Enhancing Organizational Creation, Product Development and Success Through the use of Lean Startup in Relation to the Information Technology Sector

Master thesis in Business Administration

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Preface

This thesis is written to complete my Master of Science degree in Business Administration at the University of Twente. It entails a study of the influence of lean startup on the entrepreneurial process in relation to the IT sector, and in what way lean startup adds value in order to decrease entrepreneurial failure.

From the beginning of writing this thesis I had support from many different people, and my thanks go out to all of them. First of all to my first supervisor Michel Ehrenhard for his input, effort and fast response on my questions. Also my second supervisor, Matthias de Visser, for helping me through the last part of my thesis and finalize it. Furthermore, I would like to thank my friends and good friend Jos van Boeijen for their support over the duration of this thesis. Last but not least, great thanks to my parents and sister for their support and help during my time at the University of Twente, making it possible for me to study and investing their time to help me in every possible way. Thank you all for everything.

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Management Summary

In this research paper the aim was to explore if the lean startup method influences the entrepreneurial process and in what way. Furthermore it was aimed on researching if lean startup is applicable on product development in the IT sector in order to decrease possible failure. Those two questions have been combined with each other resulting in the following main research question:

To what extent does the lean startup method influence the entrepreneurial process to prevent entrepreneurial failure in the IT sector?

Besides the main research question, five sub questions have been developed in order to give more fundamental grounds to the main research question.

Within the research paper, first a theoretical framework has been developed in terms of explaining the entrepreneurial process, describing the most important information about the entrepreneurial process, the lean startup method, usage of the tools provided by the method, and other existing development tools.

After the theoretical framework, the methodology has been explained. Because of the low amount of suitable information available, regarding not only theory but also practical information, there has been chosen to follow a qualitative approach and do a case analysis. Ten cases have been identified with information about the usage of the lean startup method in combination with IT. Seven of those cases where successful and three were unsuccessful.

Data analysis on those cases resulted in 196 codes, 20 categories and 10 concepts. All the cases have been independently researched on outcomes and statements to give an exact overview of the information found in those cases. After this a cross case analysis has been done in terms of comparing codes and categories in the different cases with each other.

The results from the data analysis show that the lean startup method has a large influence on the entrepreneurial process in terms of providing more enhanced information about the second and third steps. It also turns the entrepreneurial process into a loop which can be repeated by the entrepreneur in order to obtain continuous development improvement. Furthermore through a more in depth measuring tool and obtaining information from the market, the initial idea and opportunity are better valuated resulting in exterminating early problems. The combination of the entrepreneurial process with the lean startup method provides a better concept, better product and better investment of the time, money and effort of the entrepreneur. Besides the influence on the entrepreneurial process, it has also been confirmed that the lean startup method is applicable in IT product development. The use of the MVP and feedback loops decrease failure and should result in a product with a higher quality. Also through testing the product in combination with the market, the feasibility can be confirmed with a lower initial investment. It should be noted that there is still discussion about certain parts of the method with regards to the usage of the tools provided by the lean startup, how to interpret the tools and data and when the entrepreneur is using the method the correct way. Follow-up studies will need to indicate whether the statements which have been made in this study can be supported with practical research.

Contents

1. Introduction

1.1 Startup Creation and Failure

Everyday new ideas are developed and managed by entrepreneurs resulting in new startups. With the fast technological development and ease to be an entrepreneur, the number of new companies is increasing every day. The entrepreneur needs to develop a business plan, gain the required resources for the development and will, after this, start to develop the product as he intended. After the product is fully created to the wishes of the entrepreneur, he will sell the product to the market and hopes to become successful with the created product. Unfortunately most of the time this ideal picture of entrepreneurship and organizational creation falls short. According to Dun & Bradstreet (2012) 33% of all new businesses fail within the first six months, 50% within the first two years and 75% within three years. The question arises why so many companies do actually fail and what can be done about it. The first question why companies actually fail has been researched a lot and can be divided into three main topics: market, product and entrepreneur.

Problems in relation to the *market* are for instance competitors with existing solutions which survive longer than expected. With their settlement on the market and their large financial resources, they have more power and a larger market share in comparison with the new entrepreneur. Also fast market development in a different way than expected by the entrepreneur creates problems when it comes to the final sellable product. (Feinleib, 2011), (McGovern, 2008), (Tobak, 2014).

The *product* topic relates to *concept creation* instead of *product creation* including the feasibility and applicability. It seems that entrepreneurs are thinking more in ideas and ideologies instead of using the existing technologies and resources. Furthermore, most of the time the product created does not solve a large unique existing problem which the market has to deal with. Therefore, the market share is already small from the beginning. This last problem can be combined with the fact that most entrepreneurs do not explore the market well enough. (Feinleib, 2011), (Desena, 2003), (Pozin, 2013), (Deeb, 2013).

The third topic is according to Feinleib (2011), Pozin (2013), McGovern (2008), Deeb (2013) and Tobak (2014) the most important one: the *entrepreneur* itself. Deeb (2013) refers to the creation of an idea in the mind of an entrepreneur that will make him so obsessed with that idea, that he gets tunnel vision and loses track of the product that the market would like to have. Mainly the managerial aspect of entrepreneurs seems to create problems in startups. The entrepreneur is not capable in making though decisions, has a closed mind, loses focus and is working with the wrong people. (Pozin, 2013), (Margolis, 2008), (Crowne, 2002).

One of the things that is mentioned by Desena (2003), Pozin (2013) and Feinleib (2014) in relation to prevent entrepreneurial failure is *feedback*. Most of the entrepreneurs do not actively search and ask for feedback or advice, in the first place based on how they work and make decision calls, but in the second place about the product itself. Is the product actually something the market wants, what are the actual needs of the market, is the market wanting all those features, or might they miss something? This part called feedback applies to the second part of the question asked in the beginning: what can be done to prevent failure or decrease possible failure?

2. Research Objective and Problem Statement

2.1. Research Objective

To answer the question in the previous chapter „what can be done to prevent failure or decrease possible failure", a new theory has emerged in the past years called the lean startup method (Ries, 2011). This theory is aimed on developing products in smaller steps resulting in more information from the market in terms of steering in the right direction and developing the right product (Ries, 2011). Therefore the goal of this thesis is to discover if the lean startup method influences the entrepreneurial process in relation to IT startups in terms of decreasing failure. The reason for stating failure instead of success is because no success does not always mean that you have failed. Through the theoretical framework that will be described in chapter three, with the research objective and questions proposed in this chapter and the actual research that will be done and evaluated, I hope to give answers to the following question. Is this method in the first place influencing the entrepreneurial process, secondly will it help to decrease possible failure in IT startups and third, if results show that it is applicable, what should be kept in mind when applying it to a startup.

2.2. Research Question and Propositions

To obtain the information that is needed in order to answer the research objective, the following main research question has been developed:

To what extent does the lean startup method influence the entrepreneurial process to prevent entrepreneurial failure in the IT sector?

To answer the main question, five sub questions are drafted that contribute to answering the main question:

1. *What is the concept of the entrepreneurial process?*
2. *What is the concept of lean startup in theory and in what way does this relate to the improvement of the entrepreneurial process?*
3. *What research has already been done into the topic of lean startup in relation to IT development, and what were the outcomes?*
4. *What are similarities and differences of the lean startup method in regards to other methods??*
5. *Is the outcome of theory in relation to the use of lean startup in IT development also consistent with practice?*

The first four sub questions are all related to theory and will be answered in the next chapter containing the theoretical framework. For the development of this framework, research has first been done through searching for academic relevant research papers and books before any other source of information, not directly related to academic level, was used. To provide information on all four sub questions in a research domain that is still in a nascent stage, not all the necessary information will be available in academic terms. For this, the information source to answer the questions needed to be adapted sometimes. This information is mainly derived from articles written by practitioners.

For answering the fifth sub question, which is aimed for practical research, the methodology used will be further explained in chapter four, including the necessary argumentation.

3. Theoretical Framework

3.1 What is the Entrepreneurial Process

The entrepreneurial process can be seen as the process that transforms an idea into a firm. This process can be seen as a *pre-firm* process. The entrepreneur who undertakes the pre-firm process creates the firm through a set of entrepreneurial decisions that arise out of four interconnected decision domains (Sarasvathy, 1997). In the past years there has been a lot of discussion about what the actual entrepreneurial process is and how this should be explained (Moroz & Hindle, 2012). In fact, Moroz & Hindle (2012, p.811) state in their research that: *"The field of entrepreneurship needs a new, comprehensive, evidence-based model of entrepreneurial process that is consistent with a strong theoretical and philosophical appreciation of process, embraces both what is generic and distinct about any act capable of being labelled as "entrepreneurship" and allows for the six common ingredients and best features of extant models of entrepreneurship thus far to be harmonized"*. Although the outcome of this research would imply that the entrepreneurial process cannot be discussed in this chapter, one of the existing entrepreneurial processes has been used to explain the steps that are important according to theory (Hisrich, Peters, & Shepherd, 2005). These steps are translated into three steps, to be known: *Identification and evaluation of opportunity, development of the business plan, determination of the required resources and managing the company* (Hisrich, Peters, & Shepherd, 2005). Those steps are further explained below.

3.1.1. Identification and Evaluation of the Opportunity

According to the opportunity identification literature there are four ways in which opportunities are identified: active search, passive search, fortuitous discovery, and creation of opportunities (De Tienne & Chandler, 2004).

Active search relates to entrepreneurs who are always searching for the creation of a better product. Those entrepreneurs are constant observing, monitoring and listening to the world around them. The neoclassical view of economics as described by Stigler (1952) is consistent with this active search. According to theory there is always a balance, active searching entrepreneurs are able to spot any imbalance and take advantage of this.

Passive search and *fortuitous discovery* can be combined into one, with the slight difference that the passive search requires the entrepreneur to be in a continuously sensitive state to the environment (De Tienne & Chandler, 2004), while fortuitous discovery presumes that natural alertness is enough for surprising discoveries to be made (Kirzner I., 1997). Beside this, both theories assume that certain entrepreneurs are able to spot opportunities while they are not actively searching for it. In these two perspectives the entrepreneur needs to be able to combine reality and future possibilities together, resulting in a new opportunity.

The last option is *opportunity creation*. According to Schackle (1961) this implies that an individual is capable of creating an opportunity from nothing but only his imagination. Opportunities are created not through the environment around them, but through their own knowledge and ambitions. Schumpeter (1934) confirms this and states that the entrepreneur is in fact not acting towards a changing market, but is changing the market itself!

3.1.2. Development of the Business Plan

After an opportunity has been recognized, the entrepreneurial process continues with the development of the business plan. In short, the business plan introduces the essential business concepts, describes the company, analyses the market, proposes a business product and outlines financial plans for the

business (Danna & Porche, 2008). Describing this more in depth, there are six sequential steps in the planning process for the business plan. These six steps are: organizing process, SWOT analysis, goal setting, operating plans, financial plan and finally writing the business plan (The American Dietetic Association, 2000).

The organizing process requires the entrepreneur to determine who needs to be involved in the process and what their tasks will be. After this a SWOT analysis is needed to map the strengths, weaknesses, opportunities and threats of the external market which will give more insights in the potential success factor of the organization and which threats should be kept in mind. The third step in the process is to set goals. With the insights of the SWOT analysis certain goals can be developed with regards to what the company should reach in the first three years regarding sales amounts, profit targets, employees, etc. After this goal setting the operating plan needs to be defined. This operating plan specifies how each goal is going to be reached and which complications need to be overcome to reach a certain objective. The fifth step in the process is to develop the financial plan, one of the most important and valuable items. In this step the costs of goals and objectives are defined and how these are going to be financed. This can be done from own investments, bank loan or private investors. The financial plan also supports schedules which need to be used to control the financial performance of the organization. If all those steps are carefully followed the business plan can be written (The American Dietetic Association, 2000). Writing the business plan is one of the most time-consuming phases in the entrepreneurial process and should not be rushed (Hisrich, Peters, & Shepherd, 2005).

3.1.3. Determination of the Required Sources and Managing the Company

After identifying the opportunity and writing the business plan, the resources needed in the process have to be determined. Resources can be everything like financial input, people, knowledge, IT development etc. The amount of different resources should not be underestimated by the entrepreneur, and the risks associated with insufficient or inappropriate resources should be assessed (Hisrich, Peters, & Shepherd, 2005). After the determination of the needed resources, the entrepreneur will first assess what his own resources are and what other resources are needed. One thing which should always be kept in mind is that the entrepreneur should keep as much ownership and control in the organization as possible. If the entrepreneur is capable of gathering the needed resources, he is capable of starting with the development of the product, managing the organization and finally deliver the product to the market (Hisrich, Peters, & Shepherd, 2005) (Figure 1).

Figure 1: The Entrepreneurial Process

3.1.4. Overview of the Most Important Literature of the Entrepreneurial Process

A lot of research has been done to the topic of entrepreneurship and the entrepreneurial process. In the beginning most of the research was focused on the characteristics that a person needed to be defined as an entrepreneur (Kirzner, 1983), (Schumpeter, 1934). Gartner (1985) is one of the first to state that the question 'who is an entrepreneur' is actually the wrong question. In his research he suggested to other researchers to not look at the question 'who is an entrepreneur' but to focus more on entrepreneurship itself. Entrepreneurship was an activity according to Gartner (1985), not a person. What do entrepreneurs do and how do they create value was the new question. He developed a new framework describing new venture creation. In this model where four dimensions, namely: *environment*, *individuals*, *process* and *organization* (Gartner, 1985). The findings of Gartner (1985) where adopted by several researchers including Bygrave & Hofer (1991) which introduced the definition of the entrepreneurial process (Bygrave & Hofer, 1991). Their view showed large similarities with the vision of Gartner (1985). With the new insights, researchers were not restricted anymore to the single question of 'who is an entrepreneur', but were more focused on the question „how to become an entrepreneur and what steps should be taken in terms of the entrepreneurial process". The work of Cunningham and Lischeron (1991) gave more fundamental grounds to the view of Bygrave & Hofer (1991). According to them there were four steps in the entrepreneurial process, to be known: *assessing personal qualities, recognizing opportunities, acting and managing,* and *reassessing and adapting* (Cunningham & Lischeron, 1991). Although they did not try to combine the whole philosophy, the entrepreneurial process was, yet again, given more shape. According to them, this process involved creating an idea, assessing the abilities of the entrepreneur and the possibility to actually take action.

In the past years, opportunity has taken a more important place in the field of the entrepreneurial process. Bygrave & Hofer (1991) had already been combining opportunity and firm creation in relation to the entrepreneur instead of entrepreneurship. This finding was further examined and researched by Venkataraman (1997), resulting in the process of discovery, evaluation and exploitation. In recent research work of Van der Veen & Wakkee (2002) this process of discovery, evaluation and exploitation was empirically tested and confirmed.
In Figure 2, the three most important contributors with their ideas in relation to the entrepreneurial process are displayed for a better overview.

	Gartner (1985)	Bygrave & Hofer (1991)	Lischeron (1991)
Key Elements	- Environment - Individuals - Process - Organization	- Environment - Individuals - Process - Organization	- Personal Qualities - Opportunity - Acting and managing - Reassessing & Adapting
Contribution to the Entrepreneurial Process	Focus on new venture creation led to the four new key elements	Transformation of the findings of Gartner into a process called: the Entrepreneurial Process.	Transformation of the view on the Entrepreneurial process. The new process was developed with the key elements from Gartner (1985), Bygrave & Hofner (1991)

Figure 2: Overview of contributors to the Entrepreneurial Process.

As can be seen from the overview in Figure 2, the entrepreneurial process has been shaped over the years into a process defining the key elements which relate to the process the entrepreneur has to undertake before starting a company. Where Gartner (1985) developed the basis for the entrepreneurial process, Bygrave & Hofer (1991) transformed his findings into the entrepreneurial process. Lischeron (1991) combined the findings of both, but also added another important element called: reassessing & adapting. This should be done after the entire process has been completed. The lean startup theory actually applies this step not at the end of the process, but already at the beginning.

3.1.5. Shortcomings of the Entrepreneurial Process

The major problem with the current approach in building a firm is the fact that the entrepreneur has to invest a lot of time, money and effort in creating the final product which has a higher chance of failing than being successful (Dun & Bradstreet, 2012). It seems that the entrepreneurial process does not cover the full reality anymore as we experience it today. For instance, it does not cover for quick market changes that are affecting entrepreneurs these days (Patel, 2009), (Tobak, 2014). As Patel (2009) explains in relation to developing the business plan: *"Technology is constantly evolving, and the way you go about operating your business isn't the same as it used to be. But the problem with business plans is that they haven't evolved with the business world. So, why would you spend time on something that is outdated?"* Tobak (2014) states that: *"Markets are a complex phenomenon with lots of moving parts that are difficult to predict."* Time and technology are more essential those days and the future is not as predictive as it was thirty years ago. With this fast moving market it seems that the entrepreneurial process needs to be adjusted to sustain and create new successful ventures which are adaptable to the quick market changes. In the entrepreneurial process as explained previously, the steps are identification of an opportunity, writing the business plan and determine the required resources and manage the company (Hisrich, Peters, & Shepherd, 2005). This process takes time and within this time, the market could have changed already. Therefore, it is not said that the process cannot be used anymore, but it seems that it should be adapted to decrease the time of identifying an opportunity and bringing the product to the market. Lean startup partly supports this idea, but in a very fast way of obtaining feedback and quick adaption to the market (Ries, 2011).

3.2. What is Lean Startup

Lean startup is created from the already existing lean manufacturing method developed in Japan. The origin of lean goes back to Toyota, where Taiichi Ohno (1988) stated that only organizational processes create value for the customer. This created the basis for lean manufacturing that was implemented by Toyota (Ede, 2008). Although this theory seems more applicable to an already existing manufacturing

or service process, Eric Ries (2011) thought differently. With the philosophy of Taiichi (1988) in mind he combined, tweaked and changed the lean theory to fit his own entrepreneurial challenges in the entrepreneurial process. This resulted in the creation of the lean startup method (Ries, 2011).

At this moment lean startup gathers more and more followers and practitioners who are applying this method in their startup. Although it seems straightforward that asking feedback from the market would enhance the success of the product, this does not mean that it is always applicable. The theory is focused on creating a Minimum Viable Product (MVP) which should be tested on the market. The MVP is that version of the product that enables a full turn of the Build-Measure-Learn loop (more explained further on) with a minimum amount of effort and the least amount of development time. The minimum viable product lacks many features that may prove essential later on (Ries, 2011, p.77). In fact the minimum viable product is nothing more than just a basic version of your intended final product to test if your idea will fit the market needs. Within certain sectors, also the IT sector, showing a minimal product which is not fully functional but reveals the int
entions you have with the product, seems to be dangerous. Dangerous in the way of other companies who capture that idea and bring it earlier and fully functional to the market than you as new startup are able to do. Also, when is a product a MVP in the IT sector? There are a lot of functions that can be implemented, but what is necessary to gather the correct feedback without already building the entire product?
Therefore, the question is *to* what extent does the lean startup method influence the entrepreneurial process to prevent entrepreneurial failure in the IT sector?

3.2.1 Build-Measure-Learn Loop and Validated Learning

The lean startup adapts the ideas of the lean principle to the context of entrepreneurship, proposing that entrepreneurs judge their progress differently from the way other kinds of ventures do. Progress in lean startup is measured through “validated learning”. Ries (2011) explains validated learning as follows: startups exist not just to make stuff, make money, or even serve customers. They exist to learn how to build a sustainable business. This learning can be validated scientifically by running frequent experiments that allow entrepreneurs to test each element of their vision (Ries, 2011, p.6). This concept can give entrepreneurs clear guidance on how to make the many trade-off decisions they face: whether and when to invest in process; formulating, planning, and creating infrastructure; when to go alone and when to partner; when to respond to feedback and when to stick with vision; and how and when to invest in scaling the business (Ries, 2011, p.19). Because the lean startup has a different way of measuring productivity, it changes the way of looking at the development of innovative new products that emphasizes fast iteration and customer insight, a huge vision and great ambition, all at the same time (Ries, 2011, p.20).

The lean startup method is designed to teach the entrepreneur how to drive a start-up. Eric Ries (2011, p.22) describes the lean startup theory as if you are driving a car. You still have a destination but instead of making complex plans that are based on a lot of assumptions, the entrepreneur can make constant adjustments with a steering wheel called the *Build-Measure-Learn feedback loop*. Through the process of steering, the entrepreneur learns when and if it is time to make a sharp turn called a *pivot* or whether he should *persevere* along the current path. Once the metaphorical engine runs, the lean startup offers methods to scale and grow the business with maximum acceleration. Through the process of driving, the entrepreneur has a clear idea of where he is going but is able to make adjustments along the way.

Reis calls the destination of a startup the *vision*. To achieve that vision, start-ups employ a *strategy*, which includes a business model, a product road map, a point of view about partners and competitors, and ideas about who the customer will be (Ries, 2011, p.22). The *Product* is the end result of this strategy. Products change constantly through the process of optimization what Ries (2011, p.23) calls *tuning the engine*. Less frequently, the strategy may have to be changed (called a *pivot*). However, the overarching vision rarely changes. Entrepreneurs are committed to seeing the startup through to that destination. Every setback is an opportunity for learning how to get where they want to go (Ries, 2011, p.24), (Figure 3).

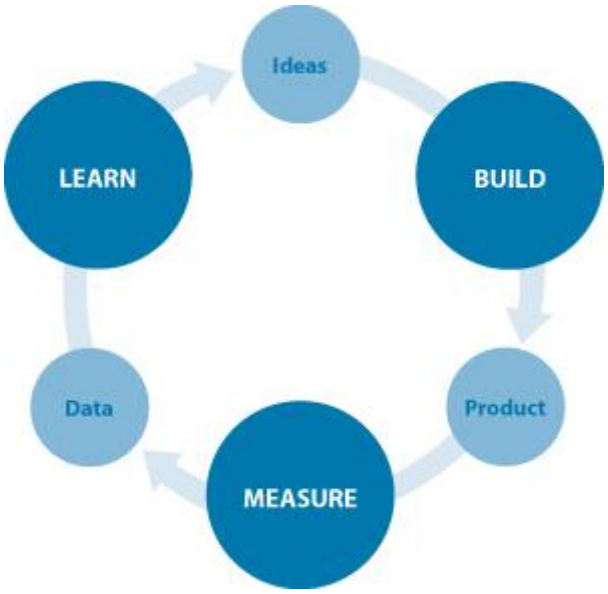

Figure 3: Build-Measure-Learn loop

One of the things in relation to validated learning is that you should know pre-hand what you want to measure and what you want to learn. The build-measure-learn cycle is a powerful tool, but it is easy to fall into two traps. The first trap is that you build, measure, and then you get to the learn part and you are left scratching your head because you were not clear on what you were trying to learn in the first place. The second possible trap is that you build-measure-learn, but hindsight bias tricks your brain into believing that the results you got are what you expected all along. Zach Nies (2013) combines this statement into the following sentence: *'learning lives at the intersection [where] we confront what actually happens, with what we expected to happen. And if we don't write down what we expected to happen, our brain will rob us our insights and those learnings' (Gold, 2014).* To solve this problem in measuring and asking the wrong questions, Nies (2013) defined the following five questions which should help to make clear what the entrepreneur really wants to learn. Those five questions are (Gold, 2014, p.5):

1. What do you want to learn and why?
2. What hypothesis are you trying to test?
3. What are your materials and method?
4. What variables are you going to control?
5. How will you measure the results?

Through answering those questions before you start to measure in order to learn, the data gathered will be more valid for further development (Gold, 2014).

3.2.2. New Product Development and Startup Creation with Lean Startup

As seen in the previous paragraph, the lean startup takes a whole new approach towards the way entrepreneurs work, build their organization, measure productivity and create their products. With regard to the existing entrepreneurial process and the steps of identifying, developing, determination of resources and managing the startup, the lean startup is already affecting this process. For instance, the business plan. According to Ries (2011, p.9) he states: *"The first problem is the allure of a good plan, a solid strategy and thorough market research. In earlier eras, these things were indicators of likely success. The overwhelming temptation is to apply them to startups too, but this doesn't work because startups operate with too much uncertainty."* This can be seen in two ways: the entrepreneur should not develop a business plan, or the entrepreneur should not spend days to create the business plan. Either way, the business plan is according to Ries (2011, p.9) less important when it comes to company development. Furthermore according to Ries (2011, p.4), the term perfect is the bottleneck for most start-ups. As seen, products change in a short period of time, but also the needs of the market. Understanding the market and adapting to changing situations is one of the key principles to entrepreneurial success (Rasmussen, 2014). The entrepreneurial process lets the entrepreneur develop the entire product instead of testing hypothesis in an early stage to get more insights and obtain reliable information of the product development is in line with the wishes of the market.

The Build-Measure-Learn feedback loop is key to one of the largest differences with the entrepreneurial process and also the core of the lean startup model. According to Ries (2011, p.77) the building phase is the first step to enter as quickly as possible with a minimum viable product (MVP). After this build phase and a MVP has been developed, the Measure phase is step two. This is mainly the biggest challenge for entrepreneurs while this determines whether the product development efforts are leading to real progress or the entrepreneur is developing a product that the market doesn't need or want. Ries (2011, p.77) calls the recommend method *innovation accounting*. A quantitative approach that allows the entrepreneur to see whether his engine-tuning efforts are the right ones. Also it allows to create *learning milestones* which are different to the traditional business and product milestones. Learning milestones are useful for entrepreneurs as a way of assessing their progress accurately and objectively Ries (2011, p.77). After the build and measure steps, the third and last step needs to be applied which is the learn phase. Through the measurement outcomes of the second phase, the entrepreneur needs to decide if he wants to persevere the original intended strategy or wants to pivot to a new one with his new insights (Ries, 2011, p77).

Through the development of products according to the lean startup method, startups are more capital-efficient, pivot sooner and create less waste of time, money and effort, resulting in a higher chance of success (Ries, 2011). Although the cycle is described as Build-Measure-Learn, in practice the entrepreneur uses the reversed cycle (Ries, 2011, p.78). First he figures what he wants to learn, uses innovation accounting to figure out what he needs to measure and then figure out what product he needs to build to gain those measurements. At the end, the whole lean startup concept is focused on minimizing the total time through the Build-Measure-Learn loop (Ries, 2011, p.78).

3.2.3. Agile Development, Scrum and Lean Software Development

When the principles of lean startup are discussed within software development markets, most of the practitioners will at first combine the methods of lean startup with the already existing methods of *Agile* and *Scrum* but even more with Lean software development. The basics of Agile and Scrum will be explained in the next section, whereas the focus in this chapter will be on Lean software development.

Agile is basically a set of software development methods in which requirements and solutions evolve through collaboration between self-organizing, cross-functional teams. It promotes adaptive planning, evolutionary development, early delivery, continuous improvement and encourages rapid and flexible response to change. It is a conceptual framework that focuses on delivering working software with the minimum amount of work (Wikipedia, 2014), (Beck, 2010). Agile software development is not a fixed set of rules and processes set in stone by the project leader. It is rather a set of evolving ideas and thoughts, which are brought forward by practitioners who actively influence their project (Stober & Hansmann, 2010). In 2001, a group of experts in agile software development published a set of guidelines as a common denominator of the methodology. This “Agile Manifesto” emphasizes the following four best practices to uncover better ways of developing software (Stober & Hansmann, 2010):

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

At first sight Agile seems not to have much in common with lean startup in terms of customer collaboration and response to change in plans, but when we delve deeper into some of the methods that have been further developed on the basis of Agile, we come to not only Scrum software development, but also lean software development.

Scrum is an iterative and incremental agile software development framework for managing product development. It defines "a flexible, holistic product development strategy where a development team works as a unit to reach a common goal", it challenges assumptions of the "traditional, sequential approach" to product development, and enables teams to self-organize by encouraging physical co-location or close online collaboration of all team members, as well as daily face-to-face communication among all team members and disciplines in the project (Wikipedia, 2014). A key principle of Scrum is its recognition that during a project the customers can change their minds about what they want and need (often called "requirements churn"), and that unpredicted challenges cannot be easily addressed in a traditional predictive or planned manner. As such, Scrum adopts an empirical approach—accepting that the problem cannot be fully understood or defined, focusing instead on maximizing the team's ability to deliver quickly and respond to emerging requirements (Wikipedia, 2014), (Schwaber & Sutherland, 2013). As can be seen, Scrum comes more close to the principles of lean startup in developing products that are tested by the customer for feedback after which they can be changed, adapted to the new insights and tested a couple of weeks later for new feedback and approval.

Lean software development is one of the further developed Agile software development tools which has been out on the market for quite some time. Lean software development is based on seven

principles which should be applied when developing software, originating from the lean theory which have been adapted by Mary and Tom Poppendieck (2003) to fit in software development. The seven principles they described in their theory are:

1. *Eliminate waste:* focused on developing the right 80% of the code in 20% of the time. Right specification of the requirements of the customers is key in this process. (Poppendieck & Poppendieck, 2006, p.23)
2. *Build Quality In:* building a qualitative product right from the start instead of building and testing later in the development phase will reduce waste of testing and failure of code. (Poppendieck & Poppendieck, 2006, p.25)
3. *Create knowledge:* develop the basic requirements as soon as possible, communicate this to the customer and gain feedback so the actual requirements will follow later on. (Poppendieck & Poppendieck, 2006, p.29)
4. *Defer commitment:* if decisions have to be made that are irreversible, first try to make those decision calls reversible. If this is not possible, those decisions should be made at the last moment in time when all the possible information can be used to make that decision. (Poppendieck & Poppendieck, 2006, p.32)
5. *Deliver fast:* when fast delivery can be established, the company is in the position that they have already reduced the amount of waste they normally would have, including an extreme low amount of defects in the code. Besides this, those companies can afford to take an experimental approach to product development. Through delivering fast, you give the customer no time to change their mind, which reduces changes. (Poppendieck & Poppendieck, 2006, p.34)
6. *Respect people:* through respecting all the people in the team, thrust their ability to organize their own time in order to meet goals and actually do something with their feedback, software can be developed faster and better. Without respect, people are not dedicated to delivering a high quality product. (Poppendieck & Poppendieck, 2006, p.36)
7. *Optimize the whole*: through continuously improving the process of all the steps, more waste is reduced until the moment that the process is as lean as possible. (Poppendieck & Poppendieck, 2006, p.38)

If you see the basics of Agile, Scrum, Lean software development in comparison with lean startup a lot seems to be consistent in terms of eliminating waste and creating products in combination with the customer while doing this in small batches. The question that raises: are there any differences?

3.2.4. Agile, Scrum, Lean software development and Lean startup: The Difference

If you look more carefully to all the theories that have been discussed, there is actually a large difference between Agile, Scrum, lean software development and lean startup! The development tools in Agile, Scrum and lean software development are aimed on delivering and producing software in an efficient way which reduces waste. This means that you are developing software for a customer, or for a new project in which the requirements are partly made. Through developing the first set of requirements and testing this with the customer or the potential buyers, you are able to identify which parts work properly and which parts should be adjusted. All the Agile methodologies are an approach to project management focused on software development. It helps teams to respond to unpredictability which may emerge when developing software through incremental, repeated batches (Kodukula, 2013), (Ries, 2011).

Lean startup on the other hand can be focused in the IT sector on developing software or software for products, but instead of giving the basis for the best way to develop the software, it is applicable one step before this. Lean startup is used to help build and define a marketable product, while Agile methods are focused on the best way of achieving the outcomes (Kodukula, 2013). To give a better overview of what is meant the following analogy based on a restaurant is used to describe this. In relation to the restaurant, lean startup is mostly taking place in the "dining room" where there is direct contact with the customers. Lean software development is taking place mostly in the "kitchen" where the goal is set to deliver a high quality product as quickly and efficiently as possible (StackExchange, 2014). Or as Ries (2011) tries to describe it in his book: "*Lean thinking defines value as providing benefit to the customer; anything else is waste. In manufacturing business, customers don't care how the product is assembled, only that it works correctly. But in a startup, who the customer is and what the customer might find valuable are unknown, part of the very uncertainty that is an essential part of the definition of a startup"* (Ries, 2011, p.48). In fact, lean startup and Agile development tools are perfect to combine with each other. Lean startup should be used to determine the actual customer, and what the customer finds really valuable, while Agile methods can be used to develop those outcomes while reducing waste.

3.2.5. Earlier Research Conducted to Lean Startup and IT

Throughout the search for literature used in this theoretical framework, and the search for previous conducted research in relation to lean startup and IT, a few things became clear. As earlier said, lean startup is still in a nascent stage. Therefore, most of the research that has been conducted in earlier years is focused on the method itself, and not into the appliance of the method in a certain sector. The information that has been found about lean startup and the IT sector is most of the time based on the use of lean methods in relation to developing large-scale software (Pernstal, Feldt, & Gorschek, 20013), (Benefield & Greening, 2013), or is focused on using lean and Agile in combination with each other, mainly based on the lean software development method (Rodriguez, Markkula, Oivo, & Garbajosa, 2012), (Jailia, Sujata, Jailia, & Agarwal, 2011), (Wang, Conboy, & Cawley, 2012). Therefore it seems that no scientific research into this topic of using lean startup in the IT sector has been done before, or has been published.

3.2.6. Problems Known Today With the Lean Startup Method

Despite the fact that the current level of research in the field of lean startup is of low volume and still has to be explored, there are some cases known in which the theory of using lean startup in general has failed to gain success. The most important ones that have been found are described in the following section.

The most common form of the problems with the lean startup method is the interpretation and inappropriate use of the tools that are used within the method. First of all is the interpretation of writing the business plan. Ries (2011, p.21) states in his book that *"Too many startup business plans look more like they are planning to launch a rocket ship than drive a car. They prescribe the steps to take and the results to expect in excruciating detail, and as in planning to launch a rocket, they are set up in such a way that even tiny errors in assumptions can lead to catastrophic outcomes"*. He also states: *"Validated learning is the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects. It is more concrete, more accurate, and faster than market forecasting or classical business planning. It is the principal antidote to the lethal problem of*

achieving failure: successfully executing a plan that leads nowhere" (Ries, 2011, p.38). Some entrepreneurs will interpret this in the way that the business plan is something that should not be looked at anymore because it is time consuming and useless. Comments on this statement is in fact that Ries (2011) is not criticizing what the business plan should be but what a business plan should not be (Berry, 2012). He states that in fact the better interpretation of this should be writing a small business plan that summarizes the current strategy, metrics, milestones, tasks and basic responsibilities. Throughout the process of defining, measuring, learning and adjusting, the business plan will also be adjusted into a new more accurate one (Berry, 2012).

Another wrong interpretation of the methods supplied has earlier been discussed in paragraph 3.2.1. concerning validated learning and asking the wrong questions (Ng, 2014). The build-measure-learn cycle can be used in the wrong way, resulting in not knowing what you wanted to measure, or resulting in measurements which are biased because you were asking the wrong questions. Therefore, the five questions stated by Zach Nies (2013), knowing: "*what do you want to learn and why, what hypothesis are you trying to test, what are your materials and method, what variables are you going to control, how will you measure the results"* should provide a tool to overcome these two problems (Gold, 2014).

The third wrong interpretation is the one concerning the minimal viable product (MVP). According to the article of Michael Woloszynowicz (2010) this misunderstanding can be separated into multiple parts. One of the misunderstandings relates to the concept of the MVP itself. Most entrepreneurs look at the MVP as a product, while you should see this as an experiment (Woloszynowicz, 2010). The MVP is in fact something that is testing your hypothesis and is not always a product that needs to be build. Through the usage of exploration, pitch and concierge experiments, the MVP can be built without building or writing any line of code (Ng, 2014).
Besides this, the final misconception lies with intellectual property. As can be imagined, most entrepreneurs will not feel comfortable with showing their MVP to the world as this could be stolen by another entrepreneur or organization. According to Sean Ellis (Woloszynowicz, 2010), most of the people that have the capability to copy your idea are too busy with their own ideas. Ries (2011, p.111) states that in practice it is difficult to copy the idea of someone else. The learning an entrepreneur gains from the MVP far outweighs the chance of someone stealing the idea (Woloszynowicz, 2010). Therefore, entrepreneurs should not be scared to show their idea to the world in order to get feedback.

4. Methodology

4.1. Research Strategy Struggles

As seen in the previous chapter, the lean startup theory is new in relation to the current entrepreneurial process and different Agile methods. The general view of lean startup is tested in some ways, but when specific markets, for instance IT, are examined, it appears there is hardly any research done that confirms the method is applicable in that area. The research that was found related to the area of lean software development (Rodriguez, Markkula, Oivo, & Garbajosa, 2012), (Jailia, Sujata, Jailia, & Agarwal, 2011), (Wang, Conboy, & Cawley, 2012). The fact that there is little research at this moment available has everything to do with the nascent stage of lean startup.
The first intention in regards to gathering the necessary information from practice was through the use of interviews. In the search for practitioners which would be suitable for my research, I struggled to find the right persons. There were a couple of direct reasons why this search failed:

1. Most of the entrepreneurs which are active in the IT sector have not heard about the lean startup theory.
2. The entrepreneurs who are using lean startup are mainly operational in different sectors than the IT sector.
3. The entrepreneurs who actually did use the lean startup theory in their IT startup where mainly in the early stages of startup.

I did find eight entrepreneurs who qualified for all the developed criteria according to the response they gave, but only one did actually qualify in the end. Because the research cannot be done with only the information of one participant, I decided to change the research methodology and focused on case studies which have already been done into this field.

4.2. Research Strategy

To analyze the data in this research paper, a qualitative approach is used. The variables which can be found in this paper are hard to quantify due to the nascent stage of lean startup and the novelty of the literature that is available at this moment. The only information available in relation to the combination of lean startup and IT, was found in case studies (Swanborn, 2013). To analyze the data which is documented in these case studies, content analysis will be applied which is defined by Babbie (2010) as "*The study of recorded human communications"*. Babbie (2010) states that almost all written communications would be suitable for content analysis (Babbie, 2010, p.330). Within this type of analysis coding is one of the most important elements in order to transform the received raw data into standardized forms (Babbie, 2001, p.309). In fact, Ryan and Bernard (2000, p.780) see content analysis as one of the "major coding traditions". They contend that "coding forces the researcher to make judgments about the meanings of contiguous blocks" and that coding is "the heart and soul" of (whole) text analysis (Kohlbacher, 2006, p.10). According to Ryan and Bernard (2000), classical content analysis comprises techniques for reducing texts to a unit-by-variable matrix. By analyzing that matrix quantitatively, hypothesis can be tested by the researcher through applying a set of codes to a set of qualitative data, with the assumption being that the codes of interest have already been discovered and described beforehand (Kohlbacher, 2006, p.10). With the process of content analysis and coding, a category system will be used to order the key variables that are defined within the case studies. Based on the review of cases, relevant codes will be defined and compared with each other for analysis (Verschuren & Doorewaard, 2010).

The selection of the different cases will be based on the criteria which have been developed earlier. Those criteria can be seen as dependent variables. In normal case study analysis it is advised not to use this type of selection because it might result in problems when determining variance and correlation between dependent and independent variables. Because of the difficulties in this research paper, in relation to entrepreneurs who use the theory in practice, this choice was made. In most of the cases or with most of the entrepreneurs that use the lean startup method in the IT sector, they are mainly in the early stages and might give better results in the future than at this moment. Because researching those cases would take a lot of time to deliver results, this option takes too much time and does not fit within the scope of the thesis for active analysis. Therefore, to come to a good representation of the method in practice, the choice has been made to select cases based on the dependent variable which are entrepreneurs who operate in the IT sector and have used the lean startup method (with success) in

their organization (Swanborn, 2013). The cases that have been selected are based on the (written) stories of entrepreneurs.

4.3. Data Collection - Cases

As this research is aimed to explore the practical use and feasibility of the lean startup method in IT, and the current level of entrepreneurs who would fulfill the criteria to use within this research is below a usable level, cases will be leading in this research paper to deliver relevant information. The first search for cases through the online library of different universities did not deliver usable information. Further research through the internet with Google showed different cases on the website of the Lean Startup Theory but also on The Lean Startup Circle. The cases found where sometimes described in a video format in which the entrepreneurs told what their experience was with lean startup, how the entrepreneurs used it and in what they failed at that time. Those cases have been transcribed by hand into text files to use in this research paper. Another reason for choosing video cases is because of the unsufficient available information in relation to existing researched cases. On the sites mentioned were cases available with positive and negative outcomes. Within all the cases that have been found a first selection has been made based upon the information that was available within the case. Certain cases where just an overview of the lean startup experience the entrepreneur had and supplied only a small summary of the effectiveness and correct use of the lean startup method in the future. Those cases have been marked as not suitable for usage. The cases that have been selected for this research are all screened on the fulfillment of main criteria in terms of entrepreneurs with well found knowledge about lean startup, the use of the concept in practice and also active in the field of IT. Furthermore, the companies that are described within the cases are from all over the world. This should not affect the outcomes of this research paper, because the research is aimed for the use of lean startup in IT and not on the social or cultural differences that might be applicable.

The final selection of cases resulted in 10 cases in which the use of lean startup leaded to success in 7 cases and failure in 3 cases. The total size of all the cases together covers over more than sixty pages of text on which coding has been applied. Within these cases the general overview of the company, the problems, the changes, impact of lean startup in terms of adjustments and decisions, and the results are given. The cases used within this research paper are displayed in Figure 4.

Company Name	General overview	Succesful
Aardvark	Aardvark, a company subsequently acquired by Google, developed a social search engine. The product enables users to ask questions, mainly subjective, that are then distributed to the social graph for users for answers. Aardvark tested its concept by building a series of minimum viable products (MVP), each designed to test a way of solving a customer problem. What became Aardvark was the sixth prototype that the team created.	Yes
BackupAgent	BackupAgent is a fast growing vendor of cloud backup software. The company was founded in 2005 when market trends such as growing bandwidth, data increase and the dependency on digital data for business continuity created a vision among the founders. A vision to develop a replacement for the traditional backup methods with a powerful and user-friendly cloud backup platform.	Yes
Dropbox	Once Drew Houston, CEO and Founder of Dropbox discovered Eric Ries's Lean Startup blog, the company started iterating their product much faster in order to test what customers really wanted, early and often. Using Lean	Yes

	Startup principles, in just 15 months, Dropbox went form 100,000 registered users to over 4,000,000.	
Good People Dating	Good People Dating is developed in order to create a dating place for especially Jewish people.	Yes
IMVU	Founded in 2004, IMVU is the world's largest 3D chat and dress-up community. At IMVU, members can meet new people, chat, create, and play games with friends. IMVU uses experimentation to develop new product features and processes to develop those features. IMVU has reached 50 million registered users and a $40+ million annualized revenue run rate.	Yes
LiveTweetApp	LiveTweetApp is an online solution to help you search, moderate and beautifully display tweets on a (big) screen. It increases social interactions during your events and conferences.	No
Scuttlebutt	Scuttlebutt is a Mac native Yammer client that helps you stay in touch with multiple Yammer networks. Say goodbye to running one browser for each network and hello to one-click access to all of them.	No
Votizen	Votizen is disrupting how our government and politics works by putting focus back on individual voter. In founding Votizen, David Binetti pivoted several times from a social network of verified voters to the first social lobbying platform in American history. Votizen's tools led to the first bill driven into the US Senate by social media alone.	Yes
Wealthfront	Wealthfront is democratizing access to outstanding investment managers. Most investors use mutual or index funds but lack access to top hedge funds and money managers. Wealthfront solves this problem by vetting managers and, with technology, providing the scale necessary to make these managers accessible to regular investors. Wealthfront practices continuous deployment in an SEC-regulated environment where risks and costs of failure are very high. Founded in 2009, the company now manages over $200M and processes over $2M a day.	Yes
Word Sting	Word Sting focusses on the development of logic models which are the non-profit equivalent of business plans. Through the use of their software, writing logic models should be simple and efficient.	No

Figure 4: Overview of the case selection with company information

4.4. Analysis - Qualitative Research; Case Studies

The analysis that needs to be conducted on the selected cases will be done according to a structured process. All the cases will first be read in detail and loaded into the software Atlas.ti. This software makes it possible to code all the relevant data available and structure the information into different topics. According to Hartley (1994, 2004) a careful description of the data and the development of categories in which to place behaviors or processes have been proven to be important steps in the process of analyzing data. Data might further be organized around certain topics, key themes or central questions, and finally needs to be examined to see how far it will fit or fail to the expected categories. (Kohlbacher, 2006). When all the cases are coded into a categorical system, a cross case analysis will be done between all the different cases as stated by Brown & Eisenhardt (1997) and with the methods suggested by Miles & Huberman (1984). The methodology of Cassell & Symon (2004) and Eisenhardt (1989) will help to establish insights into the concept of lean startup and the usability in IT startups. All the cases with their different outcomes are used to obtain insights into the different problems and successes which every entrepreneur had to deal with. Through comparing the different cases, the similarities and differences between those cases will be identified and eventually lead to answering the main research question.

5. Results

5.1. Data Analysis, Creating Codes, Categories and Concepts

From the data analysis that has been done, 169 codes have been identified in the 10 cases. Those codes have been combined into 20 different categories through the use of aggregating different codes with each other. From those 20 categories 10 main concepts have been developed resulting in the final analysis. In Figure 5 the outcome of this final analysis is displayed in terms of the codes, categories and concepts. Although 169 different codes have been identified within the cases, not all the codes have been used within the developed categories. This means that some codes did not fit within any category (because they were about company information, which is not related to any category) and are therefore not included.

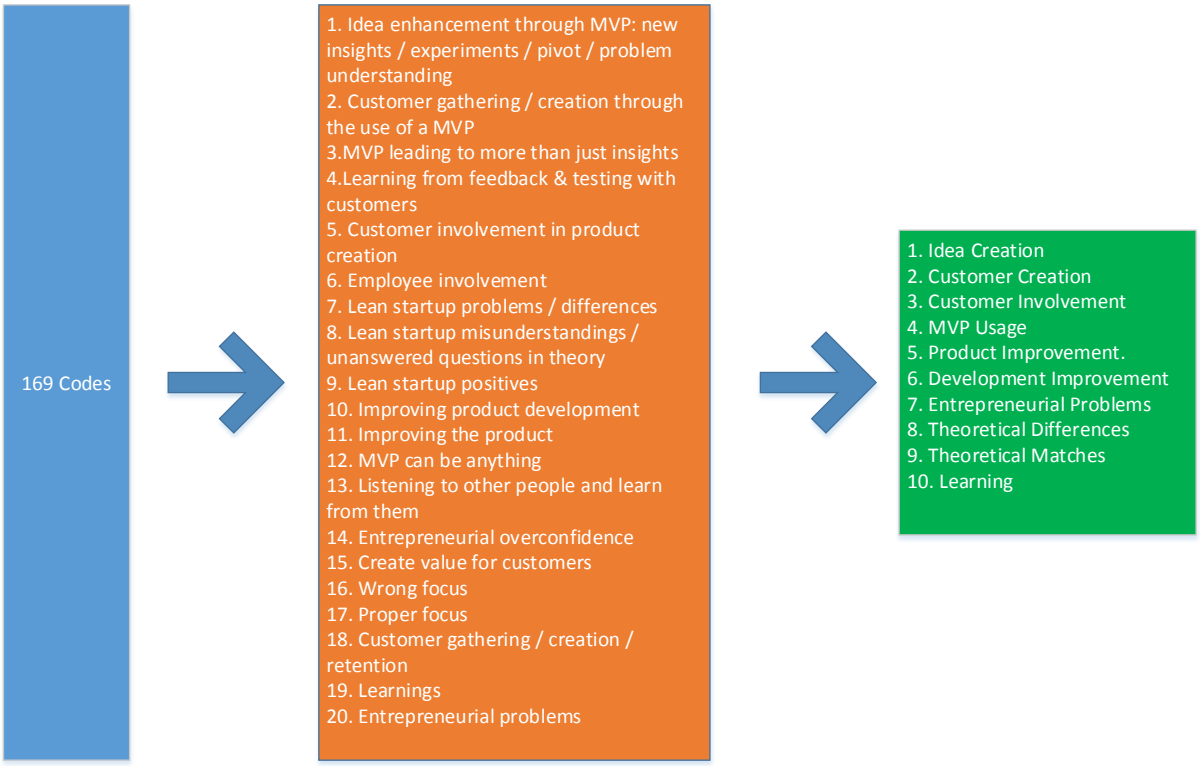

Figure 5: Data analysis process and code combination

The creation of the 169 codes has been done through following a subjective strategy. All the cases were read without making any notes. After reading all the cases, the basic structure of coding was made. Main concepts were identified and notated. After this general conceptualization, all the different cases were coded independently resulting in the set of 169 codes. From those 169 codes, the main topic was identified and the process of combining codes into categories was developed. Within this process, all the codes have been read and the first main comparable codes were combined. After this first combination, all of the remaining codes were selected and placed into a categorie if suitable. This resulted in the large shift between codes that was used in data analysis and the ones that were not. Within the 20 categories that have been developed, the main concepts were identified resulting in the creation of the final 10 concepts. In the next chapter the cases will be discussed apart from each other, resulting in the basic overview of the data. After this, the cases will be compared with each other in a cross-case comparison which will lead to answering the stated propositions, sub questions and main research question.

5.2. Independent Case Analysis

In this chapter, the cases will first separately be discussed in terms of information which was found within the case, the outcome in relation to the use of lean startup in IT and the possible adjustments with regards to the entrepreneurial process. Within this overview, every case contains a figure in which quotes, codes, categories and concepts are displayed which have been found within that specific case. This is to give a better overview of the information that relates to that case, and the overall overview of information in relation to the struggles and successes with the use of lean startup. The cases will be discussed in the order which is showed in Figure 4.

5.2.1. Aardvark

Within the Aardvark case, different problems that the company had were displayed including the importance of patience which you should have as an entrepreneur. Also the use of feedback from the market before you create or even start with building your product was one of the central topics. In terms of following the lean startup theory, the outcomes were mainly related to the concepts of: Idea creation, Customer creation, Customer involvement and Theoretical matches. It was mainly seen that the founders of Aardvark were focused on realizing a reliable and valuable product to their users. With the help of continuous feedback cycle loops, iterations and their MVP, they managed to identify the key problem which they could solve. The MVP they had created was helpful in terms of reliability, feasibility, and new insights. Those new insights relate to thinking you know what the customer wants and values, but you as an entrepreneur are actually wrong. Through following the path of not building too quickly, testing and creating a product with their customers, they ended up with a good theoretical and practical product of which the success was already confirmed by the market. In Figure 6 a small overview is given of the concept, category code and quote which are related with each other in the Aardvark case and give more insights in the case itself.

Concept	Category	Code	Quote
Idea Creation		Finding the right problem	• *"We spent half a year just on product conception, but I challenge people to take six months to not adopt an idea and actually force yourself to do the opposite to say: I will not pick an idea until six months have passed no matter how promising I think it's going to be"*
	Idea enhancement through MVP	MVP leaded to new insights	• *"This is once we have our minimum viable product concept and we are operating with that. Users are using it and we're continuing to do this loop again and again. The most important part is to learn from your users idea."*
		Use the MVP to know if the product is feasible	• *"The thing that we did different was: we didn't just jump right and we didn't go into a garage. We actually capped running Aardvark is Wizard of Oz experiment for nine months. We learned if people would actually use it"*
Customer Creation	Customer gathering / creation / retention	Know how to communicate with your potential customers	• *"We constantly would bring in users to try out different things. We would have six to twelve users each week for user research sessions."*
		Interview customers to get insights	• *"We would make more mock-ups, we would bring in more users, put them in front of pieces of paper and say: what does this button suggest to you?"*

Customer involvement	Customer involvement in product creation	Let your customers know that you really listen to them	• *"If you are really friendly to people and tell them: we're listening to you and you really do listen to them in terms of actually building the things that they're requesting and complaining about, they'll be very responsive to you."*
Theoretical Matches	Lean startup positives	LS: you need to learn	• *"We're also learning from users by setting up a community forum letting them send in information that."*
		LS: helps to avoid false positives the entrepreneur sees	• *"It sounds a little bit like psychoanalyst what happens but it's really valuable because you get language from the users and they're phrases help pull you away from your own misguided intuitions."*

Figure 6: Overview of the Aardvark case analysis

5.2.2. BackupAgent

In the case of BackupAgent, the owners struggled with the use of lean startup. At first, they started their company without using any of the key elements that are provided by the lean startup theory. Without this knowledge they had severe problems in terms of learning from customers and entrepreneurial problems. They had a strict focus on marketing instead of listening to the customer demands. If they would have used the lean startup theory in a much earlier stage, it would have saved them time and effort. In the beginning the entrepreneurs followed more the path of the entrepreneurial process, which shifted towards the lean startup method over time. In Figure 7 a small overview is given regarding the main concepts and codes within the case.

Concept	Category	Code	Quote
Theoretical Differences	Lean startup misunderstandings / unanswered questions in theory	LS: Missing learning from your customers	• *"We missed a certain frame of reference to base discussions and decisions on, as we didn't know where to start"*
		LS: Missing learning from your customers	• *"If we knew that learning was more important then execution we would have likely had totally different conversations with all our early customers. We would actually collect the facts as such and not think of it as by-catch"*

Customer Creation	Customer gathering / creation through the use of a MVP	Get interest with a MVP / gather a crowd	•	*"We had no trouble building a minimum viable product. By doing so we were able to convince investors, sign up customers and channel partners. Even after we pivoted towards serving ISPs with software we redid our product MVP-style effortlessly and again this resulted in finding another business angel and more customer"*
Learning	Lean startup problems/ differences	Wrong pivot	•	*"We didn't always pivot out of own vision and some of our features did end up in the product, because one customer or partner insisted on it."*
Entrepreneurial Problems	Entrepreneurial overconfidence	Not listening to customers, following own path	•	*"We didn't talk to customers to learn, we always tried to sell."*

Figure 7: Overview of the BackupAgent case analysis

5.2.3. Dropbox

Within the Dropbox case the company owners discussed mainly the ideas about Idea creation, Customer creation and the Theoretical matches in relation to the lean startup method. The owners of Dropbox saw that there was an enormous gap in reliable existing software for sharing and storing your digital content on cloud servers. They have been continuously developing their product through listening to the market and asking their (potential) customers for feedback. This way of working resulted in the confirmation of the product feasibility before they even did spend any money on their product development. Furthermore, they learned how to bind customers to their company, and learned that the proper focus is one of the most important parts when you develop your company. Focusing on creating a perfect product which includes not all features but features that do properly work and believing in their own product is one of the key elements that was displayed in this case. Because they were willing to listen to their customers instead of holding on to their own created idea, they changed their focus into getting happy customers instead of only revenue based customers. This resulted in the growth of their customer database and company size. In Figure 8 an overview is given of the case.

Concept	Category	Code	Quote	
Idea Creation		Feedback from market with MVP	•	*"Dozens and dozens of really smart people that commented about it and gave me about the same feedback I would have gotten if I had actually put the code in their hands, but with a lot less work for me."*

	Idea enhancement through MVP	Use the MVP to know if your product is feasible	• *"Your biggest risk is spending all this time and effort and money in making something and then it doesn't resonate with people it doesn't resonate the way you would hope it would."*
		Overal existing problem	• *"One thing that I saw and learned was building a bulletproof and reliable scalable cross-platform on cloud storage system is really hard, something that was also the problem of our competitors."*
Customer Creation		Know where to find the right audience	• *"We had no trouble building a minimum viable product. By doing so we were able to convince investors, sign up customers and channel partners. Even after we pivoted towards serving ISPs with software we redid our product MVP-style effortlessly and again this resulted in finding another business angel and more customer"*
	Customer gathering / creation / retention	Know how to communicate with your potential customers	• *"We were early adopters and we knew how to communicate with those kind of people, and that serviced really well."*
		Know how to keep your customers interested	• *"But we included always Easter eggs that appeal to that audience. So even if you think the product sucked, you would still use it for the Easter eggs."*
Theoretical Matches	Lean startup positives	Target group	• *" We have to learn about our target audience as soon as possible."*
		Test hypothesis / experiments with dedicated customers	• *"We ran a bunch experiments with paid customers which where dedicated to the product and we had some awesome results"*
Learning	Proper focus	Focus on what works	• *"We decided we would have a ton of happy users, instead of trying to make display ads or other things."* • *It really turned out that we were always really close with OEM partners, and would burn a ton of cycles but it always end up being disappointing. So after a couple of these discussions we were like: screw it, we're just gonna keep our focus on just making our users happy and not trying to do too many things at once."*
		Focus on specific assets of the product for success	• *"As a by-product of doing maybe one or two things really well, and spending all the time on those two, you leave a lot of those wrong things out."*

Figure 8: Overview of the Dropbox case analysis

5.2.4. Good People Dating

In this case, the entrepreneur was still in the startup phase in which he learned a lot about idea creation and learning to know who your customers are and what the value is you are going to give them. Again, also stated in the lean startup, learning is the key element to overcome the first problems in your startup. Related to the entrepreneurial process, the difference is how to overcome the first problems and knowing if your product is going to add value for your potential customers. Furthermore, within the case also the entrepreneurial overconfidence is repeatedly written down in terms of thinking you know everything while you know nothing. The lean startup theory helps to overcome those problems through gathering evidence from the market for the statements and thoughts you have as an entrepreneur. Below in Figure 9 a summarization can be found of the case.

Concept	Category	Code	Quote	
Idea Creation	Create value for customers	Offer the right solution through your product	•	*"So the first one is: doing your market research properly. Mainly insuring that you're solving a real problem."*
	Idea enhancement through MVP	Finding the right problem	•	*"But franchises have a seventy-five percent success rate. And the reason for that is that essentially they have built a system of a, finding the right problem, for the right market, and the solution that matches it".*
Customer Creation	Customer gathering / creation / retention	Learn to know your customers as soon as possible	•	*"First of all, it assumes that a random survey of the population is a good thing. It's not, because your market is not everybody. Your market is a specific segment of the population."*
		Know how to communicate with your potential customers	•	*"So then they changed the ads around, and they showed people cleaning their homes and use the product as a sort of self-reward. Sales took off! If they had done this research in the first place, how much angst and pain would have saved for them."*
Theoretical Matches	Lean startup positives	Research the market	•	*"imagine a mountain range. You're making progress. You're like a third way up the hill. Then something happens. Okay, so you optimize. You did everything. You reach the peak. Oh Yeah, I'm the…You look over, and you're like, oh wow, well, that mountain was so much more massive. If only I had done my research, I would have known that, and my market would have been ten times bigger. And all this work and effort would have paid off a lot better.*
		Learn to know what your customers desire	•	*"The other aspect is to offer a desirable product. So you're going to do later on solution interviews, to talk to people and see what they think of this idea, that idea. Just to make sure that you are offering the right solution, not just that you found a problem and the solution is not worth solving.*

		You need to learn	• *"You'll see that the key thing he wants to bring up is that you need to learn. Because by learning, you can iterate closer to a plan that works."*
Entrepreneurial Problems	Entrepreneurial overconfidence	Overconfidence as entrepreneur	• *"So, the question is to find who is your audience – Do you start out with everyone? Or do you start out with some idea of who your target audience is? So, It's really a question of degrees. You're asking me, I think–What is the nuance? Where is the red line between I'm assuming I know too much, or assuming I know too little?"* • *"Another point is, that this doesn't assume anything. It assumes you know nothing. Which is the truth. When you are starting out, you don't know your market."*

Figure 9: Overview of the Good People Dating case analysis

5.2.5. IMVU

Within the case of IMVU, the importance of the right focus and employee involvement was one of the core concepts. When you keep your employers involved and give them responsibility for functions within the product, the build-measure-learn loop can be shortened, resulting in a much stronger product with lesser problems and bugs. Also through focusing on a qualitative good product with reliable features in combination with customer involvement, the success and development of the product can be increased. Again, learning was one of the important statements within the case. Figure 10 gives an overview of the case with the codes.

Concept	Category	Code	Quote
Customer Involvement	Learning from feedback & testing with customers	Features that didn't work properly	• *"The team that had been working on that was disbanded and moved on to another project and so you had these areas that have no ownership and no one had the band with it to go back and fix them. So we ended up with a lot of things that really felt like orphaned features.*
	Idea enhancement through MVP	Customer involvement in product creation	• *"They've been bouncing back and forth and they look like a deer in the headlights when they're trying to do the simplest part your product which was obvious to us but to them it wasn't."*
Learning	Wrong focus	Focus too much on feedback	• *"We also got a little bit too obsessed with immediate customer feedback."*

	Proper focus	Focus on what works	•	*"This project management and the tracking and through the retrospectives adopting have led us to have extremely accurate schedules"*
Development Improvement	Improving product development	No one was responsible	•	*So when you have a culture were anybody can make any change to the product, you don't really have ownership of that. So you could also end up in a situation where someone made a change that you disagreed with but now you have the obligation to support the debt that may come along with that change.*
		Quick Build-Measure-Learn loop	•	*"We hire people and they are coming to the company and they used to be pushing code once every nine months maybe once a year and all the sudden they push code in under 40 minutes"*
		Keep employers involved	•	*"This is a meeting that anybody in the company can attend when they want. You can actually see what's going on in to see that the person who's making his decisions is delivering."*

Figure 10: Overview of the IMVU case analysis

5.2.6. LiveTweetApp

Within the case of the LiveTweetApp the idea failed to succeed. With the use of lean startup this could have been prevented in various ways. First of all, the owners ignored all the principles of the method by basing their assumptions and reactions from the market just on one customer for which they had built a successful product. Furthermore, if they would have made a demo of their product for the market, and asked for feedback, they might have discovered problems with the product in a much earlier stage, resulting in an earlier pivot and lesser investment of time and money. Their focus was more on sales instead of creating value for their customers and discovering the real problem. At the moment that they did actually started to question the market and ask for feedback, they were too late and discovered that the market was not going to use it. Again, if they would have done this in a much earlier stage as the lean startup method is proposing, it would have saved time and money. This case was selected because of the outcomes the entrepreneurs did experience when they started to question the market. It shows what lean startup tries to achieve in the beginning: understand that your product is not feasible for the market and you should not put any effort in it. In Figure 11 the outline is given of the case.

Concept	Category	Code	Quote	
Entrepreneurial Problems	Entrepreneurial overconfidence	Thinking you know what the customer needs	•	*"From there, ignoring all Lean principles, we've taken this one-time positive feedback as a sign that if one customer loved our in-house Twitter Wall*

				application, thousands of other people would have to love it too and were ready to pay for it."
		No MVP creation	•	*"We didn't build any demo neither done any interviews and went straight to release based on unverified assumptions."*
Learning	Wrong focus	Focus too much on sales	•	*"Users were able to upgrade (meaning: pay) their account from day one. This resulted in focussing too much on sales instead of the customer."*
Theoretical Differences	Lean startup problems / differences	Wrong interpretation / usage of data	•	*"We are measuring main data such as Acquisition, Activation and Retention. But numbers and figures are laying there, and we haven't used any of them to rationalize decisions."*
Customer Creation	Customer involvement	Feedback from multiple customers	•	*"We sent various one-to-one emails and collect feedbacks from registered users. This has been done though follow up emails and surveys."*

Figure 11: Overview of the LiveTweeApp case analysis

5.2.7. Scuttlebutt

In this case, the concept that was created by the entrepreneur did get some attention but eventually failed. The overall problem that was visible in the case related to the fact that the market was not large enough for the idea. The entrepreneur did follow the lean startup method in ways of testing the product with the MVP and launching it early to gather feedback from customers. Also market research was something he tried to do, but he couldn't gather enough people and thought that the first releases would eventually lead to more customers. He had already reached the maximum of the market which was one of the problems why the concept failed. What also stood out was to focus on customers and value creation instead of achieving sales when the product is just launched.

Concept	Category	Code	Quote	
Idea Creation	Idea enhancement through MVP	MVP leaded to new insights	•	*"It turned out that releasing crappy alpha versions were very useful. There were a number of important design decisions that were made in this phase that's would be too hard to change if the app was already matured."*
Theoretical Matches	Lean startup positives	Research of the market	•	*"Start finding people that has the problem that you're going to solve and contact them."*

		Launch early	•	*"You'll need to get it out fast to people who need it and ask them whether it's solving their problems."*
Customer Creation	Customer gathering / creation / retention	Know how to communicate with your customers	•	*"Are you talking to your target customers using their language? That's one of the most important things to keep in mind."*
	Customer gathering / creation through MVP	Get interest with MVP	•	*"These were alpha & beta versions of the software. It's not fully functional nor stable but it's proof that I'm "for real" and not just trying to harvest people's e-mail addresses."*
	Create value for customers	Deliver value	•	*"You really need to do some groundwork before putting up the landing page and deliver tangible value to your potential customers long before you ask them for money."*

Figure 12: Overview of the Scuttlebutt case analysis

5.2.8. Votizen

In the case of Votizen the entrepreneur shows a lot of theoretical matches and disagreements. First of all, the disagreements can be found in the fact that the tools which are provided by the lean startup can be interpreted in various ways, leading to wrong outcomes and decisions. Also he states that a pivot in the company shouldn't be based on the feedback from the market, but purely from your own vision. Of course you need to listen to the market, but without a pivot from your own vision you will end up with nothing. The theoretical matches he makes in the case are related to the help of the lean startup method resulting in avoiding false positives and the learning perspective you should have as an entrepreneur. This learning is also related to the entrepreneurial problem he states. Most of the entrepreneurs are way to overconfident in that they think they know what the customer wants and they know everything about the market and the product. The problem is that most of the entrepreneurs create a tunnel vision, not listen to the market anymore or are not willing to pay attention to feedback, resulting in a waste of time and money.

Concept	Category	Code	Quote	
Theoretical Differences	Lean startup problems / differences	Tools can be interpreted in various ways	•	*"We always talk about pivot pivot and pivot. As eric has already mentioned it is overused and I always wondered what exactly does that mean and how do we actually use it?"*
		Addition to theory	•	*"So at the end of the day I think a great way to be thinking about lean is that it converts market risk into technical risk."*

		Theory was wrong	•	*"This is not about trying to find some deterministic path to success you must have a vision you must be able to know what it is you're trying to achieve that other people cannot. That's the differentiation that you have. The lean approach is just simply trying to inform that as quickly and cheaply as possible."*
Theoretical Matches	Lean startup positives	Helps to avoid false positives	•	*"Lean just mitigates your own reality distortion field. It works on others but also works on you too. So the lean process is not about small, it's not about cheap it's about helping you avoid very expensive false positives. "*
		Need to learn	•	*"What are you trying to accomplish in how do you think you're going to get there and a second piece is: iterating releasing and measure."*
		Research the market	•	*But once you do that then go ahead and move on, iterate release the thing and measure! So for me what did I do? Well I did the MBP I got it done in six weeks at 1206 dollars and what I won was: it's a start."*
Entrepreneurial Problems	Entrepreneurial overconfidence	Don't be overconfident	•	*"It's really easy for yourself, I suppose we know this stuff, and I got caught! So don't underestimate the power that reality distortion field. Show yourself money that's the easiest way to make sure whether that you have something real and is worth pursuing."*

Figure 13: Overview of the Votizen case analysis

5.2.9. Wealthfront

Within the Wealthfront case, a lot of theoretical matches in terms of customer learnings and quick build-measure-learn loops where observed. Furthermore, the problems an entrepreneur might have within the company when they develop their software product where also displayed. According to this case, the lean startup method adds value in terms of developing a software product in the most efficient way, whilst still listening to your customers and act immediately on their requests. It also helps to focus on what will work regarding features. This results in decreasing waste of time and money. Figure 14 gives an overview of some of the codes which support the outline.

Concept	Category	Code	Quote
Theoretical Matches		Learn to know what your	• *"If you invest too much time up front, it might lead to problems in terms of quick change in relation to your users which are giving you feedback and tell you which way you need to go."*

		customer desires	
	Lean startup positives	Helps to avoid false positives	• *If it ends up that this feature or system is worthless, it is much harder to look at the facts and remove your emotions in terms of: I have spent all that time and money on this feature and just skip it and move on, and this happened in many occasions."*
		Quick Build-Measure-Learn loop	• *"Traditional organizations release every two, three or two months while we try to release as quick as possible. We make sure that every train that is going to production is tested and is not going to deliver any problems. Therefore there is no need to fix bugs because the software is stable at every point."* • *"That an investement manager is calling us: whenever I trade, I don't get the feedback I'm expecting, so if you guys could do that. So we go back to the drawing board, do the change, a little quick UI thing, get it back out to production and call them 20 minutes later to ask: hey what do you think of the flow now? "*
Entrepreneurial Problems	Product improvement	Too much features instead of a reliable product	• *"The CEO wants features, features and features, while the CTO wants stability."*
Product Improvement	Improving the product	Best practice	• *"What you want to do is: let things break and go and fix that, monitor it and improve your product in that way."*

Figure 14: Overview of the Votizen case analysis

5.2.10. Word Sting

In the Word Sting case, the use of lean startup was a failure for the entrepreneurs. Although they did investigate the market (nearly a thousand people) as foretold by the lean startup method, they only ended up with one customer to focus on. Another problem within the case is the entrepreneurial overconfidence. They were building their company on too much assumptions and they followed their own thought. The MVP they build did not work properly, resulting in a failure of customer binding. This is a difference in comparison with the lean startup which states that the MVP can be anything and should not be something that always works properly. In this case, the product was launched too early resulting in a failure. Also according to the case, if you do not know where to start

and what your customers desire, you should not develop a MVP to test the possible success of the product. Again an overview of these statements can be found in Figure 15.

Concept	Category	Code	Quote
Entrepreneurial Problems	Entrepreneurial overconfidence	Thinking you know how everything works	• *"The assumptions behind our lean canvas cracked straightaway. We assumed customers would sign up online with a credit card. Instead, obtaining our first customer took a dinner in Toronto and a lot of phone calls. And instead of a credit card, we were paid by check."*
		Following their own path	• *"Assuming that the whole world spends its time on an iPad or iPhone fidgeting with apps. Software builders are usually utterly unrepresentative of their users (we certainly were). And the mobile app wasn't helped by gooey English in the button labels, such as "completion timeframe."*
	Wrong focus	Just one customer to focus on	• *"Our first and only customer, a Canadian social services department, was led by a Deputy Minister with a fondness for a wall chart showing the logic models under his charge. They wanted to move off the wall and into our software."*
Theoretical Differences	Lean startup problems / differences	MVP didn't work	• *"Demo day came…and disaster. Our inaugural customer couldn't access the software using an out-of-date Safari browser. Our developers pleaded with the client to "recreate" the problem. Though charmingly polite, our clients were humiliated by the demo and too irritated to "iterate" our minimum viable product with us."*
		MVP didn't work	• *"First, the minimum viable product preached by Lean Startup has limited practical use. Customers aren't interested in funding your "learning." They want reliable software that delivers value consistently. You must build the minimum desirable product, and if you don't have a good understanding of what's desirable before you start, then, don't."*
Customer Creation	Customer gathering / creation / retention	Interview the potential market	• *"To confirm our suspicions, we surveyed nearly a thousand people. The feedback showed that writing a logic model is confusing, complicated, and impractical, and no good software tools were available to help."*

Figure 15: Overview of the Word Sting case analysis

5.3. Cross case comparison

In the following chapter the 10 cases will be compared with each other in relation to the entrepreneurial process and the use of lean startup in IT. The outcomes will be displayed in the following paragraphs in which the different outcomes from all the cases will be integrated with each other resulting in the final conclusion regarding the sub questions and main research question.

5.3.1. Findings Relating to the Entrepreneurial Process

The data that has been analyzed in the cases has delivered a number of propositions which can be linked to the entrepreneurial process. To summarize back to the chapter about the entrepreneurial process, this process existed of three steps which will be further explained with the outcomes of the cases analysis.

5.3.2. Identification and Evaluation of the Opportunity

Within the existing entrepreneurial process, identification and evaluation of the opportunity relates to the entrepreneur identifying and evaluating for itself if the opportunity is a real opportunity. Mainly within the current entrepreneurial process, this evaluation of the opportunity is done by the entrepreneur himself. He decides whether the idea might be successful to execute and invest time and money in developing the company, or if the idea is not worth to execute. In comparison with the lean startup method, the evaluation of an idea is directly combined with investigating the possible market and testing if your idea is suitable and delivers value to customers. All the cases, also the ones which did not succeed, state that the key to not fail directly is through testing your idea with the potential market. This can be done with interviews, mock-ups, or through the use of a MVP. As said in the Dropbox case *"Your biggest risk is spending all this time and effort and money in making something and then it doesn't resonate with people, it doesn't resonate the way you would hope it would".* One of the main issues that is seen by failing entrepreneurs is that they had an idea, but it did not solve the right problem. It did not add value, and in fact they did not identify the real problem which they should have solved. As said in the case of Good People Connect: *"Usually you have an eighty to ninety percent failure rate….they have built a system of finding the right problem, for the right market with the right solution that matches it"*. Also within the Aardvark case, patience with regard to opportunity evaluation is a key to success, as they said: *"What we found is that those ideas that we were pretty certain of, were disasters."* This was also done with the help of market research. Not through the existing way by basing thoughts on existing numbers, but through talking with potential customers and ask them to give input, understand what the real problem is and change the idea so it has a higher change of succeeding.

Through the use of the customer feedback cycle, learning from this feedback, value your idea again, shape the idea if necessary, test it again with the market and do it all over, the opportunity of an idea and the valuation of that opportunity gets more potential in terms of success and evidence. An overview of different codes relating to this first step of the entrepreneurial process is given in Figure 16. Within almost all the cases that have been analyzed, the topic of identifying the real problem, learn through feedback and testing your idea with the market through the use of the MVP is named as one of the most important steps before you even start.

5.3.3. Development of the Business Plan

Within the development of the business plan, the entrepreneur introduces the business concepts, describes the company, analyses the market, proposes a business product and outlines financial plans for the business. In the data analysis of the cases, the business plan is something that was not directly

named, but certain concepts of the business plan and the differences with those can be found in the cases. For instance planning, investment and focus are topics that relate to the business plan and where named. Within the lean startup, the business plan is something that is not directly seen as an important factor. Most of the attention in the cases is mainly based on overcoming the first steps as described at the first step of the entrepreneurial process: idea creation and valuation. The business plan is according to Ries (2011) something that is continuously changing, and the future of a company cannot be predicted for the upcoming three years.

As earlier stated, the difference between the entrepreneurial process and the lean startup method: the lean startup method puts a lot more attention to analyze the market and evaluate your opportunity. Through the stronger idea evaluation, the first steps in customer creation and identifying the potential market are already made, resulting in a stronger analysis of the market. In the lean startup process, the entrepreneur is already trying to find the right audience and is searching for ways to communicate with those potential customers. Even before a single line of code is written, the entrepreneur has a much better understanding of the market potential and if the market is large enough to focus on. The same difference relates to the topic of the business product.

The financial plans that are normally written in the business plan is in fact the same, although the lean startup method has a different approach. Instead of calculating the development costs of the product before it can be sold to the market, the lean startup method tries to overcome the problem of large investments in products which are not well enough tested with the market for feasibility. Where the current process describes the financial needs for the entire product creation, the lean startup method is more focused on the short term. Through the creation of a MVP, the product that is developed is cut into multiple parts for testing and confirmation. By using this technique, a smaller investment is necessary to start with the product creation, which is then tested with the market. This results again in new information, leading to the creation of the second MVP with a lower investment than the entrepreneur would normally have done. In fact, the result is that the entrepreneur, through the usage of the lean startup method, spends time and money in a more efficient way than he would have done in the first place within the entrepreneurial process.

5.3.4. Determination of the Required Sources and Managing the Company

After writing the business plan, the entrepreneur is in the third and last phase of the entrepreneurial process which relates to the determination of the required resources, developing the product he created, selling it to the market and managing the company. Within this step, determination of obtaining the financial resources is one of the important factors. If the entrepreneur is unable to gather the required resources, for example the investment which is needed, the whole process stops and the time and effort the entrepreneur has put into the process can directly be seen as waste. The problem is that investors might not be convinced when reading a business plan, but would have been convinced if they saw the potential through the MVP. For example, stated in the BackupAgent case: *"We had no trouble building a minimum viable product. By doing so we were able to convince investors, sign up customers and channel partners."* The use of the MVP might lead to more success and certainly a decrease in large investments which should be made in terms of money, time and effort.

Besides the findings relating the steps of the entrepreneurial process, another concept is also applicable in relation to the entrepreneurial process. In all the cases, codes have been identified regarding the

concept of Entrepreneurial Problems. The case analysis showed that a lot of entrepreneurs warned for the problems you would normally have as an entrepreneur: being overconfident and thinking you know what the market needs in terms of: not listening to customers, making too much assumptions based on guessing, no proper investigation and not testing your idea. Therefore, you should learn as an entrepreneur to be humble and learn to listen. If the lean startup method is applied in a proper way, the existing overconfidence and false positives of the entrepreneur need to be put aside because of the tools that are used. Testing, listening to customers, adjusting, learning again and let the market show what the actual problem is instead of thinking you know what it is. Confirmation is key in this process and therefore helps the entrepreneur to learn the key concepts of being a good entrepreneur.

5.3.5. Conclusion

To summarize the impact of the lean startup on the entrepreneurial process, there is a large difference in approach which should be made. In fact, the lean startup method takes some of the elements from the entrepreneurial process, but shapes the context in terms of success and shaping the idea as best as possible before a lot of time and money is invested in developing a product and company which does not add value to the market. Through a more and deeper investigation of the feasibility of the idea, adjusting it and building a customer basis from the start, the change of failure seems to be decreased. Still, failure is always possible if the entrepreneur makes the wrong choices or does not understand the actual problem, which has been seen in multiple cases. It seems that through the usage of the lean startup method, the fundamental grounds on which an idea and company is based result in more success than without the usage of the lean startup method. Also the entrepreneurial problems can partly be overcome when this method is used. The basis of this method is being humble and listen to other people and the market. Therefore it will not only help the entrepreneur to develop a proper idea, product and company, but also teaches the entrepreneur how entrepreneurship should be performed. An overview of the most important codes from the case analysis can be found in Figure 20.

To give a better understanding of the actual influence of lean startup on the entrepreneurial process as stated above, the outcomes have been translated into a new model. First the entrepreneurial process according to theory (Hisrich, Peters, & Shepherd, 2005) as stated in the beginning is displayed in Figure 18 which can be found below.

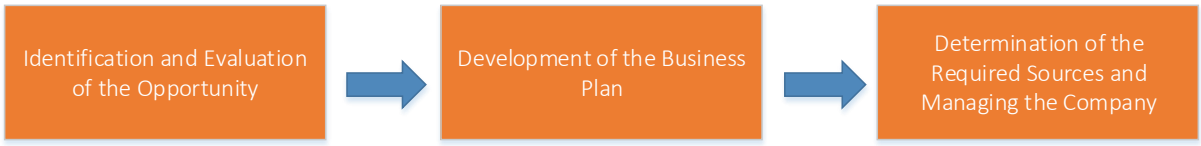

Figure 18: Entrepreneurial process according to (Hisrich, Peters, & Shepherd, 2005)

As can be seen, the opportunity spotted by the entrepreneur is identified and evaluated. After a positive evaluation, the entrepreneur develops the business plan for the entire production of the product. When he finishes the business plan development, the resources that are needed for the development should be obtained and gathered, after which the product can be developed and the entrepreneur can start to manage the company (Hisrich, Peters, & Shepherd, 2005).

In Figure 19 the theory of the entrepreneurial process and the theory of lean startup & outcomes of the cases have been combined into a new entrepreneurial process. The orange color in this overview

displays the steps of the entrepreneurial process according to Hisrich, Peters & Shepherd (2005). The blue color displays the steps according to the lean startup method stated by Ries (2011). The green color displays the influence of the lean startup method on the steps of the entrepreneurial process.

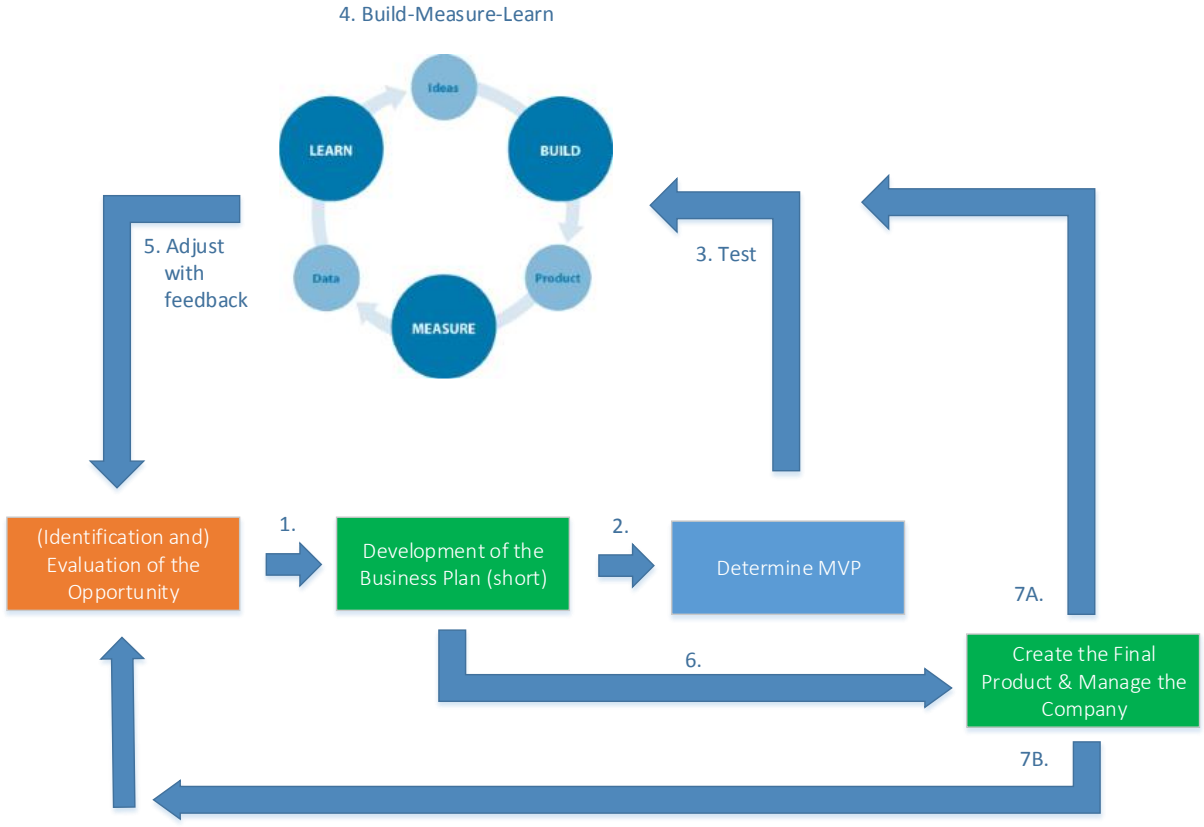

Figure 19: The combined entrepreneurial process with lean startup

As can be seen in Figure 19, the focus of the entrepreneurial process has changed towards the evaluation of the idea created by the entrepreneur. The first step is still the same in terms of identifying and evaluating the opportunity. The second step is the development of the business plan. According to the entrepreneurial process, the business plan is developed for the complete product creation and takes time to develop (Danna & Porche, 2008). Because the lean startup method is still in the phase of evaluating the opportunity, this step is less important but should not be left out. Although the opportunity and product is probably far from finished, the incentive and idea of the entrepreneur in terms of his investment of time, money and effort are still important. Also the planning in relation to the MVP should be described in the business plan. The business plan is still important after the first step of identification and evaluation of the opportunity, but the lean startup influences this step by not focusing on the long term but on the short term, the business plan box is green. After writing the business plan, the entrepreneurial process is directly influenced by a major change resulting from the lean startup method: MVP creation. Within the business plan, the first steps and possible resources necessary for MVP creation can now be used to develop that MVP. After finishing the MVP, it follows the next step in the process which is the Build-Measure-Learn cycle. Within this cycle, the entrepreneur tests the MVP with the market, tries to gain results and answers to the questions that he has in order to evaluate the idea. After this cycle, the fifth step is applied: adjusting the initial idea with the feedback and results that have been obtained. After the adjustments, the business plan also needs to be adapted

in terms of new insights which are obtained through new evaluation and feedback. This cycle continues until the entrepreneur is convinced that the opportunity is a real opportunity and has been evaluated several times. After this the sixth step is applicable which also can be found in the entrepreneurial process: create the final product and manage the company. The lean startup method influences this step because of the cycle that has been applied in the previous steps. Managing the company is in this new process more applicable, because the idea is already tested with the needs of the market. The problems which would normally occur after the development of the product will therefore be less applicable. This is where the entrepreneurial process would normally stop, but the lean startup method continuous. From this point there are two options: 7A is to test the final product again with the market if it really fulfills all the market needs and solves the entire problem. 7B is focused on the further development of the product created. When the product is finished, the entrepreneur is able to start the entire process again in order to continue to build on the existing product.

As can be seen, the entrepreneurial process is strongly influenced by the lean startup method in terms of focus, steps to be taken and continuous input from the market.

5.3.6. Findings Relating to the Use of Lean Startup in IT

Beside the findings related to the influence of lean startup on the entrepreneurial process, also the use of the lean startup method in the IT sector was part of the question. First of all, within the 10 cases, 7 cases were successful in using lean startup or did acknowledge that the use would have helped them with certain elements of company creation. Within almost all the cases they stated that the tools provided by the lean startup method should be used in a correct way. Within the cross case comparison, it seems that within the cases of failure the entrepreneurs were overconfident and didn't use the theory as it should have been used. Data gathered from potential users was not interpreted in the correct way. Also the usage of a MVP was not always found. Although it might seem not important to use those cases in this research paper, the cases display the problems that entrepreneurs struggle with in relation to the entrepreneurial process. Lean startup seems to give more structure to the steps that should be taken in order to obtain more information from the market and more information about the right direction the company should be going. In the successful cases this was found in terms of market creation. In the cases that failed, there was in fact no market creation which was the result from not following the build-measure-learn loop as suggested by the lean startup method.

One of the key elements which the lean startup method tries to achieve is the evaluation of the idea created by the entrepreneur. Within IT software development, projects are most of the times created and build according to the wishes and thoughts of the entrepreneur, resulting in costly and time consuming products. Large IT projects often fail because the created system does not solve the actual problem or does not add value to the market. Because the initial idea is more shaped during the feedback and learning process with the potential market, the final created product has a lower failure change than without the idea validation. When an idea is validated, the MVP that is built and tested with the market solves another problem: features. Entrepreneurs are focused on what they think the market needs and wants. For instance, a social media platform nowadays needs to have a chat function, because that is how people communicate when using those platforms for as far as they know. Therefore a lot of features are designed and developed in the final product, while maybe more than half of all the features will not be used by the customer. The lean startup method is an appropriate method to test and measure if features are wanted by the market and how they should be shaped. As said in the Word

Sting case: *"Build no feature unless you understand it thoroughly and have unshakeable evidence that multiple customers need it".* Also from the IMVU case: *"So we ended up with a lot of things that really felt like orphaned features. So this wasn't working".*

Another thing to mention is: when you keep your customers involved, they can give you not only directions to the right features and the correct way the product should be developed, but also how you should design it. In the case of Aardvark it was very clearly that the creators behind the idea let the customer build their product and design it. In fact, through bringing them in and asking them *"what does this button do according to you"* and show them after that answer what it really did, the product was designed in a much better way. Within the case of Scuttlebut, the entrepreneur received designs from customers which were way better than he would have created. Implementing a re-design would have cost money and valuable time. As stated in the Scuttlebut case: *"There were a number of important design decisions that were made in this phase that's would be too hard to change if the app was already matured. Some who wanted the alpha releases even submitted UI mockups that I ended up incorporating in the application".*

As can be seen from the example above, the lean startup method aims for efficient use of tools that are available and a more efficient strategy in product development. Efficiency is also found in the build-measure-learn cycle which should be as quick as possible. Software development is most of the times done on the basis of creating the full product, testing, asking feedback from the customer, manage the changes in the product that do not comply with the customer, test it again and deliver it. This is time and money consuming, while rebuilding the product costs even more time and development hours. Through using a quick build-measure-learn cycle the product is developed in small batches with more feedback from the customer resulting in small changes while developing. Also through the development with continuous feedback, the product quality is improved which is linked to the improvement of the amount of bug repairs and test time. With faster development, not only the investment in time and money improves, also the quality of the product can be improved significantly.

5.3.7. Case Differences

Within the 10 cases there are different views about the use of the lean startup method. For instance pivoting. In the Votizen case, the entrepreneur states that you should pivot out of own vision because: *"That's the differentiation that you have. The lean approach is just simply trying to inform that as quickly and cheaply as possible."* Also within the BackupAgent case this was stated in terms of: "*We didn't always pivot out of own vision and some of our features did end up in the product, because one customer or partner insisted on it."* Although this seems logical, in other cases the changes in relation to the company direction where made through market feedback. If the market told to go a different way and the product needed to be adjusted, the company followed that path in order to obtain success, something that turned into a problem in the BackupAgent case.

Another difference that was found between the cases in relation to lean startup was the focus on customers or revenue. In the Votizen case, the entrepreneur stated that revenue was at the end of the day all that mattered, and a signature means nothing until people actually pay for your product. Dropbox shifted their focus from selling their product to customers towards obtaining happy customers, although they used their product for free. This resulted in a large market share, but that is also something that Votizen has reached while focusing on revenue and sales.

The third difference that was found within the cases is the discussion about early product launch. In the cases of Votizen and Scuttlebut, the entrepreneurs state that your product should be launched as early as possible to gather information from the market. On the other hand this resulted in problems at Dropbox where different people were telling different stories. One said they should launch as early as possible, while another said that they should wait until they would have a good product so the market would really be interested. This view is supported in the Word Sting case where the entrepreneur states that the purpose of your first release is to give your customer immediate value and you should therefore not launch early. Also Aardvark did not jump right in but kept improving their product for nine months before they released anything.

5.3.8. Problems in the Success Cases

Beside the differences in the cases, also the successful cases did encounter problems with their startup. Votizen did follow the steps of the lean startup method, but he encountered that there were problems in the beginning. He received positive information from the market, but when the people were able to use the system if they paid, just a small group signed up. Therefore he pivoted, and tested it again.
Also within the IMVU case it was not always success. At a certain moment they had to manage the company, but it had grown above their own heads, resulting in a monthly loss of 500.000 dollars. They reorganized their way of working and set out a new plan, which resulted in overcoming this loss and being profitable again. In fact, the lean startup cannot do much about this problem, because it is focused on the product creation, not on tools to manage a company.
In the case of Good People Connect, the entrepreneur followed the lean startup method in terms of validating the opportunity. The problem in this case was that he saw that gathering feedback from the market would involve a lot of time and effort without any progress. Furthermore, he encountered problems in relation to asking the right questions. If you are looking for certain answers, and you are not careful enough, you will develop questions that will deliver the answers you want to hear, not the ones you need to hear.
The other cases show also problems, but those problems are more focused on learnings which do not directly relate to the wrong use of the lean startup method.

5.3.9. Conclusion

To conclude the findings stated above, from the case analysis that has been done it seems that the lean startup method is actually applicable in the IT sector. It should be kept in mind that the tools provided by the lean startup should be interepreted and used in the right way. Still it does not guarantee a successful company, but when it comes to the development of software and building a higher qualitative product step by step without making large investments up front, the lean startup method seems according to data analysis interesting and successful to use. In Figure 19 an overview is given of the codes from data analysis, linked to the concepts which support the findings above. In Figure 20 an overview can be found of all the cases and the codes that have been found in those cases relating the different concepts that have been developed.

Concept	Category	Code	Quote
Idea Creation	Idea enhancement through MVP	Finding the right problem	• *"What are the benefits of Lean as opposed to this? You are going to get real insight. You really are going to understand what the customers needs. What is their problem? It's obviously a lot cheaper, because your not wasting this time, this money, etcetera. Your motivation: It's much faster learning. You're not guessing and checking."* • *"Run your Lean Research, to maximize your odds. To be more like a franchise, where you got 75% chances of success. By cutting down your waste, by skipping the poor alternatives like surveys, which should come later in the process, like pre-selling, which comes ever later, even after surveys. Because your research should start with interviews. With asking your friends, their friends. What is the biggest problem preventing you from achieving your goal? You use your surveys, you rank your problems, and of course if you can use crowd sourcing to go faster, to get more data."* • *"But they're actually some problems with that. One problem is that their only a small amount of friends who are actually available to you at a given moment. You have maybe a small number of people on your buddy list you might I am just out of the blue and ask them: hey can you help me out with what i'm looking for. I know you know a lot about romantic poets. So there is a small number of people, but then worse: if you look further out into friend of friend and so forth, you actually don't know all that much about these people."*
		Overall existing problem	• *"One thing that I spent the book my twenties figuring out is that building a bulletproof I reliable scalable cross-platform on cloud storage system is really hard."*
		Through learning knowing your product	• *"Largely through using lean principles, IMVU was able to discover the features that would eventually lead to the product to customers would pay for."*
		Feedback from market with MVP	• *"Dozends and dozends of really smart people that commented about it and gave me about the same feedback I would have gotten if I had actually put the code in their hands, with a lot less work for me."* • *"It was very natural for us to collect facts outside the building. We spend significant time doing this. Fellow entrepreneurs in our direct surroundings still praise our 'business savyy' mentality compared to other tech startups. We also took pitching to customers, investors and channel partners very seriously"*

			• *"We did, however, get plenty of positive feedback such as our software was a good way to tell the story of a program to funders."*
		MVP new insights	• *"It turned out that releasing crappy alpha versions were very useful. There were a number of important design decisions that were made in this phase that's would be too hard to change if the app was already matured."* • *"We didn't just jump right and we didn't go into a garage, we actually kept running Aardvark as a Wizard of Oz experiment for nine months. Nine months with human beings on the backend, being involved that every single question that someone asked, not answering but class by McQueary managing the conversation. We would try and do this in an automated fashion but along the way we learn how would people actually use this product? What are the things that they would need us to build? It was absolutely fundamental, where every single person that kept coming back in the product did that."* • *"This is once we have our minimum viable product concept and we are operating with that users are using it and we're continuing to do this loop again and again. The most important part is that the top this learn from users idea."*
		MVP to know feasibility	• *"your biggest risk is spending all this time and effort and money in making something and then it doesn't resonate with people it doesn't resonate the way you would hope it would."* • *"The other point is that you have to be patient. A lot of us, and it's just human nature, like to build. We want to plant a tree and harvest the fruits. And, we want to write code and get people to use it. But if you do that before you understand who you're writing code for, and what you're solving for them, you're wasting and you're more likely to fail."*
MVP Usage	MVP leading to more than just insights	Investors attention with MVP	• *"So that was really exciting for me because here I am making this video my boxers in my apartment in Cambridge and suddenly people from all the world like really excited about it. So that kick things off and I got the Wycom peoples attention as this played a role in our funding."* • *"We had no trouble building a minimum viable product. By doing so we were able to convince investors, sign up customers and channel partners. Even after we pivoted towards serving ISPs with software we redid our product MVP-style effortlessly and again this resulted in finding another business angel and more customer."*

			• *"And during that phase when there was a human being involved in everything Aardvark interaction, we raised seven and a half million dollars and we raised two million dollars in seed financing and we raised five and a half million in a Series A. I think that that's informative that good, institutional investors, are sort of more willing to take a leap about whether you can automate something that you're on the path automating, than whether or not this product that you're building will be used by anyone once you're finally done building it*
Entrepreneurial Problems	Entrepreneurial problems	Entrepreneurial overconfidence	• *"It is really easy for yourself to say: right I suppose we know this stuff, and I got caught! So don't underestimate the power of that reality distortion field. Show yourself money, that's the easiest way to make sure whether that you have something real and is worth pursuing."* • *"We didn't accept the power of learning over execution. Most certainly we rarely measured results of actions we took"* • *"You must build the minimum desirable pdoruect, and if you don't have a good understanding of what's desirable before you start, then don't."* • *"We skipped the process of actually understanding the problem. Our only problem hypothesis was "A client wants to display tweets on a screen during an event". Our direct solution was a Twitter Wall, without further researches."* • *"You don't know your market so we need to be humble and admit this instead of asking forward looking questions in the interviews."* • *"This is only due to our lack of initial learning of our customers. Who are they really (for now they are just usernames and emails with an ID) and what are they really looking for when registering for our product?"* • *"We didn't talk to customers, we always tried to sell".* • *"We didn't build any demo neither done any interviews and went straight to release, based on unverified assumptions* • *"Assuming that the whole world spends its time on an Ipad or Iphone fidgeting with apps. Software builders are usually utterly unrepresentative of their users (we certainly were)."*

Figure 18: Overview of the codes related to the entrepreneurial process findings

Concept	Category	Code	Quote
Product Improvement	Learning from feedback & testing with customers	Too much features instead of reliable product	• *"They fell over features that belonged in the product but didn't work reliably."* • *We did too much development cycles, so we're still very pushing code all the time but we fund these groups for two months at a time and if sometimes product didn't get completed or a feature wasn't done or a bug, into the two months the team that had been working on that was disbanded and moved on to another project and so you had these areas that have no ownership and no one had the band with it to go back and fix them. So we ended up with a lot of things that really felt like orphaned features. So this wasn't working and we knew were we wanted to go, so we said: we need to focus to regroup and figure out how to do this."* • *"Build no feature unless you understand it thoroughly and have unshakeable evidence that multiple customers need it --urgently."* • *"We haven't clearly defined the core features needed to solve the problem as we are still wondering internally if we should open our « Twitter Wall » to other social networks by example."* • *"So when you have a culture were anybody can make any change to the product if your product or that supposed to own sort of a product, you don't really have ownership of that. So you could also end up in a situation where someone made a change that you disagreed with but now you have the obligation to support the debt that may come along with that change, so this system was not set up for people taking the ownership."*
Development Improvement	Improving product development	Quick Build-Measure-Learn cycle	• *"We started off for instance by doing you know three to four months large cycles. There is this huge thing that we have to build and gonna go away when we are building it and come back when it's done. We moved to four to six weeks cycles by the end."*

			• *"Of course there's concept to the pivot which is simply saying that if I was unable to reach a sustainable and scalable business model let's go back to the start and try again. Your goal has to be to make this loop happen as quickly and cheaply as you possibly can in as many times as it takes for you to be successful."* • *"The important notes here the iteration whoops got tighter they got faster. I got better at doing this process and realizing quicker when I was potentially against a false positive and the one time that I didn't it nearly killed by company."*
Customer Involvement	Customer involvement in product creation	Customers can help you	• *"It turned out that releasing crappy alpha versions were very useful. There were a number of important design decisions that were made in this phase that's would be too hard to change if the app was already matured."* • *What I ealier wanted to mention during this process: we did not ignore our customers during this time we just didn't expect them to design our product for us."*

Figure 19: Overview of the codes related to the use of lean startup in IT

	Dropbox	BackupAgent	Word Sting	Scuttlebutt	LiveTweetApp	GPC	Aardvark	Votizen	IMVU	Wealthfront	TOTALS:
Theoretical Matches	2	3	4	3	0	12	4	10	3	2	**43**
Learning	15	1	3	2	2	1	1	1	3	2	**31**
Idea Creation	4	1	1	1	1	6	7	1	3	1	**26**
Customer Creation	8	2	2	1	0	3	2	2	0	3	**23**
Theoretical differences	3	3	3	2	1	3	1	2	2	1	**21**
Entrepreneurial Problems	3	1	2	1	2	3	2	2	1	1	**18**
Product Improvement	1	0	1	1	1	2	3	2	3	2	**16**
Customer Involvement	2	1	0	2	0	3	1	1	1	2	**13**
Development Improvement	0	0	0	1	0	0	1	4	3	3	**12**
MVP Usage	3	2	1	2	0	0	1	1	0	0	**10**
TOTALS:	**41**	**14**	**17**	**16**	**7**	**33**	**23**	**26**	**19**	**17**	**213**

Figure 20: Overview of the codes relating to concepts that have been found in all the cases

6. Discussion

6.1 Adjustments of the Entrepreneurial Process and the Lean Startup Method

In Figure 19 the overview was given about the new entrepreneurial process with the influence of the lean startup method. This new method brings certain adjustments to the entrepreneurial process. First of all, the entrepreneurial process is a static process which the entrepreneur follows in order to create a company (Hisrich, Peters, & Shepherd, 2005). After finishing this process, the process is finished and the entrepreneur has to deal with managing the company and the product, so it is in fact not a continuous loop that he is following. With the influence of the lean startup method, this process is turned into a loop where the entrepreneur is constantly testing and measuring, even after the final product is created. Also the business plan is different for both theories. In the entrepreneurial process the business plan sets out the strategy for several years with predictions and necessary sources (Danna & Porche, 2008). Ries (2011, p.9) states that business plans are not applicable on startups because they operate with a lot of uncertainty. Although he seems right, still the business plan takes an important place in relation to the process. Even though the field where startups operate are uncertain, the basic information about how to proceed and what the target of the entrepreneur is, is still important. Not as important as stated in the current entrepreneurial process, but also not as unimportant as stated by Ries (2011). One of the major changes in the entrepreneurial process is the use of the MVP and testing this with the market in order to gain information about the evaluation of the opportunity. This constant loop of testing, adjusting, creating and testing is one of the most important influences of the lean startup method on the entrepreneurial process. The last step of creating the final product and managing the company is changed in the way that the initial problems that would emerge in the entrepreneurial process after product creation are already tackled in the first steps of the lean startup method.

To conclude, there are differences and similarities between the entrepreneurial process and the lean startup, but with the combination of steps from both theories, the final process is shaped in a much better process which seems to be able to decrease instant failure through exterminating the first errors.

6.2 Theoretical Implications

The lean startup theory seems flawless in terms of improving the entrepreneurial process and decreasing the chance of failure. The method delivers tools for the entrepreneur to get a better understanding of the actual problem he is trying to solve and the value it will deliver to the potential market. Within the case analysis that has been done there were three things that came forward which tend to be theoretical implications in relation to the lean startup method.

One of the major problems that have been described and criticized within the cases is the wrong interpretation of the tools which are provided by the lean startup method. Tools regarding the correct way of measuring and evaluation your idea, customer feedback, data gathered and how you should pivot. For example, what is the correct way of interviewing your customers and get the correct feedback. Within the Good People connect case the problem already existed in the correct form of asking questions: *"We have to put some of our thoughts into their minds which is done through the way we are asking them. You will ask them this way or another way, but this will result in obtaining a couple of different answers"*. Or better said by Henry Ford: *"if I had asked people what they wanted, they would have told me: faster horses".* Also this problem relates to the local maximum you can hit when you are developing and exploring your market. In the IMVU case this was found in the following statement: *"The*

customer validation is awesome and when you get into this rapid feedback and iteration loops, it is addictive. But sometimes it is important to stand back and understand you have reached a local maximum. It is very easy to look at metrics and do sort of the ninety percent of a feature that gets a lift, but the latest ten percent is way more than ten percent and this will lead to the bucket of bolts comments you receive". This sometimes not clear use of tools also can result in false data that is giving answers to the wrong questions. Therefore, a lot of false positives can be created by the entrepreneur himself through asking and aiming for a set of results combined with asking the wrong questions, while the lean startup tries to overcome those false positives.

Another implication that was found and partly relates to the wrong interpretation of the tools provided is the way of pivoting. There is a difference in the way the theory defends how to pivot and the way entrepreneurs state that you should pivot. According to theory, pivots are made upon the basis of customer feedback. You are driving to your destination, but sometimes you are going the wrong way and you need to steer left or right to correct the way you are achieving your ultimate goal. This change in steering is done through listening to the market and listen to what they say in terms of company steering. If the market asks for a different kind of product, you steer into that direction and you follow your customers. Within the cases the thought of pivoting is different. According to different cases you should not pivot because your customers want it, but because you are following your own vision. In fact you tell your customers that you know there is a better way and you give them something they could not imagine. In the BackupAgent case, the statement was made as follows: *"We didn't always pivot out of own vision and some of our features did end up in the product, just because one customer or partner insisted on it. We were also very afraid to disappoint customers who we successfully sold our MVP".* In the Votizen case, this opinion is stated in another way: *"I think this piece is the last piece that's that subtle but the most important. Pivots are driven by your vision, not by testing. This is not about trying to find some deterministic path to success, you must have a vision and you must be knowing what you are trying to achieve that other people cannot"*. Also, it is not always clear when a pivot should be made. In the Word Sting case the following was stated: *"We did however get plenty of positive feedback such as our software was a good way to tell the story of a program to funders. But intelligent iteration was not possible because of our obese development costs, which left us without any funds to product iterations"*. The entrepreneurs from Word Sting did receive positive feedback, but they already developed the company in such a wrong way that any pivot in the right directing was not possible because they already invested all their money in the development of the software. So it is not always clear when and how pivots should be made in the case of vision, listening to feedback, and when money plays also an important role.

Another difference in relation to the lean startup method is the statement that you should launch as early as possible with your MVP and get feedback from the market. In the Dropbox case for instance, they stated: *"People say the opposite things. Paul Graham stated that we should launch early and often while other people were talking about big venture-backed companies that launched a product that was not ready and spent all their money into a large company that failed"*. In the Word Sting case this was also stated in the way of: *"The purpose of your first release (and every other release) is to give your customer immediate value. You are not launching a series of science experiments for yourself to learn what you should already know".* Also within the Aardvark case signs can be found which support the ´do not launch early´ statement, because they first thought their concept through for quite some time and

how they would bring it to the market. They could have built a MVP for every idea they would have had, but this would have resulted in possible failure and waste of resources.

On the other hand, in the Scuttlebutt case the early launch paid off because people did show interest because they saw that his idea and concept was serious and he intended to build the product. As far as can be seen, the difference of early launch can be discussed on different sides of the theory. One can say that the early launch would not be a problem if the feasibility of the idea is researched enough, while the other will state that early launch can result in measuring the feasibility of the idea.

7. Conclusion

From the literature overview and research that has been done in the third chapter, the results of the data analysis in chapter five and the discussion in chapter six, the final conclusion can be made with regards to answering the sub questions and main research question which are stated in the second chapter.

7.1. Conclusions Regarding Questions

The five sub questions which have been developed in the second chapter were as follows:

1. *What is the concept of the entrepreneurial process?*
2. *What is the concept of lean startup according to theory and in what way does this relate to the improvement of the entrepreneurial process?*
3. *What research has already been done into the topic of lean startup in relation to IT development, and what are the outcomes?*
4. *Are there other methods at this moment that seem consistent with the lean startup method, and if so, what are the similarities and differences?*
5. *Is the outcome of theory in relation to the use of lean startup in IT development also consistent with practice?*

The main research question was stated as follows:

To what extent does the lean startup method influence the entrepreneurial process to prevent entrepreneurial failure in the IT sector?

The first four sub questions have already been answered in the previous chapters, and after data analysis the fifth question and main research question can be concluded. According to the minimal theoretical research that is available, lean startup should also be applicable in the IT development sector, and as far as can be seen from practice this is confirmed resulting in the positive confirmation of the fifth sub question. In all ten cases it has been proven that the lean startup is applicable, although the three cases in which the entrepreneur failed, the tools of the lean startup method were not applied well enough in the beginning. Therefore, it seems confirmed that the method can be applied in practice, but only when the basics and the tools provided are used in the correct way. If not, the method might lead to failure.

The main research question should be split into two different questions. The second part of the research question is answered while answering the fifth sub question above. Yes it is possible to use the lean

startup with regard to product development in the IT sector. To answer this second part further, the first part needs also be discussed within the conclusion which relates to the influence of lean startup on the entrepreneurial process. The answer to this question is: yes it is applicable and the lean startup method has a large influence on the entrepreneurial process in terms of providing more enhanced information about the second and third steps. It also turns the entrepreneurial process into a loop which can be repeated by the entrepreneur in order to obtain continuous development improvement. Furthermore through a more in depth measuring tool and obtaining information from the market, the initial idea and opportunity are better valuated resulting in exterminating early problems. The combination of the entrepreneurial process with the lean startup method provides a better concept, better product and better investment of the time, money and effort of the entrepreneur. Besides the influence on the entrepreneurial process it has also been confirmed that the lean startup method is applicable in IT product development. The use of the MVP and feedback loops decrease failure and should result in a product with a higher quality. Also through testing, the product with the market, the feasibility can be confirmed with a lower initial investment. It should be noted that there is still discussion about certain parts of the method with regard to the usage of the tools provided by the lean startup, how to interpret the tools and data and when the entrepreneur is using the method in the correct way. Follow-up studies will need to indicate whether the statements which have been made in this study can be supported with practical research.

8. Limitations

Within this research paper there are certain limitations that should be marked in relation to the conclusion and outcomes. First of all, the amount of scientific research that has been done into the topic of lean startup is very minimal. Even more, the amount of scientific research that has been done into using the lean startup method in the IT sector is almost null. Therefore, the information stated in the literature overview might be biased and should not be taken for granted. This might also result in false statements that are made in the conclusions of the paper in relation to theory and practice.

Also the practical side contains limitations. Only ten cases have been used in this research paper on which coding is applied and data analysis has been done. The reason for this low amount is because the search for more cases containing information about the use of the lean startup method in combination with IT did not deliver enough usable other cases. Furthermore, the cases that have been used did not all follow the entire process of the lean startup method, and used different parts of the method. Therefore, the conclusions that are made containing practical evidence might be false in terms of complete usage of the method in IT. More research into the topic of lean startup in IT should be done to confirm the outcomes of this research paper. Following different companies which clearly use the lean startup method might lead to better outcomes, but take more time.

Also the information stated in theory and practical data analysis might be biased by the researcher. Information could have been interpreted wrong by the researcher in the theoretical framework but also in the coding process. The approach in this research paper was to look at the available information with an independent and open mind, but it is always possible that personal preference or interpretation has been applied to the information, resulting in false outcomes. Again, more research should be done into this topic to confirm or deny the outcomes of this research paper.

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