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# Key Capabilities for Successful Lean Implementation

A study at an innovative start-up company in Sweden  
Master's thesis in Quality and Operations Management

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How to develop optimal conditions for successful lean implementation  
A study conducted at an innovative start-up company Gothenburg

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#### SUMMARY

Lean emphasizes waste reduction, continuous improvement and customer focus and has evolved from its origins in operational shop floor manufacturing to more of a socio-technical approach. Today, the deployment of lean is leaning towards a strategic perspective, where the approach is more management focused, shaping the strategy, culture and objectives of the organization. Implementing lean in an innovative environment is a newer concept that is perceived as both beneficial and challenging. The advantages of such an implementation includes enhanced efficiency and waste reduction, faster time-to-market, focus on customer value, continuous improvement and scalability. The challenges that come with the innovative environment involves the higher levels of uncertainty, resource constraints, rapid change, culture resistance, lack of historical data and balancing creativity with efficiency. When adapted correctly, lean can offer substantial benefits in terms of efficiency and scalability. This study aims to bridge gaps between the current state of an innovative startup and identified success factors for lean implementation. It explores how innovative startups must adapt to incorporate lean practices, focusing on essential success factors. Key challenges are identified, and success factors are suggested to address these challenges, with significant focus on cultural aspects. A qualitative study has been carried out at the company, and a total of 13 interviews has been conducted. The findings suggest several critical success factors that need to be present to implement lean successfully. These include leadership, culture and communication, human resources and training, customer focus, project management, strategy and targets, recognition and rewards, financial capabilities and lean methods and tools. The results from these suggest strategies that align with the key factors to foster optimal conditions for lean implementation. Innovative startups are recommended to implement structured HR programs for employee development, establishing clear communication channels, maintaining clear objectives and defined processes, and integrating customer feedback into product development.

Keywords: Lean; Start-up; High growth company; Lean methodology; High-tech company; Innovation; Innovative; Strategy; Change; Management



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# 1. Introduction

Today lean is used as a management concept focusing on reduction of waste, continuous improvement and customer focus. Despite its popularity, the definition of lean is not concisely defined (Pettersen, 2009). Lean has been viewed as a method that is used in the operational floor manufacturing. Toyota defines it as a continuous improvement method where the main goal is to produce products of the highest quality at the lowest possible cost and time. This is done through waste elimination. However, nowadays lean is rather viewed as a socio-technical approach where the human is considered as the crucial element for continuous improvement. This includes interpreting lean as a more strategic deployment, a system perspective, focusing on learning, both individually and organizationally and from a behavioral perspective (Hines et al., 2023). Moreover, this concept can be implemented at all levels in an organization and the results in an organization's health, wealth and significant competitiveness. It can be used for many purposes since it is a strong approach against severe organizational issues (Atkinson, 2004). Additionally, concerning the maturity of a company, the concept lean start-up was developed by the engineer, entrepreneur and start-up advisor Eric Ries who applied lean thinking into the process of innovation. Since start-ups, especially high technology ones, deal with a high level of uncertainty the prediction for the future gets more difficult. Old methods used by the managers are not reaching the objectives and planning is only accurate when there are years of stable historical data to access (Ries, 2011). An objective when using a lean system, which is any system that uses lean thinking, is to deliver maximum value at the same time as reducing waste. Here, the term waste is described as everything in a process that increases the cost without adding any value, e.g. an activity operated by humans that uses resources but does not end up adding any value, activities that increase lead times or anything that increases the costs which the customer is not willing to pay for (Pessôa & Trabasso, 2016). As lean is becoming more relevant for startups the term lean commercialization has been developed to describe the processes of transforming an innovation into a final product from which an economical benefit can be obtained. The benefit of applying lean includes reduction of lifecycle of new product development, minimization of resource wastes, more efficient and effective new product or service development and it is useful in extremely uncertain conditions (Gbadegeshin, 2018).

There have been numerous literature studies on lean in startups, but many of these studies use theoretical frameworks that are not industry specific. This has resulted in gaps in the literature concerning specific industries, which need to be addressed to enhance the understanding and application of lean principles in start-ups (Sreenivasan & Suresh, 2024). Therefore, this study will be conducted at an innovative high-tech start-up within a highly regulated industry.

## 1.1 Company Description

The case company is currently in the development phase of a product whose goal is to transform its own industry. Still in its design phase, the company focuses on conceptualizing, planning, prototyping and creating designs for its product. There is further an emphasis on collaboration both internally and externally, to bring expertise and different perspectives into the design process. Many of the employees have years of work experience within the industry, bringing deep insights into their product development. As the company does not have any revenue streams, the financial fundings are from investors, meaning that the company operates with limited capabilities to achieve their goal. Currently, the company has not implemented any formal lean principles in their organization. However, when the commercial production starts, lean implementation will be crucial for reaching the goals. Given the start-up's clear mission, complex and costly technology, long lead times and limited financial resources, applying lean principles appears beneficial as it aims to reduce waste in both money and time. However, as lean is strongly linked to established processes and mature companies, it raises concerns about the possibilities of even applying lean principles onto a company that does not have mature manufacturing processes. Neither do start-ups have old data for monitoring which is needed for creating reliable and effective key performance indicators which is needed for monitoring performance. On top of that, the start-up operates with uncertainty since the product itself is something new and innovative. This study will examine lean principles in innovative start-ups by identifying the critical success factors. It will also determine the key capabilities start-ups should focus on to enhance optimal conditions for future lean implementation.

## 1.2 Aim and Research Questions

The purpose of this study is to investigate the significance and benefits of lean practices in an innovative start-up. The study will identify the main challenges and success factors that are of importance when implementing lean practices, especially within a cultural aspect, and what capabilities are vital to consider before reorganizing. Once the success factors have been identified from the literature study, a data collection will be conducted to recognize the company's current capabilities. This will help in addressing what capabilities an innovative start-up might need to focus on to create the optimal conditions for future lean implementation.

Based on the purpose of the study, the following research questions are to be addressed:

*Research Question 1: What are the critical success factors for lean implementation in an innovative start-up?*

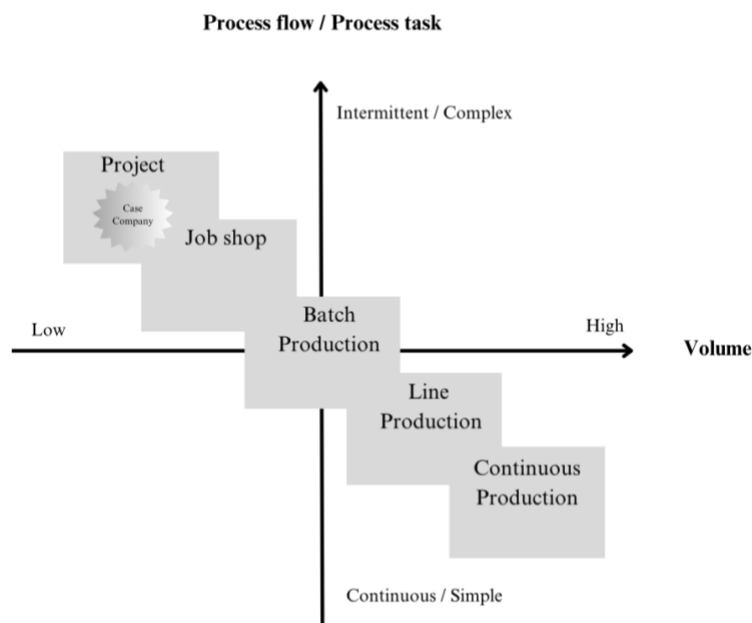
*Research Question 2: Which strategies align with these critical success factors to foster optimal conditions for successful lean implementation in an innovative start-up?*

## 1.3 Scope and Delimitations

The scope is set to conduct an investigation for future lean implementation in a start-up company that is in the early stages of maturity of their innovative high-tech product. The thesis will be considering the strategic point of view in the study of lean implementation, meaning daily activities and short-term management perspective will not be covered. Moreover, the study takes the whole organization into account to the fullest extent as possible meaning that all departments are included in the report. The purpose is to deliver a scientific contribution as well as contributing to the collaborating company. Future improvement areas and recommendations will be proposed to the case company, however, the researchers of this study will not provide an implementation plan for the case company.

## 1.4 Problematization

Lean aims to meet demand with perfect quality without creating any waste, meaning any activity that does not add value to a unit in a process. It is usually seen as an approach in manufacturing where units flow quickly and smoothly through the manufacturing process with constant velocity from start to finish. Synchronized flow is another way to explain this (Slack et al., 2020). Moreover, the level of complexity of the product and the process is linked to the applicability of lean systems. Lean systems are a type of planning and control system, and it is easier for these systems to handle products and processes that have simpler requirements. In other words, the more complex the products and processes are, the more power is needed for a lean system to be able to coordinate them (Slack et al., 2016). Product structures that are the least complex have a high level of volume, standardization and are usually commodity products with a low cost per unit. The least complex process structure is characterized by its continuous flow (Hayes et al. 1999). By contrast, the nature of the case company in this study has the opposite characteristics, where the product has a high degree of complexity due to its high technology and innovativeness. Additionally, its process structure is time consuming and is highly complex in terms of being advanced and its multidisciplinary for design, assembly, testing and certification. Unlike products in more continuous flows that have high levels of volume, this company's products do not have high volume. This study aims to explore whether a company characterized by different attributes than those typically suggested can apply lean principles, particularly considering it is a start-up with no yet established processes and whose process flow is more intermittent and complex due to the high technology and low volume of its products.



*Figure 1. An illustration of a product and process matrix adapted from Hayes et al. (1999).*

## 2.Theoretical Background

The theoretical background will lay the foundation for the analysis and discussion. All topics will be connected to the research questions. To understand the lean concept in a start-up environment, we will summarize characteristics of innovative start-ups and lean. Further, we will outline issues and requirements related to the lean implementation, including change management and critical success factors.

### 2.1. Innovative start-up

An innovative start-up typically refers to new enterprises that produce and develop innovative goods or services of high technological value. The enterprise is independent such that it is not part or subsidiary of a large firm. Further, the goods or services are generally built on originality and disruptive ideas, and the entrepreneur strives to solve either existing problems in a new way or create completely new markets (Del Bosco et al., 2021).

The terminology innovation is closely connected with entrepreneurship, and both are vital when looking at the competitiveness, development, and the economic growth of new business activities. As a start-up firm, having a capability to innovate is of high importance when addressing the market needs and achieving a competitive market (Del Bosco et al., 2021). According to Cavallo et al. (2020), such enterprises generally use their innovative practices to grow fast and scale globally, pursuing profitability and growth. It is also explained that the structure of an innovative start-up is usually towards the more flexible side, supporting Tsai et al. (2006), who describes the development of start-ups as dynamic, non-linear, and unpredictable. The article emphasizes the importance of keeping this in mind in a fast-paced environment, since a small change can have a big impact on the results. Being adaptable and robust in such an environment is important to maintain balance while the start-up grows with its nonlinear processes (Tsai et al., 2006).

#### 2.2.1. Innovation

Innovation is a broad concept that has been defined, interpreted, and understood in a variety of ways throughout history (Taylor, 2017). Due to its frequency and broadness, it is difficult to clearly define what the term means at present (Vaughan, 2013). There have been efforts made to create a unified definition of innovation with the goal of establishing clarity, however, there are arguments against this approach suggesting that it might not be beneficial (Taylor, 2017).

Regardless, there are some generic categorizations and definitions that are common. First, the concept can get divided into different types of innovation. These types include breakthrough, breakout, radical, sustaining, incremental, basic research, organizational

and disruptive innovation. It can also be categorized into innovation as a network, structure, process, profit model, brand and channel (Vaughan, 2013). Regardless of what type of innovation is under consideration, there are some general definitions of innovations that can often be applied. The department of Industry Science and Tourism defines it in broader terms as: “Innovation, at the level of an individual firm, might be defined as the application of ideas that are new to the firm, whether the new ideas are embodied in products, processes, services, or in work organization, management or marketing systems” (Rogers, 1998, p.8). Another definition proposed is: “A process that includes the generation, development, and implementation of new ideas or behaviors. Further, innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a preemptive action to influence the environment. Hence innovation is broadly defined to encompass a range of types, including new products or services, new process technologies, new organizational structures or administrative systems, or new plans or programs pertaining to organizational members” (Vaughan, 2013, p.51).

### 2.1.2. Start-up

Start-ups can be described as ventures that are designed to introduce a new product or service under significant market uncertainty. One characteristic that differs start-ups from established firms, is that their business planning process does not follow the same traditional path as large firms. While large firms can predict their future results based on past experiences, start-ups do not have any past experience besides the uncertainty of its innovative nature. It is further argued that start-ups need to navigate through various transition obstacles as they grow and mature, often requiring adaptable strategies instead of fixed plans (Bortolini et al., 2021).

## 2.2 Change Management

A major factor for the success and survival of organizations is their ability to change and be agile in the constantly evolving business environment. Being able to manage change is crucial, but it has its challenges, resulting in many organizations failing when implementing change initiatives (By, 2005). This chapter will describe the definition of change, its advantages and challenges, followed by actions to take when experiencing resistance.

Change management can be defined as “the process of continually renewing an organization’s direction, structure and capabilities to serve the ever-changing needs of external and internal customers” (By, 2005, p.1). Recardo (1995) defines it as a process that organizations use to identify new demands and/or constraints from the environment and identify strategic and operational initiatives to achieve success. It is also defined as the design, implementation and evaluation of appropriate initiatives. Change is an organizational feature that will always be present, both on operational levels and strategic levels. It goes hand in hand with the organizational strategy, emphasizing the importance of organizations’ ability to identify where they need to be in the future, and

how to manage the changes they need to make to get there. With the increasing globalization, an increased knowledge workforce, shifting trends, and the major technological innovation, change management is crucial to have as a managerial skill (By, 2005).

The major challenge with change is the fact that it is often unpredictable, reactive and discontinuous. Despite the necessity for successful change management, a study made by Balogun and Hope Hailey (2004) show that the failure rate for all change program initiatives is over 70 %. It is also shown that success levels can be as low as 10 %. There is often a lack of a valid framework in the implementation and management of organizational change, emphasizing the importance of continuous change and tools supporting this in organizations. Instead of continually monitoring and responding to changes internally and externally as an ongoing process, it is common that organizations implement incremental, discontinuous change initiatives. Discontinuous change can be defined as change that is characterized by major shifts in strategy, culture and/or structure. This type of change is often triggered by rapid shifts in the internal or external environment, such as the upcoming of a technical problem or an external shock. Supporters of discontinuous change mean that this can save money, as it avoids the costs of a never-ending process of change initiatives. Although this approach is still employed, authors of change approaches are arguing that the benefits from discontinuous change initiatives are rather short-term, and not long lasting. A more effective change strategy involves organizations and their employees consistently keeping an eye on external and internal factors, then making small adjustments as needed both in terms of the strategy and operations (By, 2005; Oakland et al., 2007).

### 2.2.1 Overcoming Resistance to Change

It is important to identify the reasons for resistance and the strength of these factors to find tactics for individuals resisting change. Once the common reasons have been identified, it is easier to determine an appropriate solution for reducing the resistance followed by implementation of a change initiative (Recardo 1995). Schuler (2003) has identified ten major reasons for the upcoming change of resistance among people:

Firstly, *people think it is riskier to change than standing still*. Change comes with risk, and if people do not genuinely believe and feel that the risks of standing still are greater than those of moving forward, there will be resistance. Here, it is vital for the leadership to explain and define, in truthful terms, why the risk situation favors change. Using numbers and emotions whenever you can is emphasized, as this gets people's attention. Secondly, *people form strong bonds with individuals associated with traditional methods*. Humans are wired to form emotional bonds and loyalty. When introducing a new way of working in an organization, the deep-seated connections people have to the old way and the people associated with it are getting challenged. Therefore, it is important to acknowledge and respect the work and contributions of those who have been successful in the past. Thirdly, *people lack role models for the new approach*. The power of observational learning is essential, and communicating the vision is not always sufficient. People need to demonstrate how the new way of working can succeed. Setting up pilot programs to showcase the change in action can be an example

of this. By seeing tangible results, the skepticism can shift towards openness and curiosity (Schuler, 2003).

Next, *people are skeptical of their competence*. In most cases, change in organizations requires new skills, and individuals often feel that they lack the competence for these skills. This issue emphasizes the importance of being an effective motivator, as well as including effective new training programs and in-detail information events presenting the plan for change. Furthermore, *people feel overwhelmed*. Fatigue can hinder both individual and organizational change efforts significantly. When introducing change initiatives, this needs to be considered as a barrier, as employees may have a negative attitude due to exhaustion and overwhelm. To reduce this barrier, it is crucial to remind people of the risks associated with not changing, while also providing understanding for concerns throughout the process. Alongside highlighting risks, it is crucial to allow space for expressing frustrations (Schuler, 2003).

Additionally, *people naturally have a healthy skepticism and seek assurance that new ideas are sound*. It is important to recognize that most valuable changes undergo refinement before reaching their best version. Skepticism plays a role in this by scrutinizing change ideas, which can lead to improvements. While some skepticism can have reason in anger or fear rather than genuine substance, it is essential to listen attentively, as individual's feedback can contribute to enhancing the initiative. Moreover, *people fear hidden agendas among those pushing for the initiative*, not all reformers are trustworthy, resulting in individuals sometimes questioning the motives behind the initiative or suspecting ulterior motives. The leadership must therefore have genuine intentions, communicate openly and provide reassurance and transparency (Schuler, 2003).

The next reason is that *people may feel that proposed changes threaten their sense of identity*. When change efforts take place in an organization, it can directly impact an individual's self-perception. For example, if the change initiative requires a change in a role for an individual, this person may lose their identity as the skilled specialist they were before, leading to feelings of disconnection from their work. To mitigate this, the leaders must acknowledge these feelings and help their employees understand how their values and sense of purpose can still be realized under the new system. More, is that *the anticipated changes can lead to concerns about declining status or quality of life*. While some may gain increased status, others may face challenges. Change is not always evenly distributed and can be perceived as threatening individual interests. Leaders must therefore communicate the unavoidability of the change initiative and provide support for adjustment. It's crucial to acknowledge that not everyone will be satisfied. Lastly, *people genuinely believe the proposed changes are not a good idea*. Rational objections to change must be addressed, and it is important to engage with individuals on both rational and emotional levels to gain their commitment to change. Acknowledgement of this fosters a more inclusive and effective change process (Schuler, 2003).

Further, Oakland et al. (2007) listed four strategic themes that are common in the implementation of a successful change initiative. The first one is the importance of having a strong leadership, especially when it comes to mindset, and it is defined as a

leadership team that sets the direction, inspires change among the employees, and makes sure that the initiative is implemented. The second theme is the identification and definition of what change is. Here, the emphasis is on project management and defining clear success measures. The third major drive is the cultural aspect. Culture shapes attitudes, beliefs and behaviors among employees, and understanding the existing culture can help in the overall communication and development of strategies to address potential resistance. Leaders can use this to their advantage, and tailor their strategies for a smoother implementation. The last theme is the importance of internal learning and education (Oakland et al., 2007). With awareness and understanding of the initiative to be implemented, employees will get a broader understanding of the need, the objectives and the expected outcomes, reducing the risk for resistance. Learning is also important as change in all aspects requires new skills and competencies, meaning that employees will need training and resources to effectively adapt to the new ways of working (Oakland et al., 2007).

## 2.3 Lean Principles

The operating principles according to lean started in environments where manufacturing was held. The term has many different synonyms such as Lean manufacturing, Toyota Production System, Lean Productions, Lean Philosophy and more (Kilpatrick, J., 2003). It is commonly said that the lean philosophy originates from the Toyota Production System (TPS), which is designed to eliminate waste (Karim & Arif-Uz-Zaman, 2013). The TPS principle was founded when Toyota Motor in Japan faced a crisis where the only solution was a significant change in efficiency and productivity (Pessôa & Trabasso, 2016). However, recently lean principles have become crucial not only for shop floors but in general management, in other words, transforming lean principles into context that does not include any manufacturing processes. One proposed example is the lean start-up which is an innovation method for newly started companies which believes that the most efficient innovation is the one that is demanded by the users (Mueller & Thoring, 2012).

### 2.3.1 Lean Thinking

By thoroughly working on the waste reduction while simultaneously guaranteeing creation of value, the lean thinking was developed. Efficiency, productivity and minimum waste are not the only factors that are focused within lean, but also focusing on identifying value in terms of the customer. In other words, one of lean thinking's main goals is to satisfy a customer's need, where the value is pulled by the customer (Pessôa & Trabasso, 2016). Five following principles have been developed by Womack and Jones (2003). The two first principles guarantee value delivery. Firstly, is to *specify the value*. The final customer defines the value, which is the fundamental of lean thinking. If this is not reached an organization can not determine what activities are value adding and what is waste. Secondly is the *identification of the value stream*. A value stream is a sequence of sub activities that adds values and makes a transformation of a deliverable into something that the customer has a willingness to pay for. By identifying the value stream and its sub activities one can reduce and eliminate activities that are wasteful, and the resources will be utilized for activities that bring value.

Following up with *guaranteeing the flow*. This principal addresses having a value stream with a flow that does not risk any interruption or delays. Being able to rely on the process is a way to reduce waste since the risk of losing resources decreases. The fourth principle is to *pull the value* which means that there should not be any activity happening without the next activity requesting it in the stream, therefore this principle reduces waste. The last *principle is to seek perfection*, which is to always have a sustainable continuous improvement- and waste reduction mindset (Womack & Jones, 2003).

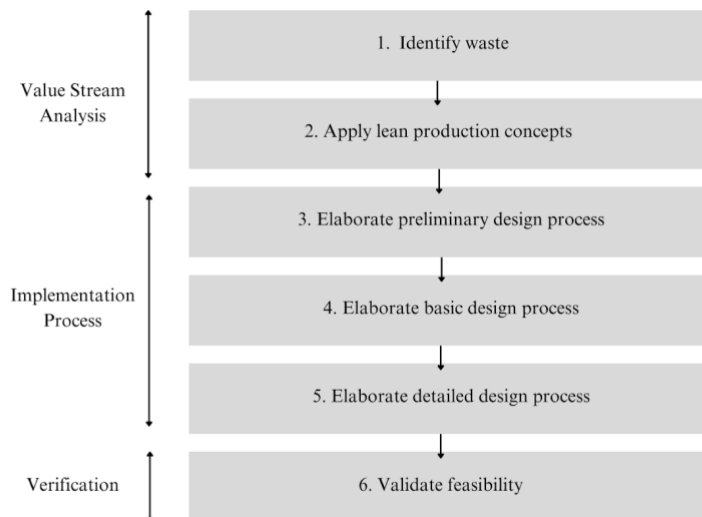
### 2.2.3. Waste Reduction

An objective when using a lean system, which is any system that uses lean thinking, is to deliver maximum value at the same time as reducing waste. It is everything in a process that increases the cost without adding any value, an activity operated by humans that uses resources but does not end up adding value, activities that increase lead times or anything that increases the costs which the customer is not willing to pay for (Pessôa & Trabasso, 2016). In lean philosophy the terms *Muda*, *Mura* and *Muri* are often used to describe the core causes of waste which are activities in processes that do not add value, lack of consistency and unnecessary requirements put on a process that will result in poor outcomes. This leads to wastes such as waiting time, transport, process inefficiencies, inventory, delays between activities, over- or under production, inventory, early or late deliveries, poor reliability, defective products or service etc. (Slack et al., 2016).

### 2.3.3 Lean Design

*Figure 2. An illustration of the development process adapted from Ko & Chung (2014).*

When lean principles are applied to engineering and design in an organization, it is called lean design (Freire & Alarcón, 2002). Having a poor design process seems to be a great factor of overall bad performance and a reason why projects do not reach their timeframes, go over budget and need reworks. Therefore, lean design has become a paradigm where the process of engineering and design can be more efficient and get outcomes with better quality (Tilley, 2005). Creating lean design on a development process (figure 2) is done by identifying waste through an analysis of the current planning and the design process by value stream mapping. Next, a new design form based on lean principles will be proposed where the design flow is parted into three phases. The first phase is the preliminary design, the second phase is the basic design, and the third phase is the detailed design. Each of these phases elaborates to smooth design work, minimize unnecessary design errors, and enhance the design reliability. Lastly the feasibility of the proposed method is validated (Ko & Chung, 2014). By using this approach to minimize waste in the production process, end user and clients value will be increased (Tilley, 2005).



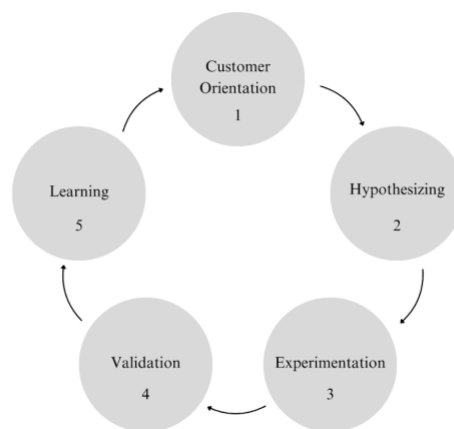
### 2.3.4 Lean Innovation and Lean Start-up

The resources differ quite a lot between being an emerging firm in comparison to being a mature corporation, meaning that you have the pressure to make the correct decisions fast and not waste resources or time on adjustments and re-work because of the lack of resources. Lean is a methodology that can be used to mitigate those risks. Joubert (2023) developed the term *lean innovation*, which is when lean is used in early phases of companies, such as start-ups or companies who are launching new products or services. Using lean innovation increases the ability to identify new opportunities by using design thinking, which is a customer centric approach when conducting ideas and

problem solving. Secondly is to enhance the capability to rapidly develop, prototype, learn, validate and enhance business solutions with fewer resources. Lastly, to increase the ability to apply the lean process which will eventually lead to reduction of waste and have the incremental improvements mindset (Joubert 2023).

Moreover, the term lean start-up has been used more frequently in the recent decade where more and more start-ups apply this method on their new business. Lean start-up emphasizes early customer interactions and iterative development phases as the entrepreneurs make assumptions early on and then test their assumptions where the results of the test either support their initial hypothesis or not, where they will make changes. By using this lean start-up strategy, the entrepreneurs avoid making mistakes that would cost them a lot of money and time. Therefore, the lean start-up method is for start-ups that want to develop their business idea towards a validated and scalable business (Harms & Schwery, 2019).

The lean start-up process lays its foundation on customer oriented experiential learning where the entrepreneurs through customer orientation decides which questions will drive their ideas. It is crucial for the entrepreneurs to collect information that is low-cost but high impact through social experimentation. When the questions are developed the next step is to create a hypothesis, which is the initial point of the experimentation process that is to put the hypothesis on test and reflect the results. Based on the results one can detect opportunities that appeared to be profitable initially but ended up not be profitable and vice versa, opportunities that did not seem to be profitable ended up actually being profitable. In other words, the experimentation will present the potential returns to an opportunity because they can obtain better information which will make it easier for the entrepreneurs to either give up, change or invest in the opportunity. Furthermore, the data that the experiments generate, entrepreneurs will use it to monitor the actual effect of their decision. This part of the process lets the decisions be validated based on the data. Lastly, the validated evidence from the previous step will be used for learning purposes, which is called experimental learning (Harms & Schwery, 2019). Lean start-up movement focuses on shortening the time it takes to get a product out to the market by experiments, testing and validated learning (Ries, 2011).



*Figure 3. An illustration of the lean start-up process through customer-oriented experiential learning adapted from Harms & Schwery (2019).*

### 2.3.5. Disadvantages of Lean

The fact that the term lean is not defined clearly, makes big difficulties since it allows many interpretations and makes it challenging to implement (Mueller & Strzelczak, 2015). Moreover, there are some scholars that believes that it might not bring any significant advantages. The disadvantages of lean that have been discussed are that companies might only focus on short term solutions which might lead to implementation failure, due to the lack of a foundational understanding of lean. Another mentioned disadvantage is the concern of having increasing bureaucracy due to more paperwork that is non-value-added activity. In summary, there are some concerns that goes alongside with lean that is good to acknowledge (Degirmenci, 2008).

### 2.3.6 Critical Success Factors

There are several strategies needed to consider when implementing lean to an organization. An incorrect application of lean strategies will result in inefficient use of an organization's resources and reduced employee confidence. Therefore, the importance of implementing the correct strategy is very important (Anvari et al. 2010).

To implement lean successfully in a firm, some factors are critical. These are called critical success factors, CSFs, and practitioners and researchers in the existing literature have suggested an array of such factors. CSFs can be defined as the factors that must go well in a firm to ensure success, and they are therefore seen as managerial areas that need continual attention to make sure they are reached and sustained.

The existing literature differs slightly when defining the different CSFs depending on what kind of study that has been made. It depends on e.g. the industry, the size of the company, the number of firms included in the study, if the business is product or service oriented and the maturity stage of the firm. Despite these influencing circumstances, there are some clear patterns in the CSFs and their importance. Most studies that have been read prioritize similar CSFs, with some differences in their ranking. To rate the importance of the factors, all CSFs from five different articles have been summarized in the table below. It is further important to mention that most of these CSF are not sufficient on their own for the implementation of lean practices; they are complementary to each other, and the optimal outcome would be to combine all these factors.

From this, an own categorization has been made, where the CSFs that have similarities have been but in the same category. The patterns have been acting as a foundation for each CSF in the table below. The first column, "Critical Success Factor", lists the main categories and headings we have identified. In the column "Key words and sources", there is a brief description of the specific articles that have been used, including keywords from the articles as well as the source used. The column "Summary" offers an overview of each category for the CSFs, based on the researchers' take-aways and conclusions from the articles.

<b>Critical Success Factor</b>	<b>Key words and sources</b>	<b>Summary</b>
Human Resources and Training	Dedicate human resources, Participate personally, Involve and support employees, (Netland, 2015) Linking the lean method to human, Education and training, Involvement of employees, (Alhuraish et al., 2017b). Reward training, Educate managers, Educate employee (Achanga et al., 2006). Motivation (Bakås et al., 2011d).	Implementing successful lean requires dedicating human resources, engaging leadership participation, supporting and involving employees, linking lean principles with human aspects, providing education and training, rewarding training efforts, and fostering motivation.
Recognition and Rewards	Reward system and training (Lizarelli et al., 2021c).	Implementing successful lean requires reward system and training including workshops, guides to techniques and practices and immersion training.
Culture and Communication	Culture of Organization (Achanga et al., 2006). Inform and discuss (Netland, 2015), Communication (Alhuraish et al., 2017b). Learning maintain oriented mindset (Lizarelli et al., 2021c). Mindshift (Bakås et al., 2011d).	Implementing successful lean requires fostering a culture of continuous improvement within the organization, emphasizing effective communication to inform and discuss ideas, promoting a mindshift towards learning and maintaining an improvement-oriented mindset among employees.
Leadership and Management	Leadership and Management (Achanga et al., 2006). Top Management (Lizarelli et al., 2021c). Strong management involvement (Bakås et al., 2011d). Top management commitment and support and lead actively (Netland, 2015).	Implementing successful lean requires strong leadership and management involvement, particularly from top management, demonstrate commitment and support by leading key activities within the organization
Project Management	Project Management skills (Alhuraish et al., 2017b). Dedicated project teams (Lizarelli et al., 2021c). Allocate Sufficient time for change (Bakås et al., 2011d).	Implementing successful lean requires developing project management skills, forming dedicated project teams, and allocating sufficient time for change are essential factors in effectively managing and implementing projects.

*Table 1: Categorization of critical success factors (CSFs) with the help of existing literature (Achanga et al., 2006; Alhuraish et al., 2017; Bakås et al., 2011; Lizarelli et al., 2021; Netland, 2015). Part 1.*

<b>Critical Success Factor</b>	<b>Key words and sources</b>	<b>Summary</b>
Strategy and Targets	Set and follow-up targets (Netland, 2015). Link lean method to business strategy (Alhuraish et al., 2017b). Allocate sufficient time for change (Bakås et al., 2011d).	Implementing successful lean requires to set and track targets, align lean practices with overall business strategy, and allocate adequate time for implementing and adapting to change
Customer Focus	Link lean method to customer (Alhuraish et al., 2017b). Customer feedback and aligning business idea to customer needs (Lizarelli et al., 2021c).	Implementing successful lean requires linking lean methods to the customer in order to integrate customer needs and feedback into the lean approach to ensure customer-centric approach.
Performance Measurements	Performance measurements and KPIs (Bakås et al., 2011d).	Implementing successful lean requires Performance measurements and Key Performance Indicators (KPIs), which are essential tools used to assess and monitor the effectiveness and success.
Financial Capabilities	Receiving rounds of financing (Lizarelli et al., 2021c). Financial capabilities (Achang et al., 2006).	Implementing successful lean requires financial capabilities since it is essential for startups to receive rounds of financing, enabling them to invest in critical provisions like consultancy, training, and implementation of lean manufacturing practices.
Lean Principles	Use Lean tools and method and integrate lean in every business (Netland, 2015). Understand tools and techniques within lean and Linking the lean method to the business strategy (Alhuraish et al., 2017b).	Implementing successful lean requires to use lean tools and methods while aligning them with the overall business strategy. This involves understanding and utilizing lean tools and techniques strategically to achieve business goals and drive continuous improvement.

*Table 2: Categorization of critical success factors (CSFs) with the help of existing literature (Achang et al., 2006; Alhuraish et al., 2017; Bakås et al., 2011; Lizarelli et al., 2021; Netland, 2015). Part 2.*

## **Human Resource and Training**

Human resource is a function in an organization which is designed to maximize the performance of the employees in terms of the organization's strategic objectives. The HR operates with how the people within the organization are managed and focuses on systems and policies. In the early 20th century, researchers started to study how to create business value by strategically managing the people and the workforce. Initially the tasks in the HR role included more administrative work such as payroll and benefit transactions. It has become a strategic move due to globalization, company consolidation, technological advancement and focuses more on talent management, planning success, relations between industries and labors and diversity and inclusion (Rihan, 1998).

Training is a learning process that includes procurement of knowledge, improving skills, and rules for changing behaviors or attitudes with the purpose to increase the employee's performance. As human capital is today regarded as one of the major drivers of productivity, economic growth and competitiveness the training becomes crucial to build and strengthen the relationships between the different parts of an organization. By making sure that this function is getting recognized the importance, the training will result in a workforce that has high competence, is motivated and adaptable. Therefore, making an investment on training activities that align with strategic objectives is crucial for an organization to increase their productivity (Singh, 2012).

A concept that is strongly connected to training is the topic of human resources. It is crucial to understand the weight of the employee's mindset when it comes to a change within the organization as well as understanding what the change is about and to collectively believe that the change is needed and will improve the organization (Bakås et al., 2011). Lean start-up has a strong emphasis on openness, collaboration and the learning speed since the learning speed is seen as a key competitive advantage (Lizarelli et al., 2021). Therefore, the categorization of human resource focuses on the training and building the competence in the internal organization which is also strongly linked to culture and communication. As the building of competence is vital, many articles state the importance of training and learning programs, following it up with reward training as well as having a reward system (Alhuraish et al., 2017).

## **Recognition and Rewards**

Employees have diverse needs, aspirations and perceptions regarding suitable rewards and recognition for motivation, and this is the next CSF. Rewards and recognition play a crucial role to boost morale and create goodwill between employees and managers. Rewards can be defined as all forms of financial compensation, tangible services and benefits that employees get as part of their employment. Mathis and Jackson (2004), among other theorists, define it as compensation, meaning that employees get paid, incentives and other benefits for their organizational work. Individuals also long for feeling valued, appreciated and treated well for their efforts, which goes under the term recognition. Recognition is the timely, informal or formal acknowledgement of a

specific behavior, effort or result that supports and often exceeds the goals of the organization. By providing both rewards and recognition to employees within an organization, the motivation and productivity can be enhanced, ultimately leading to better performance (Akafo & Boateng, 2015).

The importance of recognizing and rewarding the employees was a recurring theme among the literature that was studied. Lean is often related to a working environment that drives engagement and sustains long-term success. An integrated reward system for the project members can enhance the motivation of employees, and therefore drive the engagement and foster a culture of continuous improvement. By including both informal and formal recognitions, such as workshops, recognizing employees verbally during meetings and presentations, including bonuses for employees exceeding performance targets and allowing specialized training programs, the motivation, engagement and behaviors of the employees will improve (Lizarelli et al., 2021; Alhuraish et al., 2017).

## **Culture and Communication**

Culture and communication in the organization is another highly ranked factor among the CSFs. Culture can be defined as “the socially transmitted knowledge and behavior shared by some group of people” (Birukou et al., 2013). Communication is part of the culture and can be explained as “a process through which cultural difference is expressed and constructed” (Philipsen, 2002, p.51).

Moreover, culture is seen as a key component that differs the highest performing organization from the not so successful companies. A study was made including over 1,000 organizations with the conclusions that organizations with healthy cultures received 60 % higher returns compared to medium healthy companies and 200 % higher than organizations with unhealthy cultures (Franklin, 2024). The healthiness of the cultures was measured with McKinsey’s organizational Health Index. A strong organizational culture is linked to a well-defined mission since it unites the employees with a common purpose (Franklin, 2024).

It is shown that there is a need for communication skills, long-term focus and a strategic team in a diverse environment when new initiatives are being implemented (Achanga et al., 2006). The communication aspect includes sharing the same language among employees, meaning that all employees, regardless of position or department, should be able to understand each other to communicate more effectively. By developing this skill, there will be a better understanding and collaboration between the individuals. Further, lean principles are designed to change how people work, meaning that they are geared toward behavioral changes. This emphasizes the importance of a supportive organizational culture that installs a mind-shift towards an attitude of stopping to solve problems and focus on continuous improvement (Bakås et al., 2011).

Hiring external consultants are only short-term solutions and is not enough to achieve such a mindset. Instead, there is a need to build competence and learn internally, by a

do-it-yourself attitude. When the employees themselves need to work on the project and improvement initiatives, they get a sense of what impact continuous improvement can have on the situation, and they can maintain this mindset once the project is over. By building the culture and competence in the internal organization instead of buying solutions from an external party, a try mind-shift will be reached (Bakås et al., 2011).

## **Leadership and Management**

Leadership and management are two terms that go hand in hand, but their meanings are slightly different. “Management” involves overseeing, directing, applying skills, nurturing and adapting to current situations. It is about influencing, directing, and having the ability to lead in a given context. A manager is someone who organizes, directs, and/or plans activities, regulates resources, oversees a department or function within an organization and holds an executive role. “Leadership”, on the other hand, is defined as “the principal dynamic force that motivates and coordinates the organization in the accomplishment of its objectives” (Toor & Ofori, 2008, p.63). It involves certain attitudes of the leader who motivates individuals to pursue specific objectives. They influence their followers by giving them hope, enhancing their confidence, aligning with their aspirations and consistently upholding personal values (Toor & Ofori, 2008). In summary, leadership is more about setting the direction, inspiring others and driving change, while management is about organizing, implementing plans and ensuring efficiency.

Involvement and support of the top management is vital to implement lean, especially when it comes to human and material resources, as well as support in decisions. Achanga et al. (2006) explains that a committed management team is the foundation of success in any project, as it allows excellent project management styles, which further facilitates the integration of all infrastructures within a firm. Without strong leadership, there will be a lack of effective skills, knowledge enhancement, a clear vision and strategy, as well as a flexible organizational structure. Bakås et al. (2011) emphasizes that a strong management involvement has an impact on the time allocation, meaning that only the management can make time and effort on continuous improvement. By spending time on this, the team can investigate the current waste, issues and opportunities for improvement. The authors also mention that the management team has a major impact on the employee’s motivation or demotivation. They must push their team to see the big vision and get them on the right path, as a lack of this will reduce their internal motivation to put effort in continuous improvement (Bakås et al. 2011).

## **Project Management**

A project is a “temporary endeavor undertaken to create a unique product, service, or result” (Schwalbe, 2009, p.4). The project can be in different scope, small and large and can involve one person or hundreds of people. A project timeline can be done within a workday or take several years. Some attributes the project has are following:

A project has a unique purpose and in order for it to start there is usually a well-defined goal with the purpose to reach it when the project has reached the end. Temporality is also an attribute of a project since it has a beginning and an end where it reaches its purpose. A project requires various resources in terms of human workforce, software, money, skills and other assets. For a project to succeed it is important for it to have a primary customer or sponsor. Usually there are stakeholders that believe in the project, but it is important for someone to provide direction and usually the same one funds the projects. Lastly a project always involves uncertainty around how long it takes to complete, how much money it costs and being dependent on other partners such as suppliers, unplanned things can happen such as a supplier going out of business or an important employee needing a time off (Schwalbe, 2009).

Project management is a crucial part in lean methodology, as both terms highlight the importance of optimization, efficiency and continuous improvement. Allocating resources and time for change is a major part of project management, and this is important to prepare the organization for change. Lean requires careful allocation of resources, including time, budget and manpower. However, organizations that lack project management skills often prioritize their activities and time which many times results in a prioritization of the most urgent tasks. This comes with a risk of hindering continuous improvement and process improvements. Project management can help in the planning of resource allocation to make sure that the flow of the project is intact, reducing the risk of delays and bottlenecks (Bakås et al., 2011).

By applying project management and making weekly time to invest in improvement activities and processes, the lean initiative can be planned, executed and monitored more effectively (Bakås et al., 2011). Project management further includes putting together dedicated and motivated teams. By pushing the project team in improving their competencies, decreasing resistance and increasing team collaboration as well as satisfaction, lean initiatives can be implemented more pleasantly. Therefore, autonomy in teams, free communication among team members and cross-functional teams for each project are fundamental parts in project management (Lizarelli et al., 2021).

## **Strategy and Targets**

Strategy and targets are the coherent, overarching plan of actions a company undertakes. It outlines the objectives of the company, as well as the action plans and resource allocations over the long term. This plan involves decisions regarding the company's current and potential businesses, aiming to establish sustainable advantages by adapting to external opportunities and threats while leveraging internal strengths and addressing weaknesses. Strategy engages all levels of the organization, from corporate to functional, and it defines the company's intended contributions to both economic and non-economic stakeholders (Hax, 1990).

Targets can refer to the strategic goals that the organization is trying to achieve within a specific time period. It is strongly linked to the strategy and is set as part of the strategic planning process, as it is aligned with the overall mission of the company. The

different targets of an organization play an important role in evaluating the performance, as meeting or exceeding targets is associated with sales revenue, market share, profitability, customer satisfaction and productivity. They also serve as decision-making tools when allocating resources effectively, and they help focusing efforts and drive continuous improvement (Arnold & Artz, 2015).

When implementing lean, start-ups require a well-defined strategy and targets as it provides direction and alignment by having a plan and following it up. As start-ups often operate in fast-paced and uncertain environments, they need a clear lean strategy that provides a roadmap and guides the organizations in decision-making and resource allocation. This will allow the organization to set appropriate targets and achieve them. This includes focusing on areas that are the most impactful for improvement, holding meetings continuously and following up the implementation of the projects. Managers should also implement lean in their everyday business and not treat it as a temporary, short-term project, emphasizing the importance of including lean in the strategy. By aligning lean initiatives with the business objectives, defining clear goals and targets, leaders can make sure that the lean efforts contribute to the vision of the organization and to its growth (Netland, 2015).

### **Customer Focus**

Customer focus is more than giving customers responses to their requests or acquiring a customer relationship management software. Customers' desires and needs are dynamic and changing all the time and organizations that invest in the training of their employees in this area have been benefited in terms of always being innovative and to keep the company always focused on its customers. A company that does not incorporate customer focus to its management will lose their competitive advantage in comparison to their competitors (Yangailo, 2023).

Linking lean methodologies to customers can significantly help in implementing lean at a start-up. It can help the organization to align the efforts with their customers' needs and preferences and therefore achieve long-term success and innovation. It is important for start-ups to get customer feedback at an early stage of the development process and throughout the steps that follow. By continuously having interactions with customers, the development process can stay innovative while testing, learning and changing if needed, resulting in a product that meets the value offered with reduced waste. It is further mentioned that start-ups successfully implementing Lean include an iterative feedback and change approach, meaning that actions are taken to use customer feedback for developing solutions, acquiring suggestions and improving the product or service. Important to mention is that this feedback needs to be used properly, by analyzing it objectively and implementing actionable insights to drive changes that align with the needs of the customers. Obtaining feedback by e.g. face-to-face interactions and keeping close contact with customers can also help in identifying the right cluster of consumers before launching the product. The finding from this is the importance of listening to the customers' needs and opinions from new products, from the idea stage, contributing to keeping the firm competitive and the customers satisfied and loyal (Lizarelli et al., 2021).

## **Performance Measurements**

In the 80's the western world recognized the economic success that the Japanese were able to achieve despite limited resources. The reason for this success was due to their new business performance systems which included quality, time and flexibility besides traditional cost (Nudurupati et al., 2011). One definition of performance measurement system was "the set of metrics used to quantify both the efficiency and the effectiveness of actions" (Neely et al. 1995, p.80). Another definition is that a performance measurement system is an organization-wide shared vision, teamwork, training, incentives etc., that surrounds the performance measurement (Lebas, 1995). Most companies collect data with the goal to reach and utilize key performance indicators (KPI). The importance of using key performance indicators is that they are measured and continuously monitored which will make it more concrete for the employees to analyze. However, it happens that companies only focus on the economic metrics, especially when it comes to small and medium-sized enterprises. Previous research has shown that these types of companies usually lack measuring of operational process, even though they have a direct link to the economic performance in the company. Results have shown that if companies set significant performance measurements and continuously expose the metrics to the employees it will yield positive results. This is since employees feel more motivated and tend to put more effort into their work to reach concrete goals. Therefore, the conclusion of previous research is that well defined indicators will incentivize desired behaviors in a company (Bakås et al., 2011c).

## **Financial Capabilities**

Start-ups lack financial resources in many cases that are needed in order to acquire capital intensive complementary assets. The resources start-ups usually have in the initial phase are business network, the team commitment and heterogeneity in the functional capabilities of the company founders (Paradkar et al., 2015). Moreover, the importance of having sufficient resources will become a barrier because of prioritization on other projects rather than lean improvement projects, training and staff programs (Bakås et al., 2011).

The financial capabilities are seen as one critical success factor in terms of the ability to fund useful provisions like consultancy or training. For small and medium sized companies, financial limitations can be a barrier for the implementation of lean. Furthermore, the allocation of the resources with the particular purpose of the project is also one crucial part of the financial capabilities when implementing lean such as specialized training programs, techniques and more (Achanga et al., 2006).

## **Lean Principles**

Lean principles are a set of principles and techniques that have the purpose of maximizing the value while minimizing the waste in different processes within firms. These practices can help organizations in pursuing operational excellence and improving their performance by reducing their costs and providing products of higher quality. There are various methods and tools that are used under the lean strategy's umbrella, and some of the most essential ones include just-in-time, total productive maintenance, automation, value stream mapping and continuous improvement (Belekoukias et al., 2014).

Previously, the focus has mainly been on employees on the shop floor. This has caused a barrier between the shop floor workers and the office workers, including a lack of collaboration and understanding, resulting in a inhibition of cultural transformation and sustainable long-term success. The strategy for lean is mainly training and the education of skills, and the methods are quite easy to comprehend due to its uncomplicated character and rapid results. It is further stated that employees at all levels are linked to lean, meaning that everyone involved should understand the main purpose of lean principles. This will help in achieving continuous improvement without many difficulties (Alhuraish et al., 2017).

### 3. Method

This chapter will describe the methodology used to address the research questions that were presented in section 1.1. The research strategy and design will be described, followed by the data collection and the sub-chapters within this, including interviews and literature studies.

#### 3.1 Research Design

The research strategy is qualitative with abductive reasoning. The abductive approach is a mixture of deductive and inductive approach. A deductive approach develops propositions from existing theory and tests it in the real world, whereas an inductive approach takes applicable conclusions based on the found data (Bell et al., 2019; Dubois & Gadde, 2002). However, an abductive approach is argued to be more connected to inductive reasoning. Abductive reasoning generates hypotheses or theories based on observations and findings, as in the inductive approach, but it rather tries to propose explanations for what is observed. It starts with observations and continues with developing explanations for the phenomena, and the main method of doing this is by iteratively working between theory and data (Bell et al., 2019). It is common that the original framework is modified in studies that are based on abduction due to theoretical findings gained during the process as well as unanticipated empirical findings (Dubois & Gadde, 2002). The approach used in this case study was iterative, as there was a lot of going back and forth between the theory and the data collection. The method was to use previous literature studies as a basis of knowledge and creation of interview questions, to then analyze and incorporate new insights from data. Coming up with new insights rather than testing existing theories strengthens the arguments of using abductive reasoning in this case. The study’s approach was further influenced by constructionist ontological assumptions, common in abductive reasoning, meaning that there is a focus on understanding different perspectives of individuals within social contexts (Bell et al., 2019).

Further, a qualitative approach was being used, as the method focused more on exploring, understanding, and explaining the underlying contexts. The collection of information explains the subject, instead of measuring it. As explained by Tenny et al. (2017), it answers the why’s and how’s, in contrast to a quantitative study that instead answers how much or how many. There was an emphasis on gathering experiences and thoughts from the participants and interviewees. This approach allowed the interviews to capture experiences, attitudes and behaviors, which was well suited for this study.

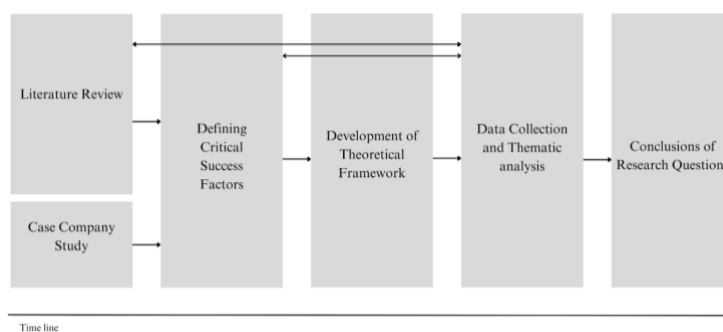


Figure 4: An overview of the research process.

## 3.2. Data Collection

The main source of data collection for the study was through interviews and literature studies. The results from the interviews were analyzed according to the theory and used as a basis for answering the research questions and for the actions to be implemented.

### 3.2.1. Interviews

The interviews were semi-structured and conducted in person with key employees from different departments at the company. By using a research method such as semi-structured interviewing, the researcher had the opportunity to keep more of an open mind about what they need to know about, with a more exploratory character. Having more of an unstructured research approach is highly associated with the goals of a qualitative research strategy (Bell et al., 2019). In practice, this involved that the interviewer used generic questions in an initial state, but flexibility was allowed, leading to follow-up questions to get a deeper understanding. Beforehand, the interviewees were contacted via email with a short overview of the purpose and the generic subjects that would be included. During the interviews, one of the researchers asked the questions while the other one was taking detailed notes of the responses. There was a time slot for one hour when interviewing each participant, but most of the interviews lasted for around 45 minutes. If approved by the other party, the audio was recorded, to be able to transcribe and not miss any information that was being told. All respondents approved getting recorded, which facilitated the transcription process. The chosen sampling method was stratified random sampling. The method was done by stratifying the population by a criterion, in our case the criteria was departmental belonging where two representatives of the department were chosen to represent the similar perspective (Bell et al., 2019). The reason for choosing this sample method was that the data collection can ensure being distributed the same way as the population in terms of the stratifying criterion (Bell et al., 2019). However, not all respondents were able to participate, and exceptions were made i.e. only one person from human resource was able to participate. Moreover, this research did not take all departments into consideration due it is time consuming, and that all departments are not relevant for this study. Departments that were included in this study were: Human resource, communication, supply chain, programs, engineering, production and commercials. These departments were chosen since the researchers and supervisor at the company concluded that these departments would be most suitable for the subject in question.

<b>Number of respondents</b>	<b>Department</b>
2	<i>Commercial</i>
2	<i>Engineering</i>
2	<i>Programme</i>
2	<i>Communication</i>
2	<i>Supply Chain</i>
2	<i>Production</i>
1	<i>Human Resource</i>
Tot: 13	

*Table 3. Number of respondents per department.*

### 3.2.2. Literature Study

A literature study was conducted before, during and after the interviews. This was done to understand and compare the interview findings with research found in literature. The literature that was used is based on previous research within the area of lean. In the initial stage, it was important to get a generic understanding of the subject. The focus on the research has therefore been including search terms such as lean, start-up companies, lean in start-up companies, communication, success factors and disadvantages with lean, innovative companies etc.

Since the main objective of the thesis was to analyze and compare a number of CSFs, the literature study has been primarily focused on identifying crucial CSFs for organizations. The main focus of these articles were success factors in lean start-ups and small and medium-sized enterprises (SMEs). In the first stage, the focus was to collect all CSFs from different articles to get an overview of the different relevant areas. Each one of the CSFs were summarized in a couple sentences with focus on the most important takeaways. All factors were then put into a table, and these were color coordinated based on similarities between the subjects, such as recurring terms and similar areas of discussion. An example of two CSFs that were put into the same category was “top management support” and “leadership and management”. The first article highlighted the importance of the top management supporting the implementation of lean, considering human and material resources and support in decisions (Lizarelli et al., 2021c). The second article highlighted the importance of committed management support, as this is vital in decision making and creating a vision and strategy (Achanga et al., 2006). Once the color coordination was done, all groups got a headline based on the overall theme of the subjects. The headlines that were created were quite generic to cover all subgroups in that category.

In a later stage, there were additional search terms, and the literature study was of deeper character. These included lean design, lean commercialization, waste reduction, resistance to change, change management and culture etc. This took place once the interviews were completed to fill in the knowledge gaps that the interviews did not fulfill. From this point, the literature was adapted according to the results and depending on the responses from the interviewees.

The literature part of the study was based on secondary data, meaning that it was based on previous studies and data collections. According to Bel et al. (2019), the advantages of using secondary data are many, including cost and time savings, access to high-quality data, more time for data analysis and opportunity for longitudinal analysis. However, there were some limitations that were important to keep in mind. There was a lack of control over the data quality and the data collection process. Bell et al. (2019) explains that the quality should never be taken for granted, and this could be dealt with by using several strategies. This could involve evaluating the data sources and the data collection methods for the secondary data, as well as being aware of potential biases or missing data.

The literature searches were conducted on Google Scholar and through Chalmers library. It was combined with material and literature provided from the company and academic supervisors (Bell et al., 2019).

### 3.3. Data Analysis

Analyzing qualitative data can be challenging due to its complex dataset. The reason for this is because the datasets often include unstructured language that is collected from notes, interview transcripts, documents or even visual images. There are several strategies for analyzing qualitative such as grounded theory and thematic analysis. For this study, the last one mentioned, a thematic approach was used. The approach is to search for themes in the data such as repetitions of topics that might occur several times, similarities and differences in terms of how the participants express their thoughts or theory related themes to mention a few (Bell et al., 2019). When using this approach, it is important to keep in mind that the themes must be relevant to the research. This means, simply because many people who have been interviewed mention the same things, does not necessarily mean it should be considered. Thematic analysis has been criticized for its lack of clear procedures. However, due to its flexible analytical strategy, it can be used to analyze a wide variety of qualitative data types few (Bell et al., 2019).

### 3.4. Research Quality

According to Bell et al. (2019), there are two ways to assess the quality in qualitative research: trustworthiness and authenticity. The criteria chosen for this study is trustworthiness. Certain writers propose four aspects of trustworthiness in qualitative studies, and these are credibility, transferability, dependability and confirmability (Bell et al., 2019).

Establishing credibility is about making sure people trust the results of the study. This involves two important steps: carrying out the research according to the standards and principles of good practice and sharing the findings of the study to the members that were part of the study to confirm that the researchers have correctly understood the social world of the members (Bell et al., 2019). To assure a high level of credibility, the researchers made sure that the interviews were conducted in a way that minimized the risk of getting biased results. The goal was to have at least two representatives from each department when interviews were conducted. Due to one respondent not being able to attend, there was only one representative from human resources. All remaining departments had two representatives. When interviewing more than one person from the same department, the respondents can complement each other on information being told while reducing bias and giving a better overview of the subject in question.

Transferability refers to which extent the conclusions and findings from the research that can be applied to other contexts, or in the same context at some other time (Bell et

al., 2019). This study has findings that can be generalized and applied to other companies or industries, but companies that operate under preconditions that are similar to the case company have a higher applicability of the findings. The researchers made sure that there was a detailed description of all phases in the research, including context, method, participant selection criteria and interview process, which allows for a smoother application to other contexts.

Dependability is about keeping complete records during all phases of the process when doing research. It includes keeping records such as selection of participants and interview transcripts. Dependability is further ensured by including auditors to review the research process, to see if the right procedures have been followed and if the data is accurate (Bell et al., 2019). The dependability in the study was increased by not only recording the interviews, but taking notes during the interviews as well as transcribing them after they were done. Further, all activities from the research process were documented in an accessible manner, ensuring transparency. This was done by using cloud storage solutions, specifically Google drive, to store all documents and notes that were relevant for the research. With both a supervisor from the university, as well as one at the company, acting as peers, the authors got valuable feedback and guidance throughout the research journey.

Confirmability is ensuring that, even though complete objectivity is difficult, the researcher does not allow personal values or theoretical preferences to influence the research process or the conclusions and findings (Bell et al., 2019). The study's confirmability was enhanced by a couple strategies, the first one being that the steps for the research methodology provided from the university were properly followed throughout the process. Further, the research process involved including other participants such supervisors, examiner, and opponent groups to get external perspectives and feedback. The thesis being conducted by two researchers is also a way of achieving confirmability.

### 3.5. Research Ethics

According to Bell et al. (2019) there are four main areas in business research ethics, *including harm to participants, lack of informed consent, invasion of privacy and involvement of deception* (Bell et al., 2019). Firstly, regarding harm to participants, the employees were ensured that their names, specific roles and levels of positions were anonymized to protect their careers and future employment. This step is important to protect the participant from any potential consequence resulting from their involvement in the study. Additionally, this also prevents the invasion of the participants privacy. To address the issue of lack of informed consent, the participants were informed about the study, its purpose and how their data would be processed. Also, an approval was obtained from the participants before recording the interviews. This ensures that the participants were fully aware and agreed to the terms of their participation. Moreover, by fully informing by being transparent and avoiding any misleading details to the participants, which ensures that involvement of deception did not occur.

## 4. Findings and Results

In this section, the findings from the interviews with the thirteen respondents will be presented. As seen below, each respondent is anonymous. The categories are all based on the success factors, and for every theme, one question was asked to each respondent. What is important to consider for this section is that the company is currently in the middle of a transition of their new improved and refined company objectives. Many times, in the interviews the respondents refer to before versus now i.e. before the implementation of the improved objectives and status during the ongoing transition. The following table summarizes the respondents' answers under each category.

Human Resources and Training	Recognition and Rewards	Culture and Communication	Leadership and Management	Project Management
Employees have expressed a desire for clearer and more structured training and educational programs.	Stock opportunities, wellness allowance, and flexible working conditions were highlighted as key benefits.	Communication is clear and effective, but there is a desire for more detailed information sharing.	Respondents feel supported by leadership, with ongoing efforts to enhance communication and alignment.	Previously, the project management in the company had some hierarchical structures and siloed operations.
The company is currently focused on enhancing training and educational programs to better facilitate employee development.	Day-to-day recognition was appreciated, but there is a desire for more structured routines.	Employees, many of whom come from larger companies, seek better adaptation to the needs of startup environments.	Past challenges included inflexibility and slight communication silos within the organization.	There has been a shift towards a more integrated framework for project management.
	There is a will to implement performance-related bonuses.	Developing a strong company culture is emphasized to align with the demands and pace of the startup environment.	The organization is now prioritizing clearer objectives and improved communication channels to cultivate a more cohesive work culture.	Opportunities for growth include navigating resistance to change and implementing more standardized processes.
	Enhancing leadership practices is aimed at fostering employee wellbeing.			There is a collective effort within the company towards improvement in project management practices.

*Table 4: A summary of the findings from the interviews for each CSF category. Part 1.*

Strategy and Targets	Customer Focus	Performance Measurements	Financial Capabilities	Lean Principles
Challenges were noted, including the need for lean frameworks in rapidly changing environments.	Some individuals consistently prioritize customer needs.	Performance measurements vary based on roles; for example, engineers emphasize quality, while communication roles focus on e.g. social media growth metrics.	Financial challenges exist due to the startup nature and the high-tech, capital-intensive product.	Most individuals acknowledge the importance of adopting lean principles, but opinions vary on when and how to apply them.
Most respondents expressed optimism about the ongoing transition to align goals with strategic objectives further.	Others prioritize customer needs intermittently but make efforts to stay updated.	Most respondents prioritize meeting deadlines, being on time, and staying within budget.	Prioritization is crucial to effectively manage limited resources.	Some emphasize the need for implementing the right type of lean.
Respondents noted improved visibility, clarity, and a sense of hope for the future during this transition.	Occasionally, the primary focus may shift towards product development rather than solely focusing on the customer.	The typical approach involves achieving binary goals initially, followed by establishing key performance indicators (KPIs) and metrics for further evaluation.	There's a concern about missing out on opportunities due to resource constraints.	Many express the necessity of adopting a lean mindset early on.
			Strong discipline is emphasized, especially given the long return on investment timeline.	One respondent mentioned ongoing work with iterative improvements and lean design, even if not explicitly labeled as academic lean.
			Building trust is essential to showcase accomplishments and secure support, particularly considering the demanding financial status of the startup	Concerns were raised about the potential for lean practices might limit the freedom of engineers.

Table 5: A summary of the findings from the interviews for each CSF category. Part 2.



## 4.1. Human Resources and Training

The first theme that was covered was the company's work with human resources and training. For this subject, the following question was asked to each respondent. *"How does the company support employee development and growth?"*. Some mentioned that they wished the training and educational programs were clearer and more structured. Important to mention is that the company is working on improving these aspects to better support employee development in the future, but some confusion still occurred. One respondent responded with *"I think there are some tools we started using last year, but I don't know the status of this"* while another one said *"A little bit confusing, we don't have a good basis for training or guidance to the employees, as I see it. [...] I believe we still need some improvements on this."*. Despite the experience of lack of formal training in the current state, there seems to be opportunities for each employee to take the matter in their own hands. Among the responses, one explained that *"[...] we ask for the training and they provide us with the training we need."* and another one *"[...] a lot of it has been inhouse development from other people with specific skill sets, but a lack of external training mostly because of funding. [...] we try to do it between the teams and the training is mostly informal."*. There is a lot of focus on self-development, where people own their individual development plan and are the drivers themselves. However, the company has an aspiration to create more training and development programs. One interviewee explained *"With our start-up characteristics, we have to be realistic with what we can provide. We aspire to have a lot of tools and structure but there are areas for development such as doing workshops, development of people and sharing information"*. Another interviewee said *"Right now we are building the company and there is a lack of training. Not everything is in place yet but we are creating this process right now."*

Three of the employees do not mind the lack of formal processes, and experienced that the human resource support is enough today, one of them mentioning *"They are supporting employee development very well. [...] With time, I got a lot of new responsibilities, and HR listens to me and gives me opportunities to develop. It has been great, but process wise, it is hard to say. I would say it is more dynamic and laid back but having 1:1 with managers is key."*

## 4.2. Recognition and Rewards

The second question was linked to the internal recognition and rewards, and the question was the following. *"How does the company support employee development and growth?"*. When asking this question, several terms were repeated among most of the employees. These included "stock opportunities", "salary review" and "benefits". The employees have stock sharing and stock programs, where they can obtain shares depending on their role. When the respondents mentioned benefits, they specified it as wellness allowance, collective agreement with the union, good salary, and overall good working conditions including flex working hours, parental leave, and pension. One

respondent expressed this as *“the company looks at the basics when it comes to recognition; are people paid fairly, are they getting a competitive package as an employee?”*.

Several respondents also highlighted the day-to-day recognition. This way of recognition is an informal process and varies a lot between the different leaders and teams. One employee expressed it as *“[...] giving responsibility day by day, and if you give tasks, you trust the employee. Another thing is more of an informal process where you get told “thank you” and “you did a great job”*. Another respondent brought this up and said *“There is a clear ambition to be transparent and part of that is recognizing people in the day-to-day operations. We try to recognize people for their work and their results are also shown sometimes in our company communication channels, so it is a mix of both the informal and formal recognition. However, there is not enough of a routine or system behind it, as people can then feel confused about what type of results will be highlighted and not”*. The limitation of systems behind this was particularly highlighted by two of the respondents, who pushed on the importance of implementing this. One mentioned that there is no recurrent way of doing this, and that some things are missing, such as group celebrations about big milestones or smaller things that could improve a lot. Another wished to have more special events, gatherings with fika and holiday celebrations such as Christmas parties. There seems to be initiatives that are taken for improving this matter in the future. Two interviewees mentioned that their goal for the company is to implement performance related bonuses, in material terms. One of them mentioned that recognition in soft terms is just as important, and explained that *“recognition in soft terms, and good leadership, is also vital, as it allows opportunities for people to flourish by being part of different workflows”*. This is a goal of the company, and with their current work with strategic objectives all the way to the individual objectives level, there seems to be greater possibilities to measure performance.

### 4.3. Culture and Communication

The third category for the interview framework was culture and communication. The question linked to this category was *“Are there any cultural or communication norms that you think might impact the implementation of new initiatives?”*

The majority of the respondents believes that there is space for improvement regarding communication within the company. However, it has been said by a number of respondents that the communication has been improving recently but that there might still be a gap between teams, which they said is because the company is still small but growing. Another respondent believes that due to the small size of the company, it can be considered that the information flow should be flowing by itself, and that people may take this for granted. What was mentioned several times is the weekly “all hands meetings” that is a relatively new channel created for increasing the communication capability within the company. Other channels used are the intranet and the newsletter that is updated regularly.

Another point that has been brought up, with different formulations, by almost half of the respondents is that it is an improvement for context and explanation would make the understanding of decisions even clearer. One respondent expressed it by “ *It is important to inform and contextualize the information and pull people to the right direction*” and another one mentioned “[...] *but I guess for the organization in full, that is something I hear a lot that clarity is something that people would like to see more of, to say this is what we are going to do and why, here is how we are going to do it, and this is when we will do it*” and “*Sometimes some decisions just come without much explanation and then people don't fully understand why some things are decided*”. Lastly, one respondent expressed their thoughts as: “[...] *we have to give the right context and explain why, otherwise the people will not accept anything and there can be a resistance among the employees. We have to have everybody on board, it's very important to explain why this change is necessary. Some do it really well, but some are not*” . Many believed that the company would be less likely to meet resistance when new initiatives are brought up or new decisions were informed even more.

Moreover, the richness of a multicultural environment was discussed by two respondents, where both agreed about the many benefits that come with it, however they mentioned that it also comes with challenges in aligning the different experiences and ways of approaching from their earlier work places which in most cases has been in more traditional larger companies, described by one respondent like this “*We are a start-up and yet have hired people with a lot of experience. Many of them are coming from traditional companies that are set in their ways [...]*”. The tendencies of this, according to some of the respondents, are that employees are used to less dynamic and fluid organizations, which start-ups are. Therefore, the desire of finding the company's own way of doing things has been one of the topics that has been brought up several times in the interviews. Another respondent spoke about this as well but formulated it by “[...] *in terms of culture, we are a multicultural company which is good because it can bring more results and can be a rich interaction. But as a company we still need to define our culture, we are building our culture. It is not well defined yet*” . Time is a resource that also has been mentioned, where many of the respondents are hopeful about the improvements, and that all they need is time: “*The company is still building their way of doing things, and this takes time*”.

Lastly, most of the respondent believed that the top management holds an important role in this subject, where engagement in flowing information down is important. Again, due to the transition of the new objectives, this has also been improved according to the respondents thanks to the weekly meetings as well as the newsletters, the intranet and the accessibility of the new well defined and refined objectives.

### 4.3. Leadership and Management

Leadership and Management is the next category that was a part of our CSFs. The question linked to this was “*Can you provide examples of how leadership has supported or hindered organizational change efforts in the past?*”.

The initial response to this question among most respondents was that they feel supported by the leaders and top management. The leaders are working closely with the teams, allowing for interaction. One interviewee explains it as “[...] *the leadership is very supportive, and we can always go and talk to them, but this is still improving*” and another one mentions “*The management is fully supportive, especially if you come with good justifications and explanations on why the change is necessary. If you have a good proposal, they will support you*”. The all-hands meetings that are being held are also helping with making sure everyone is understanding the vision.

When diving deeper into the question, the majority of the respondents compared the situation before versus now, due to the current change of the strategy at the company. Looking at the situation before the change, terms such as “inflexible”, “silos” and “lack of communication/ connection” were common among the responses. The organization seems to have gone from a culture where the organization has been compartmentalized with silos between the different teams, resulting in an inflexibility to change. There seems to have been a lack of communication and difficulties ensuring that all information goes to the employees, and one respondent highlighted this by saying “*the decision from the top needs to be spread among the other employees, and it needs to be pushed down to people*”. Another employee further highlighted the top management and said “[...] *the top management was missing a lot. There was a lack of information and communication among the employees as the communication channels were insufficient*”. Despite the inflexibility that has previously been experienced among a number of the employees, there is a bright attitude towards the current change that the organization has implemented, reducing the silos from before. Their new strategy includes clearer objectives all the way down to the individual level, and when the current state was discussed, terms such as “alignment”, “sustainability” and “visibility” were mentioned. One respondent says “*There is a change in motion as we speak. Before, there was a lack of connection between the individuals and the teams. With clearer objectives, there is effort on creating that connection*”. Another one also mentions that “*The information needs to flow, both ways. Today with the new objectives, this is a part of everyone’s deliverables. One of the deliverables is to have an inclusive and trust-based work culture where people need to speak up if something is wrong. Another new deliverable is to make sure that people receive the communication that they need through communication channels.*”.

Overall, the responses show a previous lack of communication that is now getting reduced. One respondent explains the leadership journey as “bumpy”, with good leaders on one hand, and some leaders that need to improve. The same respondent explains the situation and the current changes by saying “[...] *we need to create a culture where everyone is leaning in in order to progress and manage changes. In a start-up, it is common to see a turnover of leadership when starting to scale up and*

*mature. Leaders who are good in one phase may not be appropriate or willing for the next stage of growth. The good thing is, we recognize this, and we are good at self-awareness. We are critical and understand where we need to improve our leadership”.*

#### 4.4. Project Management

The next category, project management, was covered by asking the following question: *“Can you describe how different projects are typically managed within the company, especially with regards to prioritization and allocation of the resources?”.*

A couple of respondents mentioned the previous status of how projects were managed, before the current transition. One respondent explained the state before the shift as *“people operating in silos and creating things on their own, with a shortage of planning activities and a planning framework”.* Another respondent said *“We worked to create a framework, a high-level master plan of the program, with each one of the areas responsible for their project to fit the program. We realized that some of the areas, due to low levels of maturity, were not able to have predictive planning”.* Two employees emphasized the potential issues with resistance and ways they are working to reduce this. One of them says *“[...] there are people who dislike being controlled, and they are a roadblock. We need to push the people all the time to create activities and a schedule. We are trying to create this environment, so it is more precise from a project management perspective. It will give answers to “What do I have to do?”, critical deliverables, milestones and priorities.”.* The other respondent touched on the same subject and said *“Some individuals are agile, and others are resistant. In a start-up, the project environment demands a frequent change, and we must be reactive”.*

10 out of the 13 respondents agree that there are efforts trying to improve the project management with the current transition they are in, including the defined and improved company objectives. The organization is in this ongoing transition, and these respondents are already seeing initiatives and changes towards the right direction. One interviewee mentions that the project management is trying to get integrated better and explains their experience. *“At the moment all departments work in different ways, creating places to connect information and creating standardized templates, so it is improving step by step. Today, the company is more connected than ever in terms of project management, and we are trying to standardize more and more”.* Another respondent brings up the importance of being connected and mentions that *“[...] the project management has become workflow based. The ambition with the deliverables is to enable cross team collaborations”.* Three respondents touched upon the subject on how this improvement will be executed in practice, in more detailed terms. The responses were *“We are now pushing that each area needs a project manager for the project, with specific deliverables. They need to know cost, budget, resource allocation and more.”,* *“[...] we are trying to create high accountability with the ones responsible for the projects, and a high mandate and responsibility in terms of keeping all stakeholders related to that project informed. So it is a positive change”* and lastly *“One of the most important things we are trying to do is get to a point where we only*

*talk about our objectives every day, and only have meetings connected to those objectives. We are now discussing the new format for this. We want to improve decision making, quick decisions, alignment in the company, efficiency in what we do. We have to ensure we have the right mindset and talk the same language.”.*

Despite the ongoing transition towards better processes for this, three respondents highlighted areas for refinement rather than solely focusing on improvement initiatives. One respondent mentioned that there is room for enhancement in project management: *“The project manager is not so influential. We set the objectives ourselves and execute them within the team, with no associated program manager responsible”.* Another respondent noted the need for clearer structure of project details: *“The owner of the project should come and present how and why we are doing it, who is doing it and a time frame. We need clear structure. For me, there is a lack of management in some projects”.* The third respondent expressed a desire for more standardized processes: *“Everyone does different things, things are missed out. It can be a pain when you take over projects and there are no templates available. There is also no process for allocating people to projects”.*

## 4.5 Strategy and Targets

For the next category with the headline strategy and targets, the following question was asked to the respondents. *“How are the individual and team goals aligned with the company’s strategic priorities?”.*

One respondent differed from the overall direction of the responses, and this employee experienced it as a matter that all depends on the team and team leader. The respondent continued by giving an example about a previous experience where the team in question was very aligned. *“We had weekly deliverables linked to the long-term deliverables. The links and priorities were clear. We also implemented SCRUM<sup>1</sup> which was clear. But some teams do not have this, especially engineers.”.*

Another respondent focuses on the start-up characteristics and how this needs to be improved, which can be done with the help of lean. They mention that there are a lot of tasks that need to be done, but the company is too small for it: *“It is a challenge for us to set up objectives, things change so fast such as fundraising and circumstances. This is an area that is a challenge for us since we are a start-up and not a traditional company. The lean framework would be better in this case, as things are changing so fast. The objectives, the definitions, and how often we can change the objectives are all areas that have its challenges.”.*

This question was very relevant for the new strategic, tactical and operational objectives in the company. 7 out of 13 respondents highlighted this aspect, by mentioning that the

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<sup>1</sup> Scrum is an agile method where a team collaborates to deliver valuable products to stakeholders in complex environments (Schwaber, 2010).

new strategic priorities have resulted in well-aligned individual and team goals. One respondent says *“The company is learning, in a more team way, how to connect teams and individual goals with the overall strategic priorities. Before the transition, everyone spoke differently about the strategy since the objectives were unclear. Now when the objectives are shared among all, every employee's individual work is strongly connected to the overall objectives. Today it will be very hard to not relate to it. We have built an environment for this and every employee can see the information openly.”*. The current strategic objectives are divided in a way that there are three main strategic objectives on the top level, divided into subcategories and departmental objectives, until it reaches every individual at the company. One respondent explains that *“[...] it will all be in the same system, easy to access, visible and live”*. The majority of the interviewees believe that this change has aligned the individual and team goals with the strategic priorities very well. One employee mentions *“I believe strongly in this change with the defined objectives from top to daily individual activities. This will be valuable for every employee to know that they focus on the right things that add value directly to the company.”*. Another one says *“Today the employees are always discussing and connecting everything to the objectives. We are more well-directed than ever.”*. As the newly defined objectives are still very new, it is all still in progress. However, the overall results seem to have had a positive impact when looking at the responses. One respondent expresses it as *“a very good starting point where clarity is improved”* and another one is *“very hopeful for the objectives, but everything needs to be done correctly to see improvement”*. In summary, the team goals and individual goals are getting more and more aligned with the strategic priorities due to the new objectives that are being implemented. The visibility and clarity have been improved, and there seems to be a sense of hope and relief among the respondents.

## 4.6. Customer Focus

Moving on to customer focus, the question linked to this category was *“How integrated is the customer's perspective in your daily work tasks?”*. Every respondent highlighted the importance of having a customer focused mindset put into words like *“[...] in the end, what we are trying to do is to have a product that they want. Here we are really good, we always look at what the customer wants”* and *“The final customer is very important, all requirements that we can reach for the final product”*. The responses were quite varied among the respondents depending on their role in the company. Some of the respondents divided customers into both internal and external customers *“We need to try to create the best for every customer, both internally and externally [...]”*. However, most of the respondents interpreted the question as the end customer where for some respondents they thought of the customer daily *“I think we have a good dynamic, a good organization and structure and have a form where we receive customer inputs, so, I am always thinking about the customer.”* and *“We have constant dialogue with the customers when developing the product [...]”*. Whilst others think of the customers sometimes, but make sure to always stay updated, one of the respondents explained it like this *“I don't think of it every day. But I am quite updated about it”*.

Another point that was brought up by two of the respondents was that the main focus was on the product or the project since neither the product or project is concretized in terms of being finished. *“It is a long term project and the customer only sees the product when its certified at the end so we don't have a lot of visibility for the end customer[...]*” said one of the respondents while the other one said *“[...] whenever I discuss the delivery plan, yes, I think of the customer”* which indicates that the main focus is the product but that the end customer focus comes up when discussing about it. Moreover, the perception of being a leading company with the most competent people on the market makes it important to always update the customers if there are any changes *“Creating a perception of a company as a leading one with smart people that you want to work with. We need to take into consideration, if we communicate a change of the product, we need to flag it to the customers. ”* In contrast another respondent explained that it is not possible to include the customer in an objective way of validation, since the product is a high tech intensive with long lead time, *“[...] Taking the high tech product to the customer and validating it back is hard, since it's a high tech product we are talking about”*. In summary, all of the respondents emphasized that customer focus, both internal and external, is vital for the company to be successful, however sometimes the main focus switches to the product.

## 4.7. Performance Measurements

Performance measurements was the next category asked during the interviews. The question linked to it was *“Which metrics and key performance indicators (KPI) are at the forefront of your mind?”*. The responses varied depending on their role such as a respondent working within human resources concretized the performance metrics as improving already existing processes. This was explained that it could be done by either adding steps to an for instance recruitment process or removing a step *“[...] there is usually not numbers but more processes such as adding a step in the recruitment process in order to succeed and be able to hire the best people. It is a more qualitative measure in human resources”*.

Further, respondents within the communications department had measured its performance in terms of social media growth, where one example was to increase the number of followers on LinkedIn and be a presence on media *“Last year we had KPI to increase followers on LinkedIn and develop an intranet. Presence of the media to grow and that it is positive. Now, we work with the deliverables and objectives - then we break down the tasks into subtasks. One example is that one objective should be a compelling partner, we need to have meetings and communicate well. The goal is to have individual KPIs now”*. The new improved objective strategy is broken down to sub tasks where every individual is given indicators they should focus on, but this is still in process. The phrases *“meeting the schedule”, “being on time”* and *“being on budget”* were repeated by several respondents. One respondent answered the question that there is only one thing that is important, which is to finish something or not. Another respondent expressed that they usually have a lot of tasks, and it is not easy to concretize the size of the tasks since usually it can take longer time than expected *“[...] it is not always easy to estimate the size of the tasks, so it can be difficult to know the scope fully and put it in the schedule. We learn along the way and sometimes it can take*

*longer than expected*". Whereas one respondent describes it as the metrics at the moment in the company are binary *"Create revenue from [...] there is a high focus on this. That is always on the mind. We are still exploring a lot, it's pretty early on, we have numbers, but we still have to verify them. What we are looking at now is a binary goal, can this make revenue or not. After we know that, it will be clearer. Still very early on"*. When reaching that and collecting that type of information the next step will be to define KPIs and metrics.

Moreover, some respondents, mostly the ones from the engineering department, explained that they think about the product performance such as product quality since the industry that the company belongs to is heavily dependent on high quality products. Further, a respondent explained that there are meetings once per month where the manager shows the status of a project and has indicators for each target. If the target has not been reached there will be actions to accomplish it. Lastly, one respondent answered that the focus was on the people, to have an employee framework and measurables on their financing and funding strategy. *"We are ensuring we keep a good discipline, any objective needs to be measurable, the management team needs to sign off on all KPIs. So personally, I focus on the people and employee framework, AI driven questionnaires to all employees to help us what is bothering people, measurables on our financing and funding strategy"*.

## 4.8. Financial Capabilities

The next category discussed was financial capabilities, with the question linked to it was *"Are there any financial considerations that you think might impact the company's ability to pursue new opportunities or initiatives?"*. The answers were most of the time the same were explanations about the natural reason that the company is a start-up. That they all depend fully on investors capital and that the company right now only costs money. One respondent said *"We need to have resources to progress"*. Other respondents expressed this topic like this *"At the moment we are in now, we cannot spend a penny that is not related to the objectives that we have[...]"* and *"We have to be very responsible for every dollar that we have"*. Summarizing that the fact the company is a start-up with a high-tech product affects the financial capabilities a lot. One respondent explained the situation as a paradox since they are a start-up, meaning they have limited resources, but their product is very capital intensive, where there is a huge need of resources, *"[...] so it's a little bit of a paradox, we are a start-up and need a lot of money and need to be smart by having partnerships, relationships and diminish the risks. If we can show that the risk of working with us is lower than the other"*.

Prioritization was brought up a few times where one respondent talked about timing and decisions, that sometimes it might be better to make an investment later than now *"[...] but sometimes we need to be smart and be careful to not make premature decisions."* Whereas one respondent explained that prioritization is a need when in this current state. The respondent felt that the department the respondent belonged to is highly prioritized *"We are a start-up, so we are depending on capital, so we need to*

*prioritize. That is impacting the entire organization. For me, I feel grateful because what I am working with has priorities[...]*". Another point that was discussed by a number of respondents is the risk of missing good opportunities, since the company needs to prioritize, one respondent said, *"If there are good opportunities, and they are not pitched correctly, they might fall on the side."*

Moreover, the transparency of the financial situation seemed to be organization wide, most of the respondents knew about where the company is standing and how much they have *"[...] The communication about it now is quite open so we know where we are and how much we have "*. This was further discussed by another respondent where planning the objective is important to not lose sight of what you have in the bank, *"[...] You can fall into a false sense of where you are because you are planning too far ahead. So you need to be disciplined in ensuring that you are conservative in your planning. This is a long journey and the pay back on these investments is years. So we rely on a lot of development milestones and being disciplined on knowing what to spend "*.

Lastly, the theme of being trusted and convincing was strongly discussed by the respondents, where expressions like *"We need people to trust the company"* and *"We need to convince people that our product is compatible and cost worthy and deliver on what we promise"*. One respondent explained the process as iterations, where the company shows the investors step by step of their accomplishments so they can *"[...] buy the risk"*.

## 4.9. Lean Principles

The wrapping up category was about lean, where the question was *"How important do you think it is for the company to implement lean?"*. The absolute majority of the respondent expressed that they believed that implementing lean is very important, which was expressed differently such as *"I think it's important, very important"*, *"For all the industries, lean is very important because the main philosophy for lean is to not have waste"* and *"I believe it is super important to implement lean"*. One respondent did not have any opinion regarding lean implementation, but explained the cruciality of always wanting to work in the most efficient way, since there is a high pace in the company and a lot of things needs to be done *" [...] but if it's lean or agile, I don't really know. In the big meetings they talk about lean, but not in my department. But we always try to work as modern and effective as possible, to not do too much manual work for instance"*.

Regarding when lean should be implemented, a few respondents made sure to express their thoughts whereas the majority said as soon as possible or that it already should have been implemented *"We should have implemented it yesterday"* and *"I think it's important to implement it at the company, right now. The more we wait, the less benefits we get. Everything you do, you need to look at it again, again and again to see if you can do it better and faster because time is money"*. While others explained it more in a way of making sure to implement the correct type of lean.

Furthermore, in discussion regarding how to implement it, one respondent believed that there is a need to implement the correct type of lean, which some respondents expressed differently, for instance “[...] I'm pushing to implement lean product development in engineering, which is very different from lean manufacturing. The lean product development must be applied from the very beginning in a start-up” and “ [...] but there you have lean manufacturing and more lean by design. We started manufacturing with kaizen, but lean design is more appropriate for us”. Linked to the discussions about the type of lean, a number of respondents brought up lean mindset and to have the correct mentality “[...] the mentality should be there from the very beginning, for instance with continuous improvement, waste less. Implementing the methodology and tools and framework, for this you need more muscle and more people from the company. But the mentality is the number one step”. Another respondent mentioned that there has been some initiatives before and that “It should be encouraged again. I know that we are at a time it is a little bit different, but we can still start with smaller things in lean, and I believe it should help”. One respondent expressed that they are already working with iteration loops through testing, approving and lean design, but that they have not been saying that it is lean “[...] we are kind of doing that already, but we are not telling everybody that we are doing it academically”.

Lastly, one respondent brought up that lean might restrict the level of freedom for the engineers since they are in the design phase and according to the respondent there is a need for freedom: “They should implement it once we have designed things. Now we are designing things and design needs freedom [...] because lean brings discipline and right now, we need a little bit of freedom. It can cause the designers to feel like they don't have freedom because it will set rules for them”.

## 5. Discussion

The following chapter will summarize the key findings from our research and connect it to the theory. There will be a comprehensive analysis of the findings obtained through our research. The chapter is structured into several key subsections, each focusing on distinct aspects of the study. The subsections will delve into each critical success factor (CSF) that has been issued in the theoretical background and results section. The emphasis will be on the contribution of the research and what new insights it brings. It has been acknowledged that the CSFs that have been analyzed overlap and interconnect. To manage this, a categorization approach will be used, where similar findings are grouped together to form statements or recommendations. This approach will help in connecting the themes and insights into actionable recommendations and conclusions for the thesis. At the end of the chapter a summarizing table will outline the discussion areas, link them to the CSF, and provide a brief summary of each discussion.

### 5.1. Factors That Enable Smooth Lean Implementation

What is commonly characterized for start-ups are the lack of financial capabilities because most of the time there is no revenue or break even reached. This puts pressure on the company for business network, team commitment and heterogeneity in the functional capabilities of the company to compensate for the lack of resources (Paradkar et al., 2015). Given the results, innovative start-ups can be stressed to make the right decisions since there is no time to make wrong decisions since the investors expect returns. This puts even more pressure on start-ups to not only operate and develop with limited resources but also be on time for stakeholders. At the same time, there is a fear of missing out on opportunities for instance due to weak pitch of an opportunity or simply because of a wrong decision being made. Time and money that does not add any value to a start-up can have negative effects for the start-up and the stakeholders (Slack et al., 2016).

The purpose of lean principles is to deliver maximum value through a customer centric approach simultaneously as it reduces waste which includes time and money (Pessôa & Trabasso, 2016). In theory it seems that applying lean principles to an innovative start-up is the perfect fit since an innovative start up does neither have time or money to make the wrong decisions. However, lean principles are strongly linked to companies with already established and mature manufacturing processes. But recently lean principles have started to be used in general management and put into context that does not involve manufacturing processes (Mueller & Thoring, 2012). This means that there are possibilities for a successful implementation of lean principles onto an innovative start-up.

As innovative start-ups often lack financial resources and face intense pressure to make it in time, make the right decisions to meet investors' expectations. Lean principles offer potential solutions by emphasizing value maximization and waste reduction (Belekoukias et al., 2014). For this study ten critical success factors have been identified for which is needed to enable a smoother lean implementation. These factors are leadership and management, culture and communication, human resource and training, project management, strategy and targets, recognition and rewards, customer focus, performance measurements, financial capabilities, and lean principles.

## 5.2. Structured HR Programs

The start-up characteristics influence the company's approach to employee training and development. There is an aspiration to establish structured programs with a lot of tools to support employees, but due to resource constraints and the dynamic nature of start-ups, it can be a challenge in implementing this. The results show that there is a current need for structure in the company's formal training programs, and some confusion about the availability of training tools is present. As a result of the constraints, the company currently takes quite an autonomy and self-leadership focused approach to employee development, and the majority of the employees drive their own development needs by being active and taking action themselves. There is a notable trend of employees taking initiative for their own learning journey such as requesting training as needed and engaging in informal learning opportunities. Another approach that is being taken is the development of people internally and fostering a culture of information sharing. The importance of regular one-on-one interactions with managers is emphasized, as well as knowledge sharing between employees.

The importance of building competence in the internal organization comes with training and learning programs (Singh, 2012). The case company's focus on self-leadership is an essential part of building competence, as well as the support from HR that is experienced by the employees. By initiating a more formal way of training, there will be further improvement of the competence and knowledge among employees. Without including training and learning to effectively adapt, there will be resistance in the new ways of working (Oakland et al., 2007). One of the major reasons for the resistance is people being skeptical of their competence, meaning that they believe that they lack the competence for the skills needed. By enhancing the knowledge among the employees, the risk of resistance can be reduced while improving the internal knowledge (Schuler, 2003). With the new organizational objectives that have been defined at the case company, the role of HR can be further strengthened in aligning the training initiatives with the organizational objectives. This will not only ensure that the employees learn skills directly applicable to their roles and the company's strategic goals, but it will help in increasing the efficiency, a reduction of waste and standardization in the work processes, ensuring consistency in operations and keeping the workload distributed. The main focus of these trainings can go from a broader and more generic area towards a more technical side with time and as more resources such as funding are available. An initial concept could be learning agendas including values at the company, administration courses, leadership training and an introduction of the lean concept. This

is a good step towards the implementation of lean, as it promotes a culture of standard work, motivation and engagement among employees.

Another vital step in achieving a workplace with engaged and motivated employees is to reward them for their achievements, with informal acknowledgements as well as formal recognitions. The combination of recognition in hard and soft terms is essential for keeping the employees satisfied and motivated, especially in a start-up where the workload is intense due to the limited resources and time pressure (Lizarelli et al., 2021; Alhuraish et al., 2017). The results from the interviews show that the main focus area when it comes to recognition is on tangible benefits. The key aspects include stock opportunities, good salary, salary reviews and wellness allowance and these tangible rewards play a significant role in employee satisfaction and work as a hands-on action to show appreciation to the individuals. The results further show an act of informal recognition in the form of getting responsibility and feeling trusted by their manager. It is also expressed that there is a goal of implementing performance related bonuses, and the new objectives can help in this sense. The objectives can also work as an overall motivator for the individuals, as it can incentivize high performance. However, it is expressed that the day-to-day recognition varies a lot between different leaders, due to individual characteristics of the leaders. With these concerns about informal routines and systems of recognition, the result is a gap in employee appreciation efforts. This strengthens the need for training that focuses on good leadership practices and mentoring, as the differences in leadership has shown that the employees' experiences are very different in day-to-day work. By implementing training for good leadership practices, the leaders can develop their ways of working with a team and get aware of how a good leadership behavior can affect employee motivation.

To conclude, structured HR programs including formal training and consistent recognition systems for employee development is crucial. It can help in enhancing competence, motivation, and operational efficiency in the start-up environment.

### 5.3. Strategic Communication and Cultural Alignment

It is shown from the results that innovative start-ups might experience the communication is improving over time due to its dynamic nature, especially since the companies are growing. The challenges that are experienced are mostly about the communication silos between departments and the desire of having more informed and contextualized communication since lots of decisions and changes are made. The effects of lacking well informed information to the rest of the employees are that there will be a low level of understanding and there might occur resistance to the decision or change that has been made. By having weekly meetings with the employees these barriers can be overcome, as well as more usage of the company's own communication channels according to some of the respondents.

The results also showed that having a multicultural environment in a start-up comes with many benefits thanks to different experiences that the teams can learn from each other. However, it is stated that companies with this nature need to manage the

alignment of the employees' experience, since start-ups, especially with an innovative product, usually hires experienced employees that most likely have a background from traditional companies. These employees are less likely used to the fluidity and agile environment that start-ups have. Simultaneously, start-ups are on their way to define their own culture. Respondents indicated that, based on their previous experience, the culture at more mature companies was more clearly defined compared to start-ups.

The terms communication and culture are connected to each other. Communication is seen as a part of a company's culture and it is defined as *“a process through which cultural difference is expressed and constructed”* (Philipsen, 2002, p.51). The importance of having a strong communication and a defined culture is high when new initiatives are brought up in environments that are diversified (Bakås et al., 2011). To enhance the culture in an innovative start-up it is vital that the company has a clear mission as it aligns and motivates employees towards a shared goal. To strengthen the communication, it is vital to make sure that there is a shared language throughout the whole organization. This can ensure that no matter position or department an employee belongs to, the information should be understood equally. For innovative start-ups there is a clear need for even further understanding since the environment is characterized by its fast pace and information changes more often than in mature companies. For an organization to implement a new initiative, in this case, lean principles which will change the way of how people are used to work, it is needed to prepare the employees toward a behavioral change. According to Schuler (2003) one reason for people being resistant to change is that people think it is riskier to change than to just stand still. To minimize resistance when an innovative start-up aims to implement lean principles it is crucial to prioritize improving their communication skills to facilitate the lean mindset throughout the organization for future successful implementation of lean principles.

In summary, strategic communication and cultural alignment are essential for successful lean implementation in innovative start-ups. Regular meetings, effective use of communication channels and fostering a unified culture can mitigate resistance and align employees with the dynamic nature of start-up environments.

#### 5.4. Cultivating Openness, Alignment and Standardization

Leadership, management and project management are three areas that overlap and interconnect with each other in several different ways. Despite their slight differences, they all have the purpose of reaching the same objectives including integration, effectiveness, a clear vision, and continuous improvement. Leadership sets the direction and drives the change, while management is more about organization, implementation and ensuring efficiency. Project management is a combination of both, and the major difference is that it is temporary, meaning that it has a beginning and end. All these together influence the management team and a committed management team is the foundation of implementing lean principles (Schwalbe, 2009; Toor & Ofori, 2008; Achanga et al., 2006).

The results show that there is support by top management in organizational change efforts, and accessibility as well as receptiveness to proposals for change is highlighted. Knowledge enhancement is reached by the all-hands meetings, which work as effective forums for communication of the company's vision. Results further show that previous leadership challenges in an innovative start-up include lack of communication and information sharing. Compartmentalized structure has previously hindered flexibility, leading to disconnection and employee frustration. However, the current objectives are connected to inclusive communication channels, which can help in information reaching employees effectively. By ensuring everyone shares the same language and working in an environment where communication is transparent and open, employees will get a greater understanding for change efforts and why they are needed. Change comes with risk, but if people understand the need for the change and believe that changing is vital to go forward, the resistance will decrease. This is strongly connected to a leadership that is communicative and explains and defines why the changes are needed (Schuler, 2003).

From a project management perspective, the previous challenges are strongly connected to the nature of innovative start-ups and include limited planning frameworks and a lack of coordination and structure across projects. Respondents emphasized the importance of standardization, integration and accountability of project management practices. The lack of these practices is a typical characteristic of start-ups, as these organizations often must prioritize their activities and time, resulting in a prioritization of the most urgent tasks (Bakås et al., 2011). To implement lean principles, there has to be a clear process of allocating resources and time meaning that the project management practices have to be standardized. Another vital aspect of implementing lean principles includes having dedicated teams that improve their competencies, decrease their resistance and increase team collaboration (Lizarelli et al., 2021). Specifically, resistance to change has been a concern in the case company, and the results show that this often includes concerns regarding control and agility. Therefore, areas for improvement include reducing the resistance for change and a standardized project management. When it comes to specific projects that are being executed, there is an opportunity for clearer structure and a standardized way of communicating the strategy in each project. There are already tools available to execute projects, but the project management has an opportunity to get integrated better. By defining clear success measures and having standardized templates to be used by each team, the departments can reach a way of working more aligned. The strategy is there, but an improvement of the structure and formal ways of handling it will be advantageous. Further, overcoming the resistance is strongly connected to the mindset of the employees, and there are several methods that can be used to overcome this. The leaders can demonstrate how the new ways of working can be beneficial, and this can be enhanced by using numbers or emotions. It can also be done by including effective training programs and informative events that present the plan for change. Another important effort is for the leaders to help the employees understand how their values and sense of purpose can still be realized under the new system. This last step is already getting implemented, as the new objectives work to understand how the employees contribute to the overall goals. By cultivating openness, alignment and standardization in leadership and management, the integration and efficiency of a lean implementation can be enhanced.

## 5.5. Clear Objectives and Defined Processes

Strategy and targets are majorly about the overarching plan of actions a company undertakes, and it outlines the objectives of the company. The strategy helps reach the targets, which can refer to the strategic goals of the organization (Hax, 1990). As previously mentioned, the case company is in the middle of a transition of their new improved and refined company objectives. The strategic objectives are structured in a hierarchical manner, with top level objectives cascading down to departmental and individual goals. By having this structure, everyone's individual work will be directly linked to the strategic priorities. This is further confirmed from the results where it is clear that the new strategic objectives have improved alignment between individual and team goals and the overall strategic priorities. This sets a great starting point for achieving a well-defined strategy that provides direction and alignment, which is further required by start-ups when implementing lean principles. The clarity of the strategy and objectives is specifically important in a start-up where the environment is fast-paced and uncertain. With a roadmap that guides the decision-making and resource allocation, appropriate targets can be reached (Arnold & Artz, 2015; Netland, 2015). Results also show that this initiative improves the mental state of the individuals, as they get a clear understanding of how their contributions play a part in the overall success, leading to a better sense of direction and purpose. This confirms the theory that pushes on the importance of sharing the same language and having a well-defined mission (Franklin, 2024; Bakås et al., 2011).

Further, performance measurements and KPIs are a cornerstone in the strategy and in reaching the targets. These metrics are used to qualify the efficiency and effectiveness of actions that are taken to reach the goals (Bakås et al., 2011c). The results show that the KPIs in innovative start-ups are mainly based on meeting deadlines, being on time and staying within budget, meaning that the major approach involves achieving binary goals i.e. will this give the company revenue or not. It is common for small- and medium-sized enterprises, including innovative start-ups, to focus mainly on the economic metrics, especially in companies that lack measuring of operational processes. Innovative start-ups are not only at risk of having undefined operational processes, but also at risk for a lot of time pressure, resulting in having to prioritize tasks depending on deadlines. This complicates working with KPIs, as there is not enough historical data to depend on and define the KPIs with. It is further shown that planning is only accurate when there is stable historical data accessible, which is not the case for innovative start-ups (Ries, 2011). When working with a new innovative product in a capital-intensive industry, defining a scope gets more difficult as the environment is constantly changing. However, the case company's deliverables and objectives that are now defined can ease the process of setting a scope. The role of objectives can work as a guide to give a clear sense of purpose and direction for the employees, and when everyone is working towards the same purpose, it will be easier to measure performance. By additionally defining the operational processes in the start-up, it will be easier to establish and track the KPIs accurately. The clear objectives together with an implementation of defined processes can enhance the employees understanding of their expectations and priorities, helping in establishing individual KPIs. This can further be a major motivator for everyone (Bakås et al., 2011c)

Therefore, the strategy and productivity can be improved by defining the internal processes, starting with identification, documentation and standardization of processes.

In conclusion, the importance of clear objectives and defined processes are essential in a start-up environment. These work as a guide to provide direction, improve alignment and effectively measure performance through KPIs, thereby enhancing operational efficiency.

## 5.6. Overcoming Resistance to Change and Customer Focus

From the results, it is apparent that an innovative start-up integrates the mind to focus on the customers. However, there are some employees that don't put full focus on the customers in their everyday tasks, but they make sure to stay updated. The occurring challenge for start-ups with an innovative product is that the primary focus may shift towards the product itself rather than the customer. Also, noting that employees define their customer differently, where some might refer to internal customers while others to the final customer. Another possible challenge for innovative start-ups is the difficulties to include the customer in every step of their validation process of the product, because the product is characterized by long lead times.

Customers have dynamic needs, and their desires are always changing. If the management in an innovative start-up does not incorporate customer focus, they will risk losing competitive advantage in the future (Yangailo, 2023). Since innovative start-ups usually have an innovative product or service, specifically the case company in this study, whose product relies on complex technology, the main focus often relies on the product development. However, it is crucial for innovative start-ups to integrate a system that handles customer feedback in the early phases by increasing the customer contact with the customers despite the finished product being far from finished, even though there are struggles of doing that. To increase the level of customer focus it can be a good idea to increase the iterative feedback, meaning having the mindset to use the customer feedback as a foundation for improving the product. There are different ways of doing that, for instance increasing the number of face-to-face interactions and involving more people from the organization, except those who already have customer contact within their everyday job tasks (Lizarelli et al., 2021). By increasing the level of customer focus throughout all employees in the organization, the possibilities to decrease the gaps of various customer focus levels between the departments. Furthermore, it will enhance the visibility of the customer for the employees, since the long lead times might interrupt and limit the actual focus on the customer.

Moreover, the application of the lean principles are usually linked to the shop floor i.e. manufacturing processes. While it is clear that this creates barriers between the employees on the shop floor and the employees in the offices (Alhuraish et al., 2017). Since an innovative start-up, and specifically in the case of a company that is currently in the development phase and has not entered commercial production, there are no established processes or shop floors for the lean principles to be applied on. However, earlier in this section it has been discussed the importance of lean principles in the

theory to be added in the company even though there are not established manufacturing processes. Therefore, there are different types of lean principles that are more suitable for an innovative company, for instance lean design, due to its applicability on the development process (Tilley, 2005). Nevertheless, before even initiating lean design it is important to, again, have an approach against the resistance of change which can be done by developing a process of integrating lean thinking throughout the company. To enable this mindset, it is important for the start-up to have effective communication and a defined culture, which is discussed in the previous section.

To summarize, innovative start-ups need to maintain a strong customer focus despite its challenges such as long lead times and varying perception of “customer” among the employees. While lean principles traditionally apply to manufacturing, their adaptation areas such as lean design can help high tech start-ups integrate customer feedback early and continuously. Effective communication and a defined culture are crucial for overcoming resistance to change and successfully implementing lean thinking.

<b>Discussion Areas</b>	<b>Critical Success Factor</b>	<b>Summary</b>
Factors that enables smooth lean implementation	<i>Financial Capabilities</i>	Innovative start-ups, under financial constraints and striving to meet investor expectations, can benefit from lean principles focused on value maximization and waste reduction.
Structured HR programmes	<i>Human Resource and Training &amp; Recognition and Rewards</i>	Structured HR programs, with formal training and consistent recognition systems, are crucial for enhancing competence, motivation, and operational efficiency in startups.
Strategic communication and cultural alignment	<i>Culture and Communication</i>	Strategic communication and cultural alignment are vital for successful lean implementation in innovative startups. Regular meetings, efficient communication channels, and fostering a unified culture can mitigate resistance and align employees with the dynamic startup environment.
Cultivating openness, alignment and standardization	<i>Leadership and Management &amp; Project Management</i>	By fostering openness, alignment, and standardization in leadership and management, the integration and efficiency of lean implementation can be enhanced.
Clear objectives and defined processes	<i>Strategy and Targets &amp; Performance Measurements</i>	Clear objectives and defined processes are crucial in a startup environment. They serve as guides to provide direction, improve alignment, and effectively measure performance through KPIs, thus enhancing operational efficiency.
Overcoming resistance to change and customer focus	<i>Lean Principles &amp; Customer focus</i>	Prioritize customer focus despite challenges like long lead times and varying perceptions among employees. Adapting lean principles such as lean design and effective communication to integrate customer feedback early, driving success.

*Table 5. Visualization of the discussion areas, CSFs and overall summary.*

## 6. Conclusion and recommendations

In the following chapter, the discussions of the study will be concluded. The two research questions will be answered followed by recommendations for the case company. These are the following questions: *RQ1: What are the key factors for successful lean implementation in an innovative start-up?* and *RQ2: Which strategies align with these key factors to foster optimal conditions for successful lean implementation?* The final section of this chapter will present implications for future research.

### 6.1 Key factors for successful lean implementation

This section will answer our first research question that had the purpose of presenting key factors that need to be considered to successfully implement lean in an innovative start-up. Without these, there is risk for an incorrect application of lean strategies, which can result in inefficient use or a need for re-doings of the organization's resources and a reduced employee confidence. Therefore, it is crucial to consider using the correct factors in the early phases. Ten CSFs, or managerial areas, has been defined, and these need continual attention to make sure that they are reached and sustained. The CSFs that have been identified are: leadership and management, culture and communication, human resource and training, project management, strategy and targets, recognition and rewards, customer focus, performance measurements, financial capabilities and lean principles.

### 6.2 Strategies needed to foster optimal conditions for lean

The second research question presents a number of strategies that align with the CSFs that were formulated above. The first strategy is about implementing structured HR programs. By implementing formal training and recognition systems for employee development, the case company can foster a culture of continuous learning resulting in the employees sharing the same language. It ensures that employees are equipped with the necessary skills and knowledge to have the lean mindset and later implement lean practices effectively. The second strategy is about establishing clear communication channels and fostering a culture of openness and alignment. Ensuring that employees understand the rationale behind changes and feel motivated to contribute to the goals and vision of the company, resistance to change can be minimized. By further fostering a culture of transparency, alignment and standardizing management practices, the organization can ensure effective integration of lean principles. The fourth strategy includes maintaining the clear objectives and having defined processes and performance measurements. This will enhance the alignment between individual and team goals with the overall strategic priorities of the organization. By defining processes and implementing standardized templates and ways of working, the organization can improve efficiency and make sure everyone is working towards the same goal. Lastly, integrating customer feedback into the product development process and increasing the customer focus among employees is essential for innovative start-ups. By prioritizing customer needs during an incorporation of lean principles such as

lean design, the company can create products that better meet market demands and maintain a competitive advantage. By combining these strategies in an innovative start-up that strives to successfully implement lean, the resistance to change can be reduced while promoting a culture of continuous improvement and customer-centricity.

### 6.3 Recommendations

The recommendations for the case company are based on the strategies that were presented in section 6.2. In this section, the initial and foundational steps that will build the necessary groundwork for the rest of the strategies and for a lean culture will be presented.

The first recommendation is to implement the structured HR programs, as this is a way to equip the employees with the necessary skills about lean principles. This can include workshops, e-learning modules, and certification courses. The HR programs should also include leadership training, as there is a fluctuation in how the leaders manage their teams within the company. The HR programs will create a solid foundation as it will help address resistance to change by educating and training the employees. The leadership trainings can further help in achieving a strong leadership which is essential for a lean implementation. The next recommendation is to start implementing lean design principles in the company, as they still are in the design phase. Minimizing waste in the design process, by iterative design cycles, rapid prototyping and including customer feedback early on, can help in creating value for the customer, which is the purpose of lean. Once these actions are established, the company can move on to the rest of the areas and strategies for the long-term perspective of a lean implementation.

### 6.4 Implications for Future Research

While the identified key factors and strategies for a successful lean implementation provide a solid foundation, there are several areas where further research could be helpful in understanding the application of lean principles. This study was limited to examining the status at one start-up company during a limited time frame of a couple of months. Future research could therefore benefit from a longitudinal study that tracks the progress of a lean implementation over several years. A future research that captures a longer time frame could capture the evolving nature of implementing lean and its impacts in the long-term. It is of interest to investigate how the practices adapt to matured processes and changes in the organization, ensuring that the implementation remains effective as the firm matures and performs. It would also be of interest to see how lean affects the market competitiveness, assessing how lean practices contribute to the innovativeness of the firm as well as adaptation to market shifts. By tracking the customer feedback over time, the organization can conclude if the start-up meets customer demands better, resulting in an enhanced market position. Additionally, tracking financial metrics over a number of years can provide insight into whether the lean practices have a positive economic impact, including cost savings and revenue growth.

Another area of interest is to explore how emerging technologies and technical advancements can enhance lean implementation, including artificial intelligence (AI), Internet of Things (IoT) and machine learning (ML). Exploring how these technologies drive innovation is highly relevant due to the accelerated advancements in technology, impacting industries and business practices today. It plays a crucial role in shaping the future of businesses, especially looking from an innovation and efficiency point of view. AI and ML could e.g. be used to identify patterns in big sets of data, while IoT could be used for tracking continuously, resulting in a data collection with a higher accuracy and a smoother decision-making process.

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# 8. Appendixes

## 7.1 Interview Framework

### **Human resources and Training**

How does the company support employee development and growth?

### **Recognition and Rewards**

How does the company recognize and reward employees for their contributions?

### **Culture and communication**

Are there any cultural or communication norms that you think might impact the implementation of new initiatives?

### **Leadership and Management**

Can you provide examples of how leadership has supported or hindered organizational change efforts in the past?

### **Project Management**

Can you describe how different projects are typically managed within the company, especially with regards to prioritization and allocation of the resources?

### **Strategy and Targets**

How are individual and team goals aligned with the company's strategic priorities?

### **Customer focus**

How integrated is the customer's perspective in your daily work/job tasks?

### **Performance measurements**

Which metrics and KPIs are at the forefront of your mind?

### **Financial capabilities**

Are there any financial considerations that you think might impact the company's ability to pursue new opportunities or initiatives?

### **Lean Principles**

How important do you think it is for the company to implement lean?



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