced development/ conception, design, prototyping, testing, and implementation. The processes focus on users as either idea generators in the early stages of innovating, as testers in the last stages, or as product developers throughout the process. There are evidently scattered views of when the optimum stage of user involvement is. Existing research further lacks an indication of criteria that define which process is most appropriate for which type of organization or in which situation.

2.2.2 User Innovation Methods

Firms use different methods to integrate users. In the next section, five methods are described that highlight the different ways of integrating users.

Lead User Method

In the lead user strategy, firms search for attractive users for the identification and generation of radical business opportunities (Franke, 2014). The lead user method is a multi-stage approach, which additionally aims at enhancing the effectiveness of cross-functional development teams (Lüthje & Herstatt, 2004). The lead user method comprises four steps

(Lüthje & Herstatt, 2004): (1) The target market is defined as well as the goals of involving the lead user. (2) Trends are identified, or the dimensions in which lead users are further ahead than the mass market, allowing for a narrower search for lead users. (3) The lead users are then identified using the previously selected trends. The process of searching for lead users is creative and should be tailored to the search field. (4) The lead users are invited to one or several workshops to either generate, improve, or evaluate product concepts.

Crowdsourcing

Crowdsourcing falls under the umbrella of virtual customer integration, where customers or users are virtually, or digitally, involved throughout the innovation process in order to utilize their know-how and creativity (Füller et al. 2010). Tools are used to allow users to contribute their ideas (Füller et al. 2010). In crowdsourcing, the firm poses a problem or question formulation to online *crowds* of individuals to seek solutions (Franke, 2014). The firm then evaluates the provided solutions and often rewards the individuals who submitted the best solution (Franke, 2014). This is an advantageous strategy, as crowds of users often exhibit more know-how than a smaller group of in-house specialists, in particular when the problem is new or complex (Von Hippel, 2005b).

Toolkits for User Innovation

Much like crowdsourcing, toolkits for user innovation can be a type of virtual customer integration (Füller et al. 2010). Von Hippel & Katz (2002) coined toolkits for user innovation as an alternative approach to the traditional innovation process. In this method, firms transfer the need-related aspects of product development to users rather than producers. The toolkits are comprised of design tools which allow individual users to develop new product innovations themselves (Franke, 2014). The toolkits give the user freedom to design, prototype, evaluate, and improve the product until satisfied (Von Hippel & Katz, 2002). Toolkits have two common features. Firstly, they contain design tools, such as a list, drag and drop options, or free design via computer programs, that guide the user through the designing process (Franke, 2014). Secondly, toolkits should give feedback during the design process, i.e. the visual representation could update in real time or information regarding the consequences of the design is provided (Franke, 2014). For a user to engage in trial and error learning, research finds that it is more beneficial for the user to have access to standard design tools and component parts to build from, rather than to be given a blank slate (Von Hippel, 1998).

Lean Startups

Despite the implications of its name, the lean startup method is primarily used within large firms, as its payoffs are larger within more established companies (Blank, 2013). It aims at making production processes more efficient by reducing waste within the process, i.e. human resources, material resources, or redundant activities (Mueller & Thoring, 2012). A lean startup is motivated by the belief that the biggest waste of resources for a firm is creating a product which no customer needs (Mueller & Thoring, 2012). The lean startup method aims at testing core business assumptions in the early stages of the innovation process by operating in stealth mode, typically by means of testing hypotheses through early qualitative user observations, interviews, and feedback (Blank, 2013; Still, 2017). If the user problem matches the firm's solution (i.e. there is a problem-solution fit), the startup will commence with rapid prototyping to create a minimal viable product, which can be shown to the prospective users (Blank, 2013; Still, 2017). With a built minimal viable product and an identified problem, the startup will then validate that there is an attractive market for the product, iteratively pivoting the business model as new information presents itself (Still, 2017). Regarding users, the lean startup attempts to establish feedback loops throughout the entire lean learning cycle, as the process should be executed in a cyclical way, with no clear beginning or end (Mueller & Thoring, 2012). This method is most commonly executed for high tech innovations (Mueller & Thoring, 2012).

Design Thinking

The concept of design thinking has found a growing interest in non-design sectors, particularly complex modern technology sectors, as researchers and practitioners want to benefit from design as an agent of change and innovation (Kolko, 2015; Kimbell, 2011; Kleinsmann et al. 2017). Design thinking stems from the human centered design, i.e. interacting with the user so that one can better understand said user's existing influences, preferences, capabilities, and practices (Gleasure & O'Riordan, 2016). Design thinking makes use of large amounts of user research, feedback loops, and iteration cycles, and aims to foster innovation (Mueller & Thoring, 2012). The method begins with focusing on the users' experiences, particularly their emotional experiences, to build empathy with them and draw conclusions about what they want and need (Kolko, 2015). This is to create an emotional value proposition with the user, which requires close contact and deep understanding of the user (Kolko, 2015). Following, the firm should develop several prototypes, either digital or physical, to explore potential solutions to the user's needs (Kolko, 2015). In design thinking,

innovation is viewed as a social process and therefore the firm can, but is not limited to present the prototypes in public forums in order to iterate on them quickly (Kolko, 2015). Design thinking differs from other strategies, as it primarily incorporates users in the early stages, but very intimately, as their emotional value propositions guide the rest of the innovation process (Kolko, 2015). However, challenges of the design thinking strategy are that it is very difficult to estimate the return on investment of such a creative innovation process (Kolko, 2015).

In summary, all of these various methods for user innovation have commonalities as well as differences. The methods unanimously incorporate the user's ideas in the early stages of the innovation process as well as attempt to offer a guideline for the startups to collaborate with users. However, the methods differ in their degree of user inclusion as well as their adoption or lack of adoption of prototyping. With this research we wish to uncover if and how firms use the above-mentioned methods and more specifically if startups adopt the same methods or different ones.

The ways of integrating users are apparent in the aforementioned methods; however, how the users are selected is not discussed, although this is assumed to occur before the integration. As a result, this phenomenon of user selection will be explored in the following section.

2.2.3 Selection of Users

How companies search for and find appropriate user innovators is a valid question, since Stock et al. (2016) found that the *personality* of the user has a significant impact on the success of the overall innovation process. According to them, each stage of the innovation process requires another personality trait. For instance, users who are open to experiences are associated with greater idea generation, while introverted and conscious users are better at prototyping. Highly conscious users are more successful in commercially diffusing the innovations, but less successful in peer-to-peer diffusion. Schreier et al. (2012) add that the user's general familiarity with innovation processes and the product field has an impact on innovation success as well. The more complex the technology or product, the more skilled the user innovator has to be because innovative users question the status quo and see potential for improvement (Schreier & Prügl, 2008). In contrast, Zibarras et al. (2008) found that innovation potential might also be linked to dysfunctional characteristics, such as arrogance,

eccentricity, perfectionism, and cautiousness. All these positive and negative personality traits still lack specificity, but give a first indication of the relevance of user personality.

In addition, details about the *selection* of user innovators are so far not well researched. Schreier et al. (2012) find that the number and diversity of consumers involved in the user innovation process have an impact on the user invention's success, provided that they are active users of the product. Moreover, these three factors also have a positive influence on the consumer's perception of the innovation ability of the company, which may show in higher sales and willingness to purchase from that particular company (Schreier et al. 2012). However, these factors are unspecific and may vary between companies (Schreier et al. 2012). Furthermore, the selection criteria might depend on the type of organization: mature companies predominantly focus on person-organization fit in their recruitment (Arthur et al. 2006), while startups pay attention to complementary team composition and recruit different, but complementary personality types (Akgün et al. 2010). But more detailed knowledge about the systematic selection process and selection criteria are pointed out as research gap (Roszkowska-Menkes, 2017; Von Hippel, 2017).

2.3 Relevance of User Innovation

Firms start to identify users as a valuable resource for their own gain (Von Hippel, 2017). In the following, the relevance of involving users in the innovation process is examined by describing the motives and barriers firms perceive to user innovation, which give them reasons to pursue or not to pursue user innovation.

2.3.1 Motives for User Innovation

Users are considered one of the most important sources of external knowledge (Chatterji & Fabrizio, 2014) because they are specialized in *using* products (Von Hippel, 2005a) and are three times more efficient in their innovation efforts than producer innovators (Hienerth et al. 2014). The higher productivity is a result of the phenomenon 'efficiencies of scope', which means that many diverse user innovators with small inputs each achieve faster and better results than few producer innovators with bigger labor share each (Hienerth et al. 2014). They accelerate the innovation process, and in fact cut it in half, by enabling a simultaneous

involvement of different departments and users and therefore, avoiding time-consuming feedback rounds and misunderstandings (Herstatt & Von Hippel, 1992). Furthermore, efficiency is improved by the way user innovators facilitate the teamwork: being an outsider to the firm, they add a common and more simplistic language to the team, which facilitates the communication between different departments in the company (Herstatt & Von Hippel, 1992).

Against the general perception that users mainly support firms in improving and adjusting existing products by means of their feedback, it was found that user innovators are more likely to contribute to radical innovations, which are essential for firms to ensure long-term competitive advantage (Bogers et al. 2010; Chatterji & Fabrizio, 2004). Against the notion that employees have a clear advantage, because they can build on their experience and skills, user innovation also facilitates innovation based on tacit knowledge (Bogers et al. 2010) because the possibilities of knowledge diffusion, sharing information, and building on each other's experiences is still possible through peer-to-peer channels between users (Ogawa & Piller, 2006; Von Hippel et al. 2012). Especially the Internet facilitates knowledge diffusion and avoids redundancies of innovation activities; hence supports the diffusion of tacit knowledge (Hienerth et al. 2014).

2.3.2 Barriers to User Innovation

Lilien et al. (2002) discuss three potential disadvantages of user innovation, particularly of lead user innovation. First, ideas generated from users may fit the organization to a lower degree. This means that user inventions or ideas may not be in line with, for instance, the organization's vision, strategy, or capabilities. Second, it is more difficult to protect ideas generated by users, for instance, by patenting them, compared to protecting ideas generated in-house. Third, user innovation requires more resources and higher costs, especially financial resources and time, than other innovation sources utilize. However, Lilien et al.'s (2002) findings only verify the third disadvantage, namely the relationship between user innovation and higher costs: employees spend more working days on organizing for user innovation than on managing in-house innovation. As a result, the personnel costs for user innovation, including costs for training users, are about three times higher than for producer innovation (Lilien et al. 2002). Olson and Bakke (2001) support this finding. They observe that firms in the technology industry fail to integrate users in their new product development because the

organization's personnel faces time pressure. They add that firms especially lack sufficient human resources with user innovation experience, particularly expertise and managerial skills, which facilitate and accelerate the user innovation process.

Olson and Bakke (2001) point out further connections between the firm's personnel and potential barriers to user innovation. Due to prestige reasons, employees with technological knowledge perceive ideas from users as too simple and less valuable than their own ideas because users do not express their ideas in the same technical language (Olson & Bakke, 2001). Especially if the innovation process in place already leads to success and profitability of the firm, employees are reluctant to change and may use the 'lack of time and resources' as an excuse for not being cooperative (Olson & Bakke, 2001). Hence, the firm's corporate culture has an impact on the successful integration of users because it defines the staff's openness towards new developments and improvement of existing processes (Olson & Bakke, 2001).

Another challenge firms have to deal with when collaborating with users is related to the previously described selection of the users (Morrison et al. 2000). It is difficult to search for and identify those lead users a firm wants to work with, especially if the relevant community is big or not clearly defined (Morrison et al. 2000). In fact, this barrier highlights the lack of appropriate selection criteria to identify user innovators.

In summary, existing research is very positive about the benefits and relevance of user innovation for firms; very few researchers point out potential challenges and barriers. Nevertheless, it can be assumed that there must be differences among firms in their level of how much they benefit from user innovation, but these drivers are not sufficiently researched (Chatterji & Fabrizio, 2014). Existing research mainly studies mature firms and points out that the main barrier to user innovation is a lack of resources. So, would newly developed firms, namely startups, who generally have few resources available (Freeman & Engel, 2007; Katila et al. 2012;), benefit from user innovation or not? In the next section, startups, more specifically, high-tech startups are defined, and the differences between startups and mature firms are further explored.

2.4 High-tech Startups

A startup is a newly emerged firm, which works to solve a market problem, where neither the solution, nor success are guaranteed (Robehmed, 2013). More specifically, high-tech startups emphasize invention and innovation in their business strategies, invest heavily into research and development, and typically compete in short life-cycle product markets (Milkovich, 1987). There is no single definition of a high-tech startup within existing research, however, Löfsten and Lindelöf (2002) highlight criteria that can help identify new technology-based firms. According to the authors, a high-tech startup should be based on an invention or have an above average technological risk (Löfsten & Lindelöf, 2002). Moreover, a high-tech startup should not exceed 25 years of age and it cannot be a subsidiary of a mature firm (Löfsten & Lindelöf, 2002).

Katila et al. (2012) argue that startups require different competitive strategies than those of mature firms due to their major differences, e.g. startups have significantly limited resources in comparison to mature firms. That is, startups are often more selective about their competitive moves than mature firms (Katila et al. 2012). Limited resources refer to a multitude of aspects; e.g. some authors point at a limited access to capital (Denis, 2004; Freeman & Engel, 2007; Shane & Stuart, 2002). Other authors point at switching costs, transaction costs, and production capacity as major costs startups face in comparison to mature firms (Cho et al. 1998). Freeman and Engel (2007) state that startups face a greater risk of failure than mature firms, as they have fewer experienced employees, as well as less legitimacy and brand awareness. The chance of failure increases the more radical the innovation is (Freeman & Engel, 2007). Time is also a limited resource for high-tech startups, but it is also one of the few variables on which startups can compete with mature firms, as startups typically have faster innovation processes (Freeman & Engel, 2007).

High-tech startups often compete in new markets, which are characterized by a high degree of unpredictability and a limited understanding of customers, market segments, and competitors (Katila & Shane, 2005; Lin et al. 2010; Löfsten & Lindelöf, 2002). Therefore, marketing can prove a challenge for high-tech startups, as their products often address unknown needs and markets (Lin et al. 2010; Löfsten & Lindelöf, 2002). The startup's first customer to make a referral brings both profit and reputation to the startup (Ruokolainen & Igel, 2004). This form of networking is particularly important for high-tech startups that aim to deliver complex

hardware and software products (Ruokolainen & Igel, 2004). Due to their short product life cycles, high-tech startups must grow quickly and often internationally in order to exploit their maximum product potential (Löfsten & Lindelöf, 2002). This entails that high-tech startups put great emphasis on early market research, as they need to understand and verify their markets early on (Löfsten & Lindelöf, 2002).

According to Still (2017) firms within the high-tech sector, in comparison to other sectors, need to be more innovative and creative in order to survive, compete, and grow. This is mainly due to the ever-changing nature of technology (Still, 2017). Appropriately so, the culture within high-tech startups encourages the pursuit of opportunity, individual initiative, and self-sufficiency (Blank, 2014). However, this culture may also come at a cost. The founders of startups, namely entrepreneurs, may have novel and radical ideas, but Freeman and Engel (2007) argue that they often lack the managerial skills to lead and manage a startup when it grows. Entrepreneurs often face time constraints and can therefore rely on their own intuition in the product development stage of the innovation process, rather than available information and resources (York & Danes, 2014). The individualistic and self-sufficient startup culture can lead to an indifference to processes, procedures, and rules by the entrepreneur (Blank, 2014), where the entrepreneur risks making poor decisions based off of personal biases in the product development process (York & Danes, 2014). These differences between startups and mature firms suggest that high-tech startups may require different innovation strategies than mature firms in order to be successful. The concept of user innovation and high-tech startups will be addressed in the next section, in which the literature is summarized by means of a conceptual framework.

2.5 Conceptual Framework

The conceptual framework reflects the literature review, presents how specific concepts are connected, and describes the logic of how they work in association with one another (Sekaran & Bougie, 2016). Therefore, it represents the foundation for our empirical analysis, as it acts as the guideline for analyzing user innovation within the multiple cases. The conceptual framework is not an exhaustive tool; rather it aims at highlighting the relationships amongst current user innovation research and theoretical gaps within the field of user innovation, which need to be explored to further develop the field (Sekaran & Bougie, 2016). Our

conceptual framework incorporates the findings from the literature review, the main discrepancies and gaps in user innovation research, and the five research dimensions, derived from the gaps, which lead the analysis section. The illustrated conceptual framework can be seen in Figure 2.4 at the end of this chapter, and all supporting references can be seen in the more detailed version in Appendix B.

2.5.1 Theoretical Gaps

First, existing research focuses mainly on user innovation in mature firms, although the previous chapter reveals significant differences between mature firms and startups regarding their innovation processes. Since the *startup perspective* is so far neglected within existing research, we aim at exploring whether user innovation has the same relevance for startups as it has for mature firms by identifying *why* startups integrate users in their innovation process.

Second, existing research show a solid understanding of the relevance of user innovation and positive impact on innovation performance in general, but does not explicitly discuss *how* the user is strategically involved in order to increase innovation performance. For instance, the lack of criteria for searching and selecting users is pointed out as research gap and there is no consensus on when the user should be integrated within the innovation process. Hence, we aspire to get a better understanding of how this user innovation process is conducted and what it looks like. Relating to the first gap, we particularly examine how *startups* integrate users in their innovation process.

Third, we find that the *definition* of user innovation is still ambiguous. The motivation of user innovators is understood, but there is no clear distinction between the different terms that exist for user innovation, in particular the differentiation between customer and end user. This gap is particularly emphasized within the interview process, as the interviewees show confusion about the definition. However, contributing to this gap would exceed the scope of this research, as we intend to focus on the process of how and why user innovation is used within startups; hence, the definition gap is recommended for future research.

In summary, we choose the startup perspective for this research and aim at better understanding (1) why user innovation is relevant for startups, and (2) how startups integrate users by answering the following two research questions:

1) Why do startups strategically integrate users in their innovation process?

2) How do startups strategically integrate users in their innovation process?

2.5.2 Research Dimensions

Based on the identified gaps, we derive dimensions within the existing field of user innovation, particularly in the field of user innovation in startups, to give the research questions a more specific direction. The dimensions are selected to be explored empirically and shape the interview topic guide. Since we conduct an exploratory study, it is also important to note that we do not limit ourselves to these dimensions; rather we also explore inductively derived dimensions that emerge during the interviews and analysis of the findings.

In order to explore the relevance of user innovation for startups, i.e. *why* startups integrate users in their innovation process, this research looks at the reasons for integrating users. While the motives of mature firms are well researched, we find little evidence about the motives of startups. Although existing research is generally very positive about the impact of user innovation on incremental and radical inventions, we also raise the question why startups may not pursue user innovation. Startups face different constraints than mature firms and their decision to integrate users may be influenced by different factors. Hence, the first two dimensions look at the *motives* and *barriers* to user innovation in startups.

In order to explore *how* startups integrate users in their innovation process, we define three more dimensions: *methods*, *selection criteria*, and *timing*, as described as follows. Given the abundance of different strategies and methods for user involvement (cf. section 2.2), we first want to examine which of these *methods* are applicable for and used by startups. Second, existing research points out that *selection criteria* for users have not yet been researched. This means that we do not have an understanding of how firms search for and select the ideal users to collaborate with. However, we find this step particularly relevant for startups, as they are often still in the process of defining their target market and hence may not know who their users are. Furthermore, there is a chance that the startup's brand or product is unknown to the users, which further emphasizes why it may be difficult for startups to attract users to collaborate with. Third, different ideas for user innovation processes are described in the literature review (cf. section 2.2.1), but they all aim at integrating the user at different stages. The main difference is that some firms integrate the user as early as possible, while others

only integrate them in the final stage of the innovation process. So the dimension called *timing* explores at what stage of the innovation process startups integrate users.

Figure 2.4 below illustrates how these five dimensions (motives, barriers, methods, selection criteria, and timing) are linked. From left to right, the framework connects the reasons for user innovation (i.e. why) with user innovation strategies (i.e. how). As part of the strategy, we create a simplified model of the user innovation process by merging the stages of the three different processes introduced in section 2.2.1. and use this model as a starting point for comparing it to the user innovation process of the case studies.

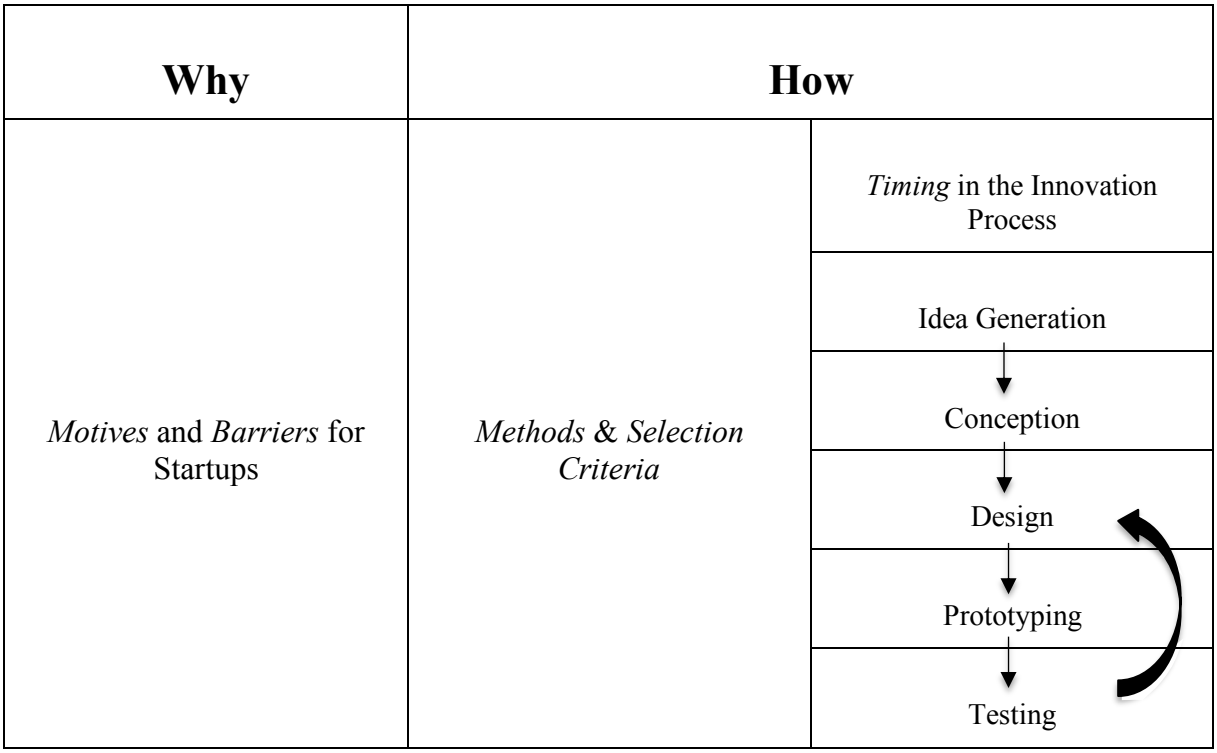

Figure 2.4 Conceptual Framework (cf. Appendix B for all supporting references)

In summary, we aim at exploring (1) the motives and barriers of user innovation for startups, and (2) the strategies for the user selection and integration process. To reflect these dimensions in the research questions, we add the following four sub research questions:

1) *Why do startups strategically integrate users in their innovation process?*
   a) *What are the motives for startups to integrate users in their innovation process?*
   b) *Which barriers hinder startups to integrate users in their innovation process?*

2) *How do startups strategically integrate users in their innovation process?*
    a) *Which criteria do startups use for selecting users to integrate into their innovation process?*
    b) *At what stage of the innovation process do startups integrate users?*

Appendix B gives an overview of the connection between the main concepts introduced in the literature review, the research questions, the interview questions, and presents which interview questions are intended to answer which research question. In the next chapter we will delve into the methodology, which explains the chosen strategy to answer these research questions.

3 Methodology

The following chapter describes how the empirical data was gathered and analyzed to answer the research questions. First, a foundation is set by explaining the research approach. From this standpoint the research design and research method are derived. Thereafter, we explain the data analysis step by step and lastly reflect upon the research quality.

3.1 Research Approach

The purpose of the research is to understand the role users play as an external source of innovation for startups by exploring why and how startups integrate users in the innovation process. Hence, this study is from the startup perspective, as we seek to gain insight into how startups make sense of the world through their personal experiences (Easterby-Smith et al. 2015).

We adopt a research philosophy which stems from the epistemological stance of constructionism (Easterby-Smith et al. 2015). A constructionist author aims at including the different meanings that people place upon their experiences, as the belief within constructionism is that societal reality is determined by many people rather than by objective factors (Easterby-Smith et al. 2015). This research focuses on the thoughts and experiences of founders and senior managers within startups, and their experiences with user innovation in the technology sector; therefore, the constructionist research design is suitable.

The research philosophy also reflects the choice of either a deductive or inductive approach. The deductive approach is top-down, entailing that theory is pre-selected and tested using a hypothesis (Saunders et al. 2009). In an inductive approach, or the bottom up approach, data is collected, and new theory is derived from the analysis of said data (Saunders et al. 2009). However, we chose a combination of the two approaches, i.e. an abductive approach, because it is used to comprehend phenomena in a new way through interpretation (Danermark et al. 2002). Abduction seeks to develop existing research as well as simultaneously discover new underlying patterns and is therefore concerned with phenomena that existing theory cannot

explain (Bryman & Bell, 2015). This thesis required an understanding of the field of user innovation in order to discover the research gaps, but it simultaneously uncovered new phenomena, namely the integration of users in startups, which existing theory cannot explain. Moreover, the abductive approach proved appropriate, as we were able to adjust the research for negative views towards user innovation by the interviewees. Because current user innovation research is majorly focused on the strengths of applicability of user innovation, we did not expect that the interviewees would have negative biases towards user innovation. However, as the initial interviews were conducted and this was realized, we were able to abductively adjust the sub research questions for this view by including the barriers hindering user innovation within startups.

Lastly, we chose to use the narrative method, which collects stories to gain insight into organizational life (Daiute & Lightfoot, 2004; Easterby-Smith et al. 2015). The narrative method was adopted for this research as our interviews aimed to uncover the experiences, actions, and reflections of each interviewee (Easterby-Smith et al. 2015).

3.2 Research Design

3.2.1 Case Study

Case studies are a theory building approach (Eisenhardt & Graebner, 2007) and analyze one or more enterprises, events or individuals thoroughly (Easterby-Smith et al. 2015). They are especially suitable for research questions asking *why* and *how* (Yin, 2014) and investigate decisions as well as the reasoning and implementation of these decisions (Schramm, 1971, cited in Yin, 2014). Stake (2006) differentiates between instrumental and expressive studies: while expressive studies focus on unique case studies, instrumental qualitative case studies allow developing general principles from specific cases. The latter approach is the intention of this research: to understand *why* and *how* startups integrate users in their innovation process.

We are aware of the potential limited external validity of case studies (Yin, 2014). Findings from our individual cases are not necessarily generalizable to all startups and their interpretation depends to a high extend on the subjective opinion of the researchers (Yin, 2014). In order to counteract these limitations and create more generalizable, accurate, and robust findings, a multiple case study was chosen for this research (Eisenhardt & Graebner,

2007), which collectively explores the phenomena of user involvement in innovation (Bryman & Bell, 2015). Multiple case studies are widely used in business and management research and add a comparative dimension to the research design (Bryman & Bell, 2015). This is especially useful to explore user innovation in another organizational context than the majority of existing research does. Hence, by means of this multiple case study, we aim at expanding the existing theories to incorporate the startup perspective. The selected cases illuminate the process of user innovation. They do not necessarily reflect the experience of one particular startup, but can also incorporate previous experiences the interviewees have gained in user innovation in startups. Eventually, the findings give an indication for theoretical propositions that can be further verified in subsequent research (Yin, 2014), underlining the exploratory nature of this research (Bryman & Bell, 2015).

3.2.2 Selection of the Case Studies

As this research deals with user involvement in the innovation process of an organizational setting, the units of analysis for the selected case studies is startups. The following three criteria were considered in the selection of the firms: (1) startup experience, (2) geographic location, and (3) industry.

(1) So far user innovation is mainly researched in mature firms. But startups typically do not have as many resources to organize for innovation as established organizations, so this thesis explores why and how startups integrate users in their innovation process. Thus, startup experience was considered the most important criterion, as it refers to the experience the case company has with startup innovation processes. Firms that consider themselves a startup are chosen for the empirical data collection of this thesis. We are aware of the fact that a clear definition for startups does not exist, so we defined it as follows: newly created companies of small size (< 60 employees) with limited resources that produce a scalable product and are still in the progress of defining their target market (Denis, 2004; Freeman & Engel, 2007; Katila et al. 2012; Löfsten & Lindelöf, 2002; Shane & Stuart, 2002).

(2) Solely Swedish startups were selected. The authors are based in the region of Skåne in the South of Sweden, where several science and startup parks are located, particularly in Lund and Malmö. Thus, this location facilitated interviewing in person, which is preferred over remote interviewing, since the latter may inhibit the opportunity to catch non-verbal

communication, go into depth and contextualize statements (Easterby-Smith et al. 2015). Sweden belongs to the top ten most innovative countries in the world (Porter & Stern, 2001), thus the choice of Swedish firms was appropriate. Sweden has developed a human, social, educational, and corporate infrastructure, which is a supportive environment for startups (Wharton School, 2015). Furthermore, choosing solely companies from the same geographic region increases the comparability, as cultural factors are assumed to be the same (Easterby-Smith et al. 2015). The behavior of managers is relative to national and organizational culture, so it is not recommended to generalize findings across cultural borders (Easterby-Smith et al. 2015).

(3) For the case study, tech-related companies with different levels and ways of involving customers were selected in order to gain access to varied views, both positive and negative, of user innovation. Reasons for this choice lie in the innovativeness of tech companies. For instance, Von Hippel (1989) highlights that firms manufacturing revolutionary or rapidly changing products, such as high-tech products, are particularly in need for user innovation rather than traditional market research. Also, Chatterji & Fabrizio (2014) add that user innovation shows the greatest benefits in new technology areas. It can be concluded that user innovation is highly relevant for high-tech companies and the likelihood that high-tech companies actively involve users is bigger. Moreover, startups engaging in product development were selected, as product development is more predominant than process development in the early stages of a firm's life cycle (Utterback & Abernathy, 1975).

The selection process for the multiple case study was carried out as follows: The resident company lists of three startup and science parks, namely Ideon Science Park in Lund, Malmö Startups and Minc in Malmö, were filtered for high-tech startups. Furthermore, the research topic was introduced to board members and managers of these parks to ask for company recommendations, which were particularly considered. In the next step, 30 startups were cold called and e-mailed and asked if they engage in user innovation. Those startups that showed interest in the study and agreed to contribute were interviewed. The first case study was meant as a pilot and minor adjustments were made on the interview guide afterwards. Nevertheless, the first case study is included in the findings as well, as it contributed valuable insights. Eventually, six Swedish high-tech startups were included in this research (cf. Table 3.1) that fulfilled the three criteria described above. All of the interviewees have experience with high-tech startups, participate in the user innovation process, and are located in the Swedish region

of Skåne. Given that startups generally have a small size, we made sure to get the best possible interviewee. In 90 percent of the cases the founder or a senior level employee was interviewed. For Startup Gamma two managers participated in the interview. Interview participants wished to stay anonymous, so pseudonyms in the form of a letter from the Greek alphabet were given to them.

After conducting the interviews with the startups, we decided to reach out to startup incubators to complement our findings. The interviews with the startup founders and managers revealed varied views on user innovation and some of the findings conflicted with the existing literature explored in the literature review. To discover potential biases among the entrepreneurs, we complemented the findings with the incubator view. Incubators are an integral part of the startup ecosystem, as they support the growth of new ventures and give advice on their innovation processes (Hausberg & Korreck, 2018). Therefore, their viewpoint was deemed another source of verification for this research, as they present a broader outsider's view on startups while still being experienced and involved in innovation processes of startups. We contacted several startup incubators which fulfilled the three selection criteria. We received responses from a business coach, a business consultant, and a senior user experience researcher employed at three different incubators in the Skåne region (cf. Table 3.2).

Table 3.1 Participating Startups

Firm	Interviewee's Position	Company	Number of Employees	Founding Year
Alpha	Founder/ CTO	Startup	50	2012
Beta	Founder	Startup	3	2015
Gamma	Founder & Head of Sales	Startup	13	2013
Delta	Head of Operations	Startup	9	2015
Epsilon	Founder	Startup	10	2016
Zeta	Senior Design Researcher	Startup	53	2014

Table 3.2 Participating Incubators

Firm	Interviewee's Position	Company
Eta	Senior UX Researcher	Incubator
Theta	Business Coach	Incubator
Iota	Business Consultant	Incubator

3.3 Data Collection Method

The data collection section helps to identify the plan and procedures for the research regarding the collection and analysis of data (Creswell, 2012). The qualitative approach makes use of data collection techniques such as interviews, and data analysis procedures such as categorizing data, to generate non-numerical values (Saunders et al. 2009). As the purpose of the research aims at uncovering non-numerical values, such as processes, characteristics and selection criteria, the qualitative data collection technique is adopted.

Case studies are characterized using multiple data sources, a strategy which also enhances data credibility (Yin, 2003). For this thesis, we collected two types of data: secondary and primary. Both data collection methods will be described in more detail as follows.

3.3.1 Secondary Data

Secondary data includes both raw data, which undergoes little processing, or compiled data, which has received some form of selection or summarizing (Kervin, 1999). To collect the data necessary for the case study, this paper made use of compiled data in the form of published journals, books, and articles, to build and structure the frame of reference. Based on this, a literature review was conducted to discover gaps within the theoretical field of user innovation and better understand the main theoretical concepts underlying the research purpose.

The platforms we used to search for peer-reviewed articles were Web of Science, LUB Search, and Google Scholar. Von Hippel's extensive work on user innovation was used as a starting point to understand the field, after which several other notable authors were incorporated. Articles were selected based on the number of citations (Easterby-Smith et al. 2015). We also paid close attention to incorporate conflicting views within the field in order to decrease the level of confirmation bias (Easterby-Smith et al. 2015). Moreover, the company databases of Malmö Startups, Minc, and Ideon, as well as company websites, were used to find supplementary information about the selected case companies.

3.3.2 Primary Data

The primary data was collected via qualitative semi-structured interviews and was used for the findings and discussion. The interview type and process is discussed in the following sections.

Interview Type

There are three types of interviews: highly structured (used for market research), semi-structured (used for guided but open research), and unstructured (used for ethnographic research) (Easterby-Smith et al. 2015). In order to obtain descriptive and personable answers, the primary data for the case study was collected by means of semi-structured interviews. Our research made use of semi-structured interviews to "understand the meanings that interviewees attach to issues and situations in contexts that are not structured in advance by the researcher" (Easterby-Smith et al. 2015, p. 140). This type of interview calls for an interview guide, however, follow up questions can be asked, further developing the results (Easterby-Smith et al. 2015).

Sampling Method

In order to select the participants for the case study, a non-probability sampling method was used because the probability of any member selected for the sample could not be calculated (Easterby-Smith et al. 2015). Moreover, for case study research, the probability of the selected sample is often not relevant for addressing the research question (Saunders et al. 2009). The sample for this research was selected based on our subjective judgment and application of the three criteria (cf. 3.2.2) (Saunders et al. 2009). However, although using a non-probability sample allowed us the freedom to select a sample closely tied to the research

question, we were aware that non-probability sampling is subject to bias, and that it was of utmost importance to ensure that the sample represented the larger group from which it was drawn (Easterby-Smith et al. 2015).

There are several types of non-probability sampling (Saunders et al. 2009). We chose purposive sampling because the sample size was relatively small and individual cases were not difficult to identify (Saunders et al. 2009). We identified the criteria needed for the sample prior to the selection process and proceeded to approach potential sample members to affirm whether they met the criteria or not. The six selected case studies, the three supporting incubator interviewees, as well as the selection criteria can be found in more detail in section 3.2.2.

Interview Preparation

All interviews were conducted individually and in-person at the meeting place of choice by the interviewee in Malmö or Lund, Sweden. This was to ensure that the interviewees felt comfortable and relaxed in an environment that they were familiar with (Easterby-Smith et al. 2015).

The interviews took between 45-60 minutes to conduct. Prior to conducting the interview, all interviewees are asked whether they consented to recording the interview and whether they chose to be anonymous within the research (Easterby-Smith et al. 2015). All firms had the chance to review the analysis for their firm before the final submission of the thesis, validating the findings. In accordance with Easterby-Smith et al. (2015), all interview recordings are named, filed, and safely stored. Whilst still in the interviewing phase, we conducted an initial analysis of the data, in order to identify patterns, and iteratively adjust or clarify questions for newly detected patterns.

We made a conscious effort to listen and to refrain from projecting our opinions into the situation (Charmaz, 2014). Moreover, if something was not clear, we made sure to summarize and present what had been said, in order to seek clarification of the situation (Easterby-Smith et al. 2015).

Topic Guide

Because semi-structured interviews were conducted, a topic guide rather than an interview guide was used for the purpose of this research (Easterby-Smith et al. 2015). Topic guides are

more common for less structured interviews, where questions are predetermined, but the order of the questions may vary for each interview (Easterby-Smith et al. 2015). This flexibility allowed the interviewees to address the questions in a natural pattern to them, one in which they felt comfortable in. As the interviews were conducted, one of us assumed the role of the questioner and stimulated the conversation, whilst the other assumed the role of an active listener and ensured that all questions from the topic guide had been addressed.

The topic guide for the case study startups was made up of ten main questions, plus an additional nine follow-up questions which were only asked if the interviewee required more guidance to address the respective main questions (cf. Appendix C). The topic guide for the incubator interviews was made up of ten questions (cf. Appendix D).

In alignment with the purpose of our research, we based our predetermined questions on ideal and interpreting questions, as well as *how, what, when*, and *who* questions. Appendix B exemplifies the connection between literature review, research question, and interview question.

3.4 Data Analysis

The grounded analysis approach was chosen, as the aim of the research is to derive structure and an understanding from the vast amount of collected data in order to find themes and patterns (Easterby-Smith et al. 2015). We engaged in a research cycle, which means to alternate between the data collection and the data analysis, in order to refine our search for the most relevant findings within user innovation in startups (Easterby-Smith et al. 2015). The following sections consist of the four steps taken to analyze the data: summarize, categorize, into dimensions, coding, and conceptualization.

3.4.1 Summarize

The first step of the data analysis was to transcribe the audio recordings of the interviews into written text (digital copies and transcripts of the interviews are available upon request). As a result of the six case study interviews and incubator interviews, over 450 minutes of compiled empirical data was collected and transcribed into individual word documents. As is indicated by Saunders et al. (2009) and Williamson (2002) qualitative research can produce large

amounts of data, and it is crucial to keep said data concise and organized.

3.4.2 Categorize into Dimensions

In the categorizing stage, the transcribed data was fragmented to further the process of the analysis (Saunders et al. 2009). Categorizing involves developing categories and attaching meaningful chunks of data to them in order to recognize relationships within the data (Saunders et al. 2009). The five categories were derived from the dimensions used in the conceptual framework (cf. Appendix B). Therefore, the selected categories will be referred to as the five dimensions from here on. The dimensions are as follows:

- Motives for user innovation
- Barriers to user innovation
- User innovation methods
- Selection criteria for users
- Timing of user innovation

All the transcribed data from the six case companies and the three incubators were attached to the five dimensions in a highly organized fashion, using an excel spreadsheet.

3.4.3 Open Coding

Open coding entails attaching a word or phrase to a piece of data, which summarizes the meaning of that piece of data (Easterby-Smith et al. 2015). Codes create a link between the large amount of data and the more systematic categories (Easterby-Smith et al. 2015). We attached codes to every quote under the dimensions. For example, within the first dimension ‘motives for user innovation’, codes such as ‘reduce the risk of investment’ and ‘feedback’ emerged amongst many others.

3.4.4 Conceptualization

In the conceptualization stage we began to discover similarities and differences amongst the codes, as well as correspondence and causation (Easterby-Smith et al. 2015). For each respective dimension we lined up the codes and ensured that different words had not been used to explain the same concept. We tried to keep the codes as informative and simple as

possible, but readdressed the original transcriptions to ensure that we had not overlooked any quotes. To establish the most significant codes for each respective dimension, we applied a ranking system. For each dimension, and each code, we noted how many of the six case companies and how many of the three incubators mentioned the codes. Through this ranking process we were able to see which categories were the most mentioned and therefore most relevant to be included into our analysis. The number of incubators who mentioned the codes were used as a gage against the case companies, however, did not drive the selection process. In the last stage of the data analysis process we compared and contrasted our significant codes with the existing literature on user innovation. We also looked at the emerging concepts, which were deemed significant by the case companies, but do not appear in existing user innovation literature.

3.5 Research Quality

It is frequently discussed if validity and reliability are appropriate criteria to assess the research quality for qualitative research. Scholars argue that these criteria are a better fit for quantitative research because qualitative research does not aim at revealing one reality, but numerous truths (Bryman & Bell, 2015). Although the constructionist epistemology is "less concerned with issues of validity and more concerned with providing a rich picture of life and behavior in organizations or groups" (Easterby-Smith et al. 2015, p. 90), we believe that an adjusted form of these two criteria is still useful for research quality assessment.

3.5.1 Validity

In order to validate the conclusions drawn from the research findings, we evaluate the internal and external validity, and neglect measurement validity. The latter is per definition more essential for quantitative research (Bryman & Bell, 2015), since proving the correct application of operational measures is difficult for case studies that are based on researcher subjectivity (Yin, 2014).

Internal validity confirms whether observations in the case studies match the proposed theories developed (Bryman & Bell, 2015). Since our study is of an exploratory nature, and we do not establish causal relationships between conditions, assessing the internal validity is

challenging (Yin, 2015). We acknowledge that full objectivity is hard to be achieved in business research (Bryman & Bell, 2015). But we increase the credibility by (1) attending all interviews in person to clarify statements immediately, (2) attending all interviews with two researchers to increase understanding and improve the quality of follow-up questions, (3) meeting all interviewees in their natural work environment to improve the quality of observational findings, (4) recording and transcribing all interviews to revise findings based on actual words used by the interviewees instead of first interpretations established during the interview. All interviews were conducted in English, despite the mother tongue of the interviewees being Swedish. However, we have a native English and Swedish speaker on the research team who could help translate English concepts into Swedish. In addition, we are aware that there could be rival explanations and biases as a result of the founders' overconfidence. Therefore, incubators were included to increase verification.

External validity defines the "degree to which findings can be generalized across social settings" (Bryman & Bell, 2015, p. 400). It is acknowledged that multiple case studies are problematic to generalize (Bryman & Bell, 2015) because they represent several separate experiments, rather than one sample (Yin, 2014). We increase the external validity by choosing high-tech organizations located in the same region that face similar conditions in their initial years and therefore can be more easily generalized. Lastly, we follow Yin's (2014) advice and highlight any contradictions found during the empirical research conflicting with initial propositions for revision.

3.5.2 Reliability

External reliability refers to the degree of repeatability of the study and the probability that the same approach leads to the same results (Bryman & Bell, 2015). When replicating a qualitative study, it is recommended to adopt a similar social role to that of the original researcher (Bryman & Bell, 2015). Our social role when conducting the interviews was that of students, so future researchers may receive different answers if they are not students, e.g. if they are perceived as competition by the startups.

Factors that could influence the repeatability of this research lie in the nature of the startup. A case study usually examines a company over a period of time (Easterby-Smith et al. 2015), but our case companies have only existed for a few years, so observation over a longer period of time was not possible. Furthermore, startups experience a high employee turnover (Löfsten

& Lindelöf, 2002), so findings could also change depending on the participant. We mainly interviewed founders, but some of our interviewees have not been with the company for a long period of time, which may limit their knowledge about the development of the company.

In order to increase the reliability of this study, we have extensively described our research approach step-by-step and documented all phases of this research, especially the empirically collected data, for future replication. The conceptual framework clearly illustrates how our research dimensions derive from the literature review and research gaps. Furthermore, the methodology clearly explains how we selected the case companies and conducted the interviews. Lastly, we provide a comprehensive summary of our discussion, so that readers can follow the conclusions we draw and easily test the propositions themselves.

4 Empirical Findings and Discussion

In this chapter, we analyze the results for the five dimensions from the conceptual framework, namely the motives, barriers, methods, selection criteria, and timing of user innovation. Dimensions one and two analyze why startups integrate users in their innovation process, while dimensions three, four, and five analyze how startups incorporate users (cf. section 2.5). As described in the methodology, this research does not strive for a comparison of the startup and incubator views; the perspective of the incubator is used to explain and verify the answers of the startups, especially for those topics where startup views vary significantly from one other or from existing research.

In the following sections, we approach each of the five dimensions separately by first describing the findings from the interviews and incorporating exemplifying quotes. Then, we split up the discussion section for each dimension to improve the readability. Finally, we conclude this chapter by providing a concise summary of the principle implications from the discussions and provide answers to the research questions.

4.1 Dimension 1: Motives for User Innovation

The first dimension analyzes why startups integrate users in their innovation process, i.e. the motives for user innovation. The existing literature discusses five general motives for user innovation (cf. section 2.3.1): (1) users are experts in using a product and have better insight regarding their needs and problems (Baldwin & Von Hippel, 2011; Lilien et al. 2002; Schilling, 2017; Schweisfurth, 2017; Von Hippel, 2005a; Von Hippel, 2017), (2) user innovation is more efficient and productive than in-house innovation (Hienerth et al. 2014; Herstatt & Von Hippel, 1992), (3) users are a valuable source of feedback, (4) users contribute to radical innovations (Bogers et al. 2010; Chatterji & Fabrizio, 2004; Ogawa & Piller, 2006; Von Hippel et al. 2012), and (5) users stimulate an iterative process of alignment (Thomke & Von Hippel, 2002).

We outline the most important and robust motives stated by the case companies, i.e. motives that were indicated by at least four out of six startups. Table 4.1 below provides an overview of the seven highest ranked motives. All motives capture different aspects of user innovation and are hence discussed as separate categories. However, it should be acknowledged that the motives are not mutually exclusive and can overlap in some regards. For instance, getting inspiration from the users can also help the startup identify user needs and problems. The following findings section describes these motives, while the discussion section compares the findings to existing literature review.

Table 4.1 Motives for User Innovation

Motives stated by interviewees	Number of startups that mentioned the motive	Number of incubators that mentioned the motive
Identify user needs	5	2
Achieve alignment	4	3
Reduce risk of investment	4	3
Gain feedback	4	2
Ensure sales	4	2
Identify problems	4	1
Get inspiration	4	0

4.1.1 Findings

Identify User Needs

Five out of six case companies confirmed that they collaborate with users to identify their needs, which is the most prominent reason for startups to integrate user innovators. The needs are identified by communicating with users and asking them "what features they like, what features they do not like" (Startup Delta, interview, 10 April 2018). Another option is to observe "how they behave" (Startup Gamma, interview, 9 April 2018) or how they use a product, and draw conclusions from their behavior on user needs. The incubator view is in alignment with the startups on this motive.

> *"We use users as a means to identify the needs and the problems [...]."* (Startup Zeta, interview, 9 April 2018)

Achieve Alignment

Four out of six startups stated that achieving alignment between the firm and user is a reason for user innovation. By integrating users and communicating closely with them, startups aim at aligning their product ideas with the users' needs to ensure that there is demand. They aim at understanding what drives the user because this is essential to make sure that they take the right direction and provide solutions that are a fit to the user's problems.

> *"We want to have a close communication with the customers to figure out what their road-map is, and how we should align our road-map to make sure we can deliver the things that they want [...]."* (Startup Alpha, interview, 17 April 2018)

The incubators confirm the importance of this motive and highlight that it is especially relevant for startups. Compared to mature firms, startups "run out of time, meaning they run out of money" (Incubator Eta, interview, 12 April 2018) because if they do not sell sufficient quantities of a viable product, they will not be profitable. But they can only start selling a product, if they offer a product, which there is a market for, i.e. if the product reaches out to users who are willing to buy it. Therefore, startups have to manage the alignment of their product with market demands and needs.

Reduce Risk of Investment

Four startups found that user innovation gives them the chance to make an early assessment of a product idea, based on the user's feedback and willingness to buy the product, and therefore reduces the risk of investment. One startup admitted the following:

> *"We speculate a lot and guesstimate, that's what we do. We say that people will really want this feature, but we have no clue."* (Startup Delta, interview, 10 April 2018)

Thus, startups reduce assumptions about user needs by getting to know the user and obtaining verification from them. More importantly, using users can reduce the risk of investing resources in developing inventions that are not wanted by the market. The process from generating an idea to selling the actual product can be lengthy. During this time startups rely on alternative forms of funding rather than profits from sales. Therefore, the startups agreed

that they increase the chance that their product will succeed by involving users in order to invest their resources wisely. This argument was strongly supported by all incubators.

> *"You try to build as few proof of concepts as you can because it's so resource intensive. [...] Taking something from an idea to showing up at the firm's doorstep, can take up to 5 years. So without knowing if we can actually sell it to customers in the end is a huge risk and investment, so we need to know that customers want what we are making."* (Startup Alpha, interview, 17 April 2018)

Gain Feedback

Four out of six startups agreed that the opportunity to receive feedback from the user is a significant motive for them to integrate users, as feedback confirms if the product is received the way it is supposed to. The feedback process may entail several iterations. The volume of feedback is also used as an indication for prioritization: for instance, startups tackle the problems which are most often mentioned by users first:

> *"We release a feature, get their [the users'] feedback, and steer the backlog depending on their request."* (Startup Gamma, interview, 9 April 2018)

Thus, communication in both directions is essential for obtaining valuable feedback. However, in the startups' opinion, a prototype, beta version, or minimal viable product has to be presented to the users in order for them to give concrete feedback because they claimed that users are not necessarily aware of what they want and they cannot give feedback on something intangible. While the incubators also highlighted the importance of feedback, they emphasize that it is more important to obtain the first user feedback early on, even before a prototype exists, because it costs financial and human resources to design prototypes and both resources are crucial to startups:

> *"You have to talk to the user [...] as soon as you can, even when it's still an idea [...]. Because [...] you are going to spend a lot of time and money and you are going to create something and no one will want it."* (Incubator Eta, interview, 12 April 2018)

Ensure Sales

Four out of six startups viewed user innovation as part of their sales efforts because if a user says, "if only you had this, we would buy" (Startup Alpha, interview, 17 April 2018) then startups can be sure that there is a market for their business idea. Some startups use the online

platform ‘Kickstarter’ to present their idea to an audience, receive feedback, and test how many potential users commit to buying the product, and thus help fund the project. Kickstarter is described as a “good way of [...] seeing if the product flies” (Startup Delta, interview, 10 April 2018), and hence an efficient tool to get users to confirm the business idea. Furthermore, if sales stagnate, users can provide valuable feedback explaining why they do not want to buy the product.

> *“Because if we don't have any customers then we won't sell anything. [...] if we don't know what the customer wants, our market fit or our market strategy won't work.”* (Startup Delta, interview 10 April 2018)

Two of the incubators emphasized that sales are crucial for startups to succeed. User feedback is a way of predicting sales because it ensures that startups have a customer who is interested in buying their product, potentially even before the product is on the market. However, many startups fail at collecting these “real facts” (Incubator Theta, interview, 19 April 2018) when doing research.

> *“The business part is really simple, you have to make more money than you pay, otherwise your business will fail. [...] if they [the startups] can make customer driven projects then they will succeed.”* (Incubator Theta, interview, 19 April 2018)

Knowing that there is a customer also facilitates financing the production. For instance, it is easier to convince creditors if the startup can deliver a verified business plan with confirmed customers. Nevertheless, Incubator Eta (interview, 12 April 2018) highlighted that involving users does not guarantee that the startup has a customer in the end because the success of a business depends on several factors, but it increases their chances.

Identify Problems

Users help startups to identify problems users experience in life. This view was supported by four out of six startups. The case companies explained that users might not know what they want and sometimes they work on inventions which users have not seen or experienced before. Then they “do not even know what they should use it for” (Startup Gamma, interview, 9 April 2018) and hence struggle to contribute concrete ideas. But by listening to the users’ thoughts on what they *think* they want, startups can get inspiration for their underlying problems and hence create a solution to this problem the users “see a value for” (Startup Gamma, interview, 9 April 2018).

> *"We tried figuring out what their pains were and if those pains matched with the ideas that we had."* (Startup Epsilon, interview, 13 April 2018)

Get Inspiration

Four startups pointed out that users inspire them. They acknowledged that users have better insight and therefore better ideas than producers because they are the ones who use the product, not the ones who sell the product. Users are "experts in their own lives" (Startup Zeta, interview 9 April 2018), and an inspiration for market requirements because they are inspired by their surroundings and problems experienced in everyday life. According to Startup Alpha (interview, 17 April 2018) users can sometimes become a mediator of existing ideas, as they bring forward features which they have experienced somewhere else but were not satisfied with. Startup Beta (interview, 13 April 2018) added that users had been an important source of inspiration in times of stagnation and stimulated a re-launch. However, startups emphasize that users do not necessarily inspire them with a concrete idea of a product, but rather deliver inspirations to improve the existing product:

> *"We know where we want to go, so the users may help us choose the road of getting there, but they don't help us choose the end goal."* (Startup Delta, interview, 18 April 2018)

In summary, seven motives explain why startups integrate users in their innovation process. They mainly collaborate with users to identify user needs and align the business idea with the user demand. Therefore, they ensure sales and are a means to assess business opportunities early and therefore reduce the risk of making inefficient investments. Furthermore, startups consider users a valuable source of feedback. Finally, user innovation enables startups to identify problems users seek solutions for by using the user's better insight as a source of inspiration.

4.1.2 Discussion

The findings give an indication of the motives of user innovation in a startup context, which partly differs from existing research focusing on mature firms.

Three of the motives described in existing literature were confirmed by the case companies. First, they involve users to collect feedback on their product (Bogers et al. 2010; Chatterji & Fabrizio, 2004). This feedback inspires startups and helps them identify user needs and

problems because users are experts in using products and have better insight (Baldwin & Von Hippel, 2011; Lilien et al. 2002; Schilling, 2017; Schweisfurth, 2017; Von Hippel, 2005a; Von Hippel, 2017). Thus, startups emphasize that users are not integrated to co-create or to provide inspiration for initial product ideas because they think that they already have this innovation capability in-house. Instead users provide inspiration for the problems they face in life. Furthermore, startups integrate users to make sure that their innovation strategy and business ideas are aligned with the user demands. This step is crucial to startups, as they are usually in the process of defining their target market (Katila & Shane, 2005; Lin et al. 2010; Löfsten & Lindelöf, 2002), so they have to ensure that there is a market for their business idea.

Two motives described by existing research are not applicable to startups. While existing research states that users improve the efficiency and productivity of the firm's innovation process (Herstatt & Von Hippel, 1992; Hienerth et al. 2014), none of the startups mentioned this connection. They seem to feel more efficient when innovating in-house due to several barriers they relate with user innovation, which are analyzed in-depth in the second dimension. Another reason could be that startup founders have not fully developed the managerial skills necessary to organize for user innovation in an efficient way (Freeman & Engel, 2007). Moreover, in contrast to literature which states that users contribute to radical innovations (Bogers et al. 2010; Chatterji & Fabrizio, 2004; Ogawa & Piller, 2006; Von Hippel et al. 2012), the results showed that startups rather utilize users for incremental improvements on existing products. This finding is particularly surprising since tech startups usually innovate around radical inventions and rely on groundbreaking ideas (Still, 2017).

The case companies revealed two additional motives, which are not mentioned in the literature, presumably because they are especially crucial for, and specific to startups. User innovation ensures sales and reduces the risk of investment, which is important for startups because they face a higher risk of failure (Freeman & Engel, 2007). They are at a critical stage of their life cycle and have a determined period of time available to make the product fly. While mature firms use the return from their established product portfolio to cross-finance their new innovations, startups rely on other sources of funding during the time that they do not make a profit. During this time, they can only rely on validation from the user to make sure that potential buyers are interested in the business idea. High-tech startups with short product life cycles must be particularly fast at meeting the user's demand (Löfsten &

Lindelöf, 2002; Ruokolainen & Igel, 2004) to ensure sales and exploit their product idea before it becomes obsolete. Therefore, startups need to utilize every source available, i.e. the user, to reduce this risk, avoid wasting resources, and ensure profit from sales.

4.2 Dimension 2: Barriers to User Innovation

The second dimension analyzes why startups may *not* integrate users into their innovation process, i.e. the barriers to user innovation. Existing literature discusses the following barriers to user innovation: (1) aligning user ideas with the firm's strategy, (2) protecting user ideas, (3) the cost of user innovation, (4) the firm's corporate culture, and (5) identifying user innovators (Lilien et al. 2002; Morrison et al. 2000; Olson & Bakke, 2001). However, the aforementioned barriers strongly focus on mature firms, despite scholars recognizing that different firm types experience strategic differences (Katila et al. 2012). Although there is limited research exploring the barriers to user innovation within startups, there does exist literature on general challenges startups face, which are: (1) limited resources, (2) switching costs, (3) fewer experienced employees, (4) limited brand awareness, and (5) an individualistic startup culture (Cho et al. 1998; Denis, 2004; Freeman & Engel, 2007; Katila et al. 2012; Shane & Stuart, 2002).

All the case companies confirmed that they experience multiple barriers with regards to user innovation. Four barriers emerged from the data as the most important for startups: lack of resources, excessive amount of user ideas, inability to deliver on ideas, and conflict between the present user demand and the future need (cf. Table 4.2 below). The barriers will be explained in the following findings section and compared to existing literature in the discussion section.

Table 4.2 Barriers to User Innovation

Barriers stated by interviewees	Number of startups that mentioned the barrier	Number of incubators that mentioned the barrier
Lack of resources	4	3
Excessive number of user ideas	4	1
Cannot deliver user idea	4	0
Present user demand vs. future need	4	0

4.2.1 Findings

Lack of Resources

Four of the case companies pointed at a lack of resources as one of the main barriers to user innovation within startups. By lack of resources the case companies meant that they do not possess enough time and money within their firm to function effectively and reap the rewards of user innovation. Not only did they refer to a lack of time when it came to interpret the results of user innovation, i.e. analyzing the data they collected from users, but they also struggled with having enough time to train employees in the skills of engaging in user innovation, e.g. how to conduct focus groups. The case companies emphasized that half of the challenge lies in conducting the user innovation research, and the other half, which is often overlooked, lies in understanding and applying the user innovation results.

> *"I think the biggest cost for a startup is time. We are specialists in some areas, and if we can't hire a new person to figure out a new area then we have to train ourselves to do it. And that takes time and we don't have the time. Time is money."* (Startup Delta, interview, 10 April 2018)

Time was verified as the main resource deficiency for startups by all the incubators. They emphasized the difficulty for startups to collect, analyze, and verify user data. However, one incubator stated that startups also have a tendency to waste time, particularly within their marketing efforts. According to the incubators, a startup's fear of social connection with the user can cause it to rely on socially detached communication channels such as emails, over

connected communication channels such as telephone or personal contact, which leads to delayed feedback.

> *"Email marketing and social media platforms are a good way of reaching out to lots of people, but it is time consuming. Because they [startups] send an email and then they wait. So, they send another one. And maybe someone responds, but only with a question. So, this could easily be avoided by calling them up. [...] But the barrier of connecting socially with people is a hard one."* (Incubator Theta, interview, 19 April 2018)

A lack of financial resources was also mentioned as a barrier and the connection was made that wasting time means wasting money.

> *"Our largest competitor has a team of 400 users that continually come in and test their products and make sure that they are good. [...] If we would hire 400 people it would cost a lot of money. So, we try to do our research as cost effectively as we can." (Startup Alpha, interview, 17 April 2018)*

Excessive Number of User Ideas

Four of the case companies stated that users produce an excessive number of ideas. The case companies expressed that they can receive hundreds of ideas from users, which they struggle to filter through to select the ones which align with the firm. It is interesting to note that the solution the case companies provided for this barrier was to rely on what they personally thought made sense, i.e. their gut feeling, when filtering through the ideas.

> *"We always have too many ideas. We have an excel sheet of all the ideas that we are trying to do, and there are usually at least 100 ideas on that spreadsheet. We typically have two to three active investigations ongoing. We would like to have ten, but it is not possible."* (Startup Alpha, interview, 17 April 2018)

Cannot Deliver User Idea

Four of the case companies felt that they cannot always incorporate the user's ideas and deliver what the user has suggested or asked for. Some participants felt this was particularly worrisome when working with user innovator firms, as they expressed a fear of losing the firm as a strategic partner if they did not incorporate their ideas. Other participants referred to

conflicting views amongst user innovators and being unsure of which ideas to pursue, as they could not deliver all ideas.

> *"You always want to do what the user wants, but sometimes you can't. You have to be able to keep up with their demands, and we only have six developers, so we can't do that."* (Startup Gamma, interview, 9 April 2018)

Present User Demand vs. Future Need

An interesting barrier that emerged from the findings is that high-tech startups struggle to get the users to understand and contribute to their innovation process because the startups can be far ahead of the market. The case companies expressed that some users do not understand the problem that their product can solve because the users have not yet experienced that problem.

> *"We are much further ahead of the market. So, it is kind of difficult to follow what the market thinks or says."* (Startup Alpha, interview, 17 April 2018)

Moreover, the participants expressed that because they innovate ahead of the market it can be difficult for users to provide feedback for situations they do not fully grasp. Often user ideas are coming from current needs rather than future needs.

> *"It's less useful to ask users hypothetical questions for things they haven't experienced. Because then you're asking them to guess and they could be right or they could be wrong. [...] If I ask you how it is to fly a plane and you've never done it before, then you can't help me, you could hypothesize what it would be like."* (Startup Zeta, interview, 9 April 2018)

In brief, the case companies point at four main barriers to user innovation within startups: a lack of resources to engage in user innovation, an excessive number of resulting user ideas, the inability to always deliver user ideas, and lastly, getting users to understand and contribute to the future needs that the firms aim to address. In the next section the results from the second dimension will be discussed in comparison to existing literature.

4.2.2 Discussion

When comparing the empirical findings with existing literature for user innovation barriers, we found that three of the barriers for startups align with existing literature: user innovation

generates too many ideas; startups have limited resources; and selecting users is a challenge (Lilien et al. 2002; Morrison et al. 2000; Olson & Bakke, 2001). The scholars argue that firms spend more time organizing for user innovation than on managing in-house innovations and that this is a trade-off scenario (Lilien et al. 2002; Olson & Bakke, 2001). This is because user innovation requires more resources to pay employees to engage in the process, as well as to train users in how to effectively participate (Lilien et al. 2002; Olson & Bakke, 2001). The results show that startups hardly have the resources to train their employees to engage in user innovation, and they spend a great deal of time analyzing the excessive number of ideas to strategically align the results with the firm.

Moreover, the focus by the startups, incubators, and literature on the financial and time restraints of user innovation suggests that startups should only involve users if they are prepared to manage the resulting data. This is an interesting finding as both the empirical results and the existing literature highlight that the barrier to user innovation is not a lack of idea generation, it is rather an excessive amount of idea generation. This points at a weakness within the user innovation process; users are excessively engaged in contributing their ideas, but startups do not have the resources to manage the flow of ideas. Perhaps the solution lies in incorporating more user support within multiple stages of the innovation process to effectively use the user to help with user idea management. The difficulty of identifying and selecting users was also mentioned as a barrier to user innovation by the startups and within literature (Morrison et al. 2000). However, this barrier is explored in more detail in dimension four ‘Selection Criteria’ (cf. section 4.4).

Although the literature aligns with the empirical results for the above-mentioned barriers, one barrier mentioned in the literature was not supported by startups in the empirical results: patenting ideas. The literature emphasizes the challenge of patenting ideas generated by users (Lilien et al. 2002), however, we found that most startups do not even consider patenting user ideas. Several of the startups did not feel that they had any direct competitors within their market. Moreover, both the startups and the incubators expressed that it is better to collaborate with individuals external to the firm, as staying ahead of the market is a stronger position to be in than to obtain a patent, which is both financially burdening and time consuming to obtain.

When exploring the barriers of implementing users within startups some new results emerged from the data, which do not appear in current literature within the field. First, startups

expressed that a major barrier to engaging in user innovation is when users suggest ideas, which the startup cannot implement. If the user who is suggesting the idea is a powerful individual or a potential business partner, then the startup faces the risk of losing the individual as a partner if it does not implement the idea. This barrier is highly relevant for startups as their restricted resources force them to be more selective about their competitive moves than mature firms (Katila et al. 2012). Startups also rely on existing customers and partners to spread awareness and grow the startup's network (Ruokolainen & Igel, 2004). Therefore, startups engaging in user innovation do not just use it for idea generation, but they may also use it as a strategic tool for relationship and reputation management.

Another newly emerged barrier for high-tech startups is the challenge of involving users when the firm innovates ahead of the market. The startups said that because their market and products are novel, users often do not understand them and cannot provide feedback. Therefore, user innovation may be more difficult for high-tech startups to manage, unless they can discover ways to help the user understand the future needs they aim to meet. However, this barrier may also be a bias by the startups, as literature points out that the high-tech startup culture leads to employees assuming that their ideas are better than the users, hindering the implementation of user ideas (Olson & Bakke, 2001). The startups could possess this bias, but simply not reflect upon it, as it is difficult to identify one's own personal biases (Milkman et al. 2010).

4.3 Dimension 3: User Innovation Methods

The third dimension analyzes how startups integrate users strategically in their innovation process by particularly examining the methods they use. Existing literature introduces numerous strategic methods to integrate users, such as the lead user method (Franke, 2014; Lüthje & Herstatt, 2004), crowdsourcing (Franke, 2014; Füller et al. 2010; Von Hippel, 2005b), toolkits for user innovation (Franke 2014; Füller et al. 2010; Von Hippel, 1988; Von Hippel & Katz, 2002), lean startup (Blank 2013; Mueller & Thoring, 2012; Still, 2017), and design thinking (Gleasure & O'Riordan, 2016; Kimbell, 2011; Kleinsmann et al. 2017; Kolko, 2015). The interviewees did not name these methods explicitly when explaining how they integrate users. However, they did mention more general methods for user integration, such as user product interaction and user attachment prioritization, as presented in Table 4.3 and the

findings section below. However, some of the described ways were very similar to the concepts derived from existing research and are pointed out in the discussion section below.

Table 4.3 Methods of User Innovation

User innovation methods stated by interviewees	Number of startups that pursue this method	Number of incubators that recommend this method
User product interaction	6	2
Prioritize user attachment	5	1

4.3.1 Findings

User Product Interaction

To begin with, all startups emphasized that they do not follow specific strategies to integrate users, but rather innovate in-house, present the invention to the users, and hope they will like it, i.e. a trial and error strategy.

> *"Startups do not really follow a strategy […] We basically use trial and error, or learn by failing, and sometimes you get it right and it succeeds. We don't spend very much time with business models and literature, […] we just do stuff."* (Startup Delta, interview, 10 April 2018)

All interviewed startups agreed that they integrate the user in their innovation process by presenting a prototype or minimal viable product to the market and letting the user interact with it. They highlighted that it is an advantage for the startup if the user has a chance to interact with the product, especially if it is a new product the user has never experienced before, because they get a good feeling for the product and are able to give more precise feedback. The startups engage in discussions with the users, interview them in a comfortable environment, and observe how they interact with the product. One startup mentioned another method called 'think aloud', which means that they ask the user to speak up and share their thoughts while trying the product. Based on this feedback, they adjust and improve the product, and have users interact with it again until they are confident about their product.

> *"It's less useful to ask users hypothetical questions for things they haven't experienced. Because then you're asking them to guess and they could be right or they*

could be wrong. […] I would suggest that the user gets to see the product or feel the product and then gets asked questions." (Startup Zeta, interview, 9 April 2018)

Another interesting finding was brought up by Startup Beta (interview, 13 April 2018), who stated that they let users interact with the product as part of their PR strategy: they choose influencers or journalists to test and write about the product. This particular startup would rather send almost perfect products instead of prototypes to their users to make sure they have something positive to write about.

As described below, startups are highly convinced of the advantages of user interaction with the product. They stated that they receive the best user feedback if they are able to ask direct questions about the product instead of hypothetical questions about a product the user cannot experience. However, the incubators pointed out that startups have more options than basing their feedback on actual user interaction. If they take efforts in creating an environment for hypothetical thinking, startups can help users to see what they want, even if that demand is hypothetical. The strategy would be to create a future scenario for the user and make her see the end-solution the startup has in mind without spoon-feeding it to her.

"Yes [I would say that users know what they want, even if it is hypothetical]. If they get help to get to the conclusion that the startup already sees. And by doing that the user gives the startup a lot of information on stuff they may never have thought of, and they [startups] can use those, but they [startups] still have the end solution." (Startup Theta, interview, 19 April 2018)

Prioritize User Attachment

We explicitly asked the case companies for strategies to evaluate ideas from users. One strategy was stated by five startups: to prioritize the implementation of the ideas that have the strongest user attachment, i.e. those ideas the most users suggest or request. Startups constantly re-evaluate the priority list of ideas depending on user feedback.

"Typically innovations that have a customer attachment have priority over those where we don't see a clear customer need." (Startup Alpha, interview, 17 April 2018)

Startups use different tools to measure how many users request a feature. For instance, they can publish ideas for products on the crowdfunding platform Kickstarter, where they are able to view the reactions and suggestions of the user community. Moreover, Startup Epsilon

(interview, 9 April 2018) stated that they "strategically wait until they [the users] scream for the product" before they develop it to increase internal pressure and productivity. Furthermore, it is highlighted that ideas with a user attachment are easier to pitch internally:

> *"The internal ideas normally have a higher pay out, but with a lower chance of success. Which is why it's difficult to get them through an approval process. When it's fighting against something that the customer asked for that is a clear payback."* (Startup Alpha, interview, 17 April 2018)

In summary, most of the startups interviewed do not use specific methods for user innovation. However, two major strategies can be pointed out that explain how startups integrate users in their innovation process. First, startups let users interact with the product before starting feedback-adjustment-loops. Second, they use user feedback to prioritize their implementation and improvement steps.

4.3.2 Discussion

The major finding regarding the methods startups use to integrate users in their innovation process is that startups do not seem to make use of explicit user innovation methods. At least they do not use specific terms to describe their applied methods. The findings show that startups are not necessarily knowledgeable about what processes they use, as they have less structure, time, and business experience available. Nevertheless, the interviewees described two ways users are strategically integrated, which underline that startups integrate users to a limited extent. First, they prefer to let users interact with the product once a prototype or minimal viable product exists. However, this reveals that startups do not prefer to integrate users in earlier stages of the innovation process, which is further analyzed by the fifth dimension (cf. section 4.5). Second, startups utilize users as a form of rating, which determines how to organize the feedback-loop and how to prioritize suggestions for improvements and new features.

Some approaches of the concepts described by existing research are reflected by the methods mentioned by the startups. Just like startups prioritize among their users in order to find out which user attachment has the strongest weight; the lead user method suggests prioritizing among users that are future-thinkers and have the ability to influence their peers. Furthermore, startups use Kickstarter not only to fund their projects, but also as a crowdsourcing tool when

scanning through the feedback users leave on the platform. In addition, startups interview and observe users to identify their problems and needs, which is a simple form of design thinking, a solution-oriented approach.

Startups were convinced that users are only able to give valuable feedback if they interact with a nearly finished product, while the incubators highlighted that startups can create an innovative and practice-related environment for the user to be able to give feedback to hypothetical questions as well. One method introduced in the literature can help startups to overcome this challenge: toolkits for user innovation aim at providing the user with freedom and space to design a prototype without having a finished product at hand and can be one way of creating an environment for users to innovate with startups. Startups do let users interact with their products to start feedback loops and improve the invention step by step. The lean startup method follows the same principle, but suggests integrating the user much earlier, before the prototype is finished, to create continuous feedback loops throughout the whole innovation process and therefore ensure user-product-fit.

After exploring the general user integration methods startups use, the next two dimensions further examine how startups integrate users in the innovation process.

4.4 Dimension 4: Selection Criteria for Users

The fourth dimension analyzes how startups select user innovators to integrate into their innovation process. Existing literature discusses the following selection criteria for users: (1) experience, (2) volume, (3) diversity, (4) person-organization fit, (5) complementary team composition (Akgün et al. 2010; Arthur et al. 2006; Schreier et al. 2012). Moreover, existing literature recognizes the following personality traits as ones which firms looks for in user innovators: (1) open to experiences, (2) introverted, (3) conscious, and 4) and innovative (Schreier & Prügl, 2008; Stock et al. 2016; Zibarras et al. 2008).

It should be noted that neither the case companies nor the incubators put great emphasis on using selection criteria to identify users. Therefore, for this dimension, the limit of how many case companies have to mention a criterion is lowered from four case companies to a minimum of three (cf. Table 4.4). The following three criteria for selecting users were the most important: previous experience, demographics, and trust. Moreover, the following

personality traits were most valued in user innovators: communicative and curious. The following findings section describes the five criteria while the discussion section compares them to the criteria outlined in the literature review.

Table 4.4 Criteria for User Selection

User selection criteria stated by interviewees	Number of startups that mentioned the criteria	Number of incubators that mentioned the criteria
Selection criteria		
Previous experience	4	0
Trust	4	0
Demographics	3	0
Personality traits		
Communicative	4	0
Curious	3	0

4.4.1 Findings

Previous experience

Four of the case companies select users based on the previous experience of the user. They take the previous technological experience of the user into consideration and prefer individuals who "want to be heard and want to contribute" (Startup Zeta, interview, 9 April 2018). Users with previous technological experience are seen as vocal and confident in what they think future trends will be. However, a self-motivated interest by the user in the startup's products is also considered a form of previous experience, as the user has previous knowledge of the startup. A user who initiates contact with the case company is preferred to a user whom the case company has to contact.

> *"Also, it is much better to have someone who is interested in your products to discuss with, someone that comes to us, rather than calling 1000 people are trying to find one that is interested."* (Startup Gamma, interview, 9 April 2018)

The results also showed that the user innovator should have the intention of using the product not selling it; ergo, they made the distinction between end users and customers.

> *"So, people that want to use it not people that want to sell it. People that have a vision of what they would want their product to be."* (Startup Alpha, interview, 17 April 2018)

Trust

Four of the case companies select user innovators based on trust in the user or a close relationship with the user. When trust is established with the user then the relationship between the startup and the user can evolve. The user can be made privy to more classified information, which in most cases results in better feedback from the user. The user can also be involved in the innovation process earlier the sooner trust is established. The fear that the firm's idea will be stolen by a user is diminished with trust, ergo, building a stronger and healthier relationship with the user innovator, where they can even evolve to become strategic partners.

Trust in the user is also coupled with a close relationship with the user. Several of the case companies selected users based on how close their relationship with one another is. If the case company wanted to be able to physically meet with the user to evaluate how the user interacted with a prototype for example, then the case company preferred a close relationship with that user. Trust and a close relationship were also used as criteria to select users because then the case company could better understand the user's strengths and "*get to know the user's specialties*" (Startup Delta, interview, 10 April 2018). Some case companies preferred integrating friends and family, as they could easily receive constructive feedback. However, the most mentioned reason for using users based on a relation to them was to ensure that the user would engage in the innovation process more than one time, i.e. the case company would receive feedback iteratively. Moreover, by using friends and family as users the startup does not have to fear losing a potential customer and tarnishing their reputation if the product is unsatisfying.

> *"It's important to know the users you innovate with because it's easier. They know that the product you send them won't work, so they won't give you bad feedback about that the product is faulty, they will actually give you constructive criticism. And they will continue in the process, they will help you over a longer*

> *period of time, and not just one time. That's why it's easier to work with them if you know them, it's easier when you have rapport."* (Startup Delta, interview, 10 April 2018)

Demographics

Three of the case companies verified that they select user innovators based on demographics, more specifically, gender and age. The criteria for the demographic is decided upon based on either the user problem that needs to be explored or a product failure that needs to be solved.

> *"There are many people who want to participate, so the requirements for why I need the user will tell me who I need to pick. [...] I would filter and make sure I would only talk to those people. Same with age, and gender. It really depends on what the purpose of the study is."* (Startup Zeta, interview, 9 April 2018)

Moreover, some case companies emphasized the importance of using multiple demographics to increase the diversity amongst the user innovators. This was seen as particularly important when the case company itself was made up of a uniform group of individuals, such as white males in their late 20's with an engineering degree from Sweden (Startup Delta, interview, 10 April 2018). Including users from various demographics was seen as a way of including external views into the innovation process, however, the startups only stated that they wanted to do this, but had not yet done it.

Communicative

The case companies also look for specific personality traits when selecting users to innovate with. Four of the case companies valued a communicative user, who would be open, reflective, and enjoyed being heard. According to the case companies, these traits were seen as conducive to providing feedback. The case companies valued both positive and negative communication, as long as the user was verbal during the innovation process then it was seen as constructive feedback.

> *"I think it's a combination of different things. So, they [users] have to be very happy or very angry, they have to be motivated in some way. They have to want to talk about the product in some way, to vent.* " (Startup Zeta, interview, 9 April 2018)

Curious

Three of the case companies valued curiosity in their user innovators, particularly curiosity about technology and innovation. Often time the curiosity is driven by the user's desire to see the technology with their own eyes.

> *"We want the users to be curious, and kind of techy."* (Startup Delta, interview, 10 April 2018)

In summary, albeit limited, the case companies look for previous experience, trust and close relations, various demographics, communication, and curiosity when selecting users.

4.4.2 Discussion

When comparing the empirical findings with existing literature on selecting user innovators, we found that three of the criteria used by startups, namely experience, curiosity, and diversity align with the literature by Schreier et al. (2012) and Stock et al. (2016). Schreier et al. (2012) state that the user's familiarity with the firm's innovation processes and the product field has an impact on the innovation's success. According to the authors, the more technical the innovation is, the more advanced the user should be. In alignment with the literature, the findings show that startups seek users that have technological experience or a good understanding of their firm. However, despite that all the case companies operate within high-tech industries, they do not differentiate between the degrees of technological knowledge the user should have. The literature also highlights that more diversity within a user group increases the success of the innovation (Schreier et al. 2012). Startups use varying demographics, such as age and gender, to select user innovators they find appropriate for the purpose of their study. An interesting finding is that startups are aware that they want to increase the diversity of their users to counteract the degree of uniformity they have within their own companies. However, they have yet to discover how to best achieve this.

Overall, the personality traits of the user did not play a significant role in the selection process of users, however, the startups did mention that they look for open-minded and curious users (Stock et al. 2016). According to the literature, users who are open to new experiences should be used within the first phase of the innovation process, whilst other phases require different user traits (Stock et al. 2016). Startups do not attach different traits to different stages of the innovation process (Stock et al. 2016). One reason could be that startups mainly integrate

users in the later stages of the innovation process, and therefore do not differentiate between personality traits (c.f. section 4.5, Dimension 5).

It is interesting to note that the existing literature on user selection criteria is not only limited, but it is also minorly relevant to startups. For example, startups value diversity amongst users from a demographic standpoint; however, they do not look for complementary personality types when selecting users, as suggested by Akgün et al. (2010). Because of their limited resources (Freeman and Engel, 2007), startups arguably do not have the time to engage in the preparatory research required to understand the users' various personality traits. However, it is also plausible that startups simply do not require this information about the users in order to engage in effective user innovation. A debated topic within literature is using innovative users; some authors believe innovative users are more aware and take bigger risks (Schreier & Prügl, 2008), whilst other authors argue that innovative users can be arrogant, cautious, and perfectionists (Zibarras et al. 2008). Interestingly enough, startups do not mention innovativeness as a criterion for selecting users. This could be because it is very difficult to measure how innovative an individual is; to do so could require delving into the users past innovative projects as a screening process before selecting them. Startups do not have the time to engage in such a process.

The findings revealed that startups use two criteria for user selection, which are not prevalent in existing literature: trust as a selection criterion and that the user is communicative as a personality trait. Startups value trust with the users they integrate in their innovation process for many reasons: they can divulge classified information; the user can become a strategic partner who innovates with them over a longer period of time; they can physically meet the user and observe his or her behavior; they can better make use of the user's skills; and they can avoid losing customers or tarnishing their reputation if their product malfunctions, because a trusting user will have more patience and understanding. This finding may explain why startups generally do not put much thought and time into selecting users, namely because they prefer to involve the individuals, such as friends and family, whom they already know. This also ties into the personality trait startups prefer; a communicative user. Startups seek out users who will provide both positive and negative feedback and who are open and reflective. It could be argued that startups select friends, family, and partners to innovate with because these users can be more open with them and provide them with more constructive and consistent feedback.

4.5 Dimension 5: Timing of User Integration

The fifth dimension, timing of user integration, analyzes at what stage of the innovation process startups integrate users. As described in the literature review, the six stages of the innovation process are: (1) idea generation, (2) conception, (3) design, (4) prototyping, (5) testing, followed by (6) the implementation or launch of the new product (Acklin, 2010; Still, 2017; Thomke & Von Hippel, 2002). In the producer approach stages one through four are done in-house, without the involvement of users until stage five (Thomke & Von Hippel, 2002). However, Thomke and Von Hippel (2002) recommend a more user-centered approach by involving users much earlier, namely in stage two, three, and four.

All the case companies confirm that they include users at certain stages of the innovation process, however, the findings point at a slight variation in timing amongst them. The stages in which the case companies incorporate users are described in the findings section and these findings are compared to existing literature in the discussion section. Table 4.5 below presents an overview of the different stages of the user innovation process in the correct order and indicates the number of startups integrating users for each stage of the process as well as the number of incubators recommending integrating users for each stage.

Table 4.5 Stages of User Involvement

Stages of innovation process	Number of startups that integrate users at this stage	Number of incubators that recommend integrating users at this stage
Idea Generation	2	3
Conception	3	3
Design	3	3
Prototyping	0	3
Testing, incl. Testing-Design Loop	6	3
Implementation	1	3

4.5.1 Findings

Idea Generation

None of the startups aim at actively including users in the idea generation. However, two startups mentioned that they do engage with users at this stage of the innovation process, but rather randomly and alongside their own innovation efforts. For Startup Delta (interview, 10 April 2018) the user is automatically involved when they present their idea on the crowdfunding platform Kickstarter because users utilize the platform to leave comments with more specific product and feature ideas for the company. These ideas may be considered by the startup for the first prototype:

> *"We also get many product development ideas, so you have to filter through the ideas you get from users."* (Startup Beta, interview, 13 April 2018)

Conception - Design - Prototyping

Half of the startups engage with the user during the conception and design stages. At this stage, startups tend to integrate carefully selected lead users who are "experts within the field" (Startup Beta, interview, 13 April 2018) they innovate in or become "strategic partners [...] they want to work long-term with" (Startup Alpha, interview, 17 April 2018) so that the issue of intellectual property can be clarified by signing an agreement. At this point, startups aim at integrating users to understand their needs and talk about their experiences. It also involves talking hypothetically about the potential product and connecting it to previous experiences users may have had in other settings. Surprisingly, none of the startups integrate users at the prototyping stage.

> *"I think it's really important to involve users as early as possible and use them as one source of innovation. Part of the innovation should come from the users."* (Startup Zeta, interview 9 April 2018)

Testing incl. Testing-Design Loop

The most striking finding is that all of the interviewed startups agreed that they integrate users in the testing phase where firms carefully search for users to collect their input on ready-made prototypes. By engaging with the user, they try to find out if the quality is sufficient and if every feature works. The case companies pointed out that this stage is highly iterative as the product is improved and new features are added depending on the user feedback.

> *"We decided on what we were going to build. We iterated on that until we had an MVP [minimal viable product]. Then we launched that in Lund with [two users]. Five months later we had four more iterations of the product, and then we got our first paying customers."* (Startup Epsilon, interview, 13 April 2018)

Startup Zeta (interview, 9 April 2018) highlights one challenge they face with this stage:

> *"This process has to have a start and an end, otherwise it will never finish. In most things in life you are never done, you can always do more, so you have to make a decision, that this is enough."* (Startup Zeta, 9 April 2018)

As Early as Possible

The startups seemed to understand that involving the user at the testing stage is rather late and could potentially happen earlier. Two startups explicitly stated that they prefer to integrate users "as early as possible and use them as one source of innovation" (Startup Zeta, interview, 9 April 2018). But then again, the interviewees pointed out that it is difficult to collect proper feedback from users if the startup is not able to let them experience a prototype first.

> *"But you want to give the user a prototype or something physical to look at and give feedback on as early as possible, so it's a tricky situation. Involve them early but develop something first. We can't finish products and then go to users [...] we have to be able to change things along the way."* (Startup Zeta, interview, April 2018)

This challenge especially exists for tech startups because the innovation is so radical that most people cannot think as far ahead and imagine the product before they see a finished prototype. In contrast, the incubator's view stands out. As Table 4.5 illustrates, all three incubators strongly support user integration throughout all the stages of the innovation process. They have observed that startups "fail in selling the product" (Incubator Eta, interview 12 April 2018) if they do not focus on and integrate the user's view during all the stages. Incubator Iota (interview, 12 April 2018) further recommended startups to integrate the user "back and forth throughout the innovation process" and "include many iterative testing phases" to make sure that startups do not work on something "that is not wanted by the market". Furthermore, two of the three incubators did not see a challenge due to idea protection. They highlight that in most cases patenting, for instance, is costly and takes a long time; money and time they rather recommend investing in the innovation itself to be faster and better than the competition.

In summary, the majority of startups integrate users only in the testing stage of the user innovation process due to different challenges they face when integrating them at other stages. The incubator representatives do not advocate this approach, as they highly recommended integrating users throughout all stages of the innovation process.

4.5.2 Discussion

According to existing literature, the user approach aims at integrating users at all stages of the innovation process, which are idea generation, conception, design, prototyping, and testing (Acklin, 2010; Still, 2017; Thomke & Von Hippel, 2002). However, it was found that startups rather follow the producer approach (Thomke & Von Hippel, 2002) and mainly involve users at the testing stage to get feedback on prototypes, despite that previous research discusses that early integration minimizes costly trial and error loops during the testing phase (Thomke & Von Hippel, 2002). This is especially surprising since startups indicated that two of their main motives for integrating users are achieving alignment and reducing the risk of investment (cf. section 4.1). However, pursuing an idea through the conception, design and prototyping stage is cost-intensive. Without integrating users at these stages, startups are not able to make sure that their prototype will actually align with user needs. Consequently, they do not reduce the risk of investments spent on these stages. The alignment process begins when users start testing and giving feedback on the prototypes, but, if their input was not considered during the stages before, it is more likely that numerous loops are needed to align the product with the user needs. A negative consequence of this could be that the startup finds out that there is no demand during the testing stage and the investment was in vain.

Startups seem to be aware of this risk and the opportunity of integrating users earlier but point out a few challenges that hinder them to do so. However, we question if these challenges are a real, or only a perceived barrier. Since the incubators verify that the benefits of integrating users throughout all stages outweigh these challenges, we assume that the startups' view on this topic may be biased. For example, startups may be afraid of losing full credit for their invention and therefore do not want to risk including users earlier in the process.

4.6 Summary of the Discussions

This research explores why and how startups integrate users in their innovation process. Following, the discussions from all the dimensions are combined, for a final discussion across all the dimensions. We derived the following six propositions.

1. Integrating users in the innovation process aligns the startup with the user and reduces the risk of investment.

Our results indicate that startups integrate users to identify user needs and align the startups' innovation ideas with the users' demands. Startups believe that users are experts within their own lives, hence by involving them startups can identify problems users seek solutions for. Most notably, startups involve users to understand the problems that users encounter but do not involve users for their innovative product ideas or to co-create with them. Furthermore, startups claim to involve users to assess business opportunities early and therefore reduce the risk of making inefficient investments. By involving users the success or failure of a startup's business idea can be verified, ultimately ensuring future sales of the product. However, we find that these reasons for integrating users are not reflected by how startups integrate users, as further elaborated on below.

2. Startups perceive that their limited human and financial resources hinder the incorporation of users in the innovation process.

The literature claims that user innovation requires substantial resources to train users to engage in the innovation process. Startups in particular struggle to allocate the resources necessary to train internal employees to engage in the process. Startups believe that organizing for user innovation requires more financial and human resources than in-house innovation. Further, they may choose to not pursue user innovation due to the large number of user ideas it produces; particularly if the user suggests ideas based on current market trends whilst the startup aims to address complex future needs. The focus of the startups, incubators, and literature on the financial and human restraints of user innovation suggests that startups should only involve users if they are prepared to manage the resulting data. This exemplifies that users are excessively engaged in contributing their ideas, but startups do not have the resources to manage the flow of ideas. The limitation is therefore directly linked to how user innovation is implemented. Startups do not fully integrate the user into all stages of the

innovation process. The barriers they perceive to hinder them may be a result of improper execution of user integration. It is difficult to say if startups have experienced the full effect of successful user innovation if they thus far only implement it in one stage.

3. If an idea or project is backed by multiple users, then it is often prioritized over ideas which have not received user support.

Startups prioritize a user attachment to ideas or features when setting their action plan, i.e. they use the user as a method to structure the prioritization of their work. Ideas which are supported by multiple users are seen as having a guaranteed return on investment, as startups view those users as definite future customers. Moreover, ideas which are backed by multiple users are more likely to gain support amongst the internal startup team.

4. Startups believe that users need to interact with a product or prototype to participate in user innovation, and therefore mainly integrate the user in the testing stage of the innovation process.

Due to several perceived challenges of integrating users in other stages, startups mainly integrate users in the late testing stage of the user innovation process. Moreover, startups believe that users can only provide valuable feedback if they interact with prototypes, which falls under the testing stage. The existing literature and incubators stress the opposite approach; to integrate the user as early as possible, and at all stages of the innovation process. Startups could attempt to integrate users at all stages by adopting one of the methods mentioned in existing literature, e.g. toolkits for user innovation that enable users to develop a product within a certain frame or format. It can be argued that if implemented correctly, startups could create a situation where the user provides inspiration for the problem without having to understand the technical details of the product. This would not require a prototype, as the user would not need to see the product to answer leading questions about their needs.

5. Startups select users based on trust, but view user selection as a barrier to user innovation.

The process of selecting users is a barrier for startups to engage in user innovation. This may explain why selection criteria do not play a major role in the user innovation strategy of startups, neither are reflected by existing literature. Startups mainly select users based on the degree of trust (i.e. family, friends, and business partners), to ensure reoccurring and

constructive feedback from the user. A trusting relationship also guards startups against idea protection issues and bad reputation in case issues occur at the beginning of the innovation process. However, if startups view user selection as a barrier, but they aim to establish the very complex condition of 'trust' prior to the innovation process, then this may insinuate that their user selection strategy requires more attention or reconfiguration.

6. Despite the general positive implications of user innovation in literature, startups perceive several barriers to user innovation, which inhibit the incorporation of users throughout the innovation process.

Startups must manage the barriers and trade-off they perceive when it comes to user innovation; on the one hand, organizing for user innovation requires resources – but on the other hand, investing in innovations that are not verified by the users have a long-term cost. Startups are aware of the multiple opportunities of integrating users throughout the innovation process, but they feel there are too many challenges holding them back. However, the incubators confirm that these perceived barriers can be overcome, but it will require the startup to be courageous and leave the comforts of the innovating space to trust in the user's ability and to openly and actively communicate with the user and acknowledge that he or she can contribute to the innovation and knowledge of the startup. Moreover, our results indicate that there is a gap between the reasons why startups integrate users in their innovation process, and how they execute it. Startups do not align all their motives for integrating users with their methods, e.g. they claim that early alignment of users leads to a reduced risk of investment, however, they adopt a late integration of users in the innovation process, after the prototype is completed. It seems that startups are not as convinced of user innovation as the existing scholars within the field, however this could be because startups integrate users to a limited extent. One could argue that if startups integrate users in more stages, they may benefit more from user innovation. However, to do so would require finding solutions to the barriers they perceive to overcome their potential biases towards user innovation.

5 Conclusion

In conclusion, the purpose of this paper is to understand why and how startups strategically integrate users in the innovation process. First, we examine the relevance of user innovation for startups and consider reasons for and against pursuing user innovation, i.e. motives and barriers that influence the startup's decision to integrate users. Second, we explore strategies for startups to select and integrate users, i.e. which methods they use, which selection criteria they apply and at what stage of the innovation process startups integrate users. To achieve the purpose of this thesis we conducted a literature review to identify gaps in user innovation research and find predictions on the role of user innovation in startups, which we then validated with empirical findings from a multiple case study on six Swedish high-tech startups. The analysis of the findings was further verified through interviews with three incubators who are experts for innovation processes in startups. The key empirical outcomes for each research question are summarized below.

RQ 1: Why do startups strategically integrate users in their innovation process?

- By involving the user, startups can assess and validate business opportunities early and therefore reduce the risk of making inefficient investments.
- Since users are experts in their own lives, startups integrate them to gain feedback to identify user needs and problems as well as to get inspired.
- Startups may choose to not engage in user innovation due to resource constraints, such as limited human or financial resources.

RQ 2: How do startups strategically integrate users in their innovation process?

- Startups mainly integrate users in the testing stage of the innovation process, where they let users interact with the product.
- Startups prioritize a user attachment to ideas or features when setting their action plan, i.e. they use the user's ideas and feedback as a method to structure the prioritization of their work.

- Users are selected based off of the degree of trust between the startup and the user, e.g. family, friends, and business partners are prioritized when selecting users for the innovation process.

The empirical results further indicate that startups do not seem to be as convinced of user innovation as the scholars in this field because they do not integrate users throughout the innovation process. While existing literature on user innovation views users as an integral part of the innovating team and suggests several methods to successfully execute on it, startups only utilize users to a limited extent. To startups, user innovation is a tradeoff they have to carefully manage. On the one hand, they face resource constraints and have to decide how many resources they can invest in organizing for user innovation. On the other hand, they are aware that an early integration of users verifies if there is a promising market for the startup's business or product idea. If they fail on allocating sufficient resources for user innovation they risk investing too many resources in prototyping a product for which there is no demand.

5.1 Contribution and Managerial Implications

We *theoretically* contribute to the field of user innovation by building upon the existing theories and applying the literature of user innovation to a startup context. We identify several research gaps and found that existing research mainly focuses on mature firms. We argued that users could be an important source of innovation for startups as well because they rely on radical innovations to stay ahead of the market and the competitors. However, we expected startups to integrate users differently as they, for instance, face more resource constraints than mature firms.

Our *empirical* contribution partly confirms these theoretical predictions: we find that there are differences between mature firms and startups with regards to the relevance of user innovation because the empirical results based on startups differ from the existing literature based on mature firms. Furthermore, we add to the understanding of how users are strategically integrated in the innovation process of startups by examining the methods, selection criteria, and timing of involving users.

Our *practical* contribution results in four managerial implications. First, we present a guideline for startups not currently engaging in user innovation that would like to understand

why user innovation is relevant for their firm, i.e. how they can benefit, and how they can strategically integrate users in their innovation process. Second, there was a noticeable contradiction between the startups' reasons for engaging in user innovation and how they actually integrate users. For instance, startups emphasize that early alignment of the users' needs and the startups' objectives reduces the risk of investment, however, in actuality startups solely include users in the late testing stage. This means that their intentions do not meet their actions. We think this misalignment is a result of the perceived barriers that hinder startups to integrate users throughout more stages of the innovation process. This could possibly be a result of the independent and tenacious startup culture, where the startup wants to have full responsibility and control over the innovation process and credit for the invention. But these barriers can be overcome as they are all linked to poor execution of user integration. We suggest that startups experiment with incorporating users into more stages to explore if the benefits of full user integration outweigh the invested resources and costs of implementation. Third, it is suggested that in order to receive more diverse and representative feedback, startups may consider expanding their user selection criteria beyond the criterion trust in order to include more than friends, family, and business partners in the user innovation process. Lastly, if startups acknowledge that they remain the innovator, they are able to strategically integrate users as an innovation tool. Even if they integrate users, startups are still in control over the innovation process because innovation is much more than the ideation phase and the success of an idea is not only defined by how genius the idea is, but how well it is executed. Hence, startups should understand that they do not hand credit over to the user, as it is still the firm who organizes for innovation.

5.2 Limitations and Future Research

Since we chose an exploratory, abductive approach to our research, the case studies revealed several interesting findings that were not directly related to the research questions. While these findings are important, addressing each finding in depth goes beyond the scope of this thesis. Hence, we acknowledge three limitations to our research and base suggestions for future research on these.

The literature review revealed that the definition of user innovation still needs more attention and clarification. Current research does not explicitly differentiate between *customers* and *end*

users, while the empirical research reveals that the differentiation between customers and end users is highly relevant to B2B startups for instance. Opinions on whom to prioritize in the innovation process varied among the interviewees. As we followed existing literature, we did not differentiate between B2B and B2C startups in our case selection, which we acknowledge as a limitation of our research and recommend for future research by fellow scholars.

The empirical results presented several barriers that hinder startups in engaging in user innovation. Some of the interviews revealed *negative biases* towards user innovation amongst startup founders, which we find particularly interesting given that user innovation is deemed to be highly relevant for high-tech startups. Unfortunately, exploring the origin of and reasons for these biases is outside the scope of this research and therefore suggested to be explored in future research of a more psychological nature.

Finally, we understand that user innovation can be explored from two perspectives: both the firm and the user have a stake in the user innovation process. Since we are particularly interested in researching the degree to which user innovation literature can be applied to startups, we prioritize the firm perspective for this research. But it is also interesting to explore user innovation from the user's perspective, particularly why users engage in user innovation considering that startups with limited brand awareness must find ways to attract users for collaboration. Exploring these aspects was not feasible due to time constraints. However, we suggest examining the user perspective in future research, which will further contribute to answering the question of who the innovator is.

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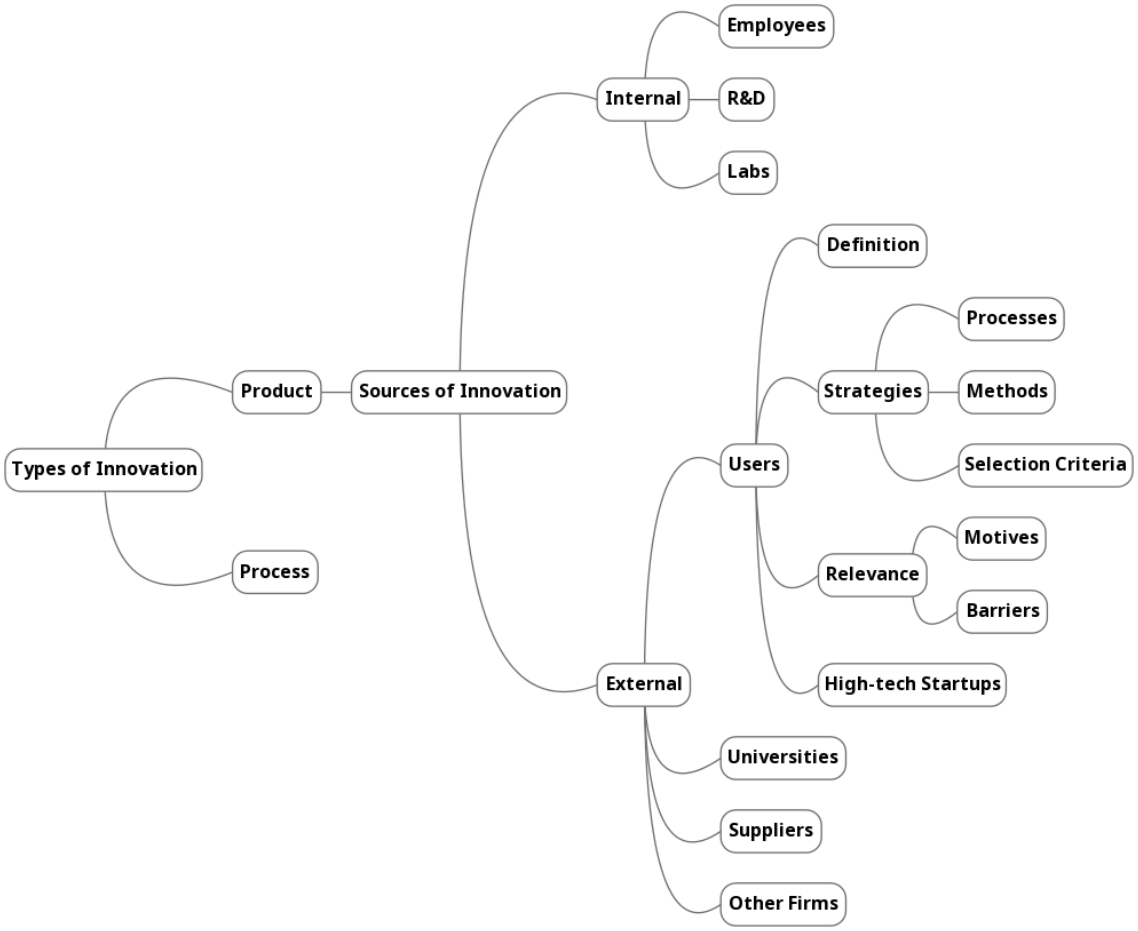
Appendix A

Overview of the Concepts explored in the Literature Review



Appendix B

Detailed Overview of the Conceptual Framework

Existing Literature	Research Gaps	Research Questions		Dimensions	Interview Questions Startups	Interview Questions Incubators
Motives for user innovation: • Insight (Von Hippel, 2005a) • Efficiency & productivity (Hienerth et al. 2014) • Feedback (Bogers et al. 2010; Chatterji & Fabrizio, 2004) • Radical innovation (Bogers et al. 2010; Chatterji & Fabrizio, 2004; Ogawa & Piller, 2006; Von Hippel et al. 2012)	User Innovation in Startups	Why do startups strategically integrate users in their innovation process?	What are the motives for startups to integrate users?	Motives	• Why does your firm involve users in the innovation process? • Where and when did you initially get the idea to involve users? • Can you give examples of successful cases when involving users in the innovation process?	• Would you recommend any external source of innovation for startups, what and why? • Would you recommend startups to involve users in their innovation process? Why is that?
Barriers to user innovation: • Alignment, idea protection, costs, corporate culture, identification of users (Lilien et al. 2002; Morrison et al. 2000; Olson & Bakke, 2001)			What are the barriers for startups to integrate users?	Barriers	• Do you have any reasons for not pursuing user innovation? • Can you give examples of problems when involving users in the innovation process?	• What challenges exist for startups in their innovation process? • Do you have any examples of challenges? • Which barriers do startups perceive when involving users in their innovation process?
Challenges for startups: • Limited resources, switching costs, limited experience, limited brand awareness, individualistic culture (Cho et al. 1998; Denis, 2004; Freeman & Engel, 2007; Katila et al. 2012; Shane & Stuart, 2002)						
User innovation methods: • Lead user method (Franke, 2014; Lüthje & Herstatt, 2004) • Crowdsourcing (Franke, 2014; Füller et al. 2010; Von Hippel, 2005b) • Toolkits for user innovation (Franke 2014; Füller et al. 2010; Von Hippel, 1988; Von Hippel & Katz, 2002)	User Innovation Strategies	How do startups strategically integrate users in their innovation process?		Methods	• What is your firm's innovation strategy? • Which external sources of innovation does your firm use? • How does your firm involve users in the innovation process? • How does your innovation process differ from your competitors?	• How should startups integrate users in their innovation process?

• Lean startup (Blan 2013; Mueller & Thoring, 2012; Still, 2017) • Design thinking (Gleasure & O'Riordan, 2016; Kimbell, 2011; Kleinsmann et al. 2017; Kolko, 2015)				• Have you always used this strategy, or have you developed it over time? • If you had to estimate: how much of your innovations are retrieved from users, and how much from your in-house employees? How many ideas are generated by users and how many generated in-house? • How do you evaluate ideas coming from users?	
Selecting users • Experience, volume, diversity, person-organization fit, complementary team composition (Akgün et al. 2010; Arthur et al. 2006; Schreier et al. 2012) • Open, introverted, conscious (Stock et al. 2016); innovative (Schreier & Prügl, 2008; Zibarras et al. 2008)	Selection criteria for user innovators	Which criteria do startups use for selecting users to integrate into their innovation process?	Selection criteria	• How do you search for and select users to collaborate with? • Does your firm use certain criteria or a specific method to search for and select users? • Are you looking for certain personality traits in the users you work with?	• What characteristics would the ideal user innovator have? • How do you think startups should search for and select user innovators for collaboration (e.g. strategies, methods, selection criteria)?
User innovation processes: • Idea generation, conception, design, prototyping, testing, implementation (Acklin, 2010; Still, 2017; Thomke & Von Hippel, 2002) • Producer vs. customer approach (Thomke & Von Hippel, 2002)	Stages to integrate user innovators	At what stage of the innovation process do startups integrate user innovators?	Timing	• What does the innovation process look like for your firm, i.e. what are the single stages of the process? • Do you differentiate between certain stages of the innovation when involving users? • If yes, at what stages of the innovation process do you involve users?	• At what stage(s) of the innovation process or new product development should startups involve their users?

Appendix C

Interview Topic Guide for Participating Startups

1. In what way are you involved in the innovation process of your company?
2. What is your firm's innovation strategy?
3. What does the innovation process/ new product development look like for your company; what are the single steps/ stages of the process?
4. Briefly, which external sources of innovation does your company use?
5. How does your firm involve users in your innovation process?
    a. How does your innovation process differ from your competitors?
6. Why does your firm involve users in the innovation process?
    a. Where and when did you initially get the idea to involve users?
    b. What do you think motivates your users to innovate with your firm?
    c. Do you have any reasons for not pursuing user innovation? What are the problems involved/or weaknesses of user innovation?
7. How do you search for and select the users your firm works with?
    a. Does your firm use certain criteria/ a specific method to search for and select your users?
    b. Are you looking for certain personality traits in the users you work with?
    c. Do you differentiate between certain stages of the innovation process when involving users (e.g. do you only involve users in a particular stage; are you applying different selection criteria for different stages of the innovation process)?
    d. How do you evaluate ideas coming from users?
    e. Have you always used this strategy for finding and selecting users? Or have you developed it over time?
8. Can you give examples of successful cases and problems when selecting and involving users in the innovation process?
9. Briefly, if you had to estimate: how much of your innovation is retrieved from users, and how much from your in-house employees (e.g. in percentage)? How many ideas are generated by users and how many are generated in-house?
10. Is there anything else you would like to share with us, which we haven't discussed yet?

Appendix D

Interview Topic Guide for Participating Startup Incubators

1. What challenges exist for startups in their innovation process? Do you have any examples of challenges you have encountered?
2. Would you recommend any external source of innovation for startups; what and why?
3. In your opinion, how would you define user innovation and customer innovation?
4. Would you recommend startups to involve users in their innovation process? Why is that?
5. Which barriers do startups perceive when involving users in their innovation process?
6. How should startups integrate users in their innovation process?
7. What characteristics would the ideal user innovator have?
8. How do you think startups should search for and select user innovators for collaboration (e.g. strategies, methods, selection criteria)?
9. At what stage(s) of the innovation process or new product development should startups involve their users?
10. Given that startups might not yet have an established customer base, how can they motivate (potential) users to engage in innovation?
11. Is there anything else you would like to share with us, which we haven't discussed yet?