The Influence of Customer Feedback on Software Startups

The Identification of crucial Pivot Triggering Factors through the Application of the ESSSDM Funnel.
Master Thesis in Informatics

Title: The Influence of Customer Feedback on Software Startups
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Abstract

Background: Most Software Startups fail to establish a working business model. One of the main reasons is that they fail to validate their hypothesis and neglect to learn from their customers. Therefore, Software Startups are supposed to continuously adjust their direction to achieve product-market fit.

Purpose: The purpose of this study is to explore the role of customer feedback in the context of Software Startups during the decision to pivot. Thus, the central research question of this thesis is: What role does customer feedback play when a Software Startup decides to pivot?

Method: By living up to the values of a pragmatic research philosophy this qualitative study used nine semi-structured interviews with experts from the relevant field. Afterwards, these insights have been placed into the four stages of the Early Stage Software Startup Development Model (ESSSDM) funnel.

Conclusion: This study showed that customer feedback plays a crucial role when a Software Startup decides to pivot. However, the interviewees revealed that it is essential how customer feedback is perceived and used for the product development. Furthermore, customer feedback was not perceived as the only crucial triggering factor, but an element of a broader set.
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List of Abbreviations

AI .................................................................................................................. Artificial Intelligence
ESSSDM ................................................................. The Early Stage Software Startup Development Model
IaaS ............................................................................................................. Infrastructure as a Service
SaaS .......................................................................................................... Software as a Service
SWS ........................................................................................................... Software Startup
1. Introduction

The introduction chapter starts by illustrating the background of the topic. Going on, the underlying problem of this thesis is discussed. Thirdly, the purpose and research questions of the thesis are stated. Following that, the delimitations of this research are outlined. This chapter ends with the most important definitions concerning the different concepts of this research.

1.1. Background

Up to 90% of all startups fail (Marmer et al., 2012). One of the main reasons being that Software Startups miss to learn from their potential customers (Giardino et al., 2014). They neglect to validate their hypotheses and therefore persevere when they should have changed their direction (Giardino et al., 2014). To understand this better, the topic of online grocery shopping is a great example. At the end of the last century, Webvan raised around $800 million in funding to provide an online solution including same-day delivery. Although they managed to go public during their short lifetime, only two years after the launch they declared bankruptcy (Blank, 2003).

Looking at Tesco, it becomes evident that, despite many challenges, it has been possible to establish a successful online grocery shopping services (Delaney-Klinger, 2003). The question one might ask is: What differs the first case from the latter one - if they have even co-existed at the same time?

Despite of Tesco not having the newest warehouses, website or computer systems, they have examined if there was a consumer demand (Hirakubo & Friedman, 2002). Webvan, on the other hand, before validating the hypothesis and the target market had already built automated warehouses, bought a fleet of delivery trucks and had around 400 employees (Blank, 2003). Nevertheless, they never managed to build the customer base they would have needed to compensate for their massive upfront investments (Blank, 2003).

To conclude, customer involvement might potentially play a critical role in the startup’s survival (Crowne, 2002; Ries, 2011). This idea is complemented with an example from another company. Software giant Youtube was forced to change their business model due to customer needs.
Youtube initially started as a dating platform where users could upload short videos of themselves (Bajwa et al., 2017). Users, however, were reluctant to do so - even after money was offered to them. Consequently, the founders radically changed the concept and opened the platform for all types of videos. Today Youtube is the world's largest video platform (Koebler, 2015).

As illustrated by the given examples, achieving what Ries (2011) called the ‘product-market fit’ is challenging for many Software Startups. The old paradigm of ‘build it and they will come’ no longer works; founders have to discover the most promising customer segment for their businesses (Ries 2011; The Economist, 2014). Besides achieving the product-market fit, Software Startups also face other significant challenges. These can relate to technology uncertainty, financial difficulties or team-related challenges (Giardino et al., 2016).

Similar to the earlier described cases, many successful Software Startups change their business model along the way (Bajwa et al., 2017). This is known as a pivot. Alternatively, an organization can decide to stick to their plans - the decision to persevere (Ries, 2011). The choice to pivot or persevere is continuous. It requires reconsidering if the hypothesis of the business model is still valid or if it needs to be adjusted.

Multiple sources describe pivoting within different contexts. For instance, related to Software Startups, Bajwa et al. (2017) collected 49 cases which revealed 10 pivot types and 14 pivot triggers. In another research, pivoting was discussed in relation to the success factors (Eloranta, 2014) or factors that lead to failure of Software Startups (Giardino et al., 2014).

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1 Further information available under: https://web.archive.org/web/20050428014715/https://www.youtube.com/
However, pivoting is not only a topic related to Software Startups. ‘Pivot’ and ‘Software Startup’ have been keywords during the research that led to an article that describes the socio-economical change of a nation - Israel (Senor & Singer, 2010). In the case of Stock & Seliger (2016), pivoting is also a part of the methodology in the iterative development of hardware. As a final remark, lean startup and the decision to pivot have been discussed in connection with internal startups, as well (Edison, 2015; Edison & Abrahamsson, 2015; Edison, 2016).

1.2. Problem

In 2014, Shi et al. studied the development of Software Startups. They have investigated one of the few studies “which conduct[s] software startups by linking Information Systems literature with entrepreneurism” (Shi et al., 2014, p. 7). Moreover, Unterkalmsteiner et al. (2016) created a research agenda covering “a wide spectrum of the software startup industry current needs” (p. 89). One of the points in their agenda is the lack of in-depth insights in pivoting decisions. Confirming the identified research gap by Unterkalmsteiner et al. (2016), studies have paid little attention to this field (Hirvikoski, 2014; Terho, 2015), despite the relevance of pivots for a Software Startup’s success. Thus, in 2017, Bajwa et al. state with regards to pivots: “The first direction is to collect primary data to validate ... triggering factors identified in this study” (p. 2404). Adding to that, they also talk about the collection of further information to gain a comprehensive understanding of the decisions in product development (Bajwa et al., 2017).

With the given contributions, some questions from the research agenda on Software Startups by Unterkalmsteiner et al. (2016) have been partly answered. Among others, Bajwa et al. (2017) identified negative customer feedback as critical. In general, experts like Ries (2011) and Blank (2013) confirmed the relevance of customer feedback.

Furthermore, Unterkalmsteiner et al.’s research agenda (2016) required the attempt to get to the bottom of the relationship of pivots during different product development cycles. Basically, it needs to be investigated when to decide to move forward with an idea or when to pivot. In 2013, Bosch et al. have already presented the Early Stage Software Startup Development Model, or short: ESSSDM, which is contributing, inter alias, to the earlier mentioned gap.
Two major supporting parts of the ESSSDM are: “the concept of validating ideas through a funnel, and ... the introduction of abandoning ideas as an alternative to pivot or preserve” (Bosch et al., 2013, p. 14). A funnel is “a tube or pipe that is wide at the top and narrow at the bottom” (English Oxford Living Dictionaries, 2018). With regards to the ESSSDM, this ‘tool’ is separated into four stages where each of the steps moves an initial problem closer to become an established product on the market. Thus, among other aspects, the specifications of product features become more precise with each of the stages.

1.3. Purpose and Research Question

Concluding from the previous problem discussion, the purpose of this study is to explore the role of customer feedback in the context of Software Startups during the decision to pivot. Thus, the research question and its sub-questions in this sense are:

1. **What role does customer feedback play when a software startup decides to pivot?**
   a. **What critical pivot triggering factors can be deduced from the application of the ESSSDM funnel?**
   b. **What are the remaining unassigned crucial pivot triggering factors?**
   c. **What relevance is being attributed to customer feedback?**

1.4. Delimitations

The first delimitation is that this study used purely qualitative data on software startups. Thus, no quantitative data were collected and analyzed during this research. Saunders et al. (2016), however, stressed that qualitative studies are more likely to be influenced by personal biases than quantitative ones.

In addition to that, the interview transcript’s interpretation might not reflect entirely what has been communicated by the interviewee. The researchers of this thesis tried their best to interpret what has been expressed before in a non-deliberate way. However, misunderstandings, subjectivisms or reinterpretation in other directions cannot be excluded entirely (DiCicco-Bloom & Crabtree, 2006; Hsieh & Shannon, 2005).
Finally, if a company has not lived up to the thesis’ definition of a software startup (will be presented later), the company was not purposively selected to be interviewed. For further limitations, the scholar can skip to the end of chapter 3. Methodology. As a final remark at this point, it is advised to consider that, like with every methodology, the applied approach and the suggested findings have its downsides which is why one should critically question outcomes of this study.

1.5. Definitions

In the following, the authors review the different definitions of Lean Startup, Pivot, Software Startup and Customer Feedback.

1.5.1. Lean Startup

Blank outlines in the 2003 published book ‘The Four Steps to the Epiphany’ that startups differ substantially from larger organizations and are not just smaller representations of established businesses. The most significant difference between traditional organizations and startups is that the former are executing established business models while the latter are searching for one (Blank, 2013; Ries, 2011). Blank defines a startup as “a temporary organization designed to search for a repeatable and scalable business model” (Blank, 2013, p. 67).

His work laid the foundations for Eric Ries’ book ‘The Lean Startup’ (2011). In this book, Ries (2011) combines the principles of lean production to minimize waste (Womack et al., 1990) and the customer development model described in ‘The Four Steps to the Epiphany’ to a comprehensive model on how to establish an organization based on falsifiable hypotheses (Blank, 2003). Ries’ (2011) comprehension of the lean startup is: “a human institution designed to create new products and services under conditions of extreme uncertainty.” (Ries, 2011, p. 8).
1.5.2. Pivot

One of the critical points in the Lean Startup methodology is the decision to pivot, persevere or abandon a product (Bosch et al., 2013; Eisenmann et al., 2012; Ries, 2011). The focus of this study is on the pivot. A pivot is defined as a “structured course correction designed to test a new fundamental hypothesis about the product, strategy, and engine of growth” (Ries, 2011, p. 149).

This definition emphasizes the difference between a simple change and changes that affect the business model. An example could be that a feature of a product turns out to be the main product at the end (Ries, 2011), thus leading to a new hypothesis which requires new validation. It is worth noting that multiple pivot types can be initiated by various triggering factors (Bajwa et al., 2017). The focus in this research, however, is on the pivot triggers.

1.5.3. Customer Feedback

Many researchers refer to customer feedback as one of the leading triggering factors (will be presented in 2.5.1 Pivot Triggering Factors). Customer feedback provides information that is recognized as being helpful to improve a product or service. Commonly one distinguishes between positive and negative customer feedback. While positive feedback expresses that customers’ expectations “were met at least satisfactorily and/or possibly exceeded,” negative feedback expresses that customer expectations “were not met” (Hu et al., 2016, p. 22; Voss et al., 2004).

1.5.4. Software Startup

Although Startups in the field of software engineering were discussed already over 20 years ago (Carmel, 1994), the term Software Startup (SWS) is not uniquely defined (Paternoster et al., 2014). As the definition is ambiguous, Paternoster et al. (2014) recommend that each research needs to define this term on their own. Nevertheless, it is important to note that there is one agreed point; a Software Startup is a unique mixture of factors (Paternoster et al., 2014). For this study, the components of this special mix are: “uncertainty,” “innovativeness,” “software development” and “youthfulness.”
The first part, uncertainty, relates to unstable conditions regarding, for example, the market (Giardino et al., 2014; Paternoster et al., 2014). According to some researchers, there is a strong correlation between innovativeness and the amount of uncertainty (Boudreau et al., 2011). In addition to this, startups are often associated with innovativeness (Ries, 2011). Thus, innovativeness needs to be taken as given, as well.

The third factor, software development, deals with the enterprise’s characteristic to have a product heavily influenced by software development (Paternoster et al., 2014).

To draw a line between established companies and young ones, the authors have originated the definition of youthfulness from previous research. It is assumed that youthful for startups means to be “not more than 10 years old” and with that the sampling companies age is 2008 or later (Yli-Renko et al., 2001, p. 595).
2. Theoretical Framework

The following chapter starts with the conducted method for this literature review. Followed by a literature review of the underlying model of the Lean Startup methodology and its origin. Derived from these findings a definition for Software Startups is determined. Additionally, pivot and pivot triggers are presented. Lastly, the chapter introduces the conceptual framework used in the analysis part of this study.

2.1. Method of Literature Review

This thesis is based on a systematic literature review (Bryman & Bell, 2015). The authors made use of the search engines Google Scholar, Primo and Scopus to find relevant secondary sources. The following two subchapters (2.2 Customer Development Process and 2.3 Lean Startup) derive from their original publications of Blank (2003) and Ries (2011). Then, in 2.4 Software Startup, the definition origins from the systematic literature review by Paternoster et al. (2014). Nevertheless, further research supplemented the previous parts.

Moving on, the focus of this literature review is on previously identified pivot triggering factors. With relations to find the relevant articles for the subchapters 2.5 Pivoting and 2.6 Triggering Factors, the authors limited the keywords used during this research to focus on the most influential literature. The keywords are: ‘pivot,’ ‘startup,’ ‘pivoting,’ ‘start-up,’ ‘startups,’ ‘pivots’ and combinations of these words. The authors first read the headlines of the articles to identify the appropriate sources for this research. Second, the authors read the abstract. Third, the authors read the literature in detail where the abstract showed its possible importance for this study. Finally, further relevant articles were identified through the reference list of the screened literature.
A search on Google Scholar, Primo, and Scopus at the end of February 2018 with the following criteria resulted in 37 relevant papers:

1) The paper needs to research in the context of information systems or information technology and startups. The aim is to exclude studies that use keywords like pivot and software within subjects such as the clinical pivot-shift-test (Muller et al., 2016) or pivot tables (Dongarra & Eisenstat, 1984).

2) The time range was unspecified, as a pivot in the context of Software Startups is a somewhat contemporary phenomenon.

3) English is the language set for the search results.

4) Further criteria were set to default.

5) To have some limitations in place, a research paper needed four references or more on the due date 2018-02-28.

2.2. Customer Development Process

The customer development process described by Blank (2003) in his book ‘The Four Steps to the Epiphany’ is widely seen as one of the foundation parts of the lean startup methodology (Blank, 2013; Bosch et al., 2013). Blank is outlying the customer development process in contrast to the product development model originated from manufacturing businesses. Figure 1 shows the basics of that model:

*Figure 1: Product Development Process (Blank, 2003)*

![Diagram of Product Development Process](image)

Blank (2003) argues that the product development model is only a good fit when trying to bring a new product to an existing market, where the customers and competition are known and understood. He further argues that most startups do not fulfill these prerequisites. Nevertheless, many startups and investors follow this model for product development, as well as, business planning. Mostly, without knowing their customers and their real market. Primarily, the use of the product development model for customer development and generation is mentioned to result in false expectations about a startups development in the first years.
To recap, Blank (2003) is criticizing that startups do not follow a process “with measurable milestones, for finding customers, developing the market, and validating the business model.” (p. 15).

For this reason, the customer development model is emphasizing on learning who the customers will be and which market the company will target. Blank (2003) sees it as a supplement for the product development model, not as a replacement. However, in contrast to the product development model, it is not focused on delivering the product to the first customers. Instead, it is learning about their needs and problems from the very start of the development process. Figure 2 shows the four steps of the model:

*Figure 2: Customer Development Process (Blank, 2003)*

Different from the product development model, each step is outlined as an iterative circle. The iterative aspect illustrates the journey of finding the right customers and markets most likely will take several iterations before a startup is getting it right.

The Customer Discovery phase is focusing on understanding problems and needs of potential customers. Typically, the founders test their hypotheses with potential customers. The starting point is always the founder's vision of a product. Rather than collecting a wish list of features, founders test their initial hypotheses to discover their real customers and market.
The Customer Validation phase is then using the gained knowledge about customers to sell the product to early customers with the goal to establish a repeatable sales model. The arrow back towards Customer Discovery illustrates the importance of finding a product enough customers are willing to pay for. If Customer Validation reveals that there are not enough customers willing to pay for the product, one might go one step back and discover in more detail the problems and needs of customers. At the end of the first two phases, a profitable business model should be established and verified.

If a startup verified its business model is working, the Customer Creation phase targets on generating demand from customers. The essential point being, that costly marketing is only used after a startup successfully validated its hypotheses and sold to early customers.

In the last phase (Company Building), a startup then concentrates on shifting from the learning of the previous phases to successfully execute the discovered business model on a bigger scale (Blank, 2003).

2.3. Lean Startup

As stated in 1.5. Definitions, startups differ substantially from larger organizations because they do not have an established business model (Blank, 2003; Ries 2011; Sutton, 2000). Instead, they start with falsifiable business model hypotheses about a new product or service and iteratively find their customers and market (Blank, 2003; Ries 2011). In brief, Eisenman et al. (2012) call this a hypothesis-driven approach.

In addition to that, startups work under conditions of high uncertainty and are often inexperienced (Giardino et al., 2014; Trimi & Berbegal-Mirabent, 2012). Aside of that, in most cases they are using scarce resources (Bosch et al., 2013; Eisenmann et al., 2012) and often fail because they develop a product that no customer is willing to pay for (Crowne, 2005; Ries, 2011). To counteract these challenges, the lean startup methodology is minimizing waste by firstly resolving business model uncertainty (Eisenmann et al., 2012). In this earlier described hypothesis-driven approach, an entrepreneur learns how to create a working business model before wasting resources (Eisenmann et al., 2012).
To be more precise, the lean startup methodology comprises five core principles. The first one says that ‘entrepreneurs are everywhere’ (Ries, 2011, p. 8). According to Ries (2011), this means that a startup does not necessarily have to be a new venture but can also be an initiative in an enterprise. As described in 1.5. Definitions, his understanding of the lean startup stresses that the venture is developing a new product or service while operating under extreme uncertainty (Ries, 2011).

Because startups operate in this context, Ries (2011) also argued that “a new kind of management” practice is needed (Ries, 2011, p. 8). For this reason, traditional management practices have often not been able to deal with high uncertainty. This brings the scholar to the second principle of the lean startup: “entrepreneurship is management” (Ries, 2011, p. 8).

The goal of the lean startup is to achieve a product-market fit: a situation in which a cost-effective and scalable product solves the problems and needs of the customers in the market (Eisenmann et al., 2012; Ries, 2011). Therefore, the entrepreneurs have to learn along the way on “how to build a sustainable business.” (Ries, 2011, p. 9). The ‘validated learning’ is the third principle of the lean startup (Ries, 2011). Validated, in this context means to test every single part and hypothesis with the help of the build-measure-learn cycle.

The customer development model discussed earlier helps to receive fast and continuous feedback on the hypothesis. This concept’s fundamental idea is to ‘get out of the building’ and get real feedback from the relevant target group (Blank, 2013; Ladd, 2016; Ries, 2011). Therefore, the startup is building a so-called minimum viable product (MVP). A MVP embraces the most needed features to prove or disprove the hypothesis (Ries, 2011).

The use of the customer development model and MVPs are part of the ‘build-measure-learn cycle,’ the fourth principle of the lean startup (Ries, 2011). To paraphrase this, at the end of a build-measure-learn cycle, the startup went through the following phases: The team has created a MVP, measured specific data and reached a point at which it needs to decide what will come next (Ries, 2011). However, Nguyen-Duc & Abrahamsson (2016) found out that a MVP is not perceived by all startups to be a supportive tool.
The decision at the end of each build-measure-learn cycle is known as to *persevere* or to *pivot* (Ries, 2011). To persevere means, that the tested hypotheses of a MVP was confirmed by the early customers. To pivot, on the other hand, implies that the entrepreneur decides to revise some elements of the business strategy. Some researchers are adding a third, stronger form of a pivot to the discussion, *to perish or abandon*, discontinuing the idea or even the venture as a whole (Bosch et al., 2013; Eisenmann et al., 2012). All the essential hypotheses are tested with MVPs till product-market fit is reached (Ries, 2011).

Providing a base for the final step, and being the last principle, *‘innovation accounting’ is the recommended approach on ‘how to measure progress, how to set up milestones, and how to prioritize work.’* (Ries, 2011, p. 9). On the one hand, the conclusion of the metrics analysis could be that their initial hypothesis is confirmed signaling the startup to persevere (Eisenmann et al., 2012). On the other hand, based on the learnings from customers, the assumptions on a strategic level are falsified. In this case researcher such as Fagerholm et al. (2014) or Bosch et al. (2013) confirmed Ries’ (2011) suggestion to pivot.

Since this research is focusing on pivoting in the field of Software Startups, the upcoming part deals with the definition of what is meant by a Software Startup before we elaborate more on the pivoting decision.

### 2.4. Software Startup

Lower transaction costs resulted in an acceleration in the field of entrepreneurship (Reuber & Fischer, 2011). This, however, does not only result in new forms of entrepreneurship such as the so-called techno-entrepreneurship - or more commonly known as startups (Örnek & Danyal, 2015). Startups also have a significant impact on the economy as they add up to 20% of the United State’s gross (total) job creation and are also judged as being essential for the productivity growth (Decker et al., 2014; Kane, 2010).
Furthermore, some researchers refer to a phenomenon which is known as high technology (Chesbrough & Crowther, 2006). A firm is labeled as ‘high-tech’ when its main product or service depends on an innovative technology that is surrounded by high uncertainty, short life cycles and many other aspects (Burger-Helmchen, 2009; Mainela et al., 2011). By indicating that 44% of the high-tech startups’ sample are also categorized as ‘Software Startups,’ Conti et al. (2013) clarify that Software Startups are one of the leading forms of high-tech startups. However, a high-tech startup is not the synonym of a Software Startup. Some example characteristics of a Software Startup that are also applicable to high-tech startups are:

- It might have a lack of resources (such as economically or, e.g., in the form of human capital), as the focus is to launch the product rapidly and scale the business model (Paternoster et al., 2014).
- It might be innovative and deals with high potential target markets. Its innovative outcome is based on operation or development of innovative technology (Sutton, 2000)
- It might be surrounded by uncertainty (e.g., due to market demands or financial reasons) and time pressure (e.g., because of stakeholder requests), which is why the startup requires high reactiveness and a high level of flexibility (Paternoster et al., 2014).

Nevertheless, the Software Startups definitions is ambiguous, which is why it is controversial to clarify what exactly mixture makes a Software Startup unique. This is the reason why Paternoster et al. (2014) emphasize that each study must define unambiguously what is meant by the term ‘Software Startup.’

To retain the consistency, the Software Startup’s definition is derived from Ries´ work in 2011. A startup is “a human institution designed to create new products and services under conditions of extreme uncertainty” (Ries, 2011, p. 8). Uncertainty caused by “market, product features, competition, people and finance” is also one of the most frequently used characteristics of Software Startups according to Paternoster et al. (2014, p. 1210).
The given quotes lead to the second criteria of our Software Startup comprehension - the idea of newness. “Innovation implies newness” (Johannessen et al., 2001, p. 20). Johannessen et al. (2001) highlighted that one needs to differentiate between two types of changes. One form leads to some novelty and originality by making the innovation rare and in some cases inimitable. On the other hand, some changes are just alternatives or even copies. The authors’ understanding of innovation relates to the earlier idea of what a change is. In addition to that, newness is not necessarily the result of only highly technical development. Possibilities to realize this outcome are: “new products, new services, new methods of production, opening new markets, new sources of supply, and new ways of organizing” (Johannessen et al., 2001, p. 20).

The third characteristic is that software development plays an essential role in the startup (Paternoster et al., 2014). Established examples of our Software Startup definition are Uber\(^2\) or Snapchat\(^3\). In these cases, providing the service would not be possible without software development. Thus, a crucial part of the product development is developing the software.

Lastly, to distinguish between further developed companies and startups, Yli-Renko et al. (2001) used 10 years as the limit. This is also the age limit applied in this study. To sum it up, this research characterizes a Software Startup’s unique mix by having the following four components:

- Software Development
- Uncertainty
- Innovation
- Youthfulness

\(^2\) Website available under: https://www.uber.com
\(^3\) Website available under: https://www.snapchat.com
The previously described unique mixture of startups, however, relate to other fields, as well. On the one hand, established software companies might appear to be similar, as they need to achieve a momentum for the right time-to-market by keeping costs and quality in balance. Nevertheless, processes of startups are youthful, and immature compared to those of established ones (Sutton, 2000).

On the other hand, one might assume that a synonym of a Software Startup might be a small and medium-sized enterprise (SME). Commonalities between these two entities are characteristics such as low hierarchy levels, a lack of resources or, depending on the definition, a low number of employees (Paternoster et al., 2014). Looking at some further characteristics of a conventional SME, however, it becomes evident that a Software Startup and a SME are not identical. For instance, the ways of dealing with communication and coordinating in SMEs is, due to the maturity and experience, more efficient (Sutton, 2000).

On a final note, some authors claim that being a startup is a temporary stage (Crowne, 2002). This is the reason why companies can ‘grown out’ of the startup’s definition to be in the given time span of 10 years (Yli-Renko et al., 2001).

2.5. Pivoting

As previously mentioned in the part of the 2.3. Lean Startup, pivoting has its roots in the lean startup methodology. A pivot is a “structured course correction designed to test a new fundamental hypothesis about the product, strategy, and engine of growth” (Ries, 2011, p. 149). In other words, the aim is to avoid “offering a product that no one wants” (Eisenmann et al., 2012, p. 1) by putting the startup “on a path towards growing a sustainable business” (Ries, 2011, p. 150). Whenever the evaluation of the received data from measuring the product’s performance report them as ‘not being good enough,’ a pivot should be considered. The aim is to cause a repurposing of the startup, or as Münch (2012, p. 227) puts it: “to change the course.” Simplifying the decision to pivot or not, unambiguous and detailed key metrics are recommended to support this process (Terho et al., 2015).
In addition to that, some researchers call a pivot merely a decision to ‘change,’ although ‘change’ is not a synonym for ‘pivot.’ The reason being that it is not covering the full extent of the pivot’s deeper meaning (Bajwa et al., 2017; Ries, 2011). The goal is to create a new hypothesis that will stimulate the build-measure-learn cycle and move the drivers of the business model. Furthermore, according to Ries (2011), the total lifetime of a Startup is determined by how many pivots or hypotheses tests are still left. This is the reason why pivoting “is at the heart of the Lean Startup.” (Ries, 2011, p. 178).

If a startup does not decide to pivot (at the right moment), it “can get stuck in the land of the living dead” (Ries, 2011, p. 149). A position in which the company is not growing sustainably and, parallelly, is not finishing its operations. This case is especially true when one contributed an increased amount of monetary means, time and commitment. Furthermore, the decision to pivot requires courage (Ries, 2011).

The misconception is, however, that each pivot sends the startup back to the first stage so that it needs to start from scratch (Ries, 2011). Core elements can stay the same, and the acceleration effect resulting from each MVP helps to reach the following hypothesis faster (Ries, 2011). To put it in other words, a pivot does not mean to go back to ‘stage zero.’

Despite being so crucial, according to some authors, this type of course correction is not that common in practice (Almakenzi et al., 2015; Björk et al., 2013; Bosch et al., 2013). Supporting this point of view, Gonzalez-Uribe & Leatherbee (2015) revealed that only 30% out of 448 startups responded that they have pivoted. Contradicting this belief, others, however, say pivoting is kind of a constantly made crucial decision (Hirvikoski 2014; Unterkalmsteiner et al., 2016). Hirvikoski (2014) stated in that sense with regards to the startup's development, that only “later, with reflection, can we see key moments that have influenced in that path” (p. 6). Thus, the author believes that changes along the way are revealed in retrospective.
To put it briefly, the frequency of pivot occurrences is not uniquely defined, and these get only visible after a pivot has been conducted. Furthermore, also the degree of innovativeness is specified vaguely. Hirvikoski (2014) tends to consider a pivot to be more incremental and a decision made on a daily basis. On the other hand, Van der Veen & Bosch (2013) separate between architectural decisions and disruptive pivots. This is the reason why for them, “[a pivot] is a radical interruption against the ‘previous’ way of working/thinking and that often, different users/customers were targeted after a pivot” (Van der Veen & Bosch, 2013, p. 314).

Adding a third perception regarding frequency and degree of innovativeness into this literature review, Terho et al. (2015) and Pantiuchina et al. (2017) were looking at the pivots in different development phases of a startup. Pantiuchina et al. (2017) revealed that pivots do not increase over time. Nevertheless, Terho et al. (2015) advocate in favor of having a higher likelihood of comprehensive pivots in the early stages of a startup.

This thesis defines a pivot as a course correction leading to changes in the business model and with that creating a new fundamental hypothesis. Therefore, the number of occurrences is irrelevant.

Finally, Ries (2011), Bajwa et al. (2017) and Terho et al. (2015) identified numerous types of pivots. As an example, they mentioned the zoom-in pivot. This pivot type describes when an initially intended feature of a product becomes the actual standalone product. As the focus of this thesis lays on pivot triggers, the pivot types are not discussed any further. Nevertheless, it is important to note that there is no one-to-one relationship between pivot types and the factors triggering them (Bajwa et al., 2017). In the case of Groupon, for example, several factors led to a pivot (Bajwa et al., 2017). Complementing this thought, Dennehy et al. (2016) created a list of questions regarding feasibility, desirability, usability, and viability. Although it is not precisely retractable how they have collected the question catalog, the intention is to enrich a MVP with the help of their self-developed framework.

Following this literature review on pivots, in the upcoming part, we describe the different triggers that might initiate the decision to pivot.
2.6. Pivot Triggering Factors

After following the earlier described method to identify relevant papers, 37 sources contributed to 15 different pivot triggering factors. The summarized form is displayed in the concept matrix (Table 1). It is worth noting that not each factor was represented in all the papers and in many cases, one triggering factor can be allocated to multiple factor categories.

Starting with the category leadership related aspects of the SWS, Almakenzi et al. (2015) advocate in favor of the founder’s ability to see what parts of the product represents a value to the customer. Hirvikoski (2014) adds to this, s/he needs to have the ‘right’ intuition when one has the feeling that outcomes “were not good enough” like in the case example of Votizen (Ries, 2011, p. 154). At the same time, s/he needs to have an unbiased and neutral stance to judge if a way is parting – also known as the decision to pivot, persevere or abandon (Eisenmann et al., 2012). Describing the entrepreneur slightly more in-depth, a courageous and skilled person will have a higher likelihood to pivot (Münch et al., 2013; Ries 2011). Aside of being neutral, courageous and experienced, the “more money, time, and creative energy that has been sunk into an idea, the harder it is to pivot” (Ries, 2011, p. 153). Thus, the leader needs to stay neutral even though hard work and much commitment have been invested (Eisenmann et al., 2012; Eloranta, 2014; Nguyen-Duc & Abrahamsson, 2016; Ries, 2011; Unterkalmsteiner et al., 2016).

In addition to this, a corporate culture needs to be cultivated which accepts pivots (Järvinen et al., 2014). Giardino et al. (2014) add to this point of view that the company needs to adapt to the market and not vice versa. However, the SWS’s strategy is supposed to be flexible to enable pivots (Consumano, 2013; Nobel, 2011; Shi et al., 2014).

Another pivot trigger is luck. It is mentioned by Eisenmann et al. (2012) and Mullins (2017) who believe that a lucky coincidence might lead to a more significant opportunity.
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Expanding the view from being heavily founder-focused, the following category is *team, capabilities and organization*. Many authors describe the pivoting effect caused by these three internal elements (Balwa et al., 2016; Fagerholm et al., 2014; Giardino et al., 2014, Hirvikoski, 2014; Järvinen et al., 2014; Mullins 2017; Münch 2012; Terho et al., 2015; Wallin et al., 2015). As an instance, due to certain conditions, in one of the papers a case company called “Hooka changed the whole development team, and hired new professionals who could develop” (Bajwa et al., 2016, p. 173).

Another paper describes the *capabilities* regarding the effort that is required to provide a solution to a customer (Fagerholm et al., 2014). Regarding the third keyword, *organization*, it should be considered that Järvinen et al. (2014) do not only see the previously mentioned organizational culture as a crucial point but also include the organizational structure.

Progressing through Table 1, the next dimension presented in here is *development process*. For instance, Björk et al. (2013) and Bosch et al. (2013) see a parallel between copying a business model and uncertainty. In both cases, they argue that a copied business model is less likely to pivot. In other terms, the more distant a business model and their development processes are from existing ones, the higher is the probability of pivoting.

Moreover, Bajwa et al. (2017) discovered that solving an internal problem can cause a pivot, as well. Their case example Shopify pivoted from trying to use an existing cart solution for their shop to develop their own cart solution. Thus, the problem in an existing process caused the creation of a new processes chain.

If the scholar looks at the actual product and its development, *technology* has been identified as a triggering factor as well. Technology has the potential to reveal, that “a company ...[can]... achieve the same solution by using a completely different technology” (Ries, 2011, p. 176). Following this thought, feasibility related questions such as those related to technology and feature prioritization are collected under this category in Table 1 (Dennehy et al., 2016; Eloranta, 2014; Fagerholm, 2014; Terho et al., 2015). To sum it up, technology can be a limiting factor such as in the case of *Easy Learning* (Bajwa et al., 2016) or it can embody the potential of new ways to realize services. An example in the latter case would be the emergence of smartphones and the related mobile services (Bajwa et al., 2017)
Among other influencing factors on SWS, the categories: time and funding stood out. In the first case, choosing the right (Hirvikoski, 2014; Münch, 2012), or wrong timing (Bajwa et al., 2017; Nobel, 2011), or spending enough time on research to avoid to pivot (Münch et al., 2013) was a subject in five papers.

In the case of the latter, the topic of resources such as human capital is mentioned with regards to teams and their capabilities. However, the lack of funding is a crucial component, as well (Nobel, 2011). Its relevance starts from the early phases of the startup (Wallkin et al., 2015) till later phases in which reaching a product-market fit becomes crucial (Bosch et al., 2013; Dennehy et al., 2016; Walkin et al., 2015). In this context, it is worth to notice that internal startups are less affected by this pivoting trigger (Edison et al., 2015; Edison et al., 2016).

Coming back to the topic of the later phase of a startup, it is key to network (Wallin et al., 2015). In this case, however, Björk et al. (2015) and Bosch et al. (2013) used network in a different context than Wallin et al. (2015). For example: “Lean Startup is difficult to apply in situations where the product is depending on a network effect. In such cases, scaling before reaching product/market fit might be necessary” (Björk et al., 2015, p. 24). Thus, products based on a network effect tend to target at scaling the MVP, first. Then, they set the goal to reach a product-market fit - which relates to the question of to pivot, persevere or abandon (Bosch et al., 2013; Eisenmann et al., 2013). Wallin et al. (2015), on the other hand, dealt with networks in the sense of human networking that helps to leverage growth.

Moving further in the concept matrix, also the channel to the customer was subject of discussions. Bajwa et al. (2017) revealed that high customer acquisition costs might lead to changes in the business model. Giardino et al. (2014) complement this thought in regard to find a viable path. They stated that a: “small amount of participants in the beginning ... would have allowed the startup to build an effective path to customers who care about the promoted solution, and ultimately found a market that would have supported a viable business.” (p. 33). Thus, the creation of a viable customer path to the right customer in the right market can have the potential to cause a pivot. The customer, however, has also a critical role. With 25 entries in Table 1, the most mentioned triggering factor in the 37 papers is customer feedback.
How customer feedback is related to the connotation of pivoting, varies in some studies. In the case of Bajwa et al. (2017) customer feedback has been divided into “negative customer reaction,” user “appreciation of the particular feature of the product” and others (p. 2387). Among all pivoting triggers in the analyzed cases, the negative reaction is found to be the most frequently mentioned one (Bajwa et al., 2016; Bajwa et al., 2017). Blank (2013), however, relates to customer feedback more in the context of involving this person in the development process. By going out of the building, first-hand customer insights are supposed to be collected.

In general, the idea of continuous experimentation by maintaining a conversation with the customer like in Fagerholm et al. (2014) or the validation of ideas like in Ries (2011) are recurring subjects to trigger a pivot. Supplementing this thought, the customer has been seen as an impact factor in internal (Edison, 2015; Edison, 2016; Edison et al., 2015), as well as, in general startups (Almakenzi et al., 2015; Bajwa et al., 2016; Bajwa et al., 2017; Blank, 2013; Cusumano, 2013; Dennehy et al., 2016; Eisenmann et al., 2012; Fagerholm et al., 2014; Giardino et al., 2014; Järvinen et al., 2014; Miski, 2014; Müller & Thoring, 2012; Mullins, 2017; Münch, 2012; Nguyen-Duc et al., 2015; Nguyen-Duc et al., 2017; Nguyen-Duc & Abrahamsson, 2016; Ries 2011; Terho et al., 2015; Shi et al., 2014; Unterkalmsteiner et al., 2016; Van der Ven & Bosch, 2013; Wallin et al., 2015).

Nevertheless, received customer feedback is not valued as the same in each case. Eisenmann et al. (2012) describe the difference between stated versus actual preferences at the example of Facebook. While analyzing the data, user behavior has “revealed rather than stated preferences” regarding the News Feed feature (Eisenmann et al., 2013, p. 9). The idea of considering user’s behavior is confirmed by Fagerholm et al. (2014). Aside from customer interest, Giardino et al. (2014) talked about the customer's willingness to pay.

As a final remark at this point, Dennehy et al. (2016) listed various questions to achieve a product-market fit. Among others, some relate to the usability/desirability of a product by focusing on strongly customer-centric themes.
Closely related to the column *customer feedback* is the column *growth/potential* in Table 1. For example, an analysis of the data revealed that a side project outperformed the actual project (Bajwa et al., 2017). In general, it is possible to progress with multiple projects and decide at a later stage for the best alternative (Terho et al., 2015). The growth potential goes, however, beyond ‘just’ having multiple projects. Also, the question of user growth and scalability (Bajwa et al., 2017; Edison et al., 2016), or the choice of the right market (Mullins, 2017; Terho et al., 2015) are crucial, as well. An example of such a mismatch between desired growth and actual growth is presented in Edison et al. (2015), where the initial target was too narrow and specific. Thus, the pivot was to a more generic market.

One of the last parts of the concept matrix, is the term *data*. Fagerholm et al. (2014) discussed for instance about the availability of accurate data. Furthermore, Ries (2011) added in this context the connotation of “innovation accounting” (p. 9). Among other things, this metric aims at making innovation processes more tangible. “When key metrics are unrefined and informal the pivots are also wide and have a tendency to contain several other pivots.” (Terho et al., 2015, p. 557).

To paraphrase this, ambiguous data can lead to multiple pivots. Terho et al. (2015) and Bajwa et al. (2016) mention a type called ‘Domino Pivot.’ Thus, a pivot can trigger further pivots, as well.

Looking at the market, *Competitiveness* is also a possible pivot triggering factor (Bajwa et al., 2016; Bajwa et al., 2017; Dennehy et al., 2016; Eloranta, 2014). This is the reason why Eloranta (2014) and Dennehy et al. (2014) argued about the creation of some form of unique selling proposition to stand out from the crowd.

Lastly, the *other & general external factors* is presented in here. Investors, mentors, and other key personalities can have a significant influence on a startup (Bajwa et al., 2017). Additionally, regulations can set limitations to specific developments (Bajwa et al., 2017; Dennehy et al., 2016; Eisenmann et al., 2012; Karkashian, 2015). A pivot triggering factor specific to internal startups is described by Edison et al. (2016). In this case, the mother organization changed the strategy. However, the internal startup persevered. As a result, “the product development project [was] out of the scope” (Edison et al., 2016, p. 134).
2.7. Conceptual Framework

This subchapter discusses the Early Stage Software Startup Development Model. At the end of this chapter, we argue why to choose this model as a conceptual framework.

2.7.1. The Early Stage Software Startup Development Model

Bosch et al. (2013) revealed that founders of Software Startups find it challenging to follow agile and lean development models in practice. Notably, the challenge of when to know if an idea is worth scaling is addressed in their research. As a result, they propose the ‘Early Stage Software Startup Development Model’ (ESSSDM) extending already established models like the lean startup methodology. The ESSSDM especially offers more practical guidance for startups in their decision-making process. This is particularly true for the defined stages of a Software Startup and the exit criteria for each stage.

The model contains of three major parts: 1. Idea generation, 2. Prioritized ideas backlog and 3. Funnel. The Idea generation phase describes techniques such as customer interviews for generating ideas in the pre-startup phase. The intention of having a prioritized backlog is to be able to compare and prioritize multiple ideas in parallel. In the funnel, a modified version of the already discussed build-measure-learn cycle from Ries (2011) is used to validate an idea in four different stages. Each stage consists of two different question sets. The first one targets the validation of the purpose. The second one, the exit criteria, provide guidelines to decide when to move to the next stage.
The first stage of the funnel is Validate Problem. Its purpose is to confirm if potential customers want the problem solved. Questions that should be answered at this stage are: “(1) What is the problem? (2) Who has the problem? (3) Is the problem big enough to make a business out of?” (Bosch et al., 2013, p. 11). Its exit criteria are: “[W]hen a majority of customers ... indicate that they (a) want the problem solved, (b) are willing to pay for a solution, and (c) are willing to participate in solution testing.” (Bosch et al., 2013, p. 11).

After an idea is approved in the first stage, the second stage is Validate Solution. Its purpose is to learn how the solution for the identified problem has to look like. Questions that should be answered at his stage are: “(1) What features are needed for the Minimum Viable Product (MVP)? (2) Who is the early adopter? (3) How much is the solution worth to customers?” (Bosch et al., 2013, p. 11). Its exit criteria are: “[W]hen a majority of customers ... indicate that they (a) believe that the solution solves the identified problem, (b) are willing to test the MVP, and (c) are willing to pay for the MVP (verbal commitment).” (Bosch et al., 2013, p. 11).
The third stage of the funnel is *Validate MVP small-scale*. This is the first time in the funnel a MVP is built and validated against a small number of potential customers. Questions that should be answered at this stage are: “(1) *Does the MVP solve the problem(s) that customers want to have solved?* (2) *How to access early adopters?* (3) *Are customers willing to pay for the MVP?*” (Bosch et al., 2013, p. 11). Its exit criteria are: “[W]hen a majority of customers ... indicate that they (a) customers understand the Unique Value Proposition (UVP), and (b) customers accept the pricing model.” (Bosch et al., 2013, p. 11).

Finally, the fourth stage is *Validate MVP large-scale*. Its purpose is to further test the MVP with a larger number of customers. Questions that should be answered at this stage: “(1) *Has the MVP reached product/market fit?* (2) *Is there a viable path to early adopters?* (3) *Is the business model suitable for the product?*” (Bosch et al., 2013, p. 11). Its exit criteria are: “[W]hen the MVP (a) has passed relevant tests ..., (b) develops inbound channels that repeatedly delivers early adopters into the conversion funnel, and (c) produces a Customer Lifetime Value (CLV) > User Acquisition Cost (UAC).” (Bosch et al., 2013, p. 11).

At the end of each stage, there is the decision to pivot, persevere or to put an idea on hold. Since the ESSSDM is working with several ideas in parallel, an idea can be put on hold instead of abandoning it entirely.
2.7.2. Reasoning in favor of the ESSSDM Funnel Application

The ESSSDM by Bosch et al. (2013) is a comprehensive model for software startups including different development stages, as well as, offering a guideline in the decision-making process of software startup´s product development. Therefore, this study will use parts of this model to measure in which stages the pivots occurred, and what role customer feedback played. The whole model is not applied, as its application goes beyond the scope of the thesis´ focus.

Thus, Step 1 and 2 (Idea Generation and Backlog) are not relevant in the context of this research. As discussed above, the Idea Generation is about the initial hypothesis finding and the Backlog about comparing and prioritizing several hypotheses. This research focuses on the third step, the Funnel, with the build-measure-learn loops and the four stages as described above (1. Validate problem, 2. Validate solution, 3. Validate MVP small-scale, 4. Validate MVP large-scale). Each stage defines guidelines for the decision on whether to pivot, persevere or to abandon an idea or a MVP.
3. Methodology

The following chapter outlines the research’s methodology. The aim is, to support the scholar by providing information on how this study has been conducted. In the first part the main influential factor is presented - the research philosophy. Following that, the methodology guides through the research design and approach that has directed the data collection and analysis. In addition to that, ethical considerations are presented, as well. Finally, a critical reflection on the chosen methodology is given.

3.1. Research Philosophy

“The term research philosophy refers to a system of beliefs and assumptions about the development of knowledge” (Saunders et al., 2016, p. 124). From the authors’ point of view, the debate on whether interpretivism, positivism or any other philosophy has been held as more ‘truthful’ and ‘real’ than the other one, was evaluated as being misleading (Feilzer, 2010; Saunders et al., 2016). To answer the research question at hand, the authors decided not to choose between one position or another. The following paragraphs will present some of the elements that support this belief.

On the one hand, this thesis analyzed the decision to pivot or persevere (Ries, 2011). As decisions and the field of decision making have a strong relationship to psychology (Janis & Mann, 1977), this research could not ignore the importance of humans or so-called ‘social actors’ (Saunders et al. 2016). To live up to the challenge of revealing such subjectively perceived situations, this thesis aimed at showing empathy and profoundly understand what the interview transcripts were trying to reveal. By doing so, it became possible to provide an answer for such complicated matter (Saunders et al., 2016). Furthermore, the research from Unterkalmsteiner et al. (2016) asked for a study with a stronger tendency to an exploratory approach. In such exploratory research, however, it is practically impossible to conduct identical interview procedures as it is not possible to completely standardize the human behavior (Saunders et al., 2016). Hence, this thesis included elements of an interpretive research philosophy.
On the other side, the authors investigated a question that has been deduced from the past literature. Researchers such as Bajwa et al. (2017) and Terho et al. (2015) have identified numerous factors that trigger a pivot. To specify it even further, customer feedback has been the most recurring topic (see Table 1). In addition to that, the authors also found an applicable framework which helped to organize the data - the outcome was a more structured methodology than in the case of a conventional and purely inductive approach (Saunders et al., 2016). To sum this up, also parts of the (post-) positivist research philosophy are represented in this thesis (Bryman & Bell, 2015; Creswell, 1994).

In conclusion, the research at hand “starts with a problem, and aims to contribute practical solutions that inform future practice” (Saunders et al., 2016, p. 143). This implies that multiple interpretations of the world were accepted and, there might coexist multiple realities. Thus, those values are reflected by pragmatism.

“Pragmatism does not require a particular method or methods mix and does not exclude others. It does not expect to find unvarying causal links or truths but aims to interrogate a particular question, theory, or phenomenon with the most appropriate research method” (Feilzer, 2010, p. 13). To finalize this subchapter, the authors were not limiting the research to one of the general philosophies of positivism or interpretivism but used pragmatism instead.

3.1.1. Origins of the applied methodology

To paraphrase a few critical points from 2.4. Software Startup, this venture type relates to software development. As pointed out by Carmel (1994), this stressed the relation of Software Startups to the field of software engineering. Software engineering was “the basic method of applying the systems development research methodology” (Nunamaker Jr. et al., 1990, p. 89). In combination with other research methodologies, the integration of such multidimensional approach has contributed to the field of Information Systems (Nunamaker Jr. et al., 1990). At the same time, the topic of having a lean form of startup (chapter 2.3 Lean Startup) has been discussed in many other fields such as business, innovation, or entrepreneurship. To illustrate this, one could have a look at the example of the Harvard Business Review (Blank, 2013) or Leading Innovation Through Design (Mueller & Thoring, 2012).
To put it briefly, software startups are exposed to numerous influencing variables and face multiple factors that have led to a pivot - ranging from software product development to managerial reasons (Ries, 2011; Terho et al., 2015). This emphasizes the relevance of multiple fields, which is why the methodology to investigate the research question was not originated from only one field of study.

3.2. Research Approach and Design

In the following section, the authors reason for a strong tendency to a deductive research approach with the goal to add valuable insights. Nevertheless, this research exposes parts of an inductive approach, as well.

As already described, researchers have theoretically positioned themselves by discovering some pivoting factors - or stressing the importance of customer feedback. Thus, it has been possible to deduce first relevant results to answer the research question at hand (Bryman & Bell, 2015).

To organize the received qualitative data, the authors applied the conceptual framework presented in the 2.7 Conceptual Framework (Burnard et al., 2008). At the same time, this allowed splitting a hypothesis into multiple smaller ones. This defragmentation contributed to gain a greater understanding (Saunders et al., 2016).

Some authors, such as Unterkalmsteiner et al. (2016) or Paternoster et al. (2014), have pointed out, that research in the relevant field has been immature. According to Saunders et al. (2016), in such cases, an inductive approach is more adequate. These circumstances ignited the creation of an exploratory study as a crucial part of the research strategy. The overall goal has been to clarify where the nature of the problem lays. To do so, one of the suggestions made by Saunders et al. (2016) was, to collect qualitative data via past literature and interviews. The first has been presented in 2. Theoretical Framework, and, the second, will be stated in 4. Empirical Findings. The interviews were conducted with founders, co-founders or employees who have received in-depth insights into the product development of a software startup.
As described in the research philosophy section, the profound understanding of the interviewees or ‘social actors’ has been crucial for this study. These qualitative data contribute to the phenomenological research approach (Creswell, 1994).

Concluding, the scholar is advised to keep in mind that this research took a ‘snapshot’ of a phenomenon by gathering information from qualitative data analysis procedures. This is also known as a qualitative mono-method at a cross-sectional time horizon (Saunders et al., 2016).

3.2.1. Data Sourcing

To answer the research question, primary and secondary data have been acquired (Saunders et al., 2016). As described in 2. Theoretical Framework, the literature review has been entirely based on previous findings in the form of journals, articles, books and other scientific literature. The past literature enabled the authors to deduce a research question and has contributed to many further elements of this thesis.

Nevertheless, the findings were majorly based on semi-structured interviews – a source of primary data (Bryman & Bell, 2015). These were collected during face-to-face interviews, phone calls or via Skype.

3.2.2. Data Sampling

The initial goal was to focus on Berlin based software startups only, however, due to the self-selection sampling, this criterion has been invalidated. Nevertheless, as it becomes evident, most of the following filtering techniques aimed at finding Berlin based companies.

Between 2014 - 2016 the average number of Berlin’s entrepreneurs per 10,000 employable people was 238 (Metzger, 2017). Considering that there have been in total 1,887,000 employable inhabitants, the projection was, that a bit less than 45,000 potential entrepreneurs were identified. However, these are people who have founded their business in Berlin only - independently of the number of startups which have been operating in this geographical region (Statistisches Bundesamt, 2017). Independently of analyzing how many fit the startup definition from chapter 2.4, the scholar can see that this thesis’ authors faced a high amount of potential interviewees.
As the researchers had limited access to those entrepreneurs and the given timeframe have been narrow, sampling was applied. Thereby, the authors faced two contradictory forces. They wanted to receive as many interviews as possible. However, entrepreneurs and expert in this field are usually busy. This is the reason why the authors decided against the application of probability sampling. This led to the following three sampling techniques in this research: self-selection, purposive, and convenience sampling.

Starting with the first sampling technique, the authors contacted via email and phone various co-working spaces (e.g., betahouse), accelerators (e.g., Axel Springer Plug and Play) and one incubator (hub:raum) in Berlin. Some of these institutions forwarded the researcher’s interview request. In these cases, interviews could only take place, if entrepreneurs were interested in participating. To paraphrase this, they had to self-select themselves to become a part of the sample (Saunders et al., 2016). How this process has been realized will be explained in the following with the help of Figure 4.

*Figure 4: Self-Selection Sampling - Funnel*
In the first step the authors found out that there are over 100 co-working spaces in Berlin (Mühlhans, 2018). To narrow this number down to the most adequate ones, 13 organizations were identified as being more relevant. Relevance is defined as being described as “top,” “popular” or “best.” To get to 13 co-working spaces, the authors used the keyword combination “best” + “co-working space” + “Berlin” without using any operators in www.google.de’s organic search. Out of the results, randomly five pages were selected, and the suggested co-working spaces were listed in Table 2. To keep the table as lean as possible, the authors added criteria related to the number of references to each space. Out of the five different blogs/websites, an organization needs to be recommended more than once to be even judged as being popular from more than just one source.

**Table 2: Co-Working Space Overview**

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After this pre-filtering, the authors sent out emails, asking for the opportunity to either add their request to an email list or pin a physical notification on a blackboard. The goal was to gain the attention of potentially interested participants. A short description of the purpose and necessary information were added to the mail. Then it was up to the co-working spaces if they were willing to share this request or not. The betahaus GmbH & Co. KG and WeWork Companies Inc. responded, positively, and Factory Works GmbH apologized for not giving the authors any possibility to offer any support on this topic. All the others did not reply. Thus, the authors interpreted this as a silent denial. Finally, the authors ended up with 1 participant.
Before moving to the purposive selection, it is worth noting that the authors identified 91 accelerators and incubators via search in www.google.com, after filtering through various steps, 4 of them remained. However, none of the contacted institutions replied. This was the reason why the authors decided to leave out further details on how the authors identified these organizations. To paraphrase this, the outcome did not provide support to answer the research question at hand.

Aside of these successive filtering approaches, the authors published in a closed group on LinkedIn (group name: “Berlin Startups) and Xing (group name: “Startups Berlin”) a post regarding this thesis. These groups were selected because they were perceived as being suitable for this study. Out of these two posts, one interviewee contributed to this study.

Furthermore, the authors believed that extreme cases were interesting, as well (Saunders et al., 2016). In the context of this study, these were startups, which have achieved some exceptional accomplishments by generating a high level of customer value. According to the following quote, this type of value links to fundings: “[Attracting] funding ... usually requires more than emotion: [Investors] want quantitative and qualitative data demonstrating the superior benefits of the new product or service as well as what potential users are willing to pay to get it.” (Consumano, 2013, p. 28). Thus, to indicate the customer value indirectly through fundings, chosen startups needed to accumulate a funding amount higher than $3 million according to the export from angel.io (AngelList, 2018). This purposive sampling of entrepreneurs intended to see if famous startups have potentially pivoted differently than others. As some of the available databases are only to a limited extent free of charge, such as www.crunchbase.com (Crunchbase, 2018a), the authors decided on using Angellist’s freely available data.

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4 https://www.linkedin.com/groups/4738338
5 https://www.xing.com/communities/groups/startups-berlin-3217-1007067
In total 3,887,069 companies are registered on this platform. By filtering for Berlin-based companies, the total number reduces to 2,844. As described earlier, the company should have generated a (potentially) high level of customer value, which is indirectly visible through the fundings (Consumano, 2013). Thus, the funding criteria are set to be either 3 Mio. $ or greater. As the platforms Excel export (106 entries in total) and the web-based table (116 entries in total) are inconsistent, the researchers manually checked the whole list. The result was 119 potential companies. Nevertheless, the definition of being a youthful company was set to 10 years. (Yli-Renko et al., 2001), narrowing the total number to 100. Examples of companies listed in the original table but founded after 2008 are enterprises such as Soundcloud or Babbel. Furthermore, the given startup definition required to be also innovative, dealing with uncertainty and having strong relations to software development. The software startups definition cut the number to 77.

Over means such as the premium version of a LinkedIn account or the contact possibilities on the webpage, the authors reached out to these 77 different people - either through direct contact or over the customer service. Each company was contacted only once. If there were multiple founders, the interviewee was chosen based on their experience on their LinkedIn profile and their role in the company. The ideal candidate is a co-/founder who:

- knows the company since its early days and its development profoundly. Thus, this person went through various stages with the venture.

- has a role heavily related to product development or design, thus experiencing first-hand what has influenced the product development decisions.

- has achieved an exit. To exit a startup needs to be attractive to others and with that can be seen as an indicator for a successful development of the venture.

- has experience as a ‘startup mentor’. The authors believe that mentors have often acquired an extensive knowledge across various startups and usually have also proceeded through many startup phases.
However, also in this case, an unanswered email from a person was perceived as a silent denial. Out of the 77 contacted ventures, four interviews took place.

_Figure 5: Purposive Sampling of Extreme Cases - Funnel_

Due to the challenge of finding the right people, the authors decided to ask in their networks regarding potential interview candidates. This convenient sampling helped to increase the number of interviewees significantly. At the end four out of the nine interviews were sampled via convenient sampling.

Finally, the scholar needs to note that Marshall et al. (2013) discovered that out of 83 qualitative studies in the field of information systems, there were almost no justifications for sample sizes. Among other things, a factor influencing the sample size could be related to the cultural independence of the geographical location (Marshall et al., 2013). Additionally, also in other areas, the number varied depending on the researcher (Creswell, 2007; Marshall et al., 2013). Dukes (1984, p. 200) warned, however, that in phenomenological research: “[there] is always the danger of ... seeing what we want to see - rather than what is there to be seen.” To avoid this, she suggested expanding the sample size from one to a number greater than three (Dukes, 1984). This thesis contains the results from 9.
3.3. Data Collection, Analysis, and Ethical Considerations

The data collection method tries to acquire in-depth data on how an individual has subjectively perceived a specific phenomenon. Additionally, Dey (2003) stated, that the “more ambiguous and elastic [the] concepts, the less possible it is to quantify data in a meaningful way.” (p. 29)

With that said, qualitative data collection was applied. The source for primary qualitative data in this exploratory study were semi-structured interviews. To be more systematic during the process of finding answers, the interview design presented in the upcoming subchapters will follow Rabionet´s guidelines (Rabionet, 2011). She suggested six guiding stages for semi-structured interviews. The first stage was the selection of the interview’s type. Here the authors also were required to reasons for why this research needed a semi-structured approach. Additionally, ethical guidelines regarding the interviews were established. Then, there was the creation of a protocol on how to familiarize the interviewee with the thesis and what were the questions asked during the interview. After planning how to do that, the approach on how the interview was conducted would be described. As this stage ends with different results, the authors were supposed to describe how they analyzed the generated data so that a summary of those findings could be presented (this was done in chapter 4). To put it briefly:

1) Interview Type Selection
2) Interview Protocol
3) Realization of the interview
4) Data Analysis
5) Ethical Considerations
6) Summary of Findings (4. Empirical Findings)

6 The original order from Rabionet (2011) has been slightly modified to suit this thesis´ structures.
3.3.1. Interview Type Selection

The authors were using the semi-structured type of interviews. The aim was to retrace decisions in product development with regards to the relevance of customer feedback among all the pivoting triggers.

On the one side, standardizing, had the potential to miss essential aspects which were relevant for answering the research question. On the other side, the intention was to provide specific borders between which the interviewee could wander around without limiting this person to a specific path. The expectation was to have an interactive approach which might reveal experiences that have not been discovered by earlier researchers (Rabionet, 2011; Saunders et al., 2016).

To conclude, by conducting non-standardized interviews the authors attempted to probe further explanations or even build on the respondent's answer. This connotation was supported by Saunders et al. (2016) who believed semi-structured interviews contributed to understand the deeper meaning of what a participant was ascribing to a situation.

3.3.2. Interview Protocol and Realization

Before dealing with the actual conducted interview, the scholar needs to know how the contact emerged. Firstly, the authors had no previous contact with any of the interviewees. As characterized previously, the authors used three sampling strategies: self-sampling, purposive sampling of extreme cases and convenience sampling.

Due to the variety of fields and backgrounds of the startups, each contacted person from the sample was regarded as being unique in its own ways. This was the reason, why the authors created a list of various guiding questions and subjects - without being overly strict about the order of the topics or - even - if a question will be asked or not (similar to Cohen & Crabtree, 2006; Saunders et al., 2016). The basic structure of the interview was separated into several parts: Introduction, General Information, Development (of the Startup), Pivot Triggers, Knowledge of the Lean Startup, Other information and then the Outro.
In the introduction, the authors elaborated on the thesis by talking about what they were researching on. To provide the interviewee with further insights, a plan was presented on how the interview procedure would be and, additionally, there was the consent on the voice recording and data processing in a verbal form - however, if required, a written consent form was available, as well. Regarding voice records, there have been many ways to keep track of the conducted interviews, such as writing notes during the session, however, “*literature recommends audio above all the other methods*” (Robionet, 2011, p. 565). Thus, if the interviewee agreed, the interview’s audio was recorded via phone or a specific Skype application. It is worth mentioning, that, aside from one interview which was only based on notes, all interviews were recorded and complemented with notes taken during the conversation. Due to technical difficulties, the phone interview was unrecorded and based on notes only. Example questions of the interview’s introduction part are:

- Is it okay for you, if we record the interview?
- Are we allowed to name your startup in our thesis or do you want to stay anonymous?

For the upcoming interview elements, the following Table 3 displays exemplary open-ended questions with regards to each of the relevant themes. However, it is important to stress, that in the context of pivot triggers the authors realized either directly by statements made or by rephrasing the answers of the interviewee if customer feedback was crucial or not. If it was still not possible to judge the point of view regarding customer feedback, the authors specifically inquired: *Has customer feedback influenced your product?* If yes, the interviewee was then asked to name what customer’s feedback has impacted product features.
Table 3: Interview Themes and Example Questions

<table>
<thead>
<tr>
<th>Overall Theme</th>
<th>Example Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Information about the Company</td>
<td>• Could you please describe what {company_name} is doing?</td>
</tr>
<tr>
<td></td>
<td>• Could you please elaborate on your current position in the market?</td>
</tr>
<tr>
<td>Development of the Company</td>
<td>• What was the initial need that this company tried to respond?</td>
</tr>
<tr>
<td></td>
<td>• Have you always imagined to be where you are today?</td>
</tr>
<tr>
<td>Pivot Triggers during the development</td>
<td>• Where do you see major challenges along the way?</td>
</tr>
<tr>
<td></td>
<td>• Have you perceived Customer Feedback has being a trigger to change the direction?</td>
</tr>
<tr>
<td>(Knowledge of the Lean Startup)</td>
<td>• Are you familiar with the concept of: “pivot, persevere or abandon”?</td>
</tr>
<tr>
<td></td>
<td>• Have you applied a pivot in your venture?</td>
</tr>
<tr>
<td>Other information</td>
<td>• Do you see any further triggers that might have caused a pivot?</td>
</tr>
<tr>
<td></td>
<td>• Do you agree with {add_conclusion_in_here} or would you like to correct or add something?</td>
</tr>
</tbody>
</table>

As there was a realistic chance that a software startup has never pivoted before, the alternative conversation flow would have been as follows: The interview would directly jump to the reasoning of how they have avoided pivots so that the authors could understand why this is the case. As a side note, in none of the interviews, this alternative conversation flow took place.

It is worth noting that the theme regarding the Lean Startup was optional. It was only subject of the conversation if the authors perceived that the Lean Startup methodology was not stated earlier in the interaction with the interviewee.
Finally, the interview was briefly summarized and concluded. An essential part of the outro was to thank the interviewee, provide the person with how the information would be further processed and if required the authors offered to send a finished version of this research.

Moving forward and having a closer look at the chronological order, the scholar sees the most important basic information about the conducted interviews summarized in Table 4. Moving from left to right, the overview contains the following information:

1) When was the interview conducted?
2) What was the main subject of this conversation?
3) When was the subject founded, if it is a software startup?
4) From where does the software startup mainly operate?
5) Who was the interviewee?
6) Was the interview face-to-face, over Skype or phone call?
7) How long did the interview duration?
Table 4: Overview on conducted Interviews

<table>
<thead>
<tr>
<th>Date</th>
<th>Primary info on the following startup</th>
<th>Founding year</th>
<th>Mainly operation from</th>
<th>Interviewee</th>
<th>Interviewee’s relevant position</th>
<th>Interview conducted via...</th>
<th>Interview Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>08-04-18</td>
<td>6Wunderkinder (partly Ottonova)</td>
<td>2010</td>
<td>Berlin</td>
<td>Sebastian Scherer</td>
<td>Co-Founder &amp; Head of Design</td>
<td>Skype</td>
<td>24min</td>
</tr>
<tr>
<td>19-04-18</td>
<td>Mambu</td>
<td>2010</td>
<td>Berlin</td>
<td>Frederik Pfisterer</td>
<td>Co-Founder &amp; Chief Operating Officer</td>
<td>In person</td>
<td>24min</td>
</tr>
<tr>
<td>05-05-18</td>
<td>Anonymous</td>
<td></td>
<td>Anonymous</td>
<td>Anonymous</td>
<td>Anonymous</td>
<td>Skype</td>
<td>25min</td>
</tr>
<tr>
<td>07-05-18</td>
<td>Cash Payment Solution (Barzahlen.de)</td>
<td>2011</td>
<td>Berlin</td>
<td>Susanne Krehl</td>
<td>Managing Director for Swiss and Austrian</td>
<td>phone</td>
<td>22min</td>
</tr>
<tr>
<td>08-05-18</td>
<td>Softgarden (partly Granola Studios)</td>
<td>2014</td>
<td>Berlin</td>
<td>Dominik Faber</td>
<td>Founder</td>
<td>In person</td>
<td>39min</td>
</tr>
<tr>
<td>09-05-18</td>
<td>Anonymous</td>
<td></td>
<td>Anonymous</td>
<td>Anonymous</td>
<td>Anonymous</td>
<td>In Person</td>
<td>36min</td>
</tr>
<tr>
<td>15-05-18</td>
<td>1&amp;1 and general experience</td>
<td></td>
<td>-</td>
<td>Andreas Gauger</td>
<td></td>
<td>In Person</td>
<td>50min</td>
</tr>
<tr>
<td>16-05-18</td>
<td>ReTest</td>
<td>2014</td>
<td>Karlsruhe</td>
<td>Dr. Jeremias Rößler</td>
<td>CEO &amp; Founder</td>
<td>Skype</td>
<td>40min</td>
</tr>
<tr>
<td>17-05-18</td>
<td>Port-Zero and general experience</td>
<td></td>
<td>-</td>
<td>Michael Prinziger</td>
<td>CEO &amp; Founder</td>
<td>In person</td>
<td>40 min</td>
</tr>
</tbody>
</table>

In total nine interviews are represented. Due to the anonymization no further information are stated for two interviews. The remaining entries consist of mostly founders and co-founders\(^7\) who have experienced the product development intensively and since the early days.

3.3.2.1. Pre-Testing of Interviews

To avoid "flaws, limitations, or other weaknesses within the interview design" (Turner III, 2010, p. 757), pilot tests took place. The goal was to optimize the conversation flows by crafting possible ways on how the interview might proceed.

To do so, we interviewed a sample of two people from our networks who had prior experience in a related field, such as coaching in the field of entrepreneurship or working with information technology. Within ca. 50 minutes we went through the previously mentioned topics and questions via face-to-face interviews.

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\(^7\) The only exception is Susanne Krehl, a hero from the early day as she joined Barzahlen a month after the company was founded.
An exemplified modification resulted from these tests is the question of customer feedback. Our questions regarding pivoting triggering types were perceived as biased. The interviewee perceived that we were overly interested in customer feedback - and less in, e.g., pivots due to internal changes such as changes to the founding team. The plausible explanation was that taking out one co-founder might cause a pivot in the long run due to consequences of the strategy.

The course correction in here was that if the interviewee did not start talking about customer feedback independently from our questions, we asked explicitly if s/he has perceived customer feedback as being one of the pivot triggering factors.

3.3.2.2. Data Analysis Methods

In the following, one will receive insights on how the authors created meaning out of the subjective perceptions. The acquired qualitative data aimed at drawing pictures which Robson (2016, p. 459) and others “described as ‘rich,’ ‘full’ and ‘real.’” As data collection method impacts the data analysis methods, choices in here were not randomly (Saunders et al., 2016).

To be able to extract information out of the gained data, the authors needed to process through multiple steps. These included, inter alias, the convergence of data with similar meaning to be able to conclude afterwards. Following that, the qualitative data analysis took place. “Qualitative content analysis is one of numerous research methods used to analyze ... data” (Hsieh & Shannon, 2005, p. 1278). As there has been previous research available in the relevant field and the authors were able to derive a conceptual framework - the ESSSDM funnel - a directed content analysis has been applied. Per definition, the “analysis starts with ... relevant research findings as guidance for initial codes” (Hsieh & Shannon, 2005, p. 1277). The qualitative content analysis aims to provide a systematic approach for supporting or extending the given framework - in this case, the ESSSDM funnel (Bosch et al., 2013; Hsieh & Shannon, 2005).
To be able to achieve this goal, the data analysis started with transcribing the audio-recorded conversation (if the interview was not already completely documented in a written format such as in the case of Barzahlen.de). To keep the transcript lean and focused, the authors concentrated on parts that contributed to this study. However, aspects such as voice level or body language have not been analyzed. Then, the most relevant parts for each interview were summarized in chapter 4. Empirical Findings. “The next step in the analysis would be to code all highlighted passages using the predetermined codes. Any text that could not be categorized with the initial coding scheme would be given a new code.” (Hsieh & Shannon, 2005, p. 1281) Thus, the directed content analysis does not mean that information, unsuitable to be placed in the framework, were discarded⁸. To conclude, all information that suit the framework or represent exceptions were discussed in the sixth chapter.

3.3.2.3. Ethical Considerations

Researchers such as Rabionet (2011) or Dicicco-Bloom & CrabTree (2006) have stressed the importance of ethical questions related to an interview process. During the interview, the researchers dealt with personal feelings and beliefs regarding the possible failure of the past that had required possible course corrections. It would have been possible that the interviewee revealed feelings and griefs, thus “the process may [developed] in unforeseen ways” (Dicicco-Bloom & CrabTree, 2006, p. 319). In such case, the interviewers were advised to respect the psychological states - if required stop and support the interviewee - and not just ignore the situation.

It is worth noting that no matter what has been stated by the other person the researchers needed to stay professional, respectful and objective. This was a way to assure that data could be collected correctly and to their full extent (Saunders et al., 2016). Within this regard, the authors also needed to ensure always to be “respectful and culturally sensitive” (Rabionet, 2011, p. 564).

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⁸ The basic idea origins from the suggestion by Bryan & Bell (2015) and; Hsieh & Shannon (2005). In that sense, Hsieh & Shannon (2005), for example, recommend that new findings can result in new categories or refine existing ones. Nevertheless, the focus of this study is not on extending the existing framework.
Furthermore, the authors followed the advice to convey that the interviews are free of consequences and voluntarily (DiCicco-Bloom & CrabTree, 2006). On the one hand, the intimate and personal nature of the conversations might have revealed information, that could harm the interviewees’ position in the future. This was the reason why the authors offered the option to stay anonymous.

On the other hand, the researchers of this study wanted to engage with the interviewees. However, if the interviewee felt uncomfortable or wanted to reconsider the participation, there was the possibility to do so. Additionally, the possibility to fill in the consent form had existed. This (physical) document was a written agreement on the interview data processing. The consent form intended to increase the trustworthiness of the study (Saunders et al., 2016).

Finally, “[recorded] data should be carefully guarded and generally destroyed after transcription or once analysis is complete” (DiCicco-Bloom & Crabtree, 2006, p. 318). In that sense, aside from the interviewees’ statements which the authors could publish, remaining statements were deleted as soon as the conclusion in the final chapter have been written.

3.4. Critical Reflection on the Methodology

According to Golafshani (2003) the connotation of reliability and validity - originated from quantitative research - in the context of qualitative research has been debatable and not entirely applicable. Under these preconditions, a suggested approach was to target: trustworthiness, a way to improve the qualitative research’s quality (Lincoln & Guba, 1985; Shenton, 2004). In this last part of this chapter, the scholar will go through the four elements that have contributed to the concept of trustworthiness. These are credibility, transferability, dependability, and confirmability. Finally, the authors elaborate, in how far each of these trustworthiness’ components were represented in this thesis. Additionally, the scholar will understand the limitations of this study.
**Credibility:**

Credibility is the “investigators attempt to demonstrate that a true picture of the phenomenon under scrutiny is being presented” (Shenton, 2004, p. 63). To confirm this, inter alia, researchers have numerous provisions to contribute to this confidence such as applying “tactics to help ensure honesty [of] informants” (Shenton, 2004, p. 66).

**Transferability:**

The idea of transferability deals with the possibility to apply findings from one setting into the context of another. Although there is no agreement on if qualitative research is transferable, the recommendation from Shenton (2004) is to transfer only with caution. To be as transferable as possible, researchers are required to provide sufficient information about the context, so that the reader can judge in how far the results are compared to a phenomenon’s instance in another context.

**Dependability:**

Dependability covers the repeatability of a study, a topic more common to quantitative research. The idea is that “if the work were repeated, in the same context, with the same methods and with the same participants, similar results would be obtained” (Shenton, 2004, p. 71). To enable such dimension, it was recommended to report the study processes in a detailed manner (Shenton, 2004).

**Confirmability:**

The last dimension of trustworthiness, confirmability, is about the belief that findings are induced from the data collected and not from the researcher’s weltanschauung. In this context, the critical concern was: to stay objective (Shenton, 2004). According to Shenton (2004) objectivity relates strongly to the investigator’s bias. To prevent such bias, transparency of the methodology was required that helps future scholars to determine the acceptability. One way to do this is via the audit trail - an idea formulated by Lincoln & Guba (1985).
There are researchers in the field, however, who argue that “using audit trails as a means to achieve confirmability of qualitative research findings appears to be an exaggeration of the case for method, and may do little to establish the credibility of findings” (Cutcliffe & McKenna, 2004, p. 132). Among other facts, Cutcliffe & McKenna (2004) raised doubts regarding the nature of the findings as those were interpretive - unlike in the case of quantitative research. Thus, the complex nature of the qualitative data has challenged the auditor to identify in how far, and, if findings have been grounded in the acquired data or not.

Application of Trustworthiness and the Limits of the Thesis:

The researchers targeted at creating the highest level of trustworthiness including living up to the five P mantra of "prior planning prevents poor performance" (Saunders et al., 2016, p. 401). However, the “quality of the research cannot be assured by the rigorous application of a set of previously agreed strategies and procedures” (Rolfe, 2004, p. 309). Thus, it is reasonable that a scholar should question the methodology and findings of this research. As an example: Although the authors have listened to the audio-recordings many times to extract the speaker's intention correctly, “people often speak in run-on sentences, [which is why] transcribers are forced to make judgement calls. The insertion of a period or a comma can change the meaning of an entire sentence” (DiCicco-Bloom & Crabtree, 2006, p. 318). Briefly, the authors acknowledge - as already described in the research philosophy part - human actors are playing a crucial role.

On the one hand, the interviewee might have some bias about, e.g., trying to present the company in a good light. On the other hand, the interpretation of responses had the potential to be incomplete due to the focus on the statements and less on non-verbal signals or tone related aspects (Creswell, 1994; Saunders et al., 2016). Furthermore, the directed approach might cause a bias, as well. The researcher “might be more likely to find evidence that is supportive rather than nonsupportive of a theory” (Hsieh & Shannon, 2005, p. 1283). Nevertheless, to achieve the highest level of trustworthiness, the earlier described concepts of credibility, transferability, dependability, and confirmability were considered.
To achieve *credibility* in this thesis, one needs to consider the upcoming ambivalence: On the one side, the authors have implemented different components that were supposed to contribute to the *credibility*. For example, practitioners were participating voluntarily, always had the chance to stop the interview or pull back an answer before publishing this thesis. Furthermore, in many cases, the authors used iterative questions during the interview to paraphrase the given statement. This helped to recap what has been said before and, parallelly gave the interviewee the chance to correct what we have understood. Another important point in this context was the openness towards feedback regarding the questions’ quality. At any point, we were open for improvements to depict an adequate picture of reality.

On the other side, due to the lack of time and resources, the authors could not cover the *credibility* provisions to their full extent. For instance, as already described in 3.2.2. Data Sampling, the authors did not apply random sampling. One of the reasons was the difficulty to find interested participants. Furthermore, triangulation was only applied in the sense of looking at how far different participants were stating the same information. Because of the lack of time, there was no application of the recommended methods mix of to observe, create focus groups and individual interviews (Shenton, 2004). This, however, could have increased the study’s *credibility* significantly.

Putting it in simple terms, the remaining three factors of *trustworthiness*: *transferability*, *dependability*, and *confirmability*, depended heavily on the degree of information details provided in this thesis. To be transferable, one needs to understand the boundaries of contextual dependent research, such as the one at hand, and be able to investigate its outcomes. Then, this person can judge on the relevance of this contextual information. (Shenton, 2004). This information was presented in 3.3. Data Collection, Analysis and Ethical Considerations. To go through the most important points, after this chapter the scholar was supposed to keep in mind that:
Nine semi-structured interviews were conducted over the period between 01.04.2018 till 18.05.2018. With founders, co-founders, and employees who have worked for the company since the early days. The thesis was the reason for contacting these people. Thus, no previous contact had emerged. During the interviews, the most frequently applied documentation was via audio-recording. At a later stage, these files were transformed into transcripts that were analyzed with the help of the ESSSDM funnel questions. Thus, the ESSSDM funnel provided findings that guided a directed content analysis. It is important to note, that certain relevant aspects such as body language have not been analyzed. Furthermore, ethical questions such staying respectful and thoughtful have been crucial points for the methodology, as well.

To achieve dependability and at the same time confirmability, the methodology’s part on 3.3. Data Collection, Analysis and Ethical Considerations described relatively detailed topics spanning from how the research has been designed to how ethical considerations were included (3.3.2.3 Ethical Considerations). These points supported the scholar to retrace decisions made by the authors and give the opportunity to judge on his/her own the relevance of the thesis.

After depicting the methodology in this chapter, the scholar will enter the part on what findings have been discovered.
4. Empirical Findings

The following chapter outlines what has been found out empirically. Each of the interview findings are presented by grouping them in two parts. The first group represents interviewees who have talked extensively about one specific software startup. It is worth noting, that two of these people asked for staying anonymous. The second group are interviewees who have related their experience to various organizations including software startups. Each of these subchapters starts with a short introduction on the startup before diving into a short narrative regarding the topic of this thesis. The findings are entirely based on the conducted interviews and provide the base for the upcoming chapter, 5. Analysis.

4.1. 6Wunderkinder

The startup was founded in 2010 by six friends with the goal to build the next generation project management software. Running a web agency, they were in need of a reliable and easy-to-use project management tool but could not find anything fulfilling their requirements (Miller, 2014). They started publishing the app Wunderlist, an easy-to-use cross-platform task management app. The app received much attention early on and was supposed to be a preview of a comprehensive project management application called Wunderkit. Wunderkit was published in 2012 and was discontinued a few months after publication in favor of Wunderlist (Reber, 2014). Wunderlist had 13+ million users in June 2015 when it was bought by Microsoft (Reber, 2015).

The authors interviewed Sebastian Scheerer, co-founder, and designer at 6Wunderkinder. Speaking about their decision to lay off the development of Wunderkit in favor of Wunderlist, Sebastian states that “it was one of these typical situations where one has to make tough decisions.” The six friends started 6Wunderkinder with the vision to build the ultimate project management tool. At the beginning of that process, an Angel Investor suggested making a “test balloon” with the To-Do list - intended only a feature of the project management tool Wunderkit - as a standalone product to test how the market would react to it. The reaction of users was extremely positive, and the product went through the roof.
Despite their early success with Wunderlist, their main efforts still went into Wunderkit. Sebastian elaborates that developing two products at the same time let them become unfocused and frittered. “We developed many features, some of them probably did not match the needs of our customers. It also was not clear to the customer what kind of a tool [Wunderkit] was. Is it a social media tool, is it a publishing platform or more a project management tool?” This lack of focus let to an ambiguously defined product. The founder team realized that they would need to develop Wunderkit again from the ground up, but they did not have the financial or timely resources to do that.

On the other hand, in order to develop a complex product with many features, they also had to take care of Wunderlist with several million users. They had a product that users loved and could not wait for new features to be released. The instability regarding the focus caused, however, that those initially delighted users became more and more unsatisfied over time. This, finally, led to the decision to entirely concentrate on what satisfied the needs of customers, and that product was Wunderlist.

Asking Sebastian if they gathered feedback from potential customers in the early development phase of Wunderkit he states that they definitely did not test enough and only tested on a shallow level, mostly related to Wunderlist but almost not at all for Wunderkit. The founders had been confident about “what features would be cool to have and developed for their product.” Ultimately to realize that users did not know how to use them. In retrospect, he thinks of this being a mistake and something that could have been identified earlier on.

In the context of his new and current startup, Ottonova, Sebastian mentioned that customer involvement has increased drastically compared to 6Wunderkinder. On a frequent base Ottonova´s team has reached out to gather feedback. By sending out surveys, conducting interviews and using Balsamiq⁹ wireframes different features of the new product have been tested.

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⁹ Further information available at: https://balsamiq.com/
Nevertheless, he stated that: “If the customer wishes to have a hole in the wall, this person does not care if it is made by a drill or any other more efficient device. It is about the outcome: To have a hole in the wall.” With that Sebastian illustrated that customer feedback is relevant, however, its importance should not be overstressed.

4.2. Mambu

Founded in 2011 Mambu is a Berlin-based fintech startup offering a Software as a Service banking engine (Mambu, 2018). Starting to offer services for micro-credit providers in Latin America and Africa, today they provide a fully capable banking engine, and most of its new customers are from Europe (O’Hear, 2016). The SaaS banking engine of Mambu empowers more than 180 clients in 45 countries serving over 4 million end customers (Alois, 2017).

The authors interviewed Frederik Pfisterer, Co-Founder and Chief Operating Officer at Mambu. Talking about the early days of Mambu in 2009, Frederik states that they spent the first year exclusively with research in emerging markets and studied many aspects of the Lean Startup and Design Thinking. Their focus on emerging markets was also the reason to start with micro-credit providers. “We easily could imagine that as an addressable market, banks and cloud was not something you could imagine back then. However, it was the time of the first iPhone, and Salesforce.com was the first billion-dollar SaaS company. We already knew back then that the future would be cloud and digital finance.”

According to Frederik, the development of Mambu from a provider for micro-credit institutions towards a full banking provider was more an organic pull rather than a pivot, he elaborated: “We just realized there is interest, also from the developed world, and we just followed that pull. If you are offering a product, the market will tell you where to go.” Additionally, he stated that they have always been very close to the market and realized that they would not make much progress with micro-credits anymore.
Talking about the price politics, Frederik pointed out that they had a too low price in the beginning to be taken seriously from big banks and enterprises. However, the price evolution came with the more mature product. Moreover, also the customer evolution came with the price and product evolution. “Thus, I think our pivot was more gradual and a chain of coincidences than being intentional. We always knew it could evolve in that direction. We always knew that the banks most likely will have to go in the direction we are going anyways. However, in the beginning, we did not have the credibility to see them as an addressable market.”

Asking Frederik about the role of customer feedback, he stated that in the early day’s product development was almost exclusively driven by customer feedback. Nowadays, however, the company also works with a strategic roadmap to realize the vision of the product. Reflecting on his experience, he added to the past development approach: “In the beginning, we did that a bit too lean and customer-centric.” This was given by the fact that they did not have a big amount of initial funding. Today, the product roadmap helps to create plans which are not as short-term as before and therefore helps them to prepare for the future with bigger clients.

Furthermore, Frederik states that the team went through the customer development process. They showed prototypes to potential customers in the early development phase and received a lot of positive feedback, however, no one had the actual willingness to buy the product in the end. “This was the reason why we burned a lot of capital in the beginning. Today, I would try to get more commitment, specifically asking about, how much would you [the potential customer] pay for the product and what exact features would you need to buy it? Additionally, I would close a memorandum of understanding.” He referred to the year 2009, a time in which the company spent their first year with research and development.

The company also evolved in the way they sold their solution. In the beginning, one could provision a trial instance and start configuring a lending institution by themselves. “From today’s perspective, that was crazy. The product is way too complex to offer a way to just configure it as a self-service. However, it led to a few early customers. It did not harm us, but it is part of the learning process, to fail and to iterate.” Again, Frederik states that this realization was gradual and not a clear pivot.
4.3. Barzahlen

In 2011 the Berlin-based Cash Payment Solutions GmbH was founded to provide Barzahlen (Cash Payment Solutions, 2018). The startup provides offline payments for online purchases. By receiving a barcode, the user can pay the online purchase at a Barzahlen’s local partner such as supermarkets or drug stores (Vielmeier, 2012).

Nevertheless, their service grew over the limit of “just” offering a payment solution for online purchases. Today they include services such as the withdrawal for banking services or even the possibility to provide the payout of the unemployment payment at, for instance, supermarkets (IT Finanzmagazin, 2018; Neuhaus, 2017). The authors interviewed Susanne Krehl - she is the Managing Director for the Austrian and Swiss market and one of the “heroes” from the early days of Barzahlen.

Moving through the development of the venture in chronological order, the original idea was to improve the conversion rate of shopping carts in eCommerce. Initially, one of the founders discovered a paradox. Although many users selected products and went through all the different purchase phases, they had a high dropout rate in the final step - choosing the payment method and paying for the product. Potential reasons have been for example the lack of credit card diffusion among adults in Germany. As a result, and as earlier described, Barzahlen had the idea to provide offline payment with the support of retail companies for online purchases. Only three months after their launch, an untargeted market segment - a municipality utility - questioned: “Is there a chance to make the payment in the supermarket?”

The interest from such a different sector was the impulse that initiated the process to investigate further potential markets which go beyond the limits of eCommerce. “We did it in a typical startup manner by being open to new possibilities. After looking through various industries, we found some interesting potential markets. For each of these, then, we created a pilot project in the field to collect relevant data. Based on these data, we could evaluate if this test was successful. If the answer was yes, we entered the market. Additionally, the answer “yes” meant for our team to complement it by adding a relevant expert in the sales department.”
This approach shifted Barzahlen’s development from offering just eCommerce payment to a service for municipality utilities, then to 10 further industries and, today, include even solutions for the state sector beyond the municipality level.

Nevertheless, the question that emerged was: “How does Barzahlen conclude that a test was successful?” This decision was based on the perception that Barzahlen could achieve a reasonable position with their sales support and scale it. “Like many other payment solutions, we earn per transaction. Depending on the potential transactions due to, e.g., the amount of users, a market indicates its attractiveness.” Thus, reasonable in this case means: the potential amount of transaction and usage on the market needs to cross a certain limit and at the same time provide the potential to grow.

Susane emphasized, however: “The customer is always in the center of our company.” Thus, also from a technical perspective the software evolved gradually through customer feedback. As an example, they noticed that eShops often do not have IT departments. They concluded that a simple payment module that was easy to implement into an eShop, was required.

Before closing this part, the topic of investors emerged in the conversation, as well. “Our investors are strategic investors who have invested due to their strong inner belief in the idea and their ability to contribute to the venture.” The REWE Group, for instance, is currently helping Barzahlen to internationalize.

The outcome of this approach is that today, Barzahlen provides solutions that outperform many existing ways of dealing with cash in Germany. To sketch just two reasons: “We have replaced existing approaches as Barzahlen is cheaper than existing solutions. Furthermore, if you look at the federal labor office, for instance, they have “only” 300 payment terminals. We enter this situation with over 12.000 partners. We facilitate payments for them due to our widely available and cheaper service.”

Finally, Susane stated: “We constantly developed our business further. However, we have not experienced any disruptive changes.” She believed that the company went through numerous gradual pivots.
4.4. Softgarden

Softgarden is a Berlin-based provider of a SaaS applicant tracking system (Softgarden, 2018). Before the company started building a recruiting platform, the founders had a web agency building websites. In 2003 they then saw the need for an applicant tracking system as more of their clients requested to also publish job ads on their websites and candidates started applying via email. The platform was originally designed as an application service provider model and focusing on corporate clients. This means the software was web-based and hosted on servers operated by Softgarden. Differently from Software as a Service (SaaS), this does not support shared resources and multi-tenancy. The company shifted towards a Software as a Service (SaaS) solution for medium-sized businesses around 2012. As of today, Softgarden has almost 100 employees and more than 1000 clients.

The authors interviewed Dominik Faber, co-founder and longtime Chief Executive Officer at Softgarden. Talking about the early days he reflected how customers of their web agency wanted to have job adverts on their website. After providing this solution, Softgarden realized that applications came via email and were not delivered via physical mail anymore. To increase the efficiency for their clients they had the idea of building a software that manages the applications with an underlying database. Although the founders have not developed any similar solutions before, Dominik stated “We did not know much [application tracking systems]. We build exactly what customers asked for.” Thus, he believed that getting the product right was fairly easy in the beginning.

It is worth noting, that the application tracking system was from the very beginning web-based and customizable. However, initially, Softgarden did not support SaaS features such as multi-tenancy and the team was required to go through a complicated deployment and customizing process for each new client.
Due to several reasons, in 2013, the founders saw little potential in continuing with the existing approach and their focus on corporate clients. On the one hand, big players like SAP and Oracle started including applicant tracking systems in their software solutions and therefore intensified the competition in the market. Besides, new startups, backed by venture capitalists, started to pop up offering SaaS solutions. On the other hand, Softgarden’s solution gradually became outdated while trying to raise venture capital to grow faster. To keep up with the change in the market Dominik stated: “This [change] was only possible with a modern platform. It was rather obvious that we had to go in that direction. We were maybe already a bit too late with that change [SaaS].” In the following years, the company then grew from around 15 employees to almost 100.

Asking Dominik in how far customer feedback played a role in the decision to shift towards a SaaS solution, he highlighted that it was not influential. Customers mostly asked for features, but they did not request a new architecture. In the process of shifting towards a SaaS model, the company completely rebuild the product and the underlying architecture. During this time, he had a strong vision of what features mid-sized companies would need and did not ask their potential customers what they needed. However, when Softgarden first released the product, companies did not buy it. The reason for that was that potential customers were missing certain features.

Reflecting, today Dominik thinks that at some point he lost the contact with the customers due to the growth of the company. “You have to learn again that you need to build what your customers want and not try to “just” put out your solutions. Now those initial ideas start to show their potential, but we should have built some more things in the beginning. In general, it is a fine line. On the one side, you cannot just build what your customers want, because then you will not be competitive. On the other side, you have to provide at least the most important features to satisfy the customers.”

As a final remark Dominik also mentioned that they did not research much and instead relied more on their gut feeling. Supporting this, he stated: “I am convinced that just asking [customers] does not work. It has to be a mix of intuition, knowledge of the market, and feedback from customers.”
4.5. Retest

Originated from the interviewees (Dr. Jeremias Rößler) dissertation, Retest was founded in Karlsruhe, Germany in 2014. The award-winning software startup offers a new way for automated software testing. With the support of artificial intelligence (AI) and monkey-tests, graphical user interfaces are examined with a new approach that shortens the testing period. Today the team consist out of 8 people.

Jeremias, the founder of Retest, started right away by emphasizing: “We have lived through multiple pivots!” Before writing his dissertation, Jeremias experienced in various projects such as in established software companies that software testing has been a pain point. A small change in the code has the potential to cause wide reaching unexpected side effects. By using his dissertation as a foundation, he decided to contribute a solution to the challenge of software testing.

In retrospective, however, Jeremias stated: “Maybe it would have been easier to start from scratch. The reason for this is, that the code could have been directly adjusted to the needs instead of having such inflexible and bulky code which was partly developed by other people.” In addition to that, the initially idea was to provide tests on unit level. Due to the complexity and the possibility to have ambiguous results, the decision was to pivot to a testing approach on the graphical user interface (e.g. clicks or fill-in forms). “If the result is: The program crashed, then you know that the program actually crashed. It is an unambiguous result.” Thus, the tests on a graphical user interface level were less ambiguous than the ones on unit level.

The monkey-test was therefore looking for such events, however, the customer feedback for this solution was: “These results are nice. But they are not necessarily helpful.” Retest tried to improve the relevance of test results by training an AI. To do so, the tests assimilated the behaviour of an actual human user. The recording and maintenance of these results, however, meant a higher effort investment. “The amount of input was not sufficient for the provided return of seeing were the software crashes.”
The following pivot was to increase the return. Instead of looking for crashes only, the monkey-test was also required to find context related errors. However, “if the tested software calculates a result, the AI is not always capable to answer if this result is correct or not. For example, the calculation ‘1-2’ can have multiple meanings and results. In math the result is ‘-1,’ in the case of warehouse systems this could mean the customer will receive a refund of one returned product and in the case of a Fahrenheit scale ‘-1’ should output an error.”

After analyzing what has been the actual crucial part of software testing, the team concluded: “It is about what has changed and what are unwanted side effects of that.” Thus, the testing software was required to record what has been happening without interpreting the results. Then, the user could decide if these changes were intentionally or needed to be adjusted. “This implies that the testing can take place automatically without the support of an AI - which is revolutionary for automated testing.” With this paradigm change the assertion in testing has been able to be complemented. Instead of writing manually down which results need to be achieved, the software provides a robust way to do it for the tester.

For the future, however, Jeremias believes that AI would play a crucial role for software testing. In addition to this, he emphasized the vision of an entrepreneur and the strategic idea of the company. “You need to listen to the customer feedback and understand what the goal of this person is. At the end, the customer does the opposite of what he has stated. Thus, it is a balancing act. You need to decide: Shall I do what the customer explicitly requires, or think about how to find an approach to do it in a better, smarter and more general way that makes the mechanism applicable into other contexts, as well?” To put it briefly, the interviewee mentioned that a company needed to align customer feedback with the company’s strategic goals. To illustrate this at an example, Jeremias related this to a situation in which Retest have received feedback that was conflicting with the abilities of the monkey-tests.
4.6. Anonymous Companies

Due to personal reasons of the interviewees, the following two interviews are anonymized. To balance the dilemma between, on the one hand, providing enough relevant information and, at the same time, not reveal who was speaking, information on details are left out. These include questions like:

1) What was the position of the person?
2) When and where was the company founded?
3) What was the specific target market?
4) What is context-related information on certain projects?

However, it needs to be mentioned, that these two interviewees have been in the Startup since the early days and have gained in-depth insights on the situation. We will refer to the startups as Company A and Company B. Company A is a platform that provides local related details. On the one side, users interested in culture can receive local related information on for example museums. On the other side, local physical spaces received the opportunity to provide further information on their locality. Company B started as an online seating planner for weddings and other events and then changed towards a comprehensive online event planning solution.

4.6.1. Company A

Company A had a clear idea from the start on. They targeted to provide users with relevant local cultural information. To achieve this, one of the founders contributed a mobile (in-app) Content Management System. Adding to that, a website and an app was used. These systems were then displaying information inform of text or as an audio guide. To paraphrase this, “the technology was available right away. However, we needed to program it again. Actually, we reprogrammed it several times. The original code of the Content Management System was difficult to be modified, as it was a pasting of multiple code snippets. Thus, it was needed to recode the whole thing.” Nevertheless, since the early days, Company A had investors who enabled to “raise the company big.”
As a starting point, they were targeting at city administrations. During the development, however, they have experienced that it was difficult to provide a clear value proposition. As a result, the target was narrowed down to museums. Due to the previous experience with audio guides, museums appeared to be easily convincible. At this point, the strategy changed from outdoor to indoor localities. “By creating some lighthouse projects like [project anonymous], we were hoping to have some successful case examples to show to further clients. The aim was to use these in the following to re-enter the outdoor context.”

After going live, the difficulty was to reach the museums. “We contacted museums to register for this service free of charge... They only needed to pay, if they were using the audio guide. Nevertheless, they were less interested in the audio guide. For them, the website was more interesting. They thought: It is exciting to be mentioned on a website and with that to have a free of charge marketing channel.” Without digging deeper into why certain features were not used the way they were planned to; the conclusion was that the website gained importance. Consequently, the new goal was to create some sort of advertiser platform with potential click-based advertising and affiliate programs. In this context the interviewee raised doubts on the revenue model as the main source for users entering the page was via Google AdWords.

The whole evolution ended up in an accelerated cycle in which ideas were build up, put out in the field and then changed in the hope that it will work out in the next round. As a result, the interviewee stated: “The number of idea changes increased over time. We changed many things. We went one step forward and then one step backward. One museum said a thing, and then the conclusion was: We must do this as the customer gave us this feedback. Furthermore, the impulse to trigger a change was often given by the investors.”
In addition to that, the perception was that: “The museums need this solution anyway, as they had audio guides in the first place. Problems from the museums’ perspective such as the lack of money and IT skills emerged after putting the service into practice.” This was contradicting the attitude on a management level that: “The idea works. The question is more, how to realize this?” Supporting this comprehension, “the early and only user test” was supporting the final statement. The problem, however, was that the test was made with people outside of the scope of the persona identified by the marketing leader. Additionally, although having at least two sides on a platform, “only one persona was created.”

As a final note, some of the employees had ideas such as trying to sell the Content Management System, but it did not become clear in the interview if these were presented to the investors.

4.6.2. Company B

Company B originally started with the idea of a web-based seating planner for weddings and other events. The interviewee states having used lean principles in the process of finding the right idea. Undertaking several interviews with potential customers they focused on where they found the biggest need from customers. “We build what they wanted to have and what we caught out of the conversations we thought would be useful. On the other hand, we undertook an analysis of existing solutions and realized that there were quite a few companies offering solutions [seating planner] with equal features, but they did not have a proper business in place.” Because they saw the large amount of competing companies which seemed to had problems gaining traction, the founders decided to change the idea towards a comprehensive event management tool with the seating planner being a feature of it.
Following the customer interviews, the team started developing a MVP. However, the team never was able to test the MVP with potential customers. Before they had a working version, the team decided they would not be able to compete with the existing solutions in the market. Talking about why they did not see the competition from the beginning, the interviewee stated: “We should have segmented better. We undertook the interviews with people in rural areas we thought would be technical educated, but they were not. Most of them liked the idea and did not use something similar before. However, as soon as we started looking at the idea from a more global perspective, we realized that there were so many competitors with already functional solutions that we would not have a chance.”

The final decision to abandon the idea was a result of an interview with an incubator who had two startups in his portfolio operating in the same market. He illustrated the difficulties of his startups getting traction in the overflooded market. This interview and the growing doubts of the founders let them decide to discontinue the idea and search for a new idea.

4.6.3. Widespread Software Startup Knowledge

The following two interviews are dealing with numerous experience that are not bound to a specific single product development cycle.

The first interviewee in this part is Andreas. He founded several startups and was a long-term CEO of an established company. The second person - Michael - is the CEO of a software system consultancy which also provides software development as a service. As these experts were reflecting on their various experience which relate only in parts to the software startup definition of this thesis, the guideline provided by the ESSDM funnel would have been answered insufficiently. This is the reason why, the following findings are not examined in the 5. Analysis. Nevertheless, their valuable insights are taken up in the chapter 6. Discussion to respond the given research question.
4.6.4. Reflections of a Serial Entrepreneur

The authors interviewed Andreas Gauger, serial entrepreneur, startup investor, and former CEO of 1&1 (Crunchbase, 2018b). He was a co-founder of Schlund + Partner, one of the first web hosting providers in Germany which merged with 1&1 in 1998. Since leaving 1&1 in 2008 he founded and invested in several startups. Among them are AndroidPIT\textsuperscript{10}, the world's largest website for Android news, and ProfitBricks\textsuperscript{11}, a leading Infrastructure as a Service (IaaS) provider. Due to the vast experience of Andreas, this interview was more about his experience on the topic than about one specific startup.

Andreas narrated from his experiences with the development of new products in bigger companies. He stated that almost no one is testing a new product while developing it. Which would be incomprehensible considering how cheap and easy it is to do user testing. As the central problem of this phenomenon he noticed that mostly there is no one in the management who deeply cares about products. Additionally, he identified the traditional management practices with their focus on measurable metrics as a major problem because it would not be possible to measure the influence of product quality on key metrics. \textit{“As long as something is not visible, it does not get optimized. That is the case for product quality as well, you cannot measure it properly.”}\textit{ }Furthermore, every effort to improve the product quality would often be impeded by managers asking e.g., how many new customers an improvement would bring. Because it would be not feasible to measure product quality, one could not answer such questions and gets cut off.

Talking about using customer feedback for the development of the product, he mentioned it would be an often-made mistake to talk to customer and to build exactly what they ask for. \textit{“You always have to include a cost function as well.”}\textit{ }As an example, Andreas talked about that customers in one of his companies often complained about the response rates of the customer service. As a reaction, they introduced a premium customer service for 10\texteuro/month. As a result, customers did not complain anymore. However, almost no one bought that premium service.

\textsuperscript{10} Website available under: https://www.androidpit.com

\textsuperscript{11} Website available under: https://www.profitbricks.com
Another example where one can see that a good idea is only validated when potential customers are paying for the product, he mentioned an email archive service he founded. Users could forward important messages and when needed had a powerful search engine to find messages and attachments. After launching a free to use beta version, he realized that users did not take advantage of the product. Reflecting on the product, he states, that firstly, end users did not have the need for the product by then. Professional users, which maybe had a greater demand were not a target for the product. Additionally, he realized that it was too much effort to forward every important email. Even people who used the product in the beginning, gradually stopped forwarding messages, because it was too much of an effort.

Discussing more about customer feedback to improve a product early on in the development, Andreas stated: “The ultimate truth if your product will be adopted, you will only know when you actually sell it, you cannot test it before. When you ask potential customers if they would spend 10€ on it, you will still get way more saying yes than people actually buying it in the end.”

4.6.5. Reflections of a Software Consultant

The authors interviewed Michael Prinzinger the CEO of the Berlin based company Port Zero. “Port Zero has been the natural result from many previous steps.” Today his team of 15 people who are “majorly full-blooded programmers who really live that lifestyle. Their values go beyond just earning money. There is a philosophy and ethic behind it. For example, we always try to find a way to implement an Open Source solution.”

To dig deeper, Port Zero is based on three pillars. First, they provide Software Development as a service for creating e.g. the backend code. Second, they offer IT Security related services such as code auditing or penetration tests. In this section, Michael mentioned that due to the occurrences of requests, data protection has been identified as becoming important. Thus, extensive consultation with regards to topics such as the GDPR have gained momentum. Lastly, Port Zero supports during system integration such as for internet service provider. Nevertheless, they are also working on further projects such as community building and ways to transfer knowledge.
In this context he has experienced that “in 95% of the cases the customer has only a n abstract imagination or even just a feeling about what he wants. To realize this desire, we need to work together and co-develop it with the customer. Over clear communication with the customer, you will resolve such issues and sometimes even find unforeseeable ways of to approach it.”

Throughout his career, he went through numerous personal pivots that contributed all to his current startup. His last stop, before he started his career as a founder in 2013, was at Kabel Deutschland, also known as Vodafone Germany (Vodafone, 2018).

After that he and some friends developed web designs and sold them. However, as this business was not profitable and at the same time cost and time consuming, they moved on by creating kinko.me in 2013/2014. It has been a solution to provide email encryption with the support of a small hardware device and an open source code. Based on the need of secure private communication, they created this idea which he calls: “the only venture that I have founded and considered to be a typical software startup. From a technical perspective and from the public opinion it was a super product. The chaos computer club\footnote{Website available under: \url{https://www.ccc.de/}}, for example, stated that this was exactly what everyone needs. Besides, also science and media such as ... hackernews\footnote{Website available under: \url{https://news.ycombinator.com/}} were supporting our idea.

However, after trying to raise money over indigogo\footnote{Website available under: \url{https://www.indiegogo.com}} - the only available crowdfunding platform in Europe back then - we clearly missed the target and stopped.” Nevertheless, Michael is convinced that “Kinko’s idea\footnote{Website available under: \url{https://kinko.me/}} has failed. However, it was the preparatory work for Port Zero.” He reasons that the created network and reputation that they have echoed, has been beneficial for their today’s venutre. In addition to this, he emphasized that no matter what has happened, stay positive.

The final step before arriving at the venture idea of Port Zero was the attempt to provide a service for countries and cities which are interested in a public wifi infrastructure. Due to the market norms, however, the idea changed once more. This time, Port Zero emerged.
5. Analysis

In this chapter, the empirical findings of this research are analyzed by using the theoretical framework introduced earlier. The sequential structure of the Early Stage Software Startup Development Model (ESSSDM) funnel and the questions regarding each of the stages are used to guide through this analysis. To provide a starting point, Table 5 summarizes the most important key points of this framework. Based on that, each of the startups is analyzed individually.

5.1. 6Wunderkinder

From the beginning, the intention of 6Wunderkinder was to build a comprehensive project management tool - called Wunderkit. The founders had a clear vision of the product and early on published a MVP containing only the To-Do list feature of Wunderkit - also known as Wunderlist. To simplify this analysis, (potential) customers are used as a synonym for Wunderkit, as well as, for Wunderlist. Since 6Wunderkinder directly built a MVP and launched it, we classified Wunderlist into the third stage of the funnel (Validate MVP small-scale).

Although the interview did not reveal how early adopters were accessed, Wunderlist clearly solved a problem customers had, and at the same time its popularity proved that the product embodied an unambiguous, unique value proposition (Bosch et al., 2013). In addition to that, 6Wunderkinder tested if their solution was something desired and if they could reach a reasonable amount of users. Regarding the willingness to pay, it is worth noting that, Wunderlist has been a freeware. Thus it was not required to test if customers were willing to pay for the product. Besides, the authors were convinced that Wunderlist over time grew organically into the Validate MVP large-scale stage since the product achieved product-market fit. This was indicated by the extensive user base with over 13 million people and its further growth. Furthermore, this natural growth process could be considered as a viable path to the early adopters and a hint for a working business model. Nevertheless, it did not become clear if relevant tests took place (Bosch et al., 2013).
As Wunderlist was a test to see how the market would react to a new project management tool, the authors argue that Wunderlist was the embodied Validate Problem stage for Wunderkit. Wunderlist clearly showed that task management was something customers wanted to have solved and users were willing to participate in the solution. The big user base also showed that the market was big enough to make a business out of it.

From these findings, the authors deduced that 6Wunderkinder saw that the market was sufficient to make a business out of it. However, due to the limitation on one feature of the more comprehensive Wunderkit, the authors did not see Wunderlist as a validated solution for Wunderkit. This meant that the set of problems in the case of Wunderkit were more extensive than the answers provided by Wunderlist. Nevertheless, the understanding is that primarily the question “What features are needed for the Minimum Viable Product [Wunderkit]? ” (Bosch et al., 2013, p. 11) of the Validate Solution stage should have been answered with customers before releasing the MVP. Despite having no answer on if Wunderkit solved the identified problem and if the users were willing to pay for it, 6Wunderkinder moved to the next stage.

Concluding, the authors argued that Wunderkit was in the Validate MVP small-scale stage from the very beginning. The interview revealed that the founders did almost no user tests with Wunderkit. They trusted their vision on which product features were necessary. Besides, the very positive development from Wunderlist contributed to their confidence. After releasing a first version (Validate MVP small-scale), however, the team realized that customers were confused about what kind of tool Wunderkit was. According to Sebastian, Wunderkit could not gain the traction of Wunderlist, and early customers also had difficulties identifying what Wunderkit was. The founders concluded that they would need to redevelop Wunderkit entirely from scratch to resolve the confusion. At the same time, customers loved Wunderlist and could not wait for new features. This led to the decision of abandoning the small-scale MVP Wunderkit and focus on the validated large-scale MVP Wunderlist. Nevertheless, Wunderlist popularity and its exit have been interpreted as the full validation of the product.
Table 5: Questions from the ESSSDM funnel (adopted from Bosch et al., 2013)

<table>
<thead>
<tr>
<th>Funnel Stage</th>
<th>Reasons to stay in a funnel</th>
<th>Exit Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1: Validate Problem</td>
<td>What is the problem?</td>
<td>Does the majority of (potential) customers indicate that they want the problem solved?</td>
</tr>
<tr>
<td></td>
<td>Who has the problem?</td>
<td>Does the majority of (potential) customers indicate that they are willing to pay for a solution?</td>
</tr>
<tr>
<td></td>
<td>Is the problem big enough to make a business out of it</td>
<td>Does the majority of (potential) customers indicate that they are willing to participate in solution testing?</td>
</tr>
<tr>
<td>Stage 2: Validate Solution</td>
<td>What features are needed for the Minimum Viable Product (MVP)?</td>
<td>Does the majority of (potential) customers indicate that they believe the solution solves the identified problem?</td>
</tr>
<tr>
<td></td>
<td>Who is the early adopter?</td>
<td>Does the majority of (potential) customers indicate that they are willing to test the MVP?</td>
</tr>
<tr>
<td></td>
<td>How much is the solution worth to customers?</td>
<td>Does the majority of (potential) customers indicate that they are willing to pay for the MVP (verbal commitment)?</td>
</tr>
<tr>
<td>Stage 3: Validate MVP Small-Scale</td>
<td>Does the MVP solve the problem(s) that customers want to have solved?</td>
<td>Does the majority of (potential) customers indicate that they understand the Unique Value Proposition (UVP)?</td>
</tr>
<tr>
<td></td>
<td>How to access early adopters?</td>
<td>Does the majority of (potential) customers indicate that they accept the pricing model?</td>
</tr>
<tr>
<td></td>
<td>Are customers willing to pay for the MVP?</td>
<td>-</td>
</tr>
<tr>
<td>Stage 4: Validate MVP Large-Scale</td>
<td>Has the MVP reached product/market fit?</td>
<td>Has the MVP passed relevant tests such as the Sean Ellis Test?</td>
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<tr>
<td></td>
<td>Is there a viable path to early adopters?</td>
<td>Does the MVP link to customer channels that repeatedly deliver early adopters into the conversion funnel?</td>
</tr>
<tr>
<td></td>
<td>Is the business model suitable for the product?</td>
<td>With regards to the MVP: Is the Customer Lifetime Value greater than the User Acquisition Cost?</td>
</tr>
</tbody>
</table>
5.2. Mambu

Initially starting with micro-credits in developing countries, Mambu provides a wide range of SaaS-based banking solutions across the globe. The startup spent the first year with analyzing various information and methodologies to validate the problem. After being inspired by what they have learned and the success of SaaS companies like Salesforce, Frederik, and his colleagues have attributed a bright future to cloud computing in the field of financial services. They concluded that Mambu is going to provide a SaaS-based banking service. In addition to that, positive feedback was collected which led to the understanding, that the customers wanted the problem to be solved.

After growing naturally into the solution validation stage, the initial target markets were the developing countries in which Mambu provided services for micro-credit institutions. Furthermore, Frederik mentioned: “Today, I would try to get more commitment, specifically asking about, how much you would [the potential customer] pay for the product and what exact features would you need to buy it? Additionally, I would close a memorandum of understanding.” Thus, it seems that the verbal commitment to pay for a MVP was available. Despite the verbal commitment, these potential customers did not buy the service in the end. Nevertheless, the remaining questions such as: How much is the solution worth to customers? (Bosch et al., 2013), could not be answered based on the interview.

After launching the small-scale MVP, Mambu had the problem of the previously mentioned customer commitment. At this point, it becomes debatable if the unique value proposition was not perceived clearly by the customers. However, by offering the test trials during this time, which are today judged as failures, early adaptors started to use the product. They were willing to pay for the service, and it seemed to the authors that the pricing model was accepted.

Seven years later and after many development steps services for micro-credit institutions are still provided. The authors interpreted this as Mambu reaching a product-market fit with a suitable business model for micro-credit institutions.
However, micro-credit institutions have been a limited market and Mambu saw greater growth potential in the developed world. By moving micro-credits from the center of the business to one of the pillars of provided services, they expanded to a comprehensive banking solution. Additionally, Mambu also operates an own App store (the so-called Marketplace) to enable the smooth integration of third-party applications. At this point, the authors stress that the development of the other pillars could not be matched to each of the ESSSDM funnel stages. Nevertheless, the authors believed that a potentially important factor in this context is that Mambu’s further product development enabled them to ask for higher prices and with that opened previously locked doors. This is the argument for seeing Mambu as a software startup which fully validated their product more than once.

5.3. Barzahlen

In the case of Barzahlen, there were two development paths. The first represented the original product which was to provide an offline payment solution in the field of eCommerce purchases. The second one dealt with the evolution beyond the field of eCommerce. In the following, the authors started with the first stream.

As mentioned before, initially the idea was to find a way for eCommerce services to lower the dropout rate in the final step of the purchasing process. Due to the high dropout rate across different services, the problem was “big enough to make a business out of it” (Bosch et al., 2013, p. 11).

Following that, the proposed solution for the field of eCommerce was the offline payment service for online purchases. Therefore, like in the case of the chicken or egg problem, retail companies and, at the same time, eCommerce services were needed to complement the MVP. How much the solution was worth to each of these parties, however, was not ambiguously interpretable from the interview transcript. This meant that the willingness to pay in this stage has been unknown to the authors.
Persevering with the solution, Barzahlen entered the following stage - *Validate MVP small scale*. The increasing number of partners was evidence that the MVP solved the customer's problem. Parallelly, the statement that Barzahlen would offer a cheaper service and a broader network than existing solutions indicated that customers accepted the revenue model. Having satisfied customers, Barzahlen’s small-scale MVP seemed to be validated. Regarding the other question, the unique value proposition was strong enough to transform the MVP from small to large-scale. To go even further, the strategic involvement of investors and their increasing contribution was identified as a hint that Barzahlen had a sustainable business model. Nevertheless, it was difficult to interpret strictly with the guidance of the ESSSDM funnel questions at what point in the development the small-scale turned to a large-scale MVP. The authors identified the year 2014 as the turning point when Barzahlen’s service reached network participation of 7000 partners (Cash Payment Solution, 2018).

Moving on, we will analyze the second development stream. Going back to the MVP small-scale in the year 2013, three months after product launch a municipality utility caused that Barzahlen’s team was rethinking the application of the MVP. With this feedback, Barzahlen started the whole funnel all over again. The team examined the potential transaction revenues across the different industries to check if the problem size was big enough. After evaluating the pilot project as being successful, the customer base was extended by adding municipality utilities to the targeted market segment, and Barzahlen started to provide a MVP in this industry. To put it briefly, Barzahlen’s service was perceived as being convenient also in other industries.

Concluding, their competitive service enabled them to provide a sustainable business also in the field of energy suppliers and reach product-market fit in here, as well.

Judging based on the findings, the proof of concept with the large-scale MVP from the eCommerce and energy sector have also been the magnets for further fields such as banking services. From the transcript, it appeared that Barzahlen moved each time through all the four stages. As Barzahlen has established itself in over 10 industries, the authors see this as the indication that, like Mambu, they have fully validated their multiple services.
5.4. Softgarden

During their long journey, Softgarden went through various stages. Initially, Softgarden offered an applicant tracking system. They started with an Application Service Provider model and later moved towards a SaaS-based solution.

When Softgarden started to develop their applicant tracking system, it was purely based on customer needs. Their already existing customers from previous projects asked for possibilities to publish job adverts on their websites. Because of that, Softgarden did not have to validate the problem. Furthermore, they could use their existing client base as a source to know which features to build and to validate their solution. In how far the team validated the question, on how much customers would be willing to pay for the solution, could not be answered from the findings. Because of the presented reliance on existing customers, we argued that the relevant questions of the Validate Problem, Validate Solution and Validate MVP small-scale phase were answered through feedback from their existing customers.

In succession of acquiring their first corporate client, we argued that the product gradually went from Validate MVP small-scale to Validate MVP large-scale and finally was fully validated and ready for commercial scaling. This development is expressed by the successful sales of the product for several years to corporate clients. The long-term success is evidence that the product reached product-market fit and that the venture could establish a viable path to potential customers.

After some successful years, the founders decided to move from an Application Service Provider towards a Software as a Service model. Additionally, they shifted from corporate customers towards middle-sized businesses. Therefore, the product was completely redeveloped. However, since the company was established in the market, they did not start with new hypotheses but built on the existing problem of applicant tracking.

Dominik stated in the interview that during the redevelopment, he did not ask their new potential customers (middle-sized businesses) what they wanted but relied on his vision of the future market. After releasing the first version of the new product, Softgarden had to realize that customers did not buy it because they were missing features. Therefore, the authors argued that, although Softgarden can be seen as fully validated with their first
product, they missed to validate the MVP small-scale for their second product. With the first version of the software, Softgarden did not solve all the required customer problems. Because of the missing features, customers were also not willing to pay for the solution in the beginning.

Talking to potential customers, Softgarden identified the missing features and integrated them into the solution. Since the team was already knowledgeable of the market, it did not take them long to develop the missing features and gain first customers who were willing to pay and understood the Unique Value Proposition. Consequently, the MVP was validated on a small-scale. Following, Softgarden grew to almost 100 employees and over 1000 customers. Therefore, we argued that this development, like their first product, can be seen as gradually moving towards a fully validated product.

As a final remark, Dominik stated that he has never pivoted before. Due to the direction changes revealed in this part in combination with the findings, however, the authors see many parallels with the connotation of a pivot.

5.5. Retest

According to Jeremias, Retest had experienced various pivots. Based on a research project they are now providing monkey-tests on graphical user interfaces.

Looking at the origins of the company, Jeremias identified the problem that software testing had been a pain point across industries. After finishing his dissertation in a related field, he saw the potential to realize his idea. In addition to that, he thought of having already a great starting point with the code provided from his research project - a base he doubts on its usefulness from today’s perspective, as the code was quite complex.

After realizing that testing on unit level is often not very useful, the team focused on graphical user interfaces. They started to offer monkey-tests and entered with that the Validate Solution stage. Although the customers gave positive feedback, they perceived it as being difficult to understand the test results. Thus, the added value was not apparent.
To provide a solution that has more significance, the idea was to use an AI. From a technical perspective, however, maintaining an AI meant also increasing the effort for the tester. To counterbalance the pain, the idea was to find a way to raise the value of the results - thus, increasing the value for customers.

From a technological perspective, however, AI has its limits. Up to today, AI is not able to interpret software provided results in a fully useful manner. As described in 4.5. Retest, the value ‘-1’ can have different meanings depending on the context.

Based on the conclusion that capturing modifications is the most critical part of testing, Retest went through another round of iteration in the Validate Solution stage. To the authors, it appeared as if this insight was a mixture of reflection based on what the team believes as being important to them, as well as, what customer feedback has revealed. By thinking about how to design a way to realize their service in a better way, they concluded to simply let the monkey-test examine and record what changes have been found.

The authors consider this new approach to be a small-scale MVP. The reason for that being that it is solving the problem, it reached a point in which customers are willing to pay for it and clearly see the benefit.

5.6. Company A

With the original idea, Company A started in the first stage of the ESSSDM funnel. Although the management had a clear vision of how the idea was supposed to look like in the future, the venture started with the first stage. For example, the entrepreneurs identified a problem owner for their latter proposed solution. In addition to that, the market related to audio guides was analyzed extensively which answered that the problem is ‘big enough’ and that the initial target group were municipalities and cities.

Entering the following step, it is worth noting that a user test took successfully place. In this context, the customers gave feedback regarding specific features. Nevertheless, due to convenient reasons, the team changed the target group to museums. The management was convinced that the previous experience of such localities simplified the process of selling their product. Without having further insights on what exact features the customers (in this case: museums) requested or if the museums were willing to pay for the solution, the small-scale MVP was put into the market. It was released as a freemium and premium
product. Premium, in this case, was the option to use the audio guide aside from just accessing the platform. This MVP revealed the following insights:

On the one side, the museums gave the feedback that they do not have sufficient technical know-how and monetary means to benefit from Company A’s service. Besides, due to the submitted requests, Company A perceived that the possibility to be advertised on the web for free was more interesting for museums than the option of using the audio guide. On the other side, the competition was tough as larger museums had already well established digital solutions. This led to the point that neither the pricing model was accepted by the existing customers, nor was the unique value proposition strong enough for potential customers. This caused a change in the revenue model.

To be more precise, the revenue model pivoted multiple times in the third stage as the management could not figure out which MVP could lead to a sustainable business. For example, one attempt was to try achieving revenues through advertisement on the platform for people who are interested in culture and museums. To put it differently, instead of providing responses to the earlier unanswered questions (such as regarding the willingness to pay for the solution or what feature user requested), the venture kept looping through the small-scale MVP stage.

5.7. **Company B**

The founder of Company B stated that they had a very customer-centric and lean approach in place while exploring their problem space of seating planners. The interview revealed that they undertook interviews with potential customers and received positive feedback that seating planning was a valid problem to them. However, their own analysis showed that the market did not seem to be very profitable. Therefore, the question in the Validate Problem stage of whether “the problem is big enough to make a business out of” (Bosch et al., 2013, p. 11) could not be positively answered.

To solve this dilemma of seeing the customer need but dealing with an unprofitable market, Company B decided to shift the solution towards a comprehensive event management tool. They started to build the MVP with the insights gained from customer interviews. However, they never tested the MVP with potential customers, as the team concluded that the competition was too intense and abandoned the idea.
To paraphrase this, the authors argued that Company B took the gained insights from interviews focusing on seating planners as being a validation of the problem thus shifting their solution towards a comprehensive event management tool. Although the problem was not properly validated, Company B also did not validate their solution and started building a MVP instead. According to the founder, the team relied too heavily on feedback they received from their potential customers. Additionally, he stated that they also interviewed people with little technical expertise. He thought of this being a mistake.
6. Discussion

This chapter answers the research questions of this study. Firstly, the authors will present the pivot triggering factors that can be deduced of the ESSSDM funnel stages. Secondly, crucial factors are presented that have not been covered by the earlier chapter. Finally, the discussion finishes by answering if customer feedback is crucial or not.

As our research question: What role does customer feedback play when a software startup decides to pivot? is divided into three sub-questions, the following part will go through each of them. Starting with the first one:

What critical pivot triggering factors can be deduced from the application of the ESSSDM funnel?

As described in 2.7 Conceptual Framework, the ESSSDM funnel origins from the Lean Startup (Bosch et al., 2013, Ries, 2011). In the following, the authors will move quickly through the different stages to indicate what crucial factors have been revealed in chapter 5. Analysis.

As Table 5 indicates, there are two sets of questions in the ESSSDM funnel. The first bunch of questions deals with partly open-ended questions on the purpose of the funnel stage. Bosch et al. (2013) use these guiding requests to prepare the software startup for the following stages.

Starting with the first stage, Barzahlen, for instance, was analyzing potential industries before launching their product. Thus, the market analysis and its potential can initiate a pivot in this early stage. Parallelly, the team or management is required to answer who has the problem. In the initial days of Company A, for example, the target was cities and municipalities.
Following this step, the solution needs to be validated. Here customer feedback becomes the main source of information. In the case of feature requests Retest illustrated how their iterative development in cooperation with the customer changed their product. It started out with a ‘monkey-test with random results,’ then, developed to a solution realized with the help of AI and ended up being a new approach to generate assertions.

After fulfilling the earlier questions, the purpose in the third stage is to validate the small-scale MVP. In this part customer feedback is again the most crucial factor. The exceptional success of Wunderlist showed for example that the To-Do list was a problem that customers wanted to have solved. Thus, in cases like 6Wunderkinder, Mambu or Barzahlen the separation between the final two funnel stages was difficult. Going back to the example of Wunderlist, the extreme user growth moved rapidly from solving a problem (Stage three) to reaching product-market fit with a viable path to early-adopters (Stage four). Independently on how the division between those two stages is, customer feedback has been essential.

In the final question of the fourth stage (Is the business model suitable for the product?), an example is Mambu´s multiple pillars (e.g., providing a platform for banking and micro-credit solutions). The reason for that being that Mambu demonstrates to have a sustainable business model.

The second set of questions (column: Exit Criteria in Table 5) are all closed questions based on the customer's response. Thus, the most crucial source to provide answers to them is customer feedback.

To answer the first sub-question, applying the framework to the findings revealed that customer involvement and their feedback are a critical pivot triggering factors. The reason for that being, that in each of the stages the customer was a directive to judge if a software startup should pivot, persevere or abandon. This also confirms what has been identified in 2.6 Pivot Triggering Factors. Customer feedback - such as in the form of continuous experimentation - is also the most frequently occurring pivot triggering factor out of the 37 identified articles (e.g., Bajwa et al., 2017; Fagerholm et al., 2014).
However, aspects of the market potential and the ability of the management have been represented in the first stage, as well. The first point is also confirmed by research. In this context, investigations deal with market potential in the form of user growth (Bajwa et al., 2017; Edison et al., 2016) and the choice of the right market (Mullins, 2017; Terho et al., 2015). The latter one, the management ability, relates to the empathy of the management and, potentially, having the right intuition as described by Hirvikoski (2014).

Finally, among other topics, the last stage dealt with the suitability of the business model. The authors, however, had difficulties to judge to what pivot triggering factor from research this belongs to. The reason for this is that according to Osterwalder et al. (2010) a business model consists of multiple elements. Bosch et al. (2013), however, do not mention ambiguously what they understand under the term ‘suitable business model.’

Moving on to the discussion, the next sub research question to be answered is: What are the remaining unassigned crucial pivot triggering factors?

Although the previous part of the discussion revealed that customer feedback has been important for all stages in the ESSSDM funnel, Edison (2016) emphasized feedback does “not reveal the customers’ real purchasing behaviour, only their intentions to purchase” (p. 133). In addition to that, Eisenmann (2012) stressed to look at the revealed customer feedback and not the stated one. Supplementing this argument, experts such as Sebastian from 6Wunderkinder indicated that a software startup must avoid following the customer blindfolded. Almost all interviewee stated that software startups need to understand the deeper meaning of what the customer tries to reveal. A further argument strengthening this point of view is Company B or Mambu´s experience. Both had to experience the hard way that the potential customers can give misleading feedback in the early days. Thus, Frederik from Mambu reflects with regards to their journey that a mutual commitment is required between what the customer states and what actions are supposed to follow by a customer. In this context, one could add the ‘cost function’ of Andreas to the discussion. Due to the usability aspects, he believes that before launching a product user tests must be realized. However, the complete truth regarding customer feedback emerges only if the customer turns into a paying customer.
In addition to this, Michael from Port Zero assumes that communication and co-developing a solution together with the customers is essential. He refers hereby to situations in which the customer said one aspect which was contradicting the technological feasibility of Port Zero’s solution. The conclusion was then to communicate transparently and find common ground - sometimes leading to an unforeseeable approach.

Complementing these opinions, Frederik says that they were initially too customer-centric. Today, asides of having the involvement of customers, they have also created a strategic road map, which aims at long-term goals. Following this thought, Jeremias mentions the careful consideration of integrating customer needs with the company's vision as he believes that the customer “does the opposite of what he has actually stated.”

The topic of having a vision can be related to a specific leadership style which was also subject matter in Table 1. In general Sebastian, Frederik, Jeremias, Dominik and Company A emphasized this aspiration of where they want to be in the future. It is worth noting that vision has been described as a double-edged sword. Experts like Sebastian or Dominik reflected that they went through times in which they were supposed to have listened more to the customers instead of evangelizing their vision. On the other hand, Mambu’s strategy and vision creates a long-term roadmap which helps them to work also with bigger clients. No matter from which side one tackles the vision: in both cases, it can be seen as a crucial counteractor to the decision to pivot.

In this context, while Jeremias was talking about a dilemma - listening to customers or follow the own strategy - the authors perceived how much also the human component is critical to the decision to pivot. One pivot triggering factor identified with regards to the human component was the skilled and courageous person (Münch et al., 2013; Ries, 2011). An example for this is the 6Wunderkinder. Despite all the previous committed resources, time and values to produce Wunderkit, the management was required to be brave enough to change the direction. To put briefly, after having a hard time to decide the team decided to abandon the product in the end.
Confirming this point of view, keeping a neutral stance in a situation influenced heavily by commitment\textsuperscript{16} was mentioned by various researchers (Eisenmann et al., 2012; Eloranta, 2014; Nguyen-Duc & Abrahamsson, 2016; Ries, 2011; Unterkalmsteiner et al., 2016).

On the other side, the management needs to be open to changes, such as in the case of Softgarden and the development of SaaS services. They observed that their growth was stagnating. Thus they were willing to pivot. According to the authors of this thesis, this attitude is based on two major pillars: First, the pivot trigger: potential to grow relates to general user growth (Bajwa et al., 2017; Edison et al., 2016). Second, the willingness to pivot is also an indication of being open to change. Thus, the openness needs to be present in the corporate culture (Järvinen et al., 2014). The corporate culture and the closely related topic of the leadership style described earlier leads to a new stream of pivot triggering factors.

Especially, Mambu and Port Zero talked about this topic, as for example, Mambu experienced a so-called ‘market-pull.’ Frederik puts it in a way that the market told them where to go. For the authors, this means that the management has been required to be able to actively listen to the market, be open to what will come and, at the same time, have some luck. As Consumano (2013) puts it: “Unforeseeable factors such as chance events and timing affect all firms.” (p. 29). The unexpected can then lead to situations like in the case of Barzahlen. As described earlier, in an untargeted market segment, a municipality utility read accidentally about Barzahlen’s service, gave feedback and shortly after the management was providing a service outside of the initial target group. To put it briefly, Eisenmann et al. (2012) and Mullins (2017) identified factor \textit{luck}, has been a critical factor in our interviews, as well.

\textsuperscript{16} Nevertheless, a low level of commitment can also be influential. According to Andreas, management in larger companies have a tendency to launch untested product due to a lack of commitment.
One guiding aspect leading to such coincidences is also the competition. With having a proof of concept in different industries, Barzahlen’s service was perceived as being convincing for other industries as well. By having a working concept, further partners were added to their service. At the same time having more partners made their service more interesting for others (e.g., the state sector). Thus, the targeting of further industries resulted in additional pivots. In the case of Softgarden, Company A, and B, however, competitiveness had the tendency of being a different force changing the startup’s strategic direction. Company B’s development, for example, was stopped after understanding the competitors’ positioning in the market. Furthermore, the intensifying market competition led to the decision that Softgarden completely rebuilt their service. Competitiveness and the creation of unique value proposition have also been topics in other investigations such as by Bajwa et al. (2016). These mentioned market changes in the case of Softgarden also led to a technological pivot. Thus, one factor triggered another.

In addition to that, what has been identified from Mambu as a strategic advantage from the first days, was the result of many years of development in the case of Softgarden - the importance of SaaS. This ambivalence of technology was also pictured in past research. Bajwa et al. (2016) found an example in which technology was limiting the development of a company, whereas in the case of smartphones another venture benefited from this technological evolution (Bajwa et al., 2017). Especially in the conversation with Jeremias, the meaning of technology became present. As until today, AI is unable to fully realize what Retest initially tried to accomplish, existing technology has been used to provide a workaround with a satisfying outcome for the customers.

Underlying many of the previously mentioned decisions, a crucial pivoting trigger has been data. If Barzahlen’s pilot tests were generating the pursued data, the information for the company was, that the market has potential. This growth potential then led to the decision to enter the market and adjust to the market needs. Andreas supplements the belief by asking for measurable metrics. The intention is to support product decisions and answer questions like: How many new customers an improvement will bring?
Ries (2011) describes in his book the concept of ‘innovation accounting’ which targets at making goals more tangible. By having the right data, then, the decision to pivot, persevere or abandon can be made. However, in the case of Company A, misguided conclusions were drawn. Based on user tests with people outside of the persona and non-representative user opinions, ambivalent data were used as a decision base. This can again point out the relevance of the leadership skills with regards to an unbiased and neutral stance (Eisenmann et al., 2012).

With regards to the second sub-question, the scholar can see that various crucial pivot triggering factors have been identified from the interviews. To conclude this discussion and answer the overall research question, in the following the final question will be answered:

*What relevance is being attributed to customer feedback?*

The previous discussion illustrated that customer feedback is crucial. However, experts in the field revealed that it is essential how customer feedback is used in product development, as well. Furthermore, one pivot triggering factor can possibly lead to another (Terho et al., 2015) and many triggers can lead together to a pivot. As illustrated by the example of Barzahlen, a lucky coincident represented by request initiated the expansion of the target segment and technological solution. Thus, one factor triggered further pivots. To finalize the answer to this sub-question, customer feedback is one of many crucial impact factors on the decision to pivot, persevere or abandon. As a result, the focus should be less on, if customer feedback is essential or not, but more on what set of questions can have a greater impact on the product development.
7. Conclusion

This chapter summarizes the key findings of this thesis.

The purpose of this study was to explore the role of customer feedback when a software startup decides to pivot. Customer feedback is perceived as being a critical factor in the decision to pivot by several experts in the field (e.g., Bajwa et al., 2017; Blank, 2013; Ries 2011). Researchers such as Unterkalmsteiner et al. (2016) revealed that more in-depth knowledge is needed to understand the pivoting decision in software startups. Although many studies found out that customer feedback and especially negative one is crucial, this thesis expands the view. Starting with the first sub-question, customer feedback has been identified as the crucial triggering factor in all the ESSSDM funnel stages. However, with regards to the second sub-question which asks to look beyond this model, the interviews revealed numerous further critical triggers. Among them is the integration of ‘revealed customer feedback’ with the software startups’ vision. In this case, for example, the interviews showed that it is utterly important to avoid blindly following customer feedback and draw the right conclusions from it. Therefore, we advise practitioners, as well as, academia to look at pivot triggering factors as a set of dependent elements instead of a single isolated component.
8. Future Research

This chapter on possible future research.

Barzahlen and Mambu stressed heavily that they have not pivoted in a disruptive manner but experienced many small and gradual ones. This might raise the question at what point a factor becomes crucial - does it relate to the number of occurrences during the development or does it deal with the disruptiveness of the change? Besides, this research found out that there are numerous triggers causing a pivot. However, how is the composition of a triggering factor set and how do these elements influence each other remains unanswered.

The research agenda created by various authors emphasized to conduct a longitudinal study that has the possibility to provide an approach to these open questions (Unterkalmsteiner et al., 2016). In addition to this, in 2004 Shenton mentioned that a method mixture could increase a studies trustworthiness. Shenton (2004) mentions in the context to apply observations, create focus groups and conduct individual interviews. The authors of this thesis believe that a longitudinal study which embodies these different methods could reveal helpful insights for this field of study.

Besides, pivoting effects the business model. A research field dealing with a similar phenomenon is business model innovation. Thus, the authors of this thesis believe that creating a convergent study which analyzes the commonalities of business model innovation and pivot triggering factors in the context of software startups, might be an interesting field, as well. As a final remark also the VFUD framework from Dennehy et al., (2016) might provide numerous questions that might help to extend the ESSSDM model by Bosch et al. (2013).
9. References


