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Application of the Build-Measure-Learn Feedback Loop: case study

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To my parents, brothers and husband

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Resumo

A Metodologia Lean Startup pretende orientar as startups em tempos incertos, quando a startup apenas tem a ideia do empreendedor.

A presente tese tem como objetivo apresentar as limitações do Construir-Medir-Aprender Feedback Loop que está incluído na Metodologia Lean Startup de Eric Ries e considerado pelo autor uma parte essencial da própria metodologia.

Para tal foi realizado um estudo de caso considerando a jornada de empreendedores que neste momento fazem parte de uma startup Portuguesa de forma a perceber as principais dificuldades enfrentadas pelas mesmas durante a utilização do feedback loop. Os resultados mostram que a startup teve dificuldades em aplicar alguns dos conceitos incluídos no feedback loop. Não obstante o exposto, o feedback loop foi essencial para o desenvolvimento da startup.

Palavras-chave: Metodologia Lean Startup, Startups, Construir-Medir-Aprender Feedback Loop

Abstract

Lean Startup Methodology intends to guide startups during uncertain times when the startup only has the entrepreneur's idea.

The current thesis has the objective to provide the limitations of the Build-Measure-Learn Feedback Loop that is included in the Lean Startup Methodology by Eric Ries and considered by the author a crucial part of the methodology itself.

To achieve that, a case study was conducted considering the journey of entrepreneurs who are currently part of a Portuguese startup to understand the major difficulties they faced during the feedback loop. The results show that the startup had difficulties in applying some of the concepts included in the feedback loop. Notwithstanding the above, the feedback loop was essential for startup development.

Keywords: Lean Startup Methodology, Startups, Build-Measure-Learn Feedback Loop

Index

Acknowledgments	i
Resumo	iii
Abstract	v
Index	vii
List of Figures	viii
Introduction	1
1.1 Research Problem	2
1.2 Limitations	2
1.3 Thesis Structure.....	2
Literature Review	5
2.1. Introduction.....	5
2.2. From manufacturing to startups	5
2.3. The Lean Startup Methodology.....	6
2.3.1. Assumptions/Hypothesis.....	6
2.3.2. The Build-Measure-Learn Feedback Loop.....	7
2.3.3. The Minimum Valuable Product.....	8
2.3.4. Test	9
2.3.5. Measure.....	9
2.3.6. Pivot (or preserve).....	10
2.4. The Customer Development Model	11
2.5. Business Model Canvas	12
2.6. Practical application of the Lean Startup Methodology.....	13
2.7. Lean and accelerators	14
2.8. Barriers to implementing the Len Startup Methodology.....	15
2.9. Conclusion of the theoretical background	16
Methodology	19
3.1 Objectives	19
3.2 Research methodology approach	19
3.3 Case study.....	20

3.4. The validity of case studies.....	22
Case study.....	23
4.1 Introduction.....	23
4.2 About the startup	25
4.3 Highlights of the questionnaire and interview with the co-founder	25
4.4 Relating the case study info with the literature.....	29
Conclusion	31
References	33
Appendix	35

List of Figures

Figure 1: Build-Measure-Learn Feedback Loop	8
Figure 2: Lean Startup process steps.....	11

CHAPTER 1

Introduction

Entrepreneurs are aware that globalization provides access to a global market, and opportunities, such as exploring economies of scale, market share, and exposition customers. However, companies are exposed to more and different types of risks that can greatly impact their business.

As we live in a globalized world it is important to understand where companies should direct their effort to achieve efficiency with the minimum investment possible. Taking that into account, companies should explore value from the customer's perspective, and with the knowledge obtained from the analysis of their process, the company can redesign its process to increase this value (Gračanin et al.,2019).

A company's investment in redesigning processes or launching a new product has a financial impact. If this investment has an outcome that is not valued by the customer, the company will need to deal with a bad investment where the return does not occur as expected. Each step that the company takes is an additional cost to the already accumulated one. Therefore, it is important to understand which elements will be valued by the customer in an early stage of the process (Gračanin et al., 2019).

In the case of startup companies, the initial investment is crucial and must be invested in the right areas when launching a product. That is why it is important to understand if the intended product will be valued by the potential customers. Otherwise, the startup is at risk of producing something that will be only costly without any return.

Companies with a big dimension and more know-how of the markets are going global as their corporate and governance structure is prepared for that, presenting different solutions for the different markets. That is the case of multinational companies, they are prepared to deal with the consequences of the product being rejected by the customers. In the end, their structure allows making all the necessary investments to find a solution that can pass by changing some of the characteristics of the product, or even abandoning the idea itself. For startups, the cost of a product being rejected by potential customers can ruin the startup itself.

Startups are increasing all over the world, as entrepreneurs are aware that simple ideas with a focus on people and for people can become a good investment. For a startup company, the most

important is first to understand if the product/service that they are creating/investing in will be accepted by the possible customers and if they can have a profit with that.

We are living in uncertain times, where our economies and social environment are facing changes, e.g., the Covid-19 pandemic. At the most adverse times, there are always opportunities to create, and rethink launching new products or services and entrepreneurs are aware of that. The number of obstacles that a startup faces are increasing, and time is an important variable to take into consideration.

The Lean Startup theory by Eric Ries is a methodology used to launch a new product and guarantee that the startup idea is aligned with the need of the potential customers. This theory included the Build-Measure-Learn feedback loop. By using the feedback loop companies can learn faster from the customers and build faster by validating and adapting their business models (Ries, 2011). This close relationship with the customers permits the company to have real-time feedback before passing to a phase of a big production.

1.1 Research Problem

Based on the above-mentioned the research questions of this master thesis have been formulated as follows:

How do entrepreneurs describe the Build-Measure-Learn feedback loop experience to develop their idea? What are the limitations of the application of the Build-Measure-Learn feedback loop by entrepreneurs?

1.2 Limitations

This master thesis was developed with the experience journey of the Build-Measure-Learn feedback loop and applied by the founders of the Portuguese startup Noytrall. The entrepreneurs did not share confidential and sensitive information that could compromise startup development. This limitation will impact the results to fully understand the limitations of the Build-Measure-Learn feedback loop.

With the lack of this information, the authors do not imply that the results could be generalized but instead provides more insight into the practical use of the feedback loop by entrepreneurs.

1.3 Thesis Structure

This case study has the following structure:

- **Introduction:** This chapter presents the context of the case study and its relevance, the delimitation of the study and how the thesis is structured.

- **Literature review:** The literature review aims to present the theoretical background of Lean Startup Methodology and the Build-Measure-Learn feedback loop included in the methodology. Also, this chapter it is presented the most recent theoretical framework available regarding the methodology. It also aims to address methodologies that were essential for the development of the methodology.
- **Methodology:** It is presented and analyzed the research methodology used for this thesis.
- **Case study:** In this chapter, it is presented the entrepreneurs' journey, the startup and the most relevant data collected based on the survey and interview held with the co-founder and the relation with the theory presented in the literature review.
- **Conclusion:** In this chapter, the main conclusion will be presented i.e., the research question will be answered. Furthermore, the main contributions and recommendations for the future in this field will be presented.

CHAPTER 2

Literature Review

2.1. Introduction

The business environment is getting riskier and more volatile, uncertain, complex, and ambiguous (“VUCA”). VUCA was described on a leadership theory by Warren Bennis and Burt Nanus in 1985 to understand the general conditions and situation. But this concept is still actual for the times that we are facing. Entrepreneurs must be ready to deal with this type of environment and take the startups on a successful path to achieve their vision.

The use of the term startup has increased in the last years but there is no official definition. From Blank point of view, startups “are a temporary organization designed to search for repeatable and scalable business model” (Blank, 2013b). Startups are seeking to turn unknowns into knowns (Mercandetti et al., 2017).

On the European Startup Monitor for 2019/2020 the researchers used the following criteria to define a startup: “The company has to be younger than ten years. It has to have an innovative product and/or service and/or business model. The startup has to aim to scale up (intention to grow the number of employees and/or turnover and/or markets in which they operate)”. The business challenge depends on the stage of development where the startups stand. In the beginning, the 3 main principal challenges are product & service development, raising capital, and sale & customer acquisition (according to European Startup Monitor for 2019/2020).

Eric Ries’ book, *The Lean Startup* was published in 2011 and intends to provide tools for entrepreneurs to be successful when building their startups. According to this book, a startup is “a human institution designed to create a new product or service under conditions of extreme uncertainty”. Thus, big companies can be defined as startups too when they are dealing with extreme uncertainty. It is important to understand this concept as it will shape the practices included in the Lean Startup approach.

2.2. From manufacturing to startups

When addressing the concept of lean, we must mention John Krafcik and James Womack. John Krafcik introduced this word that was discussed in Womack et al. (1990) book *The Machine That Changed the World*. In his book, the lean concept was discussed considering the TOYOTA manufacturing process

and its success. The Toyota manufacturing process was implemented in a way that any performed activity should be aligned with the company structure, to minimize costs and to be the most efficient as possible. Therefore, during the process, the company would be working on reducing the risk of wasting money and time on operations, products, or services that would not be valued by the customers.

A lean startup concept is a different approach to the lean concept introduced by Eric Ries in his book. This concept came from a personal experience and is based on the insights that Ries had from customers and other authors. This experience is important because it helped to elevate the Ries' authenticity. Also, the fact that this started as a blog enabled peer recognition (Frederiksen et al., 2017). With this approach, Ries pretends that startups validate their ideas before wasting time and money on something that will not be valued by the customer. Thus, all the idea is constructed with the potential customers.

2.3. The Lean Startup Methodology

According to Ries, the entrepreneur's vision is the only constant during the process of launching a product. The author refers that the destination of a startup is creating a thriving and world-changing business. The product is always being updated based on the interactions with the potential customers

In Ries's point of view, it is important to understand the concept that he calls "Validated learning". Validate Learning consists of running different experiments to test each element of the entrepreneur's vision. This concept will help the company understand which efforts are "wasteful" and which are "value-created" that in the end will be valued and provide an advantage to the potential client. Therefore, if a specific feature will not be valued by a potential customer or if it is a waste of time, energy, or resources the company should leave behind that specific idea. Companies should only focus on the necessary effort to learn with the customers and to create something that will be useful for them.

In his book, Ries tries to break the traditional path that entrepreneurs follow when they are building their startups.

2.3.1. Assumptions/Hypothesis

The entrepreneur's innovation process starts with a vision that should transform ideas into products. For Ries, a startup cannot create a product based on assumptions because if they are not true the risk of failure is higher. Ries calls these assumptions "Leaps of faith". For the author, the startup needs to

check the robustness of these Leaps of faith, if the problem of the customers is worth solving and if it is significant. By doing this the risk of startup failure is reduced. Therefore, the first step of the process of launching a new product, as explained by Ries, should be the validation of the assumptions by creating a hypothesis regarding the potential customers, i.e., what are the needs of the customer and will the product solve that needs. Founders should focus on thinking like scientists as this can help to reduce the risk to stick with ideas that ultimately do not work (Spina et al., 2020).

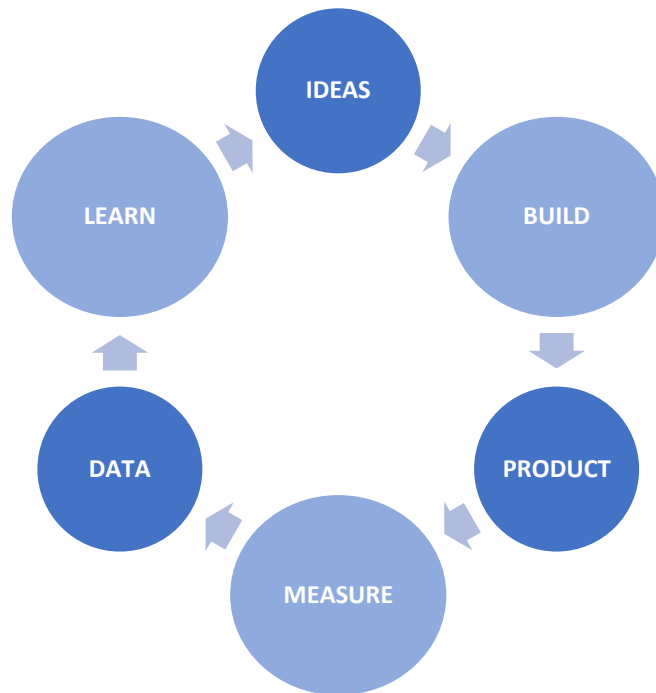
2.3.2. The Build-Measure-Learn Feedback Loop

As explained by the author, the products built by startups are experiments that will help to learn how to build a sustainable business. The outcome of the experiments is valuable information that can be used to redefine and build the business strategy.

As described by Ries in his book the Build-Measure-Learn Feedback Loop is the core of the model. The hypothesis defined during the process of launching a new product should be tested based on the Build-Measure-Learn Feedback Loop. The build phase is related to the development of a minimum viable product (“MVP”) to test the hypothesis of the company. This MVP is only a prototype to collect information from potential customers. The measure phase uses qualitative and quantitative data collected from the customer’s interactions with the products and their feedback. Lastly, the learning phase relates to what the startup learns with the customer’s feedback. At this stage, the startup should decide if it will pivot or persevere in its business strategy.

The company should minimize the time spent on these 3 stages to minimize time and money on this feedback loop.

Figure 1: Build-Measure-Learn Feedback Loop



Source: Eric Ries, 2011 – The Lean Startup

2.3.3. The Minimum Valuable Product

Startups cannot take the risk to launch something when they do not know who their customer is. Otherwise, they risk a leap of faith that can fail. In this process, time and money resources are spent on production, and in the end, the product is not valued by customers. Therefore, the MVP is so crucial for startups as minimizes efforts and time consumption. The MVP enables the startup to understand what are the main aspects that the potential customers are interested in before spending resources on something that will not be valued by them.

Eric Ries discusses 3 examples of MVPs: the video MVP, the Concierge MVP, and the Wizard of Oz MVP. For the Video MVP Ries describes the example of Dropbox, where the launching team produced a video to describe how the program would work. Regarding the Concierge MVP, the startup builds the product based on the feedback from one single customer or a few number customers. The Wizard of Oz MVP uses a pretending product that is operated by people but not yet developed.

2.3.4. Test

To test the MVP startups should “get out of the building”. By this, the author means that startups must contact potential customers and present to them the respective MVP as it is. The idea is to avoid the temptation of overbuilding and overpromising and deliver the MVP product with the required tools to start learning with the customers (Ries, 2011). As shown by the author with the Dropbox example, and mentioned above, the MVP does not need to be the product or service itself. In the Dropbox case, delivering a complete MVP would have required technology and time resources. Hence, the founders decided to do a small video for the early adopter’s audience to explain what they were doing and the product that they would deliver. And it was a success.

2.3.5. Measure

The measure is key to the startup life cycle. It is a way to understand where the startup stands and assess the progress made. Innovation accounting helps the measuring process. As detailed by the author, “to develop entrepreneurial outcomes and hold innovators accountable, startups need to focus on how to measure progress, how to set up milestones, and how to prioritize work”.

The innovation process created by the author consists of “learning milestones” that have three steps. First, startups use MVPs to collect real data from customers. This helps the startups to build a baseline, understand the position at that moment and how far it is from the goal. Secondly, “tune the engine”. In this step, the startup works towards achieving the ideal. This means that all improvements in the product, marketing, or other areas should be targeted to understand the growth drivers (ex. Design of product, marketing campaign, etc). Finally, the last step is the decision point. The decision is whether to pivot or persevere with the product strategy adopted. If the startup is getting closer to the ideal, this means that it’s learning appropriately and using this learning to progress. In this case, the startup should continue with this product strategy. Otherwise, the product strategy must be reviewed. If we are not moving in our business model it is time to “pivot”.

Startups should be aware when they are leading with the wrong kind of metrics as those metrics do not allow the startup to learn and understand the cause-effect of the actions made (Ries, 2011). For example, trying to increase sales by last minutes ad buys to have higher numbers at that specific moment instead of understanding how sales are behaving in the different segments and if there is sustainable growth. The author refers to this as “vanity metrics” as the focus is having a favorable number for that moment.

For Eric Ries, there are 3 engines of growth: sticky, viral and paid engines. Companies should focus primarily on one and measure growth based on the respective engine and feedback loop process.

One of the measures explained by the author in his book that helps the startup understand if the product is valued by the customer is the “Split-test”. In this test, the company delivers one version of the product to 50% of the clients and another version with a different design to the other half and tracks the sales of both groups.

The Kanban methodology also helps the company to focus on different tests. If during the validation process the idea was not tested (validation could be made by the split-test) the respective feature should not be included in the product.

2.3.6. Pivot (or preserve)

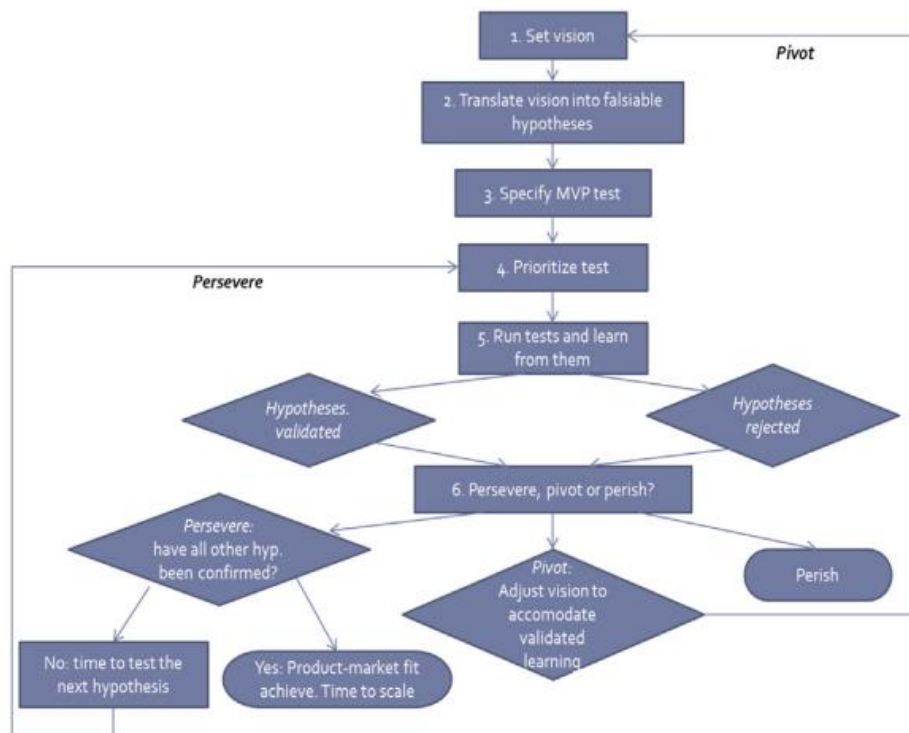
During the process of the development of the product, the entrepreneurs face a challenge related to the timing to pivot or preserve a specific feature (Ries, 2011). As referred by the author “everything that has been discussed so far is a prelude to a seemingly simple question: are we making sufficient progress to believe that our original strategic hypothesis is correct, or do we need to make a major change? That change is called a pivot: a structured course correction designed to test a new fundamental hypothesis about the product, strategy and engine of growth”.

It is not possible to measure the intuition that entrepreneurs have during the process of developing a product. But it is possible to test to confirm if there is a growing sustainable business (Ries, 2011).

The Pivot process cannot be seen as a failure but instead as a learning milestone. It can be a change to other customers that demonstrate an interest in our product as the potential customer addressed is not interested in our product or changes in the way that we are measuring our progress. When to pivot or persevere will be based on the entrepreneur’s intuition and this only happens by running different experiments with customers and/or having experts helping analyze the collected data to build a successful business (Ries, 2011).

The Lean Startup guarantees that the startup is on track and executing and that it is effectively validating learning (Ries, 2011). The Lean Startup can be seen as the following process steps as referred by Eisenmann et al., 2012 (included in Ghezzi 2019 research):

Figure 2: Lean Startup process steps



Source: Eisenmann et al., 2012 ((included in Ghezzi 2019 research)

2.4. The Customer Development Model

The Lean Startup Methodology origins relate to the experience acquired by Ries during his career and with the Customer Development Model created by Steve Blank in 2006. At the time Steve Blank was an investor and advisor to the startup that Ries was involved in as a co-founder. This is why the model details are mentioned in different parts of the lean startup methodology.

The model is described in detail by Steve Blank in his book “The four steps to the Epiphany: Successful Strategies for Products that Win”. Steve Blank refers that more important than launching a new product is to learn with the potential customers and understand what their problems are. So, the initial question for a startup is not how to find funds to accelerate a specific idea but to test if their idea is accepted by the market. Also, as the author explains, it is important to trigger the interest of the customers.

The Customer Development Model includes search and execution components.

The search part includes two subcategories: Customer Discovery and Customer Validation. Customer Discover relates to understanding if the product that the company has solves the problem that they believe the customer has. This information can only be acquired if the product is presented

to the customer. So, the second part is Customer Validation. On Customer Validation, the company is searching for positive feedback from customers related to the solution that is being presented. This positive feedback means that the company has customers for the product it will be selling. When the company does not have customers, it should accept the criticisms/observations made by the potential customers and restart again the Customer Discover process. Companies should not see this going back as a bad thing. Instead, this should be viewed as a learning process that will permit the startup to have a product that will be valued by the customer.

The execution part includes two subcategories: Customer Creation and Company Building. When moving to Customer Creation the company will focus on quantifying the demand for the launched product and how to increase this demand (Blank, 2013a). The focus shifts to comprehending the market, industry trends and competitors to gain and retain customers (Blank, 2013a). Finally, the last stage is the Company Building process and which is related to defining a structure and formal internal departments.

The traditional way of launching a new product using a business plan, then pitching it to investors and afterward producing the products/ services and starting an aggressive sales plan is riskier (Blank, 2013b).

Ries understood the importance of involving the customer during the process of launching a product as soon as possible. For him the get out of the building approach is important to test the hypothesis and that is why the lean startup methodology is focused on them too. In the end, the startup will align its product considering the customers' expectations. This is the way that the startup can be successful by matching the product to customer expectations.

Blank understood the importance of the Lean Startup when it was presented by Ries, too. For him, the Build-Measure-Learn feedback loop was important since the traditional way was a step-by-step process (waterfall) with almost no intervention from the customer (Blank, 2015). In the Build-Measure-Feedback loop, the focus is not to produce a product but instead to validate learning (Blank, 2015).

2.5. Business Model Canvas

The Lean concept was also used before in the Business Model CANVAS. The Business Model CANVAS is a simple plan that helps companies to organize their first ideas and hypothesis. It is more than filling the 9 building blocks (Customer Segments, Customer Relationships, Channels, Value Propositions, Key Activities, Key Resources, Key Partners, Cost Structure and Revenue Streams). It is a visual way to describe, assess and change the business model that can be understood by everybody (Osterwalder et al., 2010).

In 2012 Ash Marya decided to adapt the Business Model Canvas to practicing entrepreneurs and lean startups with the published book *Running Lean*. In this version, he maintained the concept of one page and changed the block Key Resources to Solution, Key Partners to Problem and Customer Relationship to Unfair Advantage.

2.6. Practical application of the Lean Startup Methodology

The Lean Startup seems to be a methodology that is well known in the entrepreneurship/startup environment (Frederiksen et al., 2017). In this chapter, this research focuses on the analysis of the literature available and relates it to the empirical evidence regarding the use of this methodology and the theoretical foundations.

Startups understand that it is important to run experiments on the original version of the business model and verify if this model is aligned with the market needs (Ghezzi, 2019).

In the study conducted by Ghezzi in 2019, the author discovered that 93% of the 227 digital startups inquired adopted and implemented the lean startup approaches (these lean startup approaches include the Ries method and Customer Development method developed by Steven Blank) to launch and develop their startups between 2012 and 2017.

Digital startups understand that to achieve a sustainable competitive advantage in the digital industries that are always changing time and speed are crucial (Ghezzi, 2019). According to the author's study, the average for creation of a MVP that was a product market fit took an average of 8.2 months (the lower bound was 4.1 months and the highest was 13.5 months).

Regarding the companies that did not use this approach, the article shows that the main reason was that those startups have already achieved product market fit. This market fit was achieved because those startups have been financed through Corporate Venture Capital funds, so this fit was already aligned with the mother company (Ghezzi 2019).

Also, Lean Startup Approaches can be perceived as a form of Agile Development and therefore related to the strategy part of the Business Model of Innovation (Ghezzi et al., 2020).

However, there is a lack of understanding between the theoretical framework of the Lean startup approach and Customer Development and empirical evidence (Newbert et al., 2020). Those theoretical approaches assume that involving the customer in the early stage provides tangible benefits that can overcome any costs that the startup has initially. This is critical for the startup (Newbert et al., 2020). In their study Newbert et al. (2020), confirm a positive correlation in all 4 hypotheses identified below, based on the data collected with 591 nascent entrepreneurs:

H1) Early customer involvement is positively related to making the first sale.

H2) The positive relationship between early customer involvement and making the first sale is strengthened as innovativeness increases.

H3) Early customer involvement is negatively related to the speed to the first sale.

H4) The negative relationship between early customer involvement and the speed making the first sale is strengthened as innovativeness increases.

Nevertheless, they also discovered that although involving customers generate sales, those sales take more time. And when we are dealing with innovative products those costs are magnified (Newbert et al., 2020).

Therefore, it is necessary to understand that when exploring innovative opportunities, it is important to address/involve the customer with caution and consider the costs/time that the startup can face and create some boundaries with customer involvement.

Facing innovation the customer has an important role in the co-creation of the company's values, being active during the process of new product development (Cui, et al 2016). There are some questions raised with the application of the Lean Startup approach such as when the potential customer should be involved in the process (Felin et al., 2019). If the potential customers are approached prematurely in the process this can lead to startup success, learning with the customer in a valuable way, or being out of track (Felin et al., 2019). The Lean Startup Methodology assumes that customers know what they want now and in the future. Yet sometimes the customer is not aware of the possible uses of a specific product and is limited by his imagination (Felin et al., 2019).

There are alternatives to seeking validation without involving the potential customer in the beginning. As the startup company is trying to understand the value of that new product for the potential customers, one alternative focuses on the analysis of social proofs (Felin et al., 2019). This social proof is based on the capacity to persuade a group to join the startup. In this case, the startup opportunity will be viable if the founder can convince members to join the startup.

When a startup is trying to disrupt the market and create new products, the focus will not be the incremental improvements as the lean concept was not designed for "radical innovation" (Felin et al., 2019).

2.7. Lean and accelerators

Mansoori et al. (2019) study a different point of view on the Lean Startup. They tried to understand how the methodology influences the relationship between the entrepreneur and the coach in the context of an accelerator program in Sweden.

The coaches used the Lean Startup methodology to prepare meetings and explore the individual relationship with the team that they coached. Entrepreneurs believe that using this methodology improves their chances of success. Coach group sessions help entrepreneurs to gain self-confidence, share their ideas and experience and get feedback and help from other entrepreneurs (Mansoori et al.,2019). On the other hand, those sessions create pressure and a competitive environment among the entrepreneurs motivating them to learn from other achievements – (peer learning) (Mansoori et al.,2019).

Overall, the use of this methodology enabled the establishment of a good relationship between coaches and entrepreneurs in a trustful way (Mansoori et al.,2019). However, during the coaching session coaches were not neutral on their roles which is not aligned with the Lean Startup methodology. As the owner of the accelerator program, the coaches were perceived by the entrepreneurs as authority figures and their opinions could overcome the collected data. The sense of value was in the opinions of the coach and not in the data. In those cases, the coaching can prejudice the implementation/execution of the lean startup methodology. Coaches should be aware of their style of advice and play a role that encourages entrepreneurs on learning (Mansoori et al.,2019).

In the end, the Lean Startup methodology helps to create a common ground/knowledge between the coach and the entrepreneur, and this helps to create coaching sessions.

2.8. Barriers to implementing the Len Startup Methodology

The concept of getting out of the building is not easy to implement and this is due to the barriers to accessing potential customers (Nirwan et al., 2015). Startups can have limited access to potential customers to validate their ideas. In these cases, the process of the feedback loop can take longer depending on the availability of the potential customer. Multiple interactions with potential customers allow entrepreneurs to collect data and redefine their offerings (De Cock et. al. 2020).

Also, entrepreneurs should have prior knowledge of the market to understand and interpret the information collected through experiments with potential customers (De Cock et. al. 2020). Entrepreneurs can be focused on their idea and received false positives (bad ideas being mistakenly accepted) and false negatives (good ideas getting rejected) (Spina et. al, 2020) from potential customers because they are looking in the wrong place or misunderstanding the market signals. Entrepreneurs should adopt a scientific mind to mitigate the effect of their biases when analyzing the information collected (Spina et. al, 2020).

The MVP is crucial to getting information from the market. It can be a prototype but some elements can affect its development such as entrepreneurs' attributes, technology, market, supporting factors (such as incubators and accelerators), finance and human capital (Tripathi et al, 2019).

2.9. Conclusion of the theoretical background

Lean Startup methodology is being used by the startup. This methodology provides an easy way to transform ideas on products and in the possibility of developing a sustainable business all connect with the potential customer that must be involved in the process as sooner as possible. Also, this methodology considers the uncertain environment that surrounds startups as time is crucial and the market need and configurations are always changing.

The use of the Build-Measure-Learn feedback Loop is a crucial part of the methodology, as it establishes important concepts as the MVP, validate learning and pivot or persevere. The feedback loop only makes sense if the customers are involved in the process. So, the customer development process developed by Steve Blank had an important place in the development of this methodology. More than seeking investment, the lean startup seeks customer validation to learn with them.

Startups need to understand the assumptions behind their ideas and transform them into hypotheses. In creating this hypothesis, the startup must validate or reject them based on the feedback from the customer. For that, the startup will have to understand whether it needs or not to produce a MVP. This MVP is only a prototype to collect info from the potential customer or a real customer. After this, the startup will validate the data collected, and understand if it is needed to do any changes to the business process and whether is being or not valued by the customer. Sometimes startups are afraid to release something that is not finished. However, that is the most important. There is no need to spend time or money on things that will not be essential to collect info from customers.

Also, it is crucial to have a clear notion of where the startup is at each moment. Creating a baseline with the info collected with the MVP will help. So, when facing a stage of pivot or persevere in a business idea this info will help. It is better to understand sooner if the idea works or not. The entrepreneur must be willing to understand that he is not going in the right way and change the approach (Pivot).

Although the theory is well known in the entrepreneurship world (Frederiksen et al., 2017) there is a lack of qualitative insight that in an innovative/disrupted environment the addition of the customer from the beginning is beneficial for the development of the product/service by the startup (Newbert et al.,2020). This happens because sometimes the potential customer does not understand what is being presented to him and how this can be beneficial for them.

Entrepreneurship programs have an important role in the use of the methodology as this functions as a way of connecting coaches and entrepreneurs. It creates a common ground to start developing this relationship and structure the work that will be needed by the startups. Additionally, the mentors/coaches have an impact on how the startup addresses the way how it will analyze the info collected from the market. If not carried with caution there is a risk of the coaches following only the opinion of the coach and not being data-driven (Mansoori et al.,2019).

From the analysis study, there is a lack of empirical study on the limitation and challenges faced by startups for the appliance of the Build-Measure-Learn feedback Loop. So, there is an opportunity to carry out a study considering the journey experience of entrepreneurs that have a startup that is developing its services and has applied the feedback loop to collect data from the market and have a perfect product-market fit to generate sales.

Methodology

This chapter will be presented and justified the choice of the research methodology that has been used in this study to answer the research problem defined in the first chapter.

3.1 Objectives

This study intends to understand how the Build-Measure-Learn Feedback loop, which constitutes part of the Lean Startup Methodology, helps to create a product/service market fit considering the challenges that entrepreneurs face in the beginning with only an idea and does not have proof that there is a need for the solution that wants to develop. In Ries's point of view, this feedback loop is crucial for a startup to validate learning and, in the end, have a product that will be accepted by her potential customer as all the product is developed considering their involvement. However, there is a lack of practical and qualitative analysis of the use of this feedback loop and even the methodology itself. Therefore, the limitations and obstacles faced by startups are unknown. With this case study, it is expected that the use of the Build-Measure-Learn Feedback loop has contributed to the validation of the entrepreneur's idea and the development of the respective service. However, it is also expected to understand the principal difficulties and limitations felt by entrepreneurs when using this feedback loop.

Considering the above-mentioned main goal of this case study, the research questions are the following: *How do entrepreneurs describe the Build-Measure-Learn feedback loop experience to develop their idea? What are the limitations of the application of the Build-Measure-Learn feedback loop by entrepreneurs?*

To reach this objective, the research methodology selected was based on a singular qualitative case study. The case study was conducted with Noytrall founder's support, a Portuguese startup that is currently providing solutions for the tourism sector. Additionally, this case study will take a descriptive research approach.

3.2 Research methodology approach

The use of a specific methodology will depend on the objective of the study and this combination should be adequately suitable.

A qualitative approach allows for in-depth analysis of complex problems that cannot be measured by a scale (Castro et al., 2010) as they are influenced by human experience, culture, values, beliefs, among other factors. On the other hand, the quantitative approach aims at experimental research based on variables and hypotheses (Stake, 1995), it is related to statistical analysis to resolve a specific problem.

Qualitative research methods allow us to understand the dynamic of variables that cannot be static (Kaplan et al., 1998). The empirical results are compared with the theoretical background considering its context. A quantitative research method would not allow discovering the limitation with the application of the feedback loop there is why this thesis has a qualitative research approach. Additionally, please note that this thesis follows the gathering information tools that is applied by Ghezzi in 2019 where it combined a questionnaire survey with a semi-structured interview. The difference is that in this case there is only the participation of one startup.

3.3 Case study

The case study as a qualitative methodology of research studies typically follows a logical model where initially the researcher explains the theoretical part related to the field that is being studied demonstrating the relationship between the intervention and its outcomes and then the collection of data related to the same field (Yin, 2013). The collected data is then compared with the interventions and their outcomes and can validate the outcomes or not (Yin, 2013).

The case study as a research methodology intends to address the questions of “how?” and/or why?” (Yin, 2009). It is focused on understanding how an identified phenomenon is being addressed, this method of research has been considered the most appropriate to analyze real management situations and create insightful knowledge (Gibbert et al., 2008).

As mentioned by Yin, the researcher on the case study needs to understand the gaps between the theory/literature and what was applied in really defining in this way weaknesses and the gaps (Yin, 2013). Additionally, in theory, the single case study allows the studying of a relevant variable and how it behaves considering different approaches and sources of information (Tasci et al. 2020). The collection of qualitative and quantitative information is important for the case study as it constitutes different ways to the verification process and enhances the study (Tasci et al. 2020). According to Eisenhardt (1989, cited by Tasci et al. 2020), the gathering of information can be from interviews, focus groups, observations, diaries, Delphi studies and surveys. Applying different approaches helps to have a clear understanding of the case (Baxter et al., 2008).

Patton et al. 2003, based on the work performed by Stake (1995), Hamel (1993) and Eisenhardt (1989) highlighted the key activities that should be undertaken when conducting a proper case study and summarized in the following roadmap steps:

1. Determine the object of study

In this step, the researcher should choose the topic that his/her case will focus on. It is important to have a broad definition of the object of study to enable the case study to lead the researcher in different directions.

2. Select the case

Selecting the case research will enable the researcher to collect information to allow the investigation of the topic that is being addressed. This should not be a random decision but based on strategic selection.

3. Build initial theory through a literature review

The research of the available literature related to the topic helps to create a frame for the study and guarantees validity for the research and confidence in the findings.

4. Collecting and organizing the data gathering

The researcher should establish the data collection tool to avoid receiving information that is not related to the topic case study. It is important to establish a clear plan to assure that the object study is being addressed.

5. Analyzing the data and reaching conclusions

As mentioned by the authors the goal of the case study is to uncover patterns, determine meanings, construct conclusions, and build theory. Following the collection of the data and crucial detail of the topic that is being addressed findings can then be presented.

The abovementioned steps will be used in this case study. This research aims to understand how entrepreneurs are using the Build-Measure-Learn feedback loop and its limitations. To achieve this, it is necessary to collect qualitative and/or quantitative information. Normally, qualitative data is related to numerical, or figures data and qualitative data is related to non-numerical data. In this case, study quantitative data were not available therefore only qualitative data was analyzed. Nevertheless, qualitative data enables one to have a clear understanding of the phenomena that are being addressed and can obtain a deep analysis of a specific topic promoting examination and reflection on the same (Kaplan et al., 1998).

For this research, we only analyzed a single case study with success. Although many states that a single case study does not allow generalization and that the use of case studies is only related to creating a hypothesis and not validating them (Patton et al., 2003).

Notwithstanding the above-mentioned, this research does not look for generalization but provides more insight into the practical use of the feedback loop by entrepreneurs.

Considering the above-mentioned, and the gathering information tools used in the study performed by Ghezzi in 2019, to describe the use of the feedback loop by the startup was first held an informal meeting to understand if the company used the methodology and its availability to participate in the present thesis. Then was produced a questionnaire to collect essential qualitative information to prepare for the last phase of 1 semi-structured interview that was held with the co-founder of the startup. The interview was conducted via video conference on the LinkedIn platform. A literature review was conducted to understand the principal concepts of the methodology, other theories that were relevant for the building of the methodology, and the existing recent literature related to the subject.

3.4. The validity of case studies

Patton et al. (2003) highlight, based on the work performed by Yin in 1984, that “the idea that properly case studies lack rigor is clearly false; in fact, case studies are remarkably hard, even though case studies have traditionally been considered to be “soft” research”.

Case studies are hardly criticized regarding the question of validity (Patton et. al. 2003). They are accused of being subjective, lacking rigor and yielding findings that cannot be generalized across settings (Patton et al. 2003). To guarantee validity in the case study it is important to build a proper study with a good descriptive or “analytic sophistication” instead of producing or thinking on something that can be easily replicated (Patton et al. 2003). It is like a formal experiment. The study seeks attention to the particular case but also generalization is archived based on a scientific approach (Patton et al. 2003). It is important to focus on a clear description of the case study. A case study must catch the complexity of a single case, it is important to understand the uniqueness of the study this will allow us to emphasize the difference between this case with others (Stake 1995). Another way to guarantee the credibility of the study is by the triangulation of data sources, data types, or researchers to enable the situation to be studied from multiple perspectives (Baxter et al. 2008). In this case study, it was used two data sources, i.e, the production of a survey and an interview. Additionally, the case study was also reviewed by Noytrall, Diana Ferreira, to avoid incorrect interpretations from the researcher.

CHAPTER 4

Case study

4.1 Introduction

For the development of this case study, there is the participation of a Portuguese startup Noytrall which is currently developing its business in Portugal.

This chapter will be presented the entrepreneur's journey, the startup and the principal highlights of the survey and interviews with one of the co-founders of Noytrall to understand how they implement this methodology and their principal limitations in adopting the Build-Measure-Learn feedback loop. The interview questions were elaborated after a primary survey that was shared with the startup to collect general info (see Appendix A and B). The interview helped to clarify some of the responses given by the co-founder on the survey and to collect additional data. Also, this interaction gives opportunities to explore other additional questions that can arise.

The questionnaire has the following main sections:

- 1) Adoption of LSM
- 2) Results LSM
- 3) Vantages and disadvantages
- 4) LSM combined with other entrepreneurial theories, approaches and tools
- 5) Build-Measure-Learn Feedback Loop
- 6) Key Findings

In the section Adoption of LSM of the questionnaire, the objective is to understand how the founders got in touch with the respective methodology and the main motivation for the adoption of the methodology in the startup development. Additionally, this section aims to understand the concepts and tools of the methodology used by the entrepreneurs as sometimes entrepreneurs are aware of different tools and methodologies and end up using what is only beneficial not going in all stages of the methodologies but instead mixing different tools. Also, this section intends to understand at which level where the methodology is used and the overall knowledge of the entrepreneurs regarding the same.

In the second part of the questionnaire, Results LSM, the main goal is to understand the results that the entrepreneurs achieved with the respective use of the methodology and have a clear notion of the entrepreneur's level of satisfaction with the adoption of the LSM. This was also commented on further in the interview.

In the third section, Vantages and Disadvantages, the objective is to understand the principal's vantages and advantages felt by the entrepreneurs with the adoption of the LSM.

In the section, LSM combined with other entrepreneurial theories, approaches and tools, the objective is to understand if the entrepreneurs felt the need to use other entrepreneurial theories, approaches and tools and the main reason for the adoption of those other methodologies.

In the next section of the questionnaire, Build-Measure-Learn Feedback Loop, the goal is to understand the limitation felt by the entrepreneurs with the feedback loop. As mentioned in the literature review the feedback loop is a crucial part of the LSM and intends for the startup to validate learning before building a product. The feedback loop addresses different subjects which is why this section is split into subcategories. The subcategories are:

- Minimum Viable Product;
- Iterative experimentation;
- Customer Insight;
- Validation;
- Learning;

The subcategory Minimum Viable Product intends to know the principal problems that the founders felt when building/creating the MVP and the time spent on building it. Also, this subcategory intends to understand the role of funding in this process and if the entrepreneurs had the skills to develop the MVP or if was involved another person in the process. This section was commented on further in the interview.

In the subcategory Iterative experimentation, it is intended to understand the business hypothesis created by the founders to validate their ideas and the number of interactions had or not with the potential customers. As demonstrated in the literature review is possible to validate ideas in other formats instead of involving potential customers. Also, the subcategory Customer Insight is useful to understand the involvement of the potential customer (if involved during the process) and how it contributed to the development of the MVP. Additionally, in this subcategory, the questions aim to understand the knowledge of the startup before going to the market to collect info from potential clients and the need or not of support to understand the info collected and how the company incorporated the feedback on its products.

In the Validation subcategory, the aim is to understand the metrics chosen by the startup to validate learning and how was the process of choosing the metrics. On the other hand, in this subcategory, it is important to understand how the startup measures success as in the end the entrepreneurs want to create a sustainable business.

In the subcategory Learning the aim is to understand if the entrepreneurs changed the business model and in which part and the experience of having (or not) to pivot from initial business ideas.

Lastly, the last main section “Key Findings” aims to allow the entrepreneur to address a subject that was not covered in the questionnaire and that they felt the need to address.

4.2 About the startup

Noytrall is a technological Portuguese startup that serves the hospitality industry. Noytrall is dedicated on providing a solution for hospitality businesses assuring that they can monitor the consumption of water and energy from each guest in real-time. This approach allows the hotels and the guests to understand the consumption that they are making and be more sustainable.

To provide this service, the startup developed a technological solution that allows the hotels to collect information from each room and it is developing an app that can be used by the customers to know their consumption and engage them in all processes. This app also helps to educate them on this matter of sustainability and be aware of sustainable experiences.

Currently, the startup has seven people and it is focused on introducing the above-mentioned service to the market.

The journey of the entrepreneurs behind this startup started in 2017 with five co-founders during university. At the time the main idea was to design solar thermal panels with a different structure allowing efficiency improvements. However, the manufacturing process required was not available. Based on their learning from participating in entrepreneurial programs the entrepreneurs ended up discovering the hotel’s need to collect info from guests water and electricity consumption and pivoted into a new startup by participating in open innovation programs.

4.3 Highlights of the questionnaire and interview with the co-founder

The interview with the co-founder Diana Ferreira was on 14th July 2022 and the answers were validated. This interview intended to collect additional information related to the beginning of the entrepreneurship journey, to understand how the startup is now performing, and the use of the Build-Measure-Learn feedback loop included in the Lean Startup Methodology (LSM) and used in building the startup.

Adoption of LSM

The use of this methodology by the entrepreneurs was based on the need to know how to develop a new business idea as mentioned by the co-founder during the interview. Since the initial product idea was developed during a master's thesis research and a theoretical product was being developed without fully understanding the market needs, the use of lean was essential.

In the questionnaire, the co-founder referred that "the creation of a new business requires the implementation of practices that support the management of normally scarce resources. In the beginning, it is essential, but over time it becomes the way we run the business, the teams, the processes, the fundraising process, the business model and many more things that are necessary for the activity". As the entrepreneurs are developing the startup, the lean concept is used in different parts of the business to guarantee efficiency and effectiveness considering the availability of resources. Some of the tools and concepts used mentioned by the co-founder were the Business Model Canvas, Build-Measure-Learn, Continuous Improvement, Customer Development, get out of the building, value proposition, MVP, Testing - A/B testing, surveys, and interviews, among others.

Results LSM

The entrepreneurs understand that the application of lean methodologies is that the Build-Measure-Learn feedback loop should be fast to implement. However, they felt that this methodology is easier for software and digital companies but for companies that have a product and a service, it is different.

From the co-founder point of view, the theory of how to apply the lean methodology is there but how to implement the theory in the practice will also depend on the mistakes made by the entrepreneurs, "We need to learn how to implement the methodology. Sometimes we need to make mistakes even though we know the theory."

Advantages and disadvantages

Although the methodology makes sense in theory, the entrepreneurs felt that in practice there are concepts not fully explained. Concepts like "get out of the building". When questioned about that the co-founder referred that "the concept of getting out of the building is something that we always hear but for us is not easy to understand its application. (...) We participated in programs to learn about the entrepreneurship process and needed a basis to understand who are the customers, is there a need and if we have a market. There is no guidance on what "get out of the building" is, it can be a different

experience for each startup. When we first started, we had difficulties with this. For the second startup we did not". For the co-founder, this is something that will depend on startup to startup.

The entrepreneurs believe that the advantages of using the methodology are the reduction of time and cost for startup testing and allows aligning business ideas to customer needs.

LSM combined with other entrepreneurial theories, approaches and tools

The entrepreneurs also felt the necessity of complementing the LSM with other tools and approaches namely the Business Model Canvas and others. The need of using these tools was because they need "depth of analysis and extra sources of data input for business model validation".

Build-Measure-Learn Feedback Loop

1. Minimum Viable Product

One of the mistakes that the entrepreneur's did at the first startup was highlighted by the co-founder was to develop a theoretical product based on a thesis before consulting the market to understand if there was a need for that product and if the technology to develop existed. However, the innovation and entrepreneurship programs helped the entrepreneurs to collect info from the market and to adapt the idea and the potential customer based on different research and having direct contact with different potential customers.

As previously mentioned, the entrepreneurs started with a theoretical product of designing solar thermal panels. As mentioned by the co-founder "there was interest by companies in these efficiency improvements even if it was just 1% or 3%" but based on their research the required manufacturing process was not available. Then based on the wrong installation of panels during the research phase, the entrepreneurs decided to pivot the startup to develop a solution that could help the installers to reduce the errors made during the panel's installation. Learning from the previous mistakes, instead of developing a solution, the entrepreneurs tested the market first. They found out that there was no interest from the installation companies. However, they did not stop there, as mentioned by the co-founder, the entrepreneurs saw the utility of the solution, so they tried to demonstrate to their potential customers that there was a market for their solution, by talking with the end-users. Interviewing hotels as end-user, the entrepreneurs understood that there was a need to know guests' water and electricity consumption.

Having identified a problem, the entrepreneurs developed an MVP to test if there was a feasible technical solution, that could be validated before testing different business assumptions and

hypothesis and iterate the MVP and with feedback collected from potential customers. The startup had the expertise to develop the respective MVP and the founding process was essentially to produce it. With a solution, they could test for Problem-Solution Fit.

2. Iterative experimentation and Customer Insight

The business development of Noytrall focused on understanding if they could have a problem-solution fit, that could be transformed into a scalable business.

For the interaction with the potential customer, the entrepreneurs conducted different types of interactions from face-to-face interviews to surveys and other ways of contact.

As the co-founder mentioned in the questionnaire “You have to put yourself on other people’s shoes, the ones that you think that have the problem that you are trying to solve. Then you have to get to the right people, ask the right questions, listen to them patiently, listen even more carefully to the things that people say between the lines”. Nevertheless, the entrepreneurs believe that interaction with the customer should happen as soon as possible, for them “interaction with potential customers is crucial. (As a business) your purpose is to sell, so you have to involve customers as soon as possible and conquer early-adopters”.

When analyzing the feedback collected from the market the startup had the help of mentorship, as mentioned by the co-founder “mentoring has been an essential process in verifying info collected, across different areas of expertise”.

3. Validation and Measure

First, instead of defining metrics for feedback, the startup opted for open answers and qualitative analysis to validate learning as mentioned by the co-founder “there is a lot of conflicting information and feedback from specialists regarding this topic. Instead of defining metrics for feedback we opted for open answers and qualitative analysis”. To test if a product was accepted by the customer the startup focused on if the potential customer wanted to pay or not. When questioned about which metrics the startup used to measure the impact of product/service improvements on customer behavior, the startup referred that used the ratio of adoption service to the total of guests.

Also, when questioning how the company measure success the answer given by the startup was “Currently, we measure our success in terms of funding that we get, sales, clients acquisition, people that we get to work with us. But we want to measure our success by the amount of carbon footprint we are able to help avoid in tourism”.

4. Learning

The entrepreneurs had to change its business model in all parts of the process. For the entrepreneurs, this is an ongoing process as it must “adapt to new situations to change or to grow”. The entrepreneur’s had to pivot from 2 different ideas before addressing the current one. For them, the development of the products constitutes a cycle of experiments and learning.

Other Findings

From the point of view of the co-founder, the Lean Startup Methodology must not be used by itself but instead in conjunction with other methods and tools.

4.4 Relating the case study info with the literature

Lean startup is being adopted by entrepreneurs that do not know how to start their business. This idea of the lean concept is also being implemented in different perspectives of the business as to how the business itself, process, and fundraising.

As the perception from the entrepreneurs, the theory of how to apply the lean methodology is there but how to implement the theory in the practice will also depend on the mistakes made by the startup.

When addressing the subject of the Build-Measure-Learn feedback the entrepreneurs needed 6months to produce the MVP because the MVP was complex. Compared with the study conducted by Ghezzi this period was lower than the average of the digital startups standing at 8.2 months.

One of the things that helps the entrepreneurs to develop the MVP faster was the founding. Most startup founders do not have a budget to develop their ideas and the funding process is crucial for them to present their idea for the problem they believe are solving and get attention from potential investors. As mentioned by the co-founder, the main reasons for participating in those programs were to understand the entrepreneurship process stands and because needed a basis to understand who the customers are, is there a need and if we have a market. Therefore, participating in those entrepreneurial programs constitute a good opportunity and brings the founders access to mentoring programs.

In those mentoring programs, the entrepreneurs considered that mentorship was essential to verify the information collected across different areas of expertise. The relationship between the mentor/coach and the startup is fundamental to learning in areas where the mentor has the expertise to guarantee that the entrepreneurs are on the right track.

The construction of the MVP by entrepreneurs had in mind the potential customer and if the respective problem exists. If the entrepreneurs did not have this in mind and did not collect the info from the market would stay with one of its initial plans of selling preventive maintenance services on solar panels to installers companies. With research they validate that those companies were not interested in that kind of service.

It is important to understand the market where the startup is making business to analyze the info collect in the right way and not be biased by our ideas (De Cock et. al. 2020) and that is what happened with the founders. As part of the Lean Startup methodology is based on collecting info from the market to have a market fit, entrepreneurs had also to pivot from different solutions before founding the one that was developed considering the feedback from the market. In some industries, direct contact with customers at an early stage can prejudice the development of an innovative product as mentioned in the research conducted by Felin et al., 2019. That was not the case for Noytrall entrepreneurs the contact with the potential client was crucial as the MVP would need a big investment and it was needed to guarantee the market fit.

The entrepreneurs felt that the get out of the building was not easy, as mentioned by Ries, the process of get out of the building is important or the company is risking building something that will be not valued by the potential customer. But as mentioned by the co-founder, finding the right questions and right people are complicated. The Lean Startup Methodology understood that it is easy to contact potential customers and get info from them. However, the experience of entrepreneurs is that sometimes the potential customer is complex and does not share all their thoughts. Notwithstanding, it was important for the entrepreneurs to address the potential customer as soon as possible to develop the product. This provides insights into the Newbert study demonstrating the importance to address the potential customers in innovative business development.

As mentioned by Felin et al., 2019 there are different ways to understand if the product will be accepted on the market without involving the customer. The entrepreneurs involved the customer during the process of the MVP. However, one of the ways that are currently measuring success is based on the fact of people that want to join the startup.

CHAPTER 5

Conclusion

The conclusion chapter aimed to present the findings of the research questions. This study offers a point of view of one startup that used the Build-Measure-Learn feedback loop to develop its idea into an actual product/service.

The Lean Startup Methodology intends to guide entrepreneurs to transform their ideas into a sustainable business always considering the potential client during the process. The potential client performs an important role in the methodology. The Build-Measure-Learn Feedback Loop is crucial as it includes the MVP that ultimately helps the entrepreneur to validate their hypothesis and learn with the potential client. This feedback loop helps create a product/service with a perfect market fit, creating grounds for the development of business sustainability. It is important to understand what will add value to the customer before investing money in developing a product (Gračanin et al., 2019).

The feedback loop was used by entrepreneurs to validate their ideas for the business that is currently in place. From the point of view of the co-founder, the use of the Lean Startup Methodology was essential to have a clear understanding of how the entrepreneurship steps can be developed to transform an idea into an eventual service. The Build-Measure-Learn Feedback Loop was seen as a crucial part of the development of the MVP and gathering information from the market. Also, for them, the involvement of the customer in the early stage helps to gain early adopters.

Notwithstanding the above, critics and limitations were referred to by the startup. For them, was not easy to validate as at the beginning they did not know how to approach the potential client to validate this idea, “there is no guidance on what the get out of the building is, it can be a different experience for each startup. When we first started, we had difficulties with this.”. Also, the co-founder highlighted that it will be easier to implement the Lean Startup Methodology on software companies.

Regarding the validated learning included in the feedback loop, the co-founder referred that “there is a lot of conflicting information and feedback from specialists regarding this topic. Instead of defining metrics for the feedback we opted for open answers and qualitative analysis”. So, the specialists/coaches have an important role in how the startup will address this subject. The entrepreneurs also felt the need on using other additional models to have a depth of analysis and extra sources of data input for business model validation.

For the co-founder, in the end for the startup the Lean Startup Methodology, including the Build-Measure-Learn feedback loop, lacks actions to be completed or adapted, it is a concept and not a methodology.

This study contributes with insights related to the practical use of the Build-Measure-Learn feedback loop by startups showing the difficulties felt by entrepreneurs and the necessity of using other methodologies to complement the methodology.

In the author's point of view, the startup should look to this feedback loop as a process that can be adapted to their situation, and as mentioned by Ries, the startups should minimize total time through the feedback loop. This is a process that helps entrepreneurs to transform their ideas into something that can be validated before wasting any time and energy.

References

- Reis, E. (2011). *The lean startup*. New York: Crown Business, 27.
- Blank, S. (2013a). The Four Steps to the Epiphany: Successful Strategies for Products That Win: K & S Ranch
- Blank, S. (2013b). Why the lean start-up changes everything. *Harvard business review*, 91(5), 63-72.
- Blank, S. (2015). Why Build, Measure, Learn isn't just throwing things against the wall to see if they work—the Minimal Viable Product. Accessed January, 16, 2022.
- Newbert, S. L., Tornikoski, E. T., & Augugliaro, J. (2020). To get out of the building or not? That is the question: The benefits (and costs) of customer involvement during the startup process. *Journal of Business Venturing Insights*, 14, e00209.
- Mansoori, Y., Karlsson, T., & Lundqvist, M. (2019). The influence of the lean startup methodology on entrepreneur-coach relationships in the context of a startup accelerator. *Technovation*, 84, 37-47.
- Frederiksen, D. L., & Brem, A. (2017). How do entrepreneurs think they create value? A scientific reflection of Eric Ries' Lean Startup approach. *International Entrepreneurship and Management Journal*, 13(1), 169-189.
- Ghezzi, A. (2019). Digital startups and the adoption and implementation of Lean Startup Approaches: Effectuation, Bricolage and Opportunity Creation in practice. *Technological Forecasting and Social Change*, 146, 945-960.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.
- Maurya, A. (2012). *Running lean: iterate from plan A to a plan that works*. " O'Reilly Media, Inc."
- Ghezzi, A., & Cavallo, A. (2020). Agile business model innovation in digital entrepreneurship: Lean startup approaches. *Journal of business research*, 110, 519-537.
- Spina, C., Camuffo, A. & Gambardella, A. (2020). Founders, Apply the Scientific Method to Your Startup. *Harvard business review*.
- Felin, T., Gambardella, A., Stern, S., & Zenger, T. (2019). Lean startup and the business model: Experimentation revisited. *Forthcoming in Long Range Planning (Open Access)*.
- Nirwan, M. D., & Dhewanto, W. (2015). Barriers in implementing the lean startup methodology in Indonesia—case study of B2B startup. *Procedia-Social and Behavioral Sciences*, 169, 23-30.
- De Cock, R., Bruneel, J., & Bobelyn, A. (2020). Making the lean start-up method work: the role of prior market knowledge. *Journal of Small Business Management*, 58(5), 975-1002.
- Cui, A. S., & Wu, F. (2016). Utilizing customer knowledge in innovation: antecedents and impact of customer involvement on new product performance. *Journal of the academy of marketing science*, 44(4), 516-538.
- Tripathi, N., Oivo, M., Liukkunen, K., & Markkula, J. (2019). Startup ecosystem effect on minimum viable product development in software startups. *Information and Software Technology*, 114, 77-91.

- Mercandetti, F., Larbig, C., Tuozzo, V., & Steiner, T. (2017). Innovation by collaboration between startups and SMEs in Switzerland. *Technology Innovation Management Review*, 7(12).
- European Startup Monitor for 2019/2020, Accessed February 26, 2022 on <https://europeanstartupmonitor2019.eu/>
- Gračanin, D., Ćirić, D., Lalić, B., Ćurčić, J., & Tasić, N. (2019). The impact of lean improvements on cost-time profile. *Procedia Manufacturing*, 38, 316-323.
- Chica, M., Hernández, J. M., & Perc, M. (2022). Sustainability in tourism determined by an asymmetric game with mobility. *Journal of Cleaner Production*, 355, 131662.
- Rauch, E., Damian, A., Holzner, P., & Matt, D. T. (2016). Lean Hospitality-Application of Lean Management methods in the hotel sector. *Procedia CIRP*, 41, 614-619.
- Yin, R. K. (2009). *Case study research: Design and methods* (Vol. 5). Sage.
- Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study?. *Strategic management journal*, 29(13), 1465-1474.
- Yin, R. K. (2013). Validity and generalization in future case study evaluations. *Evaluation*, 19(3), 321-332.
- Tasci, A. D., Wei, W., & Milman, A. (2020). Uses and misuses of the case study method. *Annals of Tourism Research*, 82(C).
- Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, 13(4), 544-559.
- Patton, E., & Appelbaum, S. H. (2003). The case for case studies in management research. *Management research news*.
- Stake, R. E. (1995). *The art of case study research*. Sage.
- Castro, F. G., Kellison, J. G., Boyd, S. J., & Kopak, A. (2010). A methodology for conducting integrative mixed methods research and data analyses. *Journal of mixed methods research*, 4(4), 342-360.

Appendix

Appendix A – Questionnaire and startup response

Dear Nøytrall,

Thank you in advance for your time to respond to the following questionnaire to collect information about your experience with the application of the Lean Startup Methodology (LSM).

This questionnaire has 6 parts:

- 1) Adoption of LSM
- 2) Results LSM
- 3) Vantages and disadvantages
- 4) LSM combined with other entrepreneurial theories, approaches and tools
- 5) Build-Measure-Learn Feedback Loop
- 6) Key Findings

If you have any questions, please do not hesitate to get in touch.

Kind regards,

Rosária

Adoption of LSM

Question 1.2: What are the main reasons and motivations behind your choice to adopt LSM?

Answer: I had a business idea and felt a need to know more about the process of starting a new business.

Question 1.3: At what stage of the startup's development did you use LSM?

Answer: All the time. The creation of a new business requires the implementation of practices that support the management of resources that are normally scarce. In the beginning, it is essential, but over time it becomes the way we run the business, the teams, the processes, the fundraising process, the business model and many more things that are necessary for the activity.

Question 1.4: Which LSM concepts and tools did you use?

Answer: Business Model Canvas; Build-Measure-Learn; Continuous Improvement, Customer Development; Get Out Of The Building; Value Proposition; MVP; Testing – A/B testing, surveys, interviews; Personas, customer decision making, customer insights, market size, needs, pains, ... Task management - CRM, Kanban, Roadmap Planning, Strategy Development.

Results LSM

Question 2.1: How long did the LSM implementation process last?

Answer: It is an ongoing process.

Question 2.2: Can you describe or justify the reasons that determined the cost of your LSM implementation process? Was the overall cost higher than initially planned?

Answer: No

Question 2.3.: Overall, from 1- Dissatisfied to 5 -Satisfied, are you satisfied or dissatisfied with the results obtained from adopting LSM?

Answer: 4

Question 2.3.1. Can you further explain why are you satisfied/dissatisfied?

Answer: It's an adaptation. We need to learn how to implement the methodology. Sometimes we need to make mistakes even though we know the theory.

Question 2.4.: From 1- Dissatisfied to 5 -Satisfied, are you satisfied or dissatisfied with the results obtained from the adoption of specific LSM concepts, tools and models?

Answer: 4

Question 2.4.1.: Can you further explain why are you satisfied/dissatisfied?

Answer: I think it's easier and faster if applied to software and digital stuff.

Vantage and disadvantages

Question 3.1. What are the most significant advantages you experienced relating to the adoption of LSM?

Answer:

X	Reducing time and cost for startup testing
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X	Aligning business ideas to customer needs
	Verifying and pivoting all business model parameters
	Receiving rounds of financing
	Offering alternatives to traditional intellectual property protection

Question 3.2. What are the most significant disadvantages you experienced relating to the adoption of LSM?

Answer:

	Defining and designing MVPs
	Identifying and engaging early adopters and trial users
	Defining testing priorities and designing tests
	Missing other market opportunities and threats
	Obtaining information about the startup's sources of advantage
X	Concepts whose processes are not explained

LSM combined with other entrepreneurial theories, approaches and tools

Question 4.1.: Did you use any other models, tools, or approaches in combination with LSM to develop your startup? (Eg. Business Plan, Agile Development, SCRUM and Sprints, SWOT Analysis, etc...)

Answer: Yes

Question 4.2. Were those other models, tools or approaches adopted from the beginning of the use of LSM?

Answer: Business plan, SCRUM, SWOT, Porter analysis

Question 4.3.: Why did you use those additional models? Which benefits did you gain from this combined use?

Answer: Depth of analysis and extra sources of data input for business model validation

Build-Measure-Learn Feedback Loop: Minimum Viable Product (MVP)

Question 6.1.: Was there any problem creating/building the MVP product? What was the MVP when you decide to test?

Answer: Because we have a complex product, MVP was not so minimal.

Question 6.2.: How long does it take to produce the MVP?

Answer: 6 months

Question 6.3. How does funding affect MVP development?

Answer: With funding one has the means to go faster

Question 6.4.: Do talented members of the startup, with the required skills, affect MVP development?

If yes in which way? Did this conduct additional time to create the MVP?

Answer: Yes. Without the required skills the MVP would be impossible

Question 6.5.: When designing the MVP did you have the potential customer in mind?

Answer: Yes

Build-Measure-Learn Feedback Loop: Iterative experimentation

Question 6.6.: Have you based your business development on the hypothesis? If yes, how do you prioritize the first assumptions to test? If not, why didn't you set up a hypothesis?

Answer: Yes. Does the problem really exist?

Question 6.7.: Did you view the product/service developments as cycles of experiments, learning and additional experiments? Can you explain why?

Answer: Yes. Build - Measure - Learn

Question 6.8.: Did you try different product/services solutions before you found the right one? Can you further explain why?

Answer: Yes. We pivoted from different solutions based on feedback from market.

Question 6.9.: How many interactions did you have with your potential customers?

Answer: Hundreds

Question 6.10.: How were conducted those interactions? Face to face interviews, calls, online info?

Answer: A mix of face to face, phone, e-mail, videocall and surveys.

Question 6.11.: Did you invest effort into understanding the problem and learning about the user and its social context before starting testing?

Answer: Yes

Question 6.12.: The profile that you made for your potential customer was right? Did you have to change the focus to other customers?

Answer: Yes. No.

Question 6.13.: Did you engage in many trials and error processes in product/service development before you had a complete understanding of the market and technology? Can you further explain why?

Answer: Once we pivoted to right product-market fit, no.

Question 6.14. Did you repeat the process of testing until all key business model assumptions have been validated?

Answer: It's a continuous process.

Question 6.15: Did you take an experimental approach that relied on frequent trial and error to find the right product/service solution?

Answer: No

Question 6.16.: Did you frequently design and run experiments on elements of our business model?

Answer: No

Build-Measure-Learn Feedback Loop: Customer Insight

Question 6.17.: How was the process of get out of the building? Was it easy for you to understand when to test your ideas/hypothesis?

Answer: It's not easy. You have to put yourself on other people's shoes, the ones that you think that have the problem that you are trying to solve. Then you have to get to the right people, ask the right questions, listen to them patiently, listen even more carefully to the things that people say "between the lines".

Question 6.18.: Did you have any prior market knowledge before starting your startup? Was all acquired with the client?

Answer: No. All founders are external to the market. We participated in a lot of open innovation programs and that brought us closer to the clients and to better understanding of their problems.

Question 6.19. Did you need outside support to understand the info collected from the market, eg network/ technical expertise?

Answer: For us, mentoring has been an essential process in verifying info collected, across different areas of expertise.

Question 6.20.: How did you incorporate the feedback from the potential client on your offerings?

Answer: We adapted our approach to the business model and communication to better reflect the impact of feedback received.

Question 6.21. Did you feel that the customer was involved too soon in the process? Can you further explain why?

Answer: No, the sooner the better. Interaction with potential customers is crucial. The purpose is to sell so you have to involve customers as soon as possible and conquer early-adopters.

Build-Measure-Learn Feedback Loop: Validation

Question 6.22. Was it easy to define which metrics would you use to validate learning? Can you further explain why?

Answer: No. There is a lot of conflicting information and feedback from specialists regarding this topic. Instead of defining metrics for feedback we opted for open answers and qualitative analysis.

Question 6.23.: Were you data-driven to improve your human judgment in the decision-making process? Can you further explain why?

Answer: No, we were qualitative driven.

Question 6.24.: Did you have metrics available to test the product/service acceptance by customers and sales performance?

Answer: Yes. Whether they wanted to pay or not.

Question 6.25.: Which metrics do you use to measure the impact of product/service improvements on customer behavior?

Answer: The ratio of adoption of service to the total of guests.

Question 6.26. How do you measure your company's success? What do you do with the respective information?

Answer: Currently, we measure our success in terms of funding that we get, sales, clients acquisition, lead transformation, people that we get to work with us, and feedback. But, we want to measure our success by the amount of carbon footprint we are able to help avoid in tourism.

Build-Measure-Learn Feedback Loop: Learning

Question 6.27.: Did you have to change your business model? If yes, which part?

Answer: Yes. We had to change a lot of times, all of the parts. It's an ongoing process. Even now we have to adapt to new situations to change or to grow.

Question 6.28.: Did you readjust your resources (ex. Employees) due to the business model change? How was it at the beginning and how was it after?

Answer: No

Question 6.29.: Can you identify the member's roles at the beginning of the startup and the roles after the contact with the market? Which additional expertise did you need?

Answer: As a startup, the founders do a little bit of everything. That keeps happening as we grow until the moment we can hire someone to replace us in that role. The same is true for initial team members.

Question 6.30.: Have you "pivoted" your initial business idea? Please share more details on why you did or did not pivot.

Answer: We started our journey in entrepreneurship in 2017 knowing nothing about it. We pivoted the idea twice and only in 2020 we got to the current idea and manage to officially start a company.

Key Findings

Question 7.: Based on your experience, is something missing on the LSM? If yes, please explain with which tool would the methodology improve.

Answer: The methodology is not really a methodology but a concept. Therefore, it is not clearly explained or detailed as a set of actions to be completed or adapted.

Appendix B – Startup Interview

Question: Tell us about the start of the startup?

Answer: The journey of the entrepreneurs started in 2017 with the idea of one of the co-founders during university when preparing his master thesis. At the time the thesis was focused on the development of a methodology to design solar thermal panels with a different structure that could allow efficiency improvements. Based on our contacts there was interest by companies in these efficiency improvements even if it was just 1% or 3%. However, based on our research there was no manufacturing process to develop the structure that was developed in the master thesis.

Afterwards, we decided to shift our idea and to start focusing on preventive maintenance on the solar panels and start addressing installers. Based on that, during the research at the University in Coimbra, we acquired a solar panel system and noticed that it was wrongly installed. Considering this situation, we decided to pivot our idea to develop a solution that could help the installers to reduce the errors made during the panel's installation. With this idea, the entrepreneurs started shifting its focus towards an educational and consultancy service, disregarding the pure engineer process that was developed. However, there was no interest from the installation companies.

We saw the utility of the service that could be built so we decided to investigate if end-users would be interested in the service. We decided to talk with the main consumers of solar panels, hotels. From interviewing hotels we discovered they had other needs and our current idea comes from that. The owner of one of the hotels told us that he did not know about the consumption of his guests when using water and electricity and was worried about it and that the guests were not aware about their consumption. To contextualize, the MVP that we built allows the hotels to collect data on the guest's consumption.

This interaction happened at the end of 2019 and from that on we started participating more actively in open innovation programs to validate the idea before developing the product to understand if it was a real necessity for the hotels. We did questionnaires, calls and meetings with different hotels and local accommodations. In our findings, we noticed that it was common that owners of local accommodations do not profit from a guest's stay, this could be based for example on the simple use of the air conditioning all day.

Question: What was your objective when participating in innovation and entrepreneurship programs?

Answer: Our purpose in participating in innovation and entrepreneurship programs was to have feedback and grow as the people that are there have the expertise and can help the startup in its process of development.

With our participation in the programs, we had to start thinking about how to develop a solution and we noticed that there was already solutions in the market that allowed the monitorization of water or just electricity and typically in specific areas or floors of the hotels. And there was a need to monetize with precision the guest itself. So, our solution has two technological parts, we acquire reading sensors from suppliers and we developed specific equipment that does the aggregation of this data and communication. With that, we can share access to a dashboard and an application to see and analyze the data collected. So, we develop this equipment, the dashboard, and the application. The dashboard for the hotels and the application for the guests.

Question: Could you please tell us in which phase are you now on the product development?

Answer: We already have paying clients. We constituted as a company at the end of last year. In January, we increased the team and we are currently seven people. Before that everything was constructed internally by the three founders. In specific, the CEO is the one that developed the technical aspect of our product. Since the team increased, we are creating a new version of the dashboard as what we had was an MVP and the application that we expect to conclude in the next months.

We are talking with hotels to acquire more clients, develop, and also planning the official launch of the product this year. The strategy that we are following is because this is the high season for hotels and September-October is when the hotels start doing the budget for the next year.

We also want to partner with associations that work as “umbrella” entities and by doing partnership with them their associates will have access to our product and can benefit from commercial discounts and this is a way to approach more clients. Additionally, we want to develop a sustainability community as the application that we are developing for the guest enables them to see their consumption and the equivalence in carbon footprint. Considering their behavior, they can gain points. With the points, they can exchange vouchers or discounts with our partners. However, this partner needs to have a sustainable business.

Question: Based on your business model, do the guests end up paying additional for the consumption that he does?

Answer: We have a business B2B. The hotels pay and the guests are included in this equation to have access to the consumption that they made. We show the guests that their consumption has an impact on tourism and we can educate them in this way. The idea is to inform, educate and raise awareness of the guest's points of view.

Question: In question 3.2. What are the most significant disadvantages you experienced relating to the adoption of LSM? You replied by saying Concepts whose processes are not explained. Could you comment further on this?

Answer: When is software and something more, as is our case it is not easy to apply the methodology. The concept of getting out of the building is something that we always hear but for us is not easy to understand its application. Theoretically, we develop the product before addressing the client, as it was based on a master thesis. We participated in programs to learn about the entrepreneurship process and needed a basis to understand who are the customers, is there a need and if we have a market. There is no guidance on what "get out of the building" is, it can be a different experience for each startup. When we first started, we had difficulties with this. For the second startup we did not.