



UNIVERSITY OF GOTHENBURG  
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# **Contextual variables influencing firm's ability to sustain continuous improvement processes:**

A comparative case study of the European operations  
of a global mining company

Graduate School  
Master Degree Project in Innovation and Industrial Management  
Spring 2022

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# Abstract

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**Purpose:** The purpose of this study is to analyze the contextual variables that affect sustainability of continuous improvement in the mineral mining industry and explain how (and if) they affect the critical failure factors of continuous improvement activities within the industry.

**Methodology:** Comparative case study

**Findings:** The findings of this research include a list of factors influencing the sustainability of continuous improvement within the mineral mining industry. Further the findings of this research categorize the contextual variables and their implications in the critical failure factors of CI. The effects of the context variable vary in polarity of effect towards the CFFs. Finally, the research findings include a regional comparison of the contextual variables and underline the importance of context for CI sustainability within the mineral mining industry.

**Key words:** *Continuous improvement, Kaizen, Critical failure factors, Context factors/variables, Sustainability of continuous improvement, Mineral mining industry*

# Acknowledgements

I would like to take the opportunity and thank everyone that has contributed to this master thesis. First of all, I would like to thank Matthew Clements, the sponsor of the research at the case company, who has made the thesis possible by providing support and access to the necessary data as well as contacts within the organization. I would also like to extend my gratitude to all the participants in the interview process for their time and expertise that resulted in an invaluable contribution in terms of insights for this research.

Furthermore, I would like to thank my supervisor, Daniel Hemberg, for being the guiding hand and support throughout the whole process of thesis writing. I would also like to acknowledge and give thanks to my supervision group colleagues and opponents for the comments and suggestions that made the thesis writing and revision an enjoyable learning opportunity.

Finally, I would like to thank my colleagues, friends and family that helped me through all the challenges along the way.

Gothenburg, June 5, 2022



Kristina Mojzisova

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# List of Abbreviations

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- **Center of Excellence (CoE)** - a body in an organization that works across business units (BUs) or product lines within a BU and has a leading-edge knowledge and competency in that area. It is composed of highly-skilled individuals and experts, who disseminate knowledge in an organization and share best practices. (Kejriwal, 2018)
- **Continuous Improvement (CI)** - a continuous cycle of systematic improvement steps that is embedded in the organizational culture, guided through top-down targets and support and executed from bottom-up.
- **Critical Failure Factor (CFF)** - A factor that leads to the failure of CI initiatives in organizations, or an absence of a factor, whose presence leads to the success of CI initiatives in organizations.
- **Kaizen** - Japanese term for improvement, meaning “change for better” and commonly used as a term for continuous improvement.
- **Lean manufacturing ‘Lean’** - systematic approach to identifying and eliminating waste through CI by following the product at the pull of the customer in pursuit of perfection.
- **Six Sigma (SS)** - an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in the customer-defined defect rates.
- **Total Quality Management (TQM)** - is the continual process of detecting and reducing or eliminating errors in manufacturing, streamlining supply chain management, improving the customer experience, and ensuring that employees are up to speed with training.

# 1. Introduction

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*This chapter of the paper provides background on the topic of continuous improvement within the mineral mining industry. In addition it introduces the case company along with the problem discussion and selected research questions. Lastly, it presents the delimitations and disposition of the study.*

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## 1.1. Background

When looking at the business environment in which companies have had to operate in the last decade, it is evident that to stay competitive, companies need to adapt to a wide array of changes and the speed with which they adapt is vital. The companies that are not agile enough and due to their robustness fail on adapting to the new circumstances often fail in the long term as well as their ability to compete in the market diminishes with every failed opportunity to develop.

Continuous improvement (CI) is a broad term for platform of topics such as agile, Lean, TQM or Six Sigma methodologies, that helps companies through its iterative processes to establish a sustainable way of working that enables them to find improvement areas continuously and develop solutions and flexible implementation processes to keep the business relevant in the ever changing environment.

Many manufacturing companies are no strangers to these methodologies, as the main concepts of continuous improvement originated from Toyota's principles of its way of working. Since Toyota has developed the manus of lean and created the continuous improvement knowledge base, these methods have been implemented across many different industries.

Lot of research has been done on how continuous improvement processes can be implemented across different industries, however to sustain the continuous improvement activities has oftentimes proved to be quite difficult. The 2008 article by Del Angel and Froelich discusses the 60% failure rate of companies trying to successfully maintain CI initiatives for a longer period of time after the first waves of success start to die down. Failed attempts of companies to implement CI practices lead to research teams focusing on identifying different factors that affect the implementation and sustainability of these activities.

## 1.2. Problem discussion

The topic of continuous improvement is becoming increasingly relevant for businesses outside of the automotive industry as other industries are seeking sustainable ways of improvement to meet customer satisfaction, while minimizing costs and maximizing quality of their products. To be successful in doing so, companies need to have structured methodology for how to achieve desired results. (Ghodrati, Lundberg and Lanke, 2016) The academic focus has been abundantly focusing on covering gaps in the CI implementation and sustainability stages. However, the majority of the literature with a holistic approach to the research area is only in the format of literature reviews and what is based on empirical studies is focused on the

manufacturing industry or very small and very focused regional application. Current literature focusing on application of CI in specific industries such as mineral mining is very sparse, which is why this paper will focus on bridging this gap.

The mineral sourcing industry has been eager to adapt 'best practices' from other industries over the last decades. (Jakelski and Lebrasseur, 1996) However when it comes to CI application it is very sensitive to different context variables, such as: the country of the business unit, type of CI practice being implemented, level of the CI maturity, size of the business unit and industry affiliation (Sunder M and Prashar, 2020). All of these contextual variants can contribute to the failure of companies' ability to implement or sustain CI practices.

Many of the mineral processing plants or mines are facing multiple challenges simultaneously. Considering that mineral deposits are not usually located in the areas of dense population and proximity of labor force, finding the right talent is proving more and more difficult. Some of the sites have average age of employees between 50-58 years, without secured pipelines of apprentices. Additionally, maintaining the talent and keeping the trained employees in the positions is starting to become a problem as the employee turnover is increasing. Many of these mineral minings sites were built in the nineteen hundreds with different cycles of investments in the machinery along the way. However, machinery processes and general plant designs are often obsolete and if not so they are rapidly headed that way. Sustainability and carbon footprint are also more and more important in this industry. Customers are becoming more aware of where their materials are coming from and thus more weight is put on the sustainability, health and safety goals within the organization. Moreover, the last two years have been marked by many changes brought about by the COVID pandemic. Economic downturn, governmental restrictions and shortages in labor are draining the operation and production teams across the different sites.

### 1.3. The case company

The company chosen for this case study has been in the mineral sourcing/mining industry since the late 1800s. They have a long history of production and operational knowledge within the silica sand and mineral mining industry. However, the speed of geographical expansion has not been met with the speed of technological development within the company. Further, as mentioned before the business climate is changing and even companies in industries such as mineral mining need to adapt to global processes and CI is one of them. The company has rolled out CI for the first time as a program in 2014-2015 across their sites, with the help of McKinsey consultant groups. Since then they launched two more cycles of training/development and direct support across their sites. However the company data shows that there are great differences in performance and level of improvement or the knowledge retention across different regions and even within those regions there is variance in performance.

From the company's data it can be seen that 62% of the participants in the CI projects failed to meet the 2021 targets for CI implementation (Appendix 9.1). Further, when looking at the regional data we can see that if we consider average site performance scores across the regions, three of the regions are performing on or above target, while the remaining 3 regions

are underperforming (Appendix 9.2). We can also observe that each region has at least one high performing and several low performing sites, with the exception of the Nordic region where neither of the sites participating in the project meets the target levels. If we add the rate of improvement from the previous cycle of CI training launched by the company, we can see that even the best performing sites are going backwards in their improvement (e.g. Arcos) or are stagnating (e.g. Latnya, Kingsteignton).

## 1.4. Purpose and research question

The observations made regarding variations in progress within the CI journey of different sites lead to formulation of the research questions. First of all, it is necessary to establish a knowledge base and conceptual framework for the research, which will be accomplished by answering the first research question. Consequently, having established the framework will enable data collection needed to answer the second question and finally the comparative analysis will lead to answering the third research question.

*Q1: What are the factors contributing to failure of firms trying to sustain CI processes in the mineral mining industry?*

*Q2: How do context variables influence the critical failure factors (CFFs) and thus sustainability of CI practices in the mineral mining industry?*

*Q3: What are the connections between different contextual factors (if any) and how do they differ between different regions?*

## 1.5. Delimitations

The delimitations of this study include the following parameters: choice of the company for the case study, choice of the studied region and choice of the context variables studied.

The company chosen for this case study, was selected as it is a multinational company operating within the mineral mining industry, which provided a great opportunity to study the context variables across different regions, while within the same organization. This allows for better understanding of the context variables as we keep the organizational variable fixed.

The region selected for this study was picked due to its geographical proximity and since the organization already had the European region as a subsection within the organization, therefore the selection was quite natural. The European region within the company has 6 sub-regions, namely: The Nordics, The UK, Western Europe, Southern Europe, Central & Eastern Europe and Iberia. Unfortunately, due to the recent military conflict within Ukraine and Russia the sub-region of Central & Eastern Europe had to be excluded from the study. Additionally, due to time constraints to carry out this research, in combination with the lack of availability of participants in the Iberian sub-region due to current company reorganization, it has been decided to exclude this region from the study as well.

Lastly, the context variable - type of CI practice has been purposefully neglected in this study as the chosen organization for this case study has been working primarily with Lean methodology and therefore doesn't provide sufficient data to analyze this context variable.

## 1.6. Disposition of the study

This study consists of six chapters, excluding the reference list and the appendix. The following chapters are presented below.

|                                      |   |
|--------------------------------------|---|
| <b>Literature Review</b>             | This chapter presents the literature base and establishes a body of knowledge necessary for the study.  |
| <b>Methodology</b>                   | This chapter presents the researchers choices in terms of research methods, data collection and analysis.   |
| <b>Reviewed Conceptual Framework</b> | This chapter presents the findings from the panel interview with experts from the field (primary data) and together with the established base of knowledge from the literature review it provides an overview of how the conceptual framework for this study has been designed. |
| <b>Empirical Data</b>                | This chapter presents the empirical data collected through the interview process.   |
| <b>Data Analysis</b>                 | This chapter aims to analyze the data presented in the previous chapter and in a structured way answer the set research questions.  |
| <b>Conclusion</b>                    | This chapter includes theoretical and managerial contributions of the study as well as final remarks.   |

## 2. Literature Review

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*This chapter presents the relevant concepts of continuous improvement necessary to establish a base knowledge for the study. Further, it presents the existing theories and findings on the different failure factors of continuous improvement and context variables influencing its implementation and sustainability.*

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The aim of this literature review is to provide a concise overview of the existing concepts and theories formulated within the academic literature on the topic of continuous improvement (CI) sustainability and factors contributing towards its success or failure. This section will present the definition of continuous improvement, the difference between implementation and sustaining phases of CI and finally it will look at different factors contributing towards the failure of companies' to sustain continuous improvement processes.

### 2.1. Continuous improvement & Kaizen

#### 2.1.1. Continuous improvement

Continuous Improvement as we know it today has been shaping over the last 30 years. However, some practices can be traced back all the way to the 1800s where companies encouraged their employees to bring improvements to the organizations through incentive programs (Bhuiyan and Baghel, 2005). By the early 1900s scientific management became popular among factories. The use of time studies and process standardization then led to the rise of quality control in manufacturing (Singh and Singh, 2012). In the 1920s, Shewart introduced the so called plan-do-see cycle, which was later adapted by Deming and transformed into what we now know as the PDCA or plan-do-check-act cycle (Deming, 1988). Both of the cycles were designed with the intention to standardize work by continuous removal of small abnormalities from the process (Singh and Singh, 2012).

During the Second World War, the US government initiated a program called 'Training Within Industry' (TWI) to help war-related industries to maximize their productions through job method training (Bhuiyan and Baghel, 2005; Carnerud, Jaca and Bäckström, 2018). TWI taught the supervisors and the shop-floor the importance of small improvements that further led to less time per piece produced or overall to better quality and process improvements (Bhuiyan and Baghel, 2005). Deming was aiding the US government during the WWII years and helped them formalize the improvement processes. According to Deming, the continuous improvement started from the engagement on the shop-floor, where everyone took responsibility themselves to look for small and inexpensive improvements (Deming, 1988). Deming's work is also often linked to the beginning of Total Quality Management systems (TQM) as he focused much of his time on statistical process control.

After WWII, the Japanese took interest in Deming's concepts of quality control in manufacturing and invited him to teach the Japanese leaders and business managers about his managerial theories (Singh and Singh, 2012). Many authors believe that Deming laid the foundation to continuous improvement in the West and through his influence in Japan paved the ground for the Japanese continuous improvement concept, Kaizen (Carnerud, Jaca and

Bäckström, 2018). However, there are some authors that highlight the differences in the original theories and their scope and suggest that both paths of the continuous improvement movements developed separately and can be distinguished as Continuous Improvement philosophy in the West and the Kaizen philosophy in Japan (Maurer, 2012; Carnerud, Jaca and Bäckström, 2018).

### 1.1.1. Kaizen

Masaaki Imai first described the managerial tool in his 1986 book 'Kaizen: The key to Japan's competitive success. Imai (1986) presents the Kaizen philosophy as a way of working where everyone from top management to the shop-floor is involved in the incremental changes towards the company's betterment (Imai, 1986). When it comes to the definition of Kaizen, Imai (2013) specifies the translation of the Japanese Kaizen into English, where KAI represents 'change' and ZEN 'good' so in literal terms it could be translated to 'change for good,' however over the years Kaizen became synonymous with the term continuous improvement (Sanchez and Blanco, 2014). This is where some authors make distinction between Deming's concepts of continuous improvement and Kaizen. While the Western term for continuous improvement mostly focused on small and inexpensive improvements executed by the shop-floor (Carnerud, Jaca and Bäckström, 2018). The Kaizen philosophy highlights the importance of self-driven sacrifice for betterment (Schmidt, 2010) across all layers within the company, not just the shop-floor (Carnerud, Jaca and Bäckström, 2018; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018; Criscione Naylor, 2020; Bhuiyan and Baghel, 2005). It provides a framework for companies to proactively make incremental changes and build culture based on employee engagement and value-creation (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018; Criscione Naylor, 2020; Iwao, 2017).

Kaizen philosophy became associated with other methodologies and tools for continuous improvement such as Ohno's Toyota Production System (TPS) that is often used interchangeably with Lean manufacturing (Carnerud, Jaca and Bäckström, 2018). Lean manufacturing focuses on waste elimination, which leads to increased performance and quality levels, while lowering the costs (Bhuiyan and Baghel, 2005). Together with Kaizen, Lean became associated with continuous improvement processes as both of them strive for continuous improvement and became integral to Japanese manufacturing in the late 20th century. As Japan began its road to success within manufacturing, the US followed and many US companies implemented continuous improvement programs based on Kaizen and/or Lean manufacturing principles (Bhuiyan and Baghel, 2005; Carnerud, Jaca and Bäckström, 2018).

When comparing the Western continuous improvement initiatives to Kaizen "many authors, including gurus such as Masaki Imai, Taiichi Ohno, Shigeo Shingo, Hiroyuki Hirano and Edward Deming indicate that one of the shared aspects between Kaizen and CI is that they both are keys to productivity in any organization because they address improvement both in business processes and in co-workers" (Carnerud, Jaca and Bäckström, 2018, p.375).

### 1.1.2. Continuous improvement in the present

Over the last three decades, the Western continuous improvements started to merge with the Kaizen philosophy and the term continuous improvement began to be used in a much

broader and more ambiguous sense (Carnerud, Jaca and Bäckström, 2018; Sanchez and Blanco, 2014). Imai (2013) himself identified Kaizen as a term for continuous improvement, however he stressed the importance of it meaning change by everyone and everywhere, strengthening the notion of permeation throughout organization. Due to the lack of a single definition of CI, it becomes more difficult to compare different literature and methodologies linked to it. Sanchez and Blanco (2014) mapped different definitions of CI in the literature and concluded that majority of the definitions agrees on these aspects of CI:

- Cyclical - continuous improvement is not an act, it doesn't end with implementation, it needs nurturing and constant re-evaluation.
- Cross-organizational - continuous improvement happens on all levels, from top-management to the shop floor
- Aims to improve - the goal of continuous improvement is to eliminate waste, increase performance through incremental change and continuously identify areas for improvement

Due to the fact that the topic of continuous improvement has become so broad, there are many more methodologies that fall under this category. It is always important to understand the definition each research or study is using and which methodologies they include. The most common methodologies being grouped under the 'continuous improvement' umbrella include lean manufacturing (Carnerud, Jaca and Bäckström, 2018; Bhuiyan and Baghel, 2005; Sanchez and Blanco, 2014), six sigma (Carnerud, Jaca and Bäckström, 2018), the balanced scorecard (Carnerud, Jaca and Bäckström, 2018), lean six sigma (Carnerud, Jaca and Bäckström, 2018; Bhuiyan and Baghel, 2005) and Total Quality Management (TQM) (Carnerud, Jaca and Bäckström, 2018; Sanchez and Blanco, 2014).

- Lean manufacturing - a "systematic approach to identifying and eliminating waste through CI by following the product at the pull of the customer in pursuit of perfection." (Bhuiyan and Baghel, 2005)
- Six Sigma - "an organized and systematic method for strategic process improvement and new product and service development that relies on statistical methods and the scientific method to make dramatic reductions in the customer-defined defect rates." (Linderman et al., 2003).
- Lean Six Sigma - is a hybrid methodology that combines lean and six sigma. It "maximizes shareholders value by achieving the fastest rate of improvement in customer satisfaction, cost, quality, process speed and invested capital." (Bhuiyan and Baghel, 2005)
- Total Quality Management - is the "continual process of detecting and reducing or eliminating errors in manufacturing, streamlining supply chain management, improving the customer experience, and ensuring that employees are up to speed with training" (Barone, 2022).
- Balanced Scorecard - a "methodology that translates the objectives of the organizations into measures, goals and initiatives in four different perspectives, namely financial, customer, internal business process and learning and growth." (Bhuiyan and Baghel, 2005)

Consequently, as CI Programs are becoming embedded into organizational structures, there are authors, who link CI to organizational culture as well. Singh and Singh, (2015);

Bhuiyan et al. (2006) define CI as 'a culture of sustained improvement aimed at eliminating waste in all organizational systems and processes, involving all organizational participants.' Additionally, Vorne (n.d.) underlines the importance of employee engagement and value creation through Kaizen and CI processes, which for its success have to become part of the organizational culture. Similarly, Liker (2004) argues that if companies wish to reap the benefits of CI methodologies, they need to start building a company-wide CI culture. (+35)

## 2.2. CI sustainability

As mentioned previously, CI is cyclical in nature. Therefore, a mere implementation of CI program is not sufficient to see the long term benefits. To sustain CI practices, companies need to embed the philosophy of continuous improvement into their corporate cultures (Carnerud, Jaca and Bäckström, 2018). There are several factors that facilitate the embedment of CI practices into corporate cultures. Jurburg et. al. (2017) summarized the most common facilitators as "top management support and commitment, strategic focus on CI through the definition of an appropriate set of goals and objectives, using the right methodology to implement CI throughout the whole organization, creating and sustaining a CI culture, employee support and commitment, good information, communication and knowledge-transfer systems, and having a CI management and follow-up system to track the CI efforts and progress made." Additionally, Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell (p. 303, 2018) identified these facilitators linked to CI practice sustainability: "use of an appropriate methodology; presence of a facilitator to support the program; commitment and support from the managers; assign specific resources to the improvement programs: economic, time, environment, etc.; stability (absence of changes, conflicts, resistance to change); involvement or commitment of the participants; teamwork; communication of the results to the rest of the organization; participation; adequate training; establishment of objectives (aligned with the general objectives); obtaining and implementing results; and existence of indicators associated with the results obtained." Criscione Naylor (2020) further adds that organizational readiness is crucial for any company's ability to sustain CI practices.

When it comes to sustainability of continuous improvement within companies there can be various factors influencing the processes that can either lead to the programs' success or more often so, to failure (Del Angel and Froelich, 2008). On average about 60% of corporate CI programs fail to yield desired outcomes in performance or quality, which makes many business leaders question the power of the managerial tool (Del Angel and Froelich, 2008). Nevertheless, by studying the failure factors we can learn from the mistakes and help managers focus on the right areas to ensure sustainability of their CI programs. Current literature on the failure factors of CI usually consists of individual case studies that are difficult to replicate or literature reviews that are merely theoretical. To better present the different factors found among the literature search, this section will use the 8 comprehensive themes of failure factors that were presented by McLean, Antony and Dahlggaard (2015). Moreover, the consideration of context variables can help practitioners better understand the environment and thus anticipate potential challenges or emerging CFFs and work proactively to ensure the CI's sustainability (Sunder M and Prashar, 2020).

## 2.3. Critical failure factors (CFFs)

To better understand what makes CI programs succeed or fail over the time, more focus was put on “examining the few things that must go well to ensure success – labeled as Critical Success Factors (CSFs), and deficiency of which could lead to failure of CI initiatives in organizations – labeled as Critical Failure Factors (CFFs)” (McLean, Antony and Dahlgard, 2015, p.4895). For the purpose of this paper the literature review will adopt Sunder M. and Prashar’s (2020) definition of CFFs, which states that CFF is:

- A factor that leads to the failure of CI initiatives in organizations, or
- An absence of a factor, whose presence leads to the success of CI initiatives in organizations

When looking at the literature available on the topic of CFFs affecting CI implementation or sustainability there is no consensus among the authors on what specific factors should be considered as critical. There is an extensive overlap of different factors, however there is no defined structure of CFFs that can be applied to any industry or CI methodology. McLean, Antony and Dahlgard (2015) came closest to creating a holistic overview of all the identified factors influencing CI’s success and created a set of 8 themes of CFFs that encompass most of the identified factors influencing CIs success. Therefore, this literature review will use these 8 themes to present the CFFs’ effect on the success of CI implementation and sustainability.

### 2.3.1. Motives & expectations

When it comes to implementing and sustaining CI over longer periods of time, many companies are eager to roll into implementation of CI, which may cause them to miss an important step in the process. Several authors suggest that taking a step back before launching into an implementation phase and investing some time into expectation setting with the employees can yield a lot of value in the long run.

Having clear objectives (Sabater and Garcia, 2011; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Paipa-Galeano et al., 2020; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018; Farris et al., 2008) in terms of what is expected from employees as well as what are the targets (Gonzalez Aleu and Van Aken, 2015) for CI activities has been viewed as a critical factor for success of CI. Moreover, long term improvement objectives (Chakravorty, 2009) and common focus (de Jager et al., 2004) within the teams were deemed important. Setting practical targets (Jakelski and Lebrasseur, 1996) for processes that employees can directly influence is critical as unrealistic targets (McLean and Antony, 2014) would only discourage employees from participation.

Organizations should also consider having a company-wide definition of continuous improvement (Singh and Singh, 2015) and a clear formalized program (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) that sets these objectives. Establishing dashboards with the targets visible and accessible to everyone across the sites (Jeyaraman and Kee Teo, 2010) was viewed as an additional enabler of CI as it promotes the level of CI awareness across the sites. Analysis of CI processes and its key value drivers further fosters the understanding (de Jager et al., 2004) of the concepts. Everyone on the site should have a clear understanding (McLean, Antony and Dahlgard, 2015) of what needs to be improved and how it should be done (de Jager et al., 2004). Inadequate understanding of CI (Singh and Singh,

2015) or organizations' aims and objectives (Bhuiyan and Baghel, 2005) can lead to lack of performance due to perceived misalignment on team or individual expectations (Farris et al., 2008). Lack of expectations settings can also cause different perceptions between management and shop-floor (McLean, Antony and Dahlggaard, 2015) to form. These disparities can have a negative influence (Chakravorty, 2009) on CI sustainability in the long run.

CI comes with changes and managers should anticipate that the announcements and communication of coming change can be unsettling to a workforce that is comfortable in its current routine (Del Angel and Froelich, 2008). Too many changes may contribute to employee 'change fatigue' (McLean, Antony and Dahlggaard, 2015) and further hamper employee participation levels in CI activities. Additionally, resistance may be caused by notions of cynicism caused by 'memories of past failure' (McLean, Antony and Dahlggaard, 2015). Learning from past mistakes (Sanchez-Ruiz, Blanco and Diaz, 2018) and the CI process itself (Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019) is crucial for organizations to prevent employee resistance and lack of buy-in. Besides resistance, employees might feel intimidated (McLean, Antony and Dahlggaard, 2015) by CI ambitions. Thus, organizations should strive for creating a culture where people are comfortable 'learning from their own and from other's experience, both positive and negative' (Bhuiyan and Baghel, 2005).

To ensure sustainability of CI, sufficient focus should be put on resource planning (McLean, Antony and Dahlggaard, 2015; Singh and Singh, 2015; Paipa-Galeano et al., 2020) as lack of resources over a longer period of time often contributes to CI failures.

### 2.3.2. Organizational culture and environment

Working with CI organizations need to understand the impact organizational culture and environment have on the implementation process and further sustainability of the program. Organizations often don't anticipate that for CI to be part of their organizational culture, they need to change the existing one. Inability to do so (Singh and Singh, 2015) can become critical for CI sustainability as one of the critical failure factors can be the cultural mismatch (DeSanctis et al., 2018) between CI and the existing organizational context. This can become very evident if the existing organizational culture or processes are not ready for the intervention (McLean, Antony and Dahlggaard, 2015; de Jager et al., 2004) that CI brings. Organizations with a high rate of acquisitions should be especially wary of the complexities merging companies with different cultures (Sabater and Garcia, 2011) and attempting to sustain CI culture at the same time can bring.

To sustain CI over longer periods of time, organizations need to build supportive organizational context (Jakelski and Lebrasseur, 1996). Since CI many times implies change in behavior and mindset of the employees, only a behavior-focused approach (Del Angel and Froelich, 2008) can make the CI initiative sustainable. One such approach praised by the literature is building the 'learning organization' (Kaye and Anderson, 1999) with a 'corporate quality culture' (Fryer, Antony and Douglas, 2007). An organizational culture unable to capture and deploy learning (Bhuiyan and Baghel, 2005) of their employees or teams can hinder adoption of CI practices and thus directly inhibit its sustainability (Kumar, Antony and Tiwari, 2011). Learning organization in itself provides for continuous improvement (Singh and Singh, 2015) by providing continuous learning and focus on the improvements through organizational procedures and policies (Bhuiyan and Baghel, 2005). Additionally, organizations should also aim

for including quality as a cornerstone of their culture. By establishing these values in the organizational culture employees are able to prioritize their individual actions (Fryer, Antony and Douglas, 2007) in a way that CI is sustained.

Organizational strategy and structure (McLean, Antony and Dahlgaard, 2015) of the business can also play a critical part in CI sustainability. One of the commonly cited CFFs for CI and its sustainability is the integration of organizational strategy and goals to the ones of CI (Sanchez-Ruiz, Blanco and Diaz, 2018; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Galeazzo, Furlan and Vinelli, 2016; Paipa-Galeano et al., 2020; Kaye and Anderson, 1999; Quesada-Pineda and Madrigal, 2015). Del Angel and Froelich (2008) stress the criticality of 'aligning attitudes and behaviors with the system and process changes, as well as with the overall direction of the company'. Organizational structure (Fryer, Antony and Douglas, 2007) should lay ground for CI and provide clarity of functions and roles as well as hierarchies (Sabater and Garcia, 2011) as too much bureaucracy (McLean, Antony and Dahlgaard, 2015) and potential 'politics and turf issues' (Singh and Singh, 2015) would hinder CI. Inadequate budgets (Rich and Bateman, 2003) and company's financial capability (Jeyaraman and Kee Teo, 2010) can also directly affect CI's sustainability as in many cases this becomes evident with shortage of resources. To sustain CI employees need to see that 'money is spent on their ideas' (Sabater and Garcia, 2011) otherwise CI processes are likely to die out. Having a sufficient amount of resources is also critical as lack of resources and too much role switching (Rich and Bateman, 2003), due to high employee turnover, can cause role confusion to the employees (Khan et al., 2019) and hinder CI. By building an organizational structure where the systems and procedures constantly reinforce the approach and mechanisms of CI (Bhuiyan and Baghel, 2005), organizations can foster CI and sustain it.

Organizations unable to empower (McLean, Antony and Dahlgaard, 2015; Fryer, Antony and Douglas, 2007) their teams and individual employees are also putting themselves into a predicament. Failure to give employees autonomy (Farris et al., 2008) and creating supportive techniques (Readman and Bessant, 2007) that foster teamwork (Singh and Singh, 2015) can contribute to loss of motivation and thus affect employee participation in CI which is critical to its success. However, empowerment alone is not sufficient. Cross-functional teams (Sabater and Garcia, 2011; Gonzalez Aleu and Van Aken, 2015), support (McLean, Antony and Dahlgaard, 2015) and communication (Fryer, Antony and Douglas, 2007) are equally critical. Teamwork is critical for problem-solving (Galeazzo, Furlan and Vinelli, 2016), which is key to CI, hence organizations should focus on creating a culture where team membership is supported (Tortorella et al., 2019; Readman and Bessant, 2007) and encouraged. Improved cross-departmental communication and teamwork enables knowledge sharing (de Jager et al., 2004) which further contributes to an establishment of a learning organization. Involvement of the majority of the employees should be a prime concern for organizations aiming to sustain CI. Further, "higher involvement of supporting areas, such as engineering and maintenance, for CI sustainability was extensively mentioned" (Tortorella et al., 2019). Nevertheless, fostering teamwork doesn't come without challenges. Teamwork complacency (Singh and Singh, 2015), the ability of participants to coordinate (Iwao, 2017) during teamwork as well as personal and professional challenges (Criscione Naylor, 2020) during teamwork might pose some barriers for organizations trying to build this competency. Organizations working effectively across internal

and external boundaries at all levels (Bhuiyan and Baghel, 2005) are able to foster CI and thus sustain it.

In addition, the environment in which companies operate can contribute to CI failure. Especially if they are facing economic challenges or operating in a volatile industry with rapid development as they might be focusing on process improvement that might not be adequate in the future environment. (McLean, Antony and Dahlgaard, 2015)

### 2.3.3. Management and leadership

Management and leadership is the second most prominent theme of CFFs mentioned in the literature right after organizational culture and employee involvement, which share the dominant position. Majority of the factors within this theme support the notion that without management's support and commitment (McLean, Antony and Dahlgaard, 2015; Paipa-Galeano et al., 2020; Rich and Bateman, 2003; Singh and Singh, 2015; Kumar, Antony and Tiwari, 2011; Farris et al., 2008; Fryer, Antony and Douglas, 2007; Gonzalez Aleu and Van Aken, 2015; Readman and Bessant, 2007) to CI the initiative is predestined to fail. Management's response (Khan et al., 2019) therefore is critical for CI's sustainability. If management doesn't appreciate the importance of CI (Singh and Singh, 2012) or "fails to communicate the reasons behind the change and fails to demonstrate strong, visible support for it" (Del Angel and Froelich, 2008), then CI lacks the backbone that supports it until it's embedded in the organization's culture. This can be seen from the findings of Sanchez-Ruiz, Blanco and Diaz (2018) as the more mature the CI embedment is within the culture the less important the factor of managerial support and commitment becomes. However, during the process of embedding CI into the organizational culture, management should act as the 'primary impetus' (Sabater and Garcia, 2011) for the initiative.

Managerial support should be strengthened by active engagement (Kumar, Antony and Tiwari, 2011) and involvement (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018), even by the senior managers (Kaye and Anderson, 1999). Visible presence (Jakelski and Lebrasseur, 1996) of management through regular shop floor visits (Readman and Bessant, 2007) or direct involvement in the CI program facilitate the success of long-term CI performance. Taylor and Wright's (2003) findings support the notion as 81% of their respondents that claimed that the CI program was successful had the top managers in charge of the CI program. This however can't be achieved if senior management lacks training (McLean, Antony and Dahlgaard, 2015) and understanding of CI (Jeyaraman and Kee Teo, 2010).

Further, frequent changes in management (McLean, Antony and Dahlgaard, 2015) can impact the success of improvement activities as the level of knowledge and commitment levels across the board might fluctuate. Frequent changes and lack of visible commitment to CI can result in resistance from the workforce as they might not trust in the program or in the senior management itself (Singh and Singh, 2015).

As CI often requires behavioral change within the organization, leadership (McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Singh and Singh, 2015) plays a pivotal role in its sustainability. Leadership needs to focus on shifting from controlling mindest to being involved (Jakelski and Lebrasseur, 1996) as active commitment demonstrated by all managers (Kaye and Anderson, 1999; Bhuiyan and Baghel, 2005) as well

as management's verbal and non-verbal commitment to improvement is vital (de Jager et al., 2004).

With leaner organizational structures, lower level managers might become too occupied (McLean, Antony and Dahlgard, 2015) with additional tasks and lose focus. Due to this ample part of the literature supports the role of dedicated 'change agent' (McLean, Antony and Dahlgard, 2015; Paipa-Galeano et al., 2020) or 'facilitator' (Bhuiyan and Baghel, 2005) that supports the CI efforts locally. This role should be assigned to a charismatic leader (Sabater and Garcia, 2011), who can guide the local teams through CI processes (Criscione Naylor, 2020) and support the local management to bring about change. Without the local support, management might lack the ability to establish the required sense of urgency (McLean, Antony and Dahlgard, 2015). This can be predominantly of importance if there is a lack of need to change (Rich and Bateman, 2003) within the organization or the industry itself. To maintain focus and the sense of urgency, visual performance measurements (de Jager et al., 2004) can be a great enabler for CI efforts.

#### 2.3.4. Implementation approach

When it comes to CI the implementation approach is one of the critical factors that can determine the overall success or failure of the initiative. The approach chosen needs to be flexible (Sabater and Garcia, 2011) adapting to local needs or cultural context. Similarly as continuous improvement has the cyclical notion, so thus the implementation approach. It needs to be constantly reviewed and adapted (Sanchez and Blanco, 2014) to the present environment and needs of the specific organization. This can become an issue if organizations choose 'prepackaged programmes' (Singh and Singh, 2015) or 'blueprints' and are not able to sufficiently appropriate it to their organizational needs. The need to tailor the implementation approach goes hand in hand with the need to create a 'shared set of cultural values (Singh and Singh, 2012) underpinning CI' (Kumar, Antony and Tiwari, 2011). Criscione Naylor (2020) identified the key values as: reliability, transparency, empathy, personal challenge, idea generation, and contribution. Organizations with existing policies and strategies that inhibit CI (Rich and Bateman, 2003) and who are not striving to embed the aforementioned values into their culture will have a clear handicap in terms of CI sustainability.

Additionally, not considering the necessary organizational development aspects (McLean, Antony and Dahlgard, 2015) needed for CI implementation can impede the success of CI sustainability. The scope and focus of the implementation approach can also act as a critical factor. Considering CI as a 'quick-fix' (McLean, Antony and Dahlgard, 2015), looking only at the short-term financial benefits (Singh and Singh, 2015) can be detrimental to the initiative as it undermines the very core values of CI. On the other hand, if the implementation is too ambitious, all-encompassing (McLean, Antony and Dahlgard, 2015), without focus on the critical processes (Kaye and Anderson, 1999), the success of the initiative can be compromised. In parallel, organizations should not lose track of the 'implementation structure in terms of roles, planning and organizing' (DeSanctis et al., 2018), because if not properly coordinated this can affect the employee buy-in of the whole initiative.

To maintain focus on the important milestones each implementation requires a 'roadmap' (McLean, Antony and Dahlgard, 2015; Khan et al., 2019; de Jager et al., 2004; Gonzalez Aleu and Van Aken, 2015) that helps the organizations navigate through the process as well as to

keep focus. Organizations need to keep in mind that CI requires maintenance after implementation to sustain the initiative until it is fully embedded in the organizational culture and processes. To do so a formalized strategic plan (Singh and Singh, 2015) for CI institutionalization (Gonzalez Aleu and Van Aken, 2015) needs to be developed. Having a clear methodology for sustaining CI (Sabater and Garcia, 2011) will enable companies in the long run to manage CI processes (Fryer, Antony and Douglas, 2007) with more ease and thus aid CI sustainability.

### 2.3.5. Training

In any type of change management training and education (McLean, Antony and Dahlgard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Jakelski and Lebrasseur, 1996; Gonzalez Aleu and Van Aken, 2015; Fryer, Antony and Douglas, 2007) of the participants is crucial. For CI, as it often requires behavioral change, both formal and informal training (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) are necessary. To create a culture for CI (Kaye and Anderson, 1999), organizations need to invest time and resources into knowledge management (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018). Training programs need to be capable of developing the necessary skills (McLean, Antony and Dahlgard, 2015) for participants. They need to provide effective training (Jeyaraman and Kee Teo, 2010) that includes practical techniques that can be utilized for CI practices (McLean, Antony and Dahlgard, 2015). Such training needs to take into account problem solving (Readman and Bessant, 2007) as well as analysis tools and techniques. A contrasting view was presented by Paipa-Galeano et al. (2020) as the findings showed that in developing countries 'training is viewed as participants' task' therefore it is not viewed as such a critical factor in terms of CI implementation and sustainability.

De Jager et al., (2004) highlighted the importance of training in local language as the shopfloor workforce is not always skilled enough in the corporate languages (frequently English in global companies). This is especially important for the training effectiveness as well as the underlying understanding of CI efforts and motives. It can be very frustrating if the change agent and the CI participants cannot seamlessly communicate, which overall impedes the possibility of CI sustainability. However, frustration levels can develop also in situations where 'there is a perceived lag between the training and results' (McLean, Antony and Dahlgard, 2015). This can be viewed from the angle of the trainer, but the participants as well, which may lead to loss of motivation or employee involvement. Teamwork and training can facilitate these types of frustration and if properly monitored it can be used to encourage involvement in CI (Bhuiyan and Baghel, 2005).

Due to CI's continual character, the training and education also needs to be continuous (Singh and Singh, 2015). Failing to provide support and training after the implementation phase is over can affect CI's sustainability. Moreover, organizations need to consider the employee turnover rate and adjust the training frequency and support adequacy to it. The cost of retraining new employees might be something organizations should monitor, however it shouldn't cause new employees lacking necessary training (McLean, Antony and Dahlgard, 2015).

Another aspect of the training variable that should be considered is the standard of training delivered and its variation. While using consultants to deliver the training there might be variation in the consultants' standard of training (Sanchez-Ruiz, Blanco and Diaz, 2018),

certification or competency (Jeyaraman and Kee Teo, 2010), especially if the organization has several locations where CI needs to be implemented. On the other hand, using internal resources to deliver the training may risk the level of quality of the training delivered (McLean, Antony and Dahlgaard, 2015) as well as risking a loss of focus if the trainer becomes overburdened with different tasks. In terms of training, distinction should be made between the concept of CI and the specific methodologies (Sabater and Garcia, 2011) so as not to lose focus of what needs to be maintained.

### 2.3.6. Project management

It is common that CI is implemented through projects. If so the CI project management becomes a separate critical factor category as it should be distinguished from the implementation approach. In this case the project selection (DeSanctis et al., 2018; Khan et al., 2019) and sequence of projects selected (Chakravorty, 2009) can be critical. Projects focusing on critical processes (Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019) facilitate CI embedment as they help align CI and organizational objectives. CI Project team should be wary of projects with too large scope (Paipa-Galeano et al., 2020) as the longevity of the project may deplete employee motivation levels. Projects with too large scope (lasting more than 6 months) might suffer from loss of participation and thus performance, if team meetings are infrequent (McLean, Antony and Dahlgaard, 2015) or there is little support from the change agent (McLean, Antony and Dahlgaard, 2015). Organizations should be careful with choosing the number of projects completed as an KPI (McLean, Antony and Dahlgaard, 2015) and measurement of CI success, as this can directly undermine the quality of CI efforts and drive teams towards a quick-win mindset.

Similarly, struggling to prioritize projects (McLean, Antony and Dahlgaard, 2015) due to daily duties and commitments (Jeyaraman and Kee Teo, 2010) may hinder CI initiatives. Therefore assigning the right people (McLean, Antony and Dahlgaard, 2015) to the projects is key. Lack of a sponsor or champion (Gonzalez Aleu and Van Aken, 2015) of a project who externally supports the project can also pose a barrier. Cross-departmental collaboration and teamwork are critical for CI project success, therefore organizations should adapt their structures to prevent department isolation (Singh and Singh, 2015), which could cause 'silo' thinking (McLean, Antony and Dahlgaard, 2015). "Absence of involvement from key individuals" is inimical to solving complex problems. 34 findings show that support from other departments, especially engineering or other support areas, is crucial for integration of CI activities. To sustain CI project teams should also consider the continuity of support to existing local teams, as too fast progress (McLean, Antony and Dahlgaard, 2015), without ensuring the long-term objectives were accomplished, can lead to failure and necessary re-training and new implementation in the future.

As previously mentioned, it is critical to align CI objectives with the strategic objectives of the organizations. For this CI project stakeholder management (Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Kaye and Anderson, 1999) is of utmost importance. Choosing projects that are not customer oriented (Jakelski and Lebrasseur, 1996; Singh and Singh, 2012; Fryer, Antony and Douglas, 2007; Singh and Singh, 2015) can contribute to failure of CI initiatives as it creates misalignment between the strategic goals and CI within an organization. As seen from Taylor and Wright's (2003) findings where the failure to sustain CI was attributed

to the fact that 62% of the motivating reasons to implement CI were connected to internal issues instead of improving customer satisfaction.

### 2.3.7. Employee involvement levels

Employee involvement together with the organizational culture are the most cited critical factors for CIs success and thus its sustainability. Involvement of employees across different departments and levels (Taylor and Wright, 2003) has been associated with success, therefore time allocation (DeSanctis et al., 2018) for the employees to spend time on CI activities is important. Lack of time (McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Diaz, 2018) is one of the most common failure factors, as it takes away focus when employees don't have time to dedicate time to CI (Singh and Singh, 2015) efforts. This can become a hurdle if key functions are not represented (Farris et al., 2008) in CI projects or if teams are not able to find common time together for performance dialogue or other CI techniques that drive improvements.

Additionally, lack of time is often caused by lack of resources (Sanchez-Ruiz, Blanco and Diaz, 2018; Rich and Bateman, 2003; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018), which results in conflicting roles and unrealistic demands (McLean, Antony and Dahlgaard, 2015) being placed on employees in terms of their commitment levels, such as 'delivering a comprehensive project report in a short period' (Khan et al., 2019) of time. The resource constraints take away the opportunity (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) for some key participants to be a part of CI initiatives. Lack of resources can cause lower levels of employee participation, but site managers should find the right approach through motivation (Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Paipa-Galeano et al., 2020; Sanchez and Blanco, 2014) instead of forcing people into CI initiatives or allowing non-participation (McLean, Antony and Dahlgaard, 2015). Companies unable to motivate (Singh and Singh, 2015) their employees to engage with CI are less likely to sustain CI efforts over longer periods of time as there is a clear need for employees to be proactively involved (Bhuiyan and Baghel, 2005) in incremental improvements. Sabater and Garcia (2011) also find motivation as the key component for CI sustainability.

When establishing cross-functional improvement teams, managers should be looking for assertive and self-responsible (Jakelski and Lebrasseur, 1996) people with proactive personality traits (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) to ensure the necessary drive and participation levels (Paipa-Galeano et al., 2020) towards the CI initiative. For CI to be sustainable employees need to be empowered to carry out tasks and make some decisions on their own, however organizations should find a good balance between employee empowerment and maintaining the required process control (McLean, Antony and Dahlgaard, 2015; de Jager et al., 2004).

As with any change management process, there might be some level of employee resistance (DeSanctis et al., 2018; Sabater and Garcia, 2011; McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Paipa-Galeano et al., 2020; Singh and Singh, 2015) to the changes CI brings about. Some employees might be susceptible to rate of change experienced (McLean, Antony and Dahlgaard, 2015), especially if the organization goes through many changes for a sustained period of time. According to Sanchez-Ruiz, Blanco and Diaz (2018) employee resistance is the second most critical failure factor right after the

aforementioned lack of time. Therefore, getting the buy-in from the shop-floor (Khan et al., 2019) is one of the critical success factors and ample time should be designated to achieve it. Lack of vision or clear objectives (McLean, Antony and Dahlgaard, 2015) of CI initiatives might also affect the employee buy-in levels as they might fail to recognize potential trade-offs the initiative brings for them. Managers should focus on getting the workforce to take ownership of CI processes (de Jager et al., 2004) as that drives the level of sustainability over time.

Lot of the literature identified having a clear reward system (Jeyaraman and Kee Teo, 2010; Readman and Bessant, 2007; Gonzalez Aleu and Van Aken, 2015; Singh and Singh, 2015) linked to CI worked as a clear enabler of CI sustainability as it drives employee engagement levels. Employee recognition (Sanchez-Ruiz, Blanco and Diaz, 2018; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Bhuiyan and Baghel, 2005) or appraisal (Kaye and Anderson, 1999) has also been viewed as a sufficient form of an incentive, since it gives employees a feeling of getting something in return (Sabater and Garcia, 2011) for their efforts. Contrastingly Galeazzo, Furlan and Vinelli (2016), in their study, found that reward systems might actually be counterproductive for CI sustainability as they drive employees to accomplish only certain objectives that are linked to their rewards and thus would take away their focus from more complex tasks that require cross departmental collaboration and problem solving. This is also supported by Chakravorty's (2009) research where they found that performance appraisals create an 'egocentric position' for employees and thus hinder teamwork and cross-departmental collaboration.

On the other hand, organizations that encourage 'Organizational Citizenship Behavior' (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018), or manage to 'link CI to intrinsic motivation' (Kumar, Antony and Tiwari, 2011) of employees, rather than just solely depending on extrinsic motivation are more likely to reach CI sustainability.

### 2.3.8. Feedback and results

Lastly, to achieve sustainability of CI, organizations need to create an efficient mechanism (Sabater and Garcia, 2011; McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Singh and Singh, 2015) to continuously monitor (Fryer, Antony and Douglas, 2007) and assess measurements (Sanchez-Ruiz, Blanco and Diaz, 2018) of CI processes. Lack of quality management systems (Kaye and Anderson, 1999) has also posed a barrier to CI embedment as quality is a core component of CI. Nevertheless, measuring and monitoring of CI processes and activities is not sufficient if a feedback system (Kaye and Anderson, 1999; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) is missing. Poor communication (Jeyaraman and Kee Teo, 2010; Tortorella et al., 2019; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018), and especially inter-organizational communication (Singh and Singh, 2015), has been identified by several authors as a critical failure factor to CI embedment. Spreading results across the sites (McLean, Antony and Dahlgaard, 2015) and especially, best practices or success stories (Jeyaraman and Kee Teo, 2010), has proven to act as a driver of employee engagement, hence also as an enabler for CI sustainability.

Organizations should also be aware of biases in their data when analyzing performance of CI activities. Lack of courage to report failures can create a false image (McLean, Antony and Dahlgaard, 2015) of the real performance, which is why building a culture that tolerates

mistakes for learning purposes (Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019) is in line with CI values. Another barrier might be caused by low levels of digitalization and system integration as well as data availability (Chakravorty, 2009; Gonzalez Aleu and Van Aken, 2015), trustworthiness and accuracy. Providing quality data (Fryer, Antony and Douglas, 2007) enables CI practices as it provides guidance on where to look for improvements and can be used to measure relevant KPIs.

Additionally, the lack of financial or measurable results (McLean, Antony and Dahlgaard, 2015) can act as a barrier for CI sustainability, especially if organizations have short-term focus (Singh and Singh, 2015) on financial results and expect CI to work as a quick-fix.

## 2.4. Contextual factors

One of the main constraints towards creating a framework for CI success is the fact that there is no single path towards the 'golden pot at the end of the rainbow'. As there are no two companies that are exactly the same, every company's journey towards CI sustainability is different. Sunder M and Prashar (2020) note that many CFFs are context dependent, which can affect the way management treats their CI programs. They propose the following contextual factors have influence on the CFFs of CI programs.

### 2.4.1. Country of business unit

Organizations are demographically distinct therefore methods that are working in one part of the world may not be as efficient in another. As organizational cultures differ from company to company, so do the national cultures and regional habits, which can impact the outcome of CI methods if they are applied consistently across different regions (DeSanctis et al., 2018). The cultural dimension study created by Hofstede Insights illustrates the differences between different national cultures and how that translates into a working environment. Visualization of this comparison can be found in Appendix 9.3. The cultural dimensions (Country Comparison - Hofstede Insights, n.d.) include power distance, individualism, masculinity, uncertainty avoidance, long term orientation and indulgence. Hofstede Insights characterize these dimensions as:

- *Power distance* - the degree to which less powerful members of a country's institutions and organizations expect and accept unequal power distribution.
- *Individualism* - the level of interdependence that a society maintains among its members
- *Masculinity* - this dimension underlines what fundamentally motivates people, wanting to be the best (Masculine) or liking what you do (Feminine).
- *Uncertainty avoidance* - the degree to which people of a culture have constructed ideas and institutions in order to avoid ambiguous or unexpected situations.
- *Long term orientation* - the measure of how every culture keeps ties to its own past while dealing with present and future issues.
- *Indulgence* - the degree to which people attempt to control their impulses and desires

In the literature considered for this research contrasting findings on this topic were discovered. While both DeSanctis et al. (2018) and de Jager et al. (2004)'s papers acknowledge that the regional culture or national culture have effect on the sustainability of CI, Sunder M and Prashar (2020) and Quesada-Pineda and Madrigal (2013) refute this claim with not enough correlation presented between the CI sustainability and the national culture as context variable. In this paper the focus will be on how national culture as a context variable influences the CFFs of continuous improvement.

#### 2.4.2. Type of CI practice

Among the literature authors have identified different groups of CFFs linked to different CI practices, therefore it can be considered of importance to specify which CFFs are linked to which CI methodology and which are shared across all the different practices. Sunder M and Prashar (2020) found that Lean-SixSigma practice has less CFFs linked to it than TQM, Lean and SS separately. While they found that 8 CFFs (high mobility of trained staff, inadequate data/information and analysis, lack of usage of statistical tools for improvement, ineffective project management, lack of process owner's engagement, deficient feedback mechanisms, lack of continuous monitoring and evaluation and lack of delivery through the CI program) are occurring in firms irrespective of the CI practice, therefore could be named universal CFFs, they also found CFFs that are predominantly linked to the Lean practice. Those being missing challenging project goals, lack of process/product innovation, and reversal to old ways. Ghodrati, Lundberg and Lanke (2016) further argue that the different CI methods can be adjusted to fit the industry they are being applied in, therefore the adaptability of CI methods is crucial for sustainability if being applied in industries other than automotive or manufacturing.

#### 2.4.3. CI maturity

Taking into account CI's cyclical attribute, it is expected that the CI practice develops over time within organizations. Many companies choose to deploy different 'waves' of CI training, usually with different focus points as well over the time, which can lead to different CFFs occurring in different stages of companies' maturity level within the CI adoption process. This is supported by Sunder M and Prashar's (2020) findings where they also indicate that in the more mature CI stages the occurrence of CFFs lowers. Further, DeSanctis et al. (2018) argue that if companies fail to establish CI culture in first deployment stages they will face CFFs from the initial implementation phases throughout the subsequent steps. Paipa-Galeano et al. (2020) also acknowledge that different CI maturity stages bring different CFF, naming specifically "lack of alignment between organization's strategic objectives and CI objectives; lack of motivation in the team; and, resistance to change" as the main barriers to sustain CI practices.

#### 2.4.4. Size of the business unit

While large companies are typically the ones implementing CI programs, there are some constraints the size of a company brings about. Process rigidity, structural inflexibility and lack of inertia caused by the size of the company can bring about some of the CFFs. However, the

amount of resources in larger organizations usually stimulates adoption of CI processes in the first place. Because of this, the size of the business unit may affect the overall CFFs a company's CI program may face. However, there is not a consensus among the researchers in terms of the CFFs related to small sized business units vs. the larger ones. Sunder M and Prashar (2020) argue that the number and possibility of occurrence of CFFs increase as the firm's size grows due to inability to manage the growing complexity. Thus showing that small-sized business units are more likely to succeed in reaching sustainability in CI practices. Contrastingly, DeSanctis et al. (2018) argue that success in reaching CI sustainability is positively influenced by large company size, stable demand and high gender equality as value in national culture: clearly pointing at the smaller sized companies as the ones with disadvantage. Similarly, Taylor and Wright (2003) highlight that the discontinuation or abandonment of CI practice was linked to the size of the business unit, especially the small sized units as it was not justifiable investment. McLean and Antony (2014) point towards resource availability as CI requires employee involvement and thus requires resources being assigned to the initiative, which can be influenced by the size of the company.

#### 2.4.5. Industry affiliation

Having its roots in the manufacturing industry, it is essential to consider the companies' industry affiliation when discussing CFFs for CI sustainability. Even more so if the industry the company operates in differs from manufacturing in the sense of high customization or high process change rates. Sunder M and Prashar's (2020) findings suggest that industry affiliation, specifically manufacturing or service, influences occurrence of CFFs in different stages of implementation. The dominant CFFs were 'organizational readiness, lack of management commitment and support towards CI programs, lack of team leaders' experience and high implementation costs.'

#### 2.4.6. Average age of employees

CI brings about change, and by nature it becomes more difficult to change for people the older they get. Therefore, higher age average in the company among managers or shop-floor can cause higher levels of resistance or insinuation of cynicism towards CI related changes. Sabater and Garcia (2011) as part of their cultural issues with CI sustainability indicate that age of employees plays a big role in employee resistance to change. "To change, age is the problem" (Sabater and Garcia, 2011) as their empirical findings show, the younger employees are much more eager to participate in change. For Tortorella et al. (2019) the variable of age is more linked with seniority and work experience within the company. They argue that the senior employees (8+ years) operate better in team-membership time as they have more workplace ownership. On the other hand their junior colleagues lack this kind of connection. Therefore arguably supporting the relevance of senior employees in the CI improvement groups. Sanchez-Ruiz, Blanco and Diaz (2018) propose a different angle to this variable, where they argue that resistance is more connected to seniority rather than age as employees become accustomed to their routines and processes over the years and it might be more difficult or intimidating for them to change.

## 3. Methodology

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*This chapter introduces and motivates the research strategy and design choices. It further presents the data collection and analysis approach applied in the research. Lastly, the ethical dimension of the research is discussed.*

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### 3.1. Research strategy

The research strategy determination depends on several dimensions, where the research philosophy is one of the defining dimensions. This research is focused on providing practical contribution and building on the existing theory, therefore in line with the research philosophy of interpretivism as it takes the nature of truth as socially constructed and the goal of the research is to understand how context variables affect the CFFs in mineral mining industry (Bell, Bryman and Harley, 2018). The main factor distinguishing epistemological interpretivism from positivism according to Bell, Bryman and Harley (2018) is the link between the researcher and the research subject. Interpretivist philosophy takes into account the social aspect of the researched subjects. It focuses on the meaning of the reached subject, the data collected and strives to interpret it (Bell, Bryman and Harley, 2018). The relationship between the researcher and the subject in this philosophy is more interactive and the researcher actively participates in the research (Bell, Bryman and Harley, 2018). Hence, qualitative research strategies are more common within this line of philosophy. The advantage of interpretivism lies within the depth of analysis it provides, especially within topics that involve people's values, beliefs, preferences, relationships etc. (Bell, Bryman and Harley, 2018). Since the research questions focus on understanding different contexts for behavioral change and implementation of new methodologies as CI, the interpretivist approach to understanding the data is the most fitting. However, one of the biggest critiques of this approach is the possible level of subjectivity of the data interpretation and thus the data reliability and outcome generalizability can be questioned to some extent (Dudovskiy, 2016).

Another dimension of the strategy selection is directly linked to the nature of the research question. Due to the exploratory nature of the research question, since the researcher wants to identify different sources of CFFs to continuous improvement retention in a particular setting and compare it with data from different regions to establish the relationship of these factors to the underlying contexts, a qualitative research strategy has been chosen. A quantitative research strategy would not be suitable for the purpose of this specific research as this paper is trying to gain understanding of how the context variables affect CFFs of CI and thus is not in its sense quantifiable. The goal of the research is not to be generalized, but rather to provide deep and rich data with contextual understanding (Bell, Bryman and Harley, 2018). In this sense the qualitative research strategy provides the right ground for conducting the research and fulfilling its purpose.

Generally, within the qualitative research strategy an inductive line of reasoning is in place (Bell, Bryman and Harley, 2018). However, since the purpose of this research is not

theory-building, but rather providing a best prediction for the given context and building on existing theory (Dudovskiy, 2016), abductive reasoning has been chosen. This line of reasoning is preferred for this type of research due to its iterative process of data collection and re-confirmation against the existing theory (Bell, Bryman and Harley, 2018). This allows the researcher to collect background knowledge on the general topic, collect data and do preliminary analysis, then go back to the literature and see whether there were any gaps and continue with data collection and analysis (Dudovskiy, 2016). This iterative process allows for emergence of new findings while overcoming the limitations of both inductive and deductive lines of reasoning (Bell, Bryman and Harley, 2018).

## 3.2. Research design

There are several different types of research designs popular among researchers such as experimental, cross-sectional, longitudinal, comparative or case study (Bell, Bryman and Harley, 2018). A comparative case study research design has been selected for this research as it was deemed the most fitting. A case study research design is usually very focused on a particular context or bounded situation, with its own functionality in the whole system (Bell, Bryman and Harley, 2018). By this, it is meant that case studies are usually focused on studying a certain type of group of people, phenomena, place, etc. (Bell, Bryman and Harley, 2018). In this case, an organization represents that bounded, self-functioning unit with the people in it. A case study provides a great opportunity for the researcher to immerse themselves into the subject and thoroughly study and analyze the problem at hand (Bell, Bryman and Harley, 2018). Case studies are also more common designs for qualitative research strategies, however they are not limited to those (Bell, Bryman and Harley, 2018). The case study aims to exemplify a typical situation of the researched subject and analyze the findings as such.

Additionally, a comparative design is applied to this case study as the aim of the research is to understand the contextual differences across different regions. The benefits of comparative case studies comes from the ability to find similarities or differences between different cases (Gustafsson, 2017). Further, it provides stronger reliability of findings if there are similarities derived from multiple cases (Gustafsson, 2017). This design has been chosen as it helps to study and analyze the underlying contexts within the mineral mining industry across different regions with different socio-cultural settings (Bell, Bryman and Harley, 2018). The context variables studied in this research include the country of business unit (implying the national culture) and age or seniority of the employees, which can be denoted by different behavior and thought patterns; the comparative research design has been deemed as most fitting to accomplish the purpose of the research within the given time frame.

Stake (1995) implies that the selection of the case should be driven by the expectations of learning opportunity, therefore researchers should choose their subjects based on the best possibility to learn, which is why the global mining company has been selected for this research.

The organization itself has a European division, therefore it was deemed appropriate to study the 'natural' section of the organization's operations that is also the closest to the researcher's geographical location. The European division consists of six sub-regional areas, namely: Iberia, Western Europe, Southern Europe, Central & Eastern Europe, the UK and the Nordics. Having these sub-regional areas creates an opportunity to collect data from each

region and compare the data from different regions against each other. Conducting a comparative study on a single company can thus provide more insights on the specific CFFs to continuous improvement and their relationship to the contextual elements or other factors that might arise from the study.

### 3.3. Data collection methods

#### 3.3.1. Secondary data

The first data collection was conducted to compose the ground level of knowledge for the underlying topic, which has been presented in the literature review. Therefore, the research started with gathering secondary data through existing literature, on the subject of critical failure factors (CFFs) and contextual variables of CI implementation and formulating the general themes of the existing theories. The literature review has been conducted systematically using inclusion criteria:

- Key words: continuous improvement, kaizen, critical (failure) factors, failed implementation, factors, context variables, CI sustainability, mining industry - the key words were used in different iterations
- Publication years: since the topic of CFFs within CI has been researched quite extensively - the literature search for these papers within different industries has been limited to literature published in the last 20 years only; on the other hand when searching for literature in connection to the mineral mining industry the search has not been restricted by publication years as the amount of literature on this topic is fairly limited.
- Literature type: the literature has been limited to include only peer-reviewed scholarly articles
- Literature language: since the researchers language is English primarily, the literature search has been limited to articles published in the English language
- Database: Gothenburg University Library and Google Scholar databases were used as they were accessible to the researcher

Selected literature has been reviewed and assessed. The original keywords: failure, continuous improvement and factors were used to identify the main literature base. Afterwards, several new keywords were identified through the so-called 'snowball approach' (Bell, Bryman and Harley, 2018), where new literature was found based on the previously referenced literature that was deemed relevant, or the emergence of new keywords throughout the literature search. Nevertheless, only the most relevant literature relevant for the studied subject has been chosen for the literature review.

Simultaneously, secondary data provided by the case company on the topic of CI and progress of different sites and regions in terms of CI maturity has been collected from the case company's business intelligence system and CI performance reports.

Subsequently, the secondary data used to analyze the country of business unit - context variable has been collected from the Hofstede Insights country comparison (Country Comparison - Hofstede Insights, n.d.), which provides data on the national culture dimensions for countries across the world. This cultural dimension has been selected as Hofstede cross-cultural dimensions theory focuses on cross-cultural communication, with application on

international communication, negotiation and management approach (Hofstede G., 1980).

### 3.3.2. Primary data for conceptual framework

After completing the primary literature review, a panel interview with seven experts from the mineral mining industry and CI practitioners from the case company's CoE team was conducted. The panel interview was conducted through a synchronous online focus group. In a synchronous online focus group, the participants are in the call in real time and simultaneously therefore the comments and answers are made naturally to previous comments and questions within the group (Bell, Bryman and Harley, 2018). Thus this form of interview can be more dynamic, which is especially fitting if the aim of the interview is to explore a new topic. The purpose of the panel interview was to gather a more practical background that is industry specific for the studied topic and help establish themes within the industry affiliation context variable as well as define the term continuous improvement and validate the 8 themes of CFFs that were presented in the literature review. The online format for a focus group also helps overcome challenges linked to geographical distances of participants (Bell, Bryman and Harley, 2018), which in this case was very beneficial as the participants were based in different countries across Europe. Overview of the participants and duration of the meeting can be found in Appendix 9.5.

#### 3.3.2.1. Reviewed conceptual framework

Due to the fact that the existing literature lacked the analysis of the mining industry from the perspective of continuous improvement CFFs and context variables specific to the industry, a reviewed conceptual framework has been created to provide a conceptual framework on the context variable of industry affiliation. This is often done to supplement or validate the conceptual framework created from the existing literature to better illustrate the concepts necessary for answering research questions or provide base knowledge for understanding the context of the studied topic (Ravitch and Riggan, 2016). Both knowledge bases, the literature review and the primary data from the panel interview were synthesized and used to establish the reviewed conceptual framework for the research. The following chapter presents the data collected through the panel interview as well as the formation of the final reviewed conceptual framework that has been used to construct the synopsis for semi-structured interview guides that were used to collect the primary data for the main research.

### 3.3.3. Primary data for the main research purpose

The data collection method deemed most fitting for the main research purposes was interviews. Interviews are the most common method of data collection among qualitative studies as they provide for in depth and complex data needed while conducting qualitative research (Bell, Bryman and Harley, 2018). For the purpose of this research semi-structured interviews were preferred to structured interviews due to their ability to provide richer data from the respondents as well as flexibility (Bell, Bryman and Harley, 2018). In semi-structured interviews there is a need for synopsis or a guide to be created for the interview process to aid the analysis of data and its comparability, but at the same time it gives the interviewer freedom to let the respondents to 'go off the topic' and gather more complex data that in the later stages can contribute to new 'puzzles' or findings (Bell, Bryman and Harley, 2018). The interview guide for

the semi-structured interviews has been created based on the reviewed conceptual framework and questions were grouped under pre-defined concept groups. However, the interviews were not limited solely to the questions in the interview guide. The copy of the interview guide can be found in Appendix 9.4.

#### 3.3.3.1. Sampling & interview set-up

As the research strategy uses an abductive line of reasoning, the interview process will also be conducted in an iterative sense. Several groups of people will be interviewed based on their relevance to the research topic to provide the most relevant information. The purposive sampling technique allows for more strategic data collection and ensures that the people chosen as respondents are aware or involved in the processes that are being studied (Bell, Bryman and Harley, 2018).

Further, a fixed sampling strategy has been chosen as the studied region has been delimited at the outset of the research as well as the rules for sampling were defined in the early stages of the research (Bell, Bryman and Harley, 2018). Originally the case study was designed to consist of six different regional sampling groups that would serve as sub-cases, however due to the political conflict in the eastern Europe and on-going reorganization activities in the Iberian region, these two regions were excluded from the research. Thus, the data collection consisted of only four separate interview cycles based on the region where the participants were located.

Each region represents a sampling group with a corresponding interview cycle. The participants from each sample group were chosen based on which sites (mines) they were working for. To reach more representative data, participants working for the highest and the lowest scoring sites in terms of CI performance within each region were selected (Bell, Bryman and Harley, 2018). The participants were chosen according to the purposive sampling method, thus they had to have roles such as the local change agent, local operations management or blue collar workers as production operators or maintenance technicians as these are the roles actively engaged in the CI processes.

The change agents are people that are involved in the project implementation and then responsible to maintain the initiative to build the culture of continuous improvement locally on the sites. This group has been chosen to be interviewed as the change agents act as a 'middle-man' between the CoE team and the local workforce. The local blue collar workers (production operators and maintenance workers) were selected in the sample groups as they are the most important respondents. The shop-floor workers are the ones needed to accept change and their voices help to express the needs to accept changes more easily as these factors can help determine the existing barriers (CFFs) to CI and their root-causes. Finally the local management (site managers, operation managers, etc.) were interviewed within each sample group. They were included to serve as a check on what findings have already been made through the previous interviews within each cycle and to also provide the managerial perspective on the subject.

The interview process has been designed in an iterative manner, so that after each interview cycle was completed there was a room for quick analysis and adoption of any necessary changes to the interview guide that may have been needed in the following interview cycles. Overall, 22 interviews (Appendix 9.5) were carried out across the 4 interview cycles (sample groups) in addition to the original panel interview with the CoE team. The whole

research design outline can be found in Appendix 9.1.

Access to organizations and their data or respondents for interviews can be often challenging among academic research (Bell, Bryman and Harley, 2018). In this case the approached organization saw the opportunity of participating in the research and the center of excellence team (the global department responsible for continuous improvement project implementation) was keen on supporting this research and thus aiding the data collection across the selected organization, which provided a great opportunity for the research itself and no direct unwillingness to participate in the research was encountered.

### 3.4. Data analysis

When the final interview cycle was completed a thorough analysis began. Softwares such as MS Teams and MS Word and Excel were used for data collection, transcription and analysis. MS Teams is already an existing tool within the organization selected for the research, hence it is quite easy to use and it has a function that allows for interview recording and automated transcript generation, therefore it is deemed an effective tool to be used for data collection. Further the MS Word was used to code transcripts and MS excel was used for the analysis process. This software is of course not as effective as Nvivo for instance, however due to the lack of previous knowledge of the Nvivo software and lack of time to obtain necessary knowledge of the software to perform the analysis it has been deemed sufficient to use the selected tools as they enable qualitative data analysis in an organized and structured manner.

The data will be analyzed through thematic analysis, using techniques such as coding. The use of thematic analysis enables the researcher to study the data in terms of patterns or the lack of them (Bell, Bryman and Harley, 2018). By analyzing the collected data, interview transcripts, and identifying the so called 'themes' (Bell, Bryman and Harley, 2018) the researcher can identify the different barriers and inhibitors to continuous improvement implementation, which is the goal of this research.

To identify different themes, the technique of coding will be used to help the structure and organization of the analysis. To ensure a level of transferability for this research a 'thick description' (Bell, Bryman and Harley, 2018) method will be used to explain different interpretations of data to codes. The final themes should be related to the research topic, therefore when coding the research question should always be kept in mind (Bell, Bryman and Harley, 2018). At least two levels of codes/categories will be used to identify the main themes, providing more coherent and condensed outcomes.

The process of data analysis was cyclical and after all the interview processes were finished the final analysis was conducted. So after the initial analysis, all the transcripts were marked with first level codes, which was done in groups based on the sample group. After that the transcripts were reviewed in the sample groups. The focus was on looking at the transcripts in geographical clusters and assigning any missing first level codes. Then, all transcript notes, first level codes and memos were looked at and the second level categories/concepts were generated and aggregated into themes that are related to the research question. As part of the comparative analysis, the final themes emerging from each geographical region of data were then compared against each other and evaluated. This allowed for better understanding of the root-causes of the CFFs and enabled the researcher to identify which context variables they

were related to and how these CFFs differed from region to region. Each cycle of the analysis was additionally consulted back with the theory background collected through the literature review, which enabled gap filling if any new concepts arose throughout the interview cycles.

Thematic analysis is quite easy to grasp and provides an easy approach to qualitative analysis, but it's often met with criticism regarding its subjectivity and data fragmentation causing loss of context between the data generated and the final outcome. (Ljungberg, 2021) To overcome these limitations, direct quotations from interviews were used in the analysis and main argument formulation. Additionally, visualization of the different relationships between the raw data, codes, and themes will be constructed to help raise the level of perceived trustworthiness of the analysis and conclusions.

### 3.5. Research quality

When it comes to research validity and reliability within the qualitative research strategy it can be difficult to fulfill the criteria per se, as they were originally developed for quantitative research strategies, which come with specific methodologies and principles (Bell, Bryman and Harley, 2018). To develop a more apt criteria to assess rigour of qualitative research, two primary criteria were established: trustworthiness and authenticity (Bell, Bryman and Harley, 2018). As these criteria better portray the nature of qualitative research the strategy will be evaluated against these criteria.

To achieve the level of trustworthiness desired, following steps will be considered within the choices made on the research's credibility, transferability, dependability and confirmability. Qualitative research can prove to be quite prone to research's bias, due to their active role in the research and possible subjectivity of data interpretation (Bell, Bryman and Harley, 2018). To mitigate the level of subjectivity, the respondent validation technique (Bell, Bryman and Harley, 2018) was used to confirm the data and findings against the participants opinion to ensure that the inputs were correctly understood as to provide for more credibility of the research's findings. Another challenge that qualitative research strategy poses is the research transferability and whether it is even possible to transfer findings at all (Bell, Bryman and Harley, 2018). Since qualitative research focuses more on the depth of the data, providing a 'thick description' of the context and interpretations made in the research enables other researchers to judge whether they can use the findings in different contexts (Bell, Bryman and Harley, 2018). Hence, this method has been chosen to give the research a level of transferability. Further, all records of data collection will be stored in an accessible manner for any auditing purposes to strengthen the validity of the research. (Bell, Bryman and Harley, 2018) Finally, to establish a good level of research confirmability, all the steps of the research will be thoroughly documented and presented in the final report.

### 3.6. Ethical consideration

One of the anticipated challenges related to this research is connected to the researcher's objectivity in the research. As I am employed by the researched organization it can be argued that objectivity can't be reached. My role within the organization is that of an individual contributor, therefore there is no conflict of interests in terms of having interviewed my

direct subordinates or line managers, which could bring a sense of bias into the data.

The participants in the research were asked if they would be interested in participating in the research and they were free to decline participation at any point in time. All of the participants included in this study were anonymized so that their identity cannot be directly linked to the data by anyone else.

I see the possibility to conduct this research and the organization's interest in it as an opportunity and would try to employ any tools and techniques necessary to establish a good level of trustworthiness and authenticity within the research. Many direct quotes were used within the empirical data chapter to establish solid background and support any interpretations of the data to establish a level of trustworthiness and credibility.

## 4. Reviewed Conceptual Framework

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*This chapter presents the reviewed conceptual framework for this research that has been built from secondary data collected through the literature review and supplemented by the findings from primary data collected via panel interview with experts from the field. This chapter presents the primary data collected through the panel interview as well as illustrates the process of building the reviewed conceptual framework.*

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### 4.1. Panel interview findings

In the panel interview, seven experts were asked to define CI and subsequently discussed the context variables affecting the mineral mining industry and validated the framework for CFFs affecting sustainability of continuous improvement activities based on their knowledge and experience.

#### 4.1.1. CI definition

To begin with the group was given 5 -10 minutes to brainstorm on the topic of what CI meant for them. They wrote their ideas on post-it notes and subsequently the discussion span around their ideas. The components of the definition included 6 themes: improvement, employee involvement, scope, frequency, embedment and nature of continuous improvement.

Improvement represented 25,6 % of mentioned components (Appendix 9.6.1), while at the same time had the largest variety in the terms participants used to describe improvement. Words used for the description included: optimization, cutting costs, decreasing waste, increasing production, improvement or simply doing more with less. From this variety we see that improvement can represent different things for different people. In many cases it is synonymous to increased efficiency or simply producing more output while using less input, however the components of efficiency can be perceived through different angles, such as waste elimination, cost cutting, production improvement or optimization.

The second most frequently mentioned component (23,1%) was the employee involvement (Appendix 9.6.1). It has been quite clear from the discussion that employee involvement from all levels across the organization is necessary for continuous improvement to work. However, when discussing which levels should be directly executing and using the CI tools the experts concluded that for CI to deliver the most value it should be executed by the front-line and simultaneously supported from top-down. As Participant A mentioned *“the front line has the best knowledge of the process and what works and what doesn't. They're best suited to spot the improvements, but obviously the supervisors and managers need to facilitate that by giving clear goals and expectations.”* Emphasis was put on the alignment of those streams as one without the other would hinder continuous improvement. *“The ideas are mostly coming from bottom up but support has to be top-down and has to work in both directions. If one direction is not doing what is their job, then we can forget continuous improvement.”* mentioned Participant D.

Similarly the scope and frequency on which CI should be executed represented 20,5% and 17,9% respectively (Appendix 9.6.1). In terms of scope, all participants were in agreement that CI consists of small systematic steps. Participant D used an interesting comparison of small vs. structural changes to describe the scope of CI: *“if you’ve got a mountain to climb up, you do it step at a time, and that’s continuous improvement. If you call a helicopter to take you up, that’s a process of complete reorganization.”* Further, when discussing how frequently CI activities need to be executed, everyone agreed upon the fact that it needs to belong to the day-to-day operations.

Linked to the daily presence of CI in operations is also the level of embedment of CI needed for it to become sustainable. It is a process that needs to be in the “DNA of the company” as Participant D mentioned. By using it everyday consistently it will become part of the organizational culture and that’s what’s crucial for CI as in the end it has a cyclical nature. Continuous improvement *“is not a project. A project has a start and an end. Continuous improvement has no end.”* as Participant D put it.

Therefore, to sum up all the components that the experts identified as part of CI; we could define CI as a cycle of systematic improvement steps that is embedded in the organizational culture, guided through top-down targets and support and executed from bottom-up. This is in line with the general description of CI from the literature review, therefore this definition of CI will be used throughout the paper.

#### 4.1.2. Context variables

After having defined CI itself, the discussion in the panel interview moved on to discussing the context variables that can affect CI’s sustainability within an organization. The nature of the mineral mining industry seemed to be the most discussed topic as many of the sub-variables are linked to it. Considering that CI is often associated mainly with the automotive or manufacturing industry, examples were drawn in comparison to the automotive industry to illustrate the differences. One of the main aspects directly affecting CI activities mentioned was the cost mindfulness in the mineral mining industry or the lack of it thereof.

When asked about how the mineral mining industry was different from other industries the most prominent answer (20,6%) was related to cost transparency or mindset and how costs are treated in the mineral mining industry (Appendix 9.6.2). Participant D drew a comparison to the automotive industry: *“when you go to a car company, take Volvo for example, you could see that one kilogram of waste costs the company so much Euro. Everybody could see that and I’ve never seen that in the mining industry. [...] And that’s what we have to think more in - Euros, less in production volumes.”* Implying that the mineral mining industry most often talks about goals in terms of output, so the produced volumes and in the process neglects addressing the costs related to production. This mindset is partly linked to the nature of the products that the industry produces. Mineral mining industry works with extraction and processing of naturally occurring minerals and produces raw materials that are used in further production systems to create finished goods. In the mineral mining industry *“usually the waste is part of the business. It’s quite a big part of it.”* Participant E mentioned. This concept of working with natural products, that in 99,9% include some waste or unsellable by-products when extracted from the Earth, mended the mentality within the industry around costs of waste to a degree that it became a source of ignorance towards the notion of costs and waste. Participant C brought up this point

as it was something he noticed when he first started working in the mineral mining industry: *“there was something that for me was industry specific or very recurring comment that I heard a lot when I started with Sibelco, which is: ‘Oh, this is a natural product!’.* Whenever you complained that the yield was not high, well of course the reason was because this was a natural product. If efficiency was not as you would expect it the answer was *‘well, you know that we work with a natural product.’* Historically, treating waste as a part of the production and not questioning its cost has led to a lack of cost mindfulness within the industry.

Nevertheless, the nature of the product alone didn't create this mindset within the industry. Another variable partly contributing to lack of cost mindfulness was the lack of sense of urgency. As an industry mineral sourcing industry commonly supplies their products globally as the location of the mineral deposits prevents the processing plants to be built near the desired customer base. Therefore, the distance from the product and the customer is often very large. Moreover, as the product is still raw material, it is usually sold in bulk quantities ranging from truck loads (40 tons) to ship-loads (70,000+ tons). Participant A underlined this in his comment: *“it's the distance from the customer. In our industry, let's say we sell a thousand tons of sand, we send it on a ship or a train. That then goes in the raw feed for something else, and then eventually it makes it to finished goods and we don't really have so much direct feedback from the customer. So if we were making a car and it was delivered and it had a dent in the door, you'd know about it and you would be very excited about getting everything perfectly aligned.”* The distance from the customer and subsequent lack of feedback or engagement with the customer regarding the product contributes to lower sense of urgency within the industry. Furthermore, the typical market shares for companies within the mineral mining industry are quite high. Many of the companies are monopolies or own big shares of the regional and sometimes even global markets. Having a dominating position within the market is certainly often considered as a positive for a company, however in this instance it leads to lack of sense of urgency and also hinders the cost mindfulness mindset. As Participant C mentioned: *“in the mining industry [...] because of the nature of the products, some of the companies are almost monopoly stores or control a big part of the market. We have good examples of companies or products where we have a dominating position in the market and the truth is that for a lot of those products and those markets we are able to almost fix, to set the price. So again there's not much urgency in controlling the costs because you control the price that you can put on the market.”*

As mentioned before working with natural products normally companies don't have the luxury of deciding where to build their plants. The locations of these plants are decided by the mineral deposits and their geographical locations. Due to that, many of the production plants are located in very isolated and remote locations. To exemplify, some of the sites are in locations such as Stjernoya (an island in the north of Norway with an approximate number of 80 inhabitants), Nebolchi (a work settlement in Russia, located in a forest 40 km from any paved road) or Arija (a village in southern Spain with an approximate number of 126 inhabitants). This leads to another dimension of the mineral mining industry that distinguishes it from other industries: the workforce. The workforce was discussed just as much (20,6%) as the cost mindfulness dimension of the industry therefore we can take it as a mark of significance.

The participants in the panel interview described the industry as conservative, traditional, mature and old-fashioned and this is reflected in the workforce base as well. Several

participants mentioned that the education level of the workforce is lower compared to other industries, such as automotive. The workforce base itself has been described as *traditional*. As Participant D put it: *“it’s a very traditional workforce, a very traditional growth path. Also the workforce is different, the level of education is different. Although I have to underline that in Lean education of frontline workers is not the most important one. It’s more about the attitude and so don’t get me wrong on that, but for sure there’s a difference between the automotive industry and the mining industry.”* As part of being traditional, the workforce base in the industry can be described as long serving, where starting at the company fresh out of high school at the age of 16 and staying until retirement is not uncommon. *“When I was manager at Kings Lynn, I had, I think, 40 people and 22 of them had done over 30 years of service and you don’t see that in a lot of industries.”* Participant A noted. It is also not uncommon for family members or generations of family members to work at the same plant. Participant A mentioned: *“If your granddad was in the business, you know one of his relations for sure would be in the business and that happens a lot.”*

#### 4.1.3. Critical failure factors

In terms of critical failure factors, the purpose of the panel interview was to review the presented eight themes of CFFs designed by McLean, Antony and Dahlgard (2015) and confirm or dispute the framework.

Throughout the discussion on the topic of CFFs the themes of implementation approach, management & leadership and employee involvement were stressed the most. The implementation approach was deemed the most important as the success of the implementation depended on it.

*“We need to be a bit more flexible and understanding and adapt ourselves also to these different cultures. So and indeed I fully agree that people in China or Peru, they can do continuous improvement. But I think if you go with the same attitude to China and Peru I think it’s different. So you need to adapt a bit to get your work done.”* Participant G

The participants agreed that the implementation approach needs to be flexible and adaptable to the local cultures, but still consistent over periods of time and geographical locations. Within the management and leadership factors, the lack of top-down commitment to CI and understanding or knowledge of CI by higher management were deemed as the most common factors leading to failure. Additionally, the lack of perceived urgency among managers to drive CI activities was also named as a common critical failure factor.

*“Something we learned in the original BSP was actually, we involved a lot of the supervisors and the middle managers on the sites, but we didn’t focus so much on the site managers and the country operations managers. And I think that was a fault . I think the ones that the site managers report to I think those are critical to have on board. And if they don’t ask the right questions, then the site managers and the people who report to them won’t give the importance to things so. So it comes down to the leadership part, I think.”* Participant A

CI can be viewed as being part of organizational culture therefore it requires participation from all levels in the organization. Lack of employee involvement was identified as the third most common CFF within the industry.

Some of the causes of the lack of participation were lack of time for the key stakeholders, resistance from longer serving employees and lack of local change agent to aid the local embedment of CI.

*“We don't have a total consistency of the rules because we don't have enough people or enough critical mass in the sites.” Participant B*

While getting buy-in from the longer serving employees was noted as yielding the most value-added towards CI sustainability it was also mentioned that the seniority highly affects the resistance levels and can make the sustainability of CI programs vulnerable if not approached correctly.

*“Regarding the average age of the employees is that again you need to adapt your message and your approach, but then normally the older the people the better the response and the most value added once you get to them.” Participant C*

The remaining groups of factors were confirmed, however their importance wasn't stressed as much as the above mentioned ones. Among motives and expectations clear and realistic target setting was noted as crucial for CI progress measurement.

*“The front line has the best knowledge of the process and what works and what doesn't, and they're best suited to spot the improvements. But obviously the supervisors and managers need to facilitate that by giving clear goals and expectations, and they need to tell the frontline what they want to improve. And set the vision if you like.” Participant A*

Cascading targets were mentioned as a necessary tool to ensure all organizational levels were included in CI practices. With reference to the CFF group of organizational culture and environment, the main challenge highlighted in the discussion was related to organizations that are built through acquisitions and therefore have different organizational cultures when joining the 'mother company,' as this creates a lot of variation to the CI maturity, organizational readiness and implementation approach. Moreover, it can be a very lengthy process to bring all the acquired companies on the same baseline or “wavelength” as participant G described it.

*“We really are a group of acquisitions. Most of the sites were purchased over time. So every few years you get a new site and those sites, some of them are very old, I mean King's Lynn has been there 130 years, so obviously that will have one type of culture and we've just bought a glass recycling plant in Sheffield and Scotland that's going to have a completely different culture. So we don't all come from the same baseline. And to change attitudes and working practices takes a long time to change a culture.” Participant A*

Training has been noted as an important factor as providing the right tools and training is essential for CI success. The project management CFFa mentioned in the discussion included lack of time or the struggle to prioritize CI by the key stakeholders. Assigning the wrong people or people lacking the necessary capabilities to the project was mentioned as a factor as well.

*“I think one of the perhaps mistakes that we made also in the past is to, and in some cases to assign somebody in the role of local change agent without let's say, really be sure or asking or investigating if this was the good match. Do you know what I mean? Uh, we need somebody. We have somebody here who has some spare time. Let's give him or her the role of change agent. And I think this is not the correct way.” Participant G*

Lastly, lack of results, communication and feedback and inaccuracies in evaluation methods of the CI program were listed as the main factors contributing to failure of CI programs.

The panel interview confirmed the presence of all eight CFF groups within the mineral mining industry, thus confirming that these are not industry specific. Therefore, the conceptual framework from McLean, Antony and Dahlgaard (2015) will be used to define the concept themes of CFFs.

## 4.2. Reviewed conceptual framework

The reviewed conceptual framework has been constructed with the purpose to supplement the theoretical framework with industry relevant context variables. Since the panel interviewed validated the framework for the CFFs as present and applicable to the mineral mining industry, the reviewed conceptual framework includes McLean, Antony and Dahlgaard's (2015) eight themes of CFFs to continuous improvement as the main concept themes for this research.

Further, the contextual variables presented by Sunder M and Prashar (2020) include industry affiliation, which has been supplemented by sub-concepts that arose from the panel interview, namely: the cost mindfulness, competition, workforce, geographical location, nature of industry and product. The type of CI practice as a context variable has been excluded as the studied company has been working primarily with Lean methodologies, therefore it wouldn't provide sufficient data to analyze this variable. Country of the business unit has been included in the study to provide more clarity as there are conflicting findings among the researchers on whether the context variable plays a role or not in CI failure. CI maturity and size of the business units were confirmed by the panel interview as context variables affecting the mineral mining industry, hence they were chosen for the study. Lastly, the context variable of age of employees has been split into two separate sub-concepts, one being the average age of employees and the later employee seniority as they often may be blurred and mixed together and thus lead to somewhat biased outcomes. The visualization of how the reviewed conceptual framework has been formed can be found in Appendix 9.7.

## 5. Empirical Data

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*This chapter presents the empirical data collected in the 22 interviews across four different geographical regions, namely: the Nordics, the UK, Southern Europe and Western Europe. The collected data is presented in four sub-chapters based on the region and within each region the data is separately presented in relation to the context variables and CFFs.*

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### 5.1. The Nordics

#### 5.1.1. Context variables

In regards to the mineral mining industry in the Nordics the most obvious factor that distinguishes the industry from others is the product itself, which is a raw material and when it comes to working with raw materials, some of the processes can become very complex and unstable as they are weather dependent and often hard to control.

*“The raw material in the field is always a constant topic of issue and yes, it’s never stable in a way. If you compare it with other industries, that I’ve worked in (construction projects). It’s more you know, concrete floor - it’s straight lines. It’s easy to control.” Participant N2*

However, it is not uncommon in this industry to have very few competitors as there are often only a few players on the market within the region and sometimes globally. This of course allows for the company to set high profit margins, which has cushioned the company’s production processes for many years in the past and has led to development of a very strong production-oriented mindset, with focus primarily on the output instead of the costs for running the production. Having such low competition has also contributed to the industry not feeling the urgency to improve or work on lowering the costs of production.

*“Of course it’s important to improve, but it’s maybe not so urgent in our business than if you compare it to [other industries]. We have two competitors, if we had hundreds of competitors, if everyone could do this, of course it would have been more challenging.” Participant N2*

On the other hand, being such few players in the field it also makes it difficult for knowledge-sharing within the industry and thus reaching a level of competence, but with natural products or raw material, brings about another challenge, such as geographical location. Being one of the few suppliers of several raw materials causes that the product sometimes needs to travel across the globe to reach the customer. Without a good communication or process integration with the customer this adds another layer of complexity for the sites to manage their production.

*“The beginning of the plan starts at the customer’s side and if they are not following the plan then we have to change the way we work all the time because we are getting too full silos or we are getting empty silos and we have to reclassify material, because their ships are not coming and so on. That is the biggest challenge at the site because we are not able to do proper planning. If we were able to manage the stocks, the inventory at the customer’s side, then we could do proper planning at our site.” Participant N1*

Since the location of the production sites is dictated by the natural location of the mineral deposit, many sites are located in remote areas with only small communities around them. Because of the remote locations, it can be very difficult to find suitable candidates for technical or managerial roles. Moreover, the workforce usually comes from the communities surrounding the site, therefore there might be a lack of diversity of employees on the sites and leads to more of a family-like atmosphere on the sites.

In the Nordics the people have been working on the sites on average for 25 years, so the seniority of employees is quite high. Many of the long serving employees have been on the site since they were 15 years old, and thus they only have experience within the same company for their whole life. This creates a great sense of loyalty to the workplace, but also the staff gets more 'settled' in their routines and it can be difficult for them to change.

*"It takes a lot of time to convince them that everything they have done the last 40 years is wrong, that we need to start doing things a whole another way than they are used to do it, right, it's kind of like if you have walked for 40 years and suddenly you need to start learning how to walk again in another way."*

*Participant N6*

This can lead to the newer employees, who have been working on the site less than 5 years and full of energy to drive improvements, to perceive the longer serving employees as 'show-stoppers' and over time wear down their enthusiasm towards implementing changes.

*"You get a little bit demotivated when your colleagues are not very enthusiastic about changing how they do their work. I mean that is one kind of a show stopper."* Participant N3

Further, in accordance with the long service of the employees is the high average age of the employees. On one of the sites the average age of the employees is 55 years, which is definitely a factor to consider when implementing continuous improvement especially because the older employees tend to struggle with digital tools as well as they may struggle with English as the language of instruction if new changes are implemented.

*"We are a lot of older people at the plant, which don't take technology on board as quickly as we did before, so it's a lot of people struggling when they get a problem because they don't know how to fix it."* Participant N1

When looking at the perceived maturity of CI across the sites in the region, they indicated that on a scale from 1 to 10 they are somewhere between 3 and 5, however this differs between sites in the region and even across different departments within a site. On top of that, the COVID-19 pandemic further influenced the state of CI maturity as the restrictions limited the workforce availability and reduced the social interactions of employees.

*"Earlier we were very tight and we also had our parties and things like that in our spare time but that is totally gone. And that is one of the things that keeps people working together because you know something else than the work or the job. You have some knowledge of what the others are doing in their spare time and things like that, and that is actually lost now during the pandemic. Totally."* Participant N5

This can be critical in this region since the local culture has been described as trust-based, consensus seeking and for good collaboration it was necessary to establish relations among the colleagues.

*“We are not the most eccentric people. You need to get to know each other a bit, and build a relation before you get close to someone... It’s important to build relations. Then it is very easy to get information from each other and discuss.” Participant N4*

However, one thing that the pandemic restrictions helped the industry with, was adoption of digital tools. In general the industry is very behind other industries such as automotive or manufacturing, in terms of technology. The level of digitalization for many sites is quite low. As the pandemic restrictions forced many people to work from home, filling in paper reports from production, as it was the habit, was no longer feasible and therefore the sites needed to start using Excel forms that could be shared with the employees working from home, which remained as a practice even after the restrictions were removed. However, due to this low level of digitalization, the level of data collected, analyzed and used for decision-making is also low. There are lots of systems in place, but often without integration which causes a lot of manual data transfer, which affects the data quality and reliability.

*“It’s quite bad, the access to the data. There is probably quite a lot of data in the production system, but it’s difficult to get hold of. It’s not easy or accessible for analysis or to even look at.” Participant N3*

Another factor that plays a role within how well sites work with CI, is the size of their teams. For the case company the smaller sites range between 5 to 30 employees, while the larger sites have somewhere between 60 to 100 employees on site. In the Nordics region there is a mix of sites in terms of sizes, where 11 out of 13 could be classified as small sites and the rest as large (Appendix 9.6.3). This leads to some difficulties when it comes to CI activities as the naturally very lean organization on site doesn’t leave a natural space for teamwork for the shop-floor. In the smaller sites, there is only one operator per shift responsible for a work center and he sees his colleague only for a 10 minute interval when they change shifts and inform each other about the most important things. Everything also gets very personal, as there is only one person on a shift responsible to make the decisions in each department.

*“I think that there’s a little bit of a problem because everyone is a little bit alone in what they are doing. So everything gets very personal, which of course is very easy in some way because you don’t get challenged and you maybe don’t compare so much how ‘I work compared to the other guy who is working next to me’ and things like that.” Participant N2*

On the other hand, the bigger sites can benefit from having shifts with more people as they can learn from each other and if one shift finds a better way of working, the others can learn from it.

*“If somebody has had a good idea on one shift and started to do it in a better way on one shift, the other shifts could be learning from this. I think that if all of the 12 (guys) were working together then we might not get that kind of perspective - from 3 shifts at the same time.” Participant N6*

However, working with bigger shifts and more departments can make it difficult for one change agent to have time and capacity to train everyone and get everyone’s buy-in. Combined with strong departmental loyalty, ‘silo’ mentality can also be present, which can make it difficult for cross-departmental collaboration.

*“People have a lot of ownership of the workplace. They're talking about ‘getting home’ to Sibelco. And that is quite good actually. So they care a lot for their working place, but that is also a disadvantage because this ownership is more related to the departments than to the site, so they have a lot of loyalty to their own department. And this is also in their system, so this is ‘us’ and this is ‘them’.” Participant N1*

### 5.1.2. Critical failure factors (CFFs)

When discussing the main barriers or obstacles to embed CI in the daily processes, several concepts came up. When it comes to motives and expectations there was a clear need for improvement within expectation and goal setting in terms of CI processes. For the shopfloor it was important to be informed about a change before the change takes place and the managers expressed the need to know what are the next steps and having a more long term perspective on the organization’s plans with the CI programs to be able to plan for it and prioritize among many other projects.

*[It’s a challenge] “if you don't get any information at all and you arrive to the site and start working and then notice ‘Oh here we have made a change’ ... and there is no information about it.” Participant N5*

In terms of organizational culture and environment there seems to be a perception in the Nordics that the corporate HR policies are not meeting the local needs. As an example, the sites struggle to attract the necessary talent for their technical or managerial roles, due to the lack of competitive salary offers.

*“When it comes to competition between all people, for example, to be attractive as an employer, then we have competitors, that is paying higher salaries, maybe they don't have this stable way of working as we have, but we are competing all the time with different companies and also the communities to hire the best people.” Participant N1*

There also seems to be a growing strain on the organization culture as with too many changes employees are becoming less comfortable to voice their opinions in anticipation of negative consequences.

*“Earlier there was a lower threshold of what you could say between the [hierarchy] layers. I would say that later on, it has been more quiet and the feeling is that people are not talking about problems that maybe need to be talked about.” Participant N5*

This may contribute to the struggles with intercompany communication being poor or very inefficient. What can further make things complicated is the misalignment between the local organizational structure, which has very flat characteristic traits and the corporate more hierarchical structure. This can manifest itself in for example: supervisors working alongside their managers and therefore not having KPIs cascaded in a proper manner; or decision making being given to the shop-floor due to the lack of managerial roles per se. Another misalignment perceived was regarding the organization values and the corporate processes and policies in terms of empowerment given to the sites, which may be confusing and demotivating over the time.

*“The change in Sibelco, especially in the corporate level is not easy, I can imagine, because we are meant to have a lot of local ownership. Act like an owner is the term of one of our five values. But if we all are limited by a lot of guidelines and policies and instructions from the corporate level, then it has less and less value because you are working within the framework which is meant to be the same all over Sibelco*

*and Sibelco isn't the same allover. We are different people and different sites in different cultures and so on. So we are not the same." Participant N1*

Within the management & leadership theme of CFFs the involvement of management has one dominant concept, coming even from the site management themselves. The managers are overwhelmed with daily tasks and CI very rarely makes it on the priority lists.

*"I think if we should work with CI in more structured way and follow up and do these regular check-ins then of course we have to realize that the leader or manager should spend some time on that task. Today, I have a hundred other things to do except lead people or review the business and it's constantly other day to day tasks." Participant N2*

Due to this every participant mentioned the lack of a dedicated resource to the role of CI responsible or what they call it 'local change agent.' What was more importantly stressed was that this person should be formally dedicated, so it should be stated in their formal role how much time should be spent on CI-related tasks as people are often expected to do CI on top of their regular assignments that already take up 100% of their time.

*"You have someone that is really dedicated to perform this, because it requires time and effort. You can't do it 20 minutes a day on top of everything else. You should be able to focus on it." Participant N2*

The implementation approach is often viewed as too ambitious, or lacking "connection to reality" Participant N4. It is also viewed as too demanding and because of the corporate program that is deployed in waves of site support it tends to be viewed as a project. Therefore when the central support team (COE) leaves the site, the perception is that the CI 'project' is over and the sites need to get on track with things they pushed to the side, while the central team was present locally. This leads to immediate drop in focus on CI and general disengagement with the topic over a longer period of time.

*"When you [COE] come they [shop-floor] set time to meet with you to work with CI and then when you leave, they'll have to go back to their daily tasks. Then they get less time to work on continuous improvement." Participant N3*

Training is an important part of the ability to sustain CI practices, therefore it is a factor when sites mention that they are lacking continuous training and additionally there is variation in the quality of training received by employees, or in the amount of training the employees receive. This of course affects the ability of the sites to use the CI tools they were designated to use.

*"We do not have any special training. There is no one on site to guide us actually within how we understand the different terms and the different elements of the OEE and so on." Participant N1*

In terms of how the sites manage CI projects, there is a perceived lack of forward-planning from the senior management. The sites can also find it difficult to get financial resources for their improvement projects. Sometimes it takes too long to approve projects, to a point where they need to get new quotes as by the time the decision was made the original quotations expired. Moreover, there is a feeling that the sites don't have enough empowerment to work with finances as they did before they were acquired by the Sibelco group.

*“Before all the money made [on the site] stayed [on the site]. But today it’s kind of a struggle to get money for improvements.” Participant N6*

Employee involvement may be one of the most critical factors influencing CI failures. All participants expressed the need for more time and resources to be able to participate in CI activities. Additionally, lack of incentives was mentioned several times, which could be a factor influencing even the shop-floor to buy-in on the CI ideas. The incentives don’t necessarily need to be monetary, but the shop-floor should see that their ideas are listened to and money is invested in them.

*“The operators should see that their ideas can be turned into something real; that the changes they are proposing can be actually listened to and we do something about it and invest in their thoughts.” Participant N6*

In regards to feedback and results, many sites struggle with documentation of CI activities. Further they lack consistency in follow-up and review activities, that is mainly caused by lack of time and resources. The inaccessibility of some data leads to lack of review or monitoring of CI activities as the measurement instruments are not automated or in some cases non-existent, thus manual monitoring would require even more non-value-adding time spent on CI activities. What several participants mentioned was also the lack of active best-practice sharing among the sites within the region or sites with similar processes from different regions.

*“Maybe to add one thing... I think in general we tend to work very much with this standard way of work and sometimes we forget to take a good idea on one site and then share that to other sites. We are very good at telling ‘you should use these tools, to do like this, this is the way you’re working’ but we never discuss that ‘this solution we have tried and this has really helped this site.’ We tend to forget that part.” Participant N2*

## 5.2. The UK

### 5.2.1. Context variables

In the UK quarrying side of the business, when participants were asked to describe the industry, the answers were much alike from all the participants. Participants described the industry as dated or significantly behind other industries in terms of technology, CI and culturally very different. It was described as not a very attractive industry as the sites might seem quite dirty and sometimes run-down. It might not be the first choice of graduates to work in the industry, therefore there is also a perceived lack of talent that the industry is able to attract.

*“It’s a little bit dated. I mean, with this site, it’s been going for over 130 years. So a lot of the equipment and the buildings are all very old and even the new stuff that we call new was built 40 years ago. And it’s probably not as advanced as some other proper factories and industries and processing places. We’re quite a dirty site, really, because we’re working with sand, mud and soil, so things are gonna look a bit run down, but it doesn’t mean to say we have to keep it like that, so maybe I’d say it’s just a little bit dated.” Participant U5*

Additionally, working with natural products in quarrying, weather conditions create a complexity that other industries, such as automotive or manufacturing don’t encounter.

Unfavorable weather conditions, such as freezing temperatures or extended periods of rain make it very difficult for quarrying activities and make it difficult to maintain steady performance.

*“Quarry and mineral processing is affected by many variables such as the weather, such as the material that you mine or you quarry or you process varies highly and so to answer your question, when when people try and compare us to car manufacturing company or a company that makes I don't know televisions there's not very many variables...in earthworks, you get a very short window of opportunity especially in some countries where it rains and rains and rains. So you need to make the most of it while you can. So I think quarrying is quite a challenging industry compared to other ones.” Participant U2*

The nature of the product being a natural deposit and thus a depletable resource influences how much financing sites get for improvement projects. If the site doesn't have a long length of reserve in deposit they are less likely to get investments for improvement projects and vice versa. Additionally, this contributes to the output-maximization mindset instead of cost focus. Once the sites establish a customer base with regular consumption, they need to produce the promised volumes. Therefore it may be sometimes difficult to lower the volumes to meet the staffing levels or maintenance needs and sites would do anything to get the level of output needed.

*“It's like a big ship, that sort of set sail, and because we've set sail and we have to produce 40,000 ton of mineral every month just to satisfy the customers or the demand. You very rarely get to a point where you can take your foot off and to stop for a week because it's fairly quiet and say we're going to do a load of maintenance. So once you set sail, there's never that lull, there's never that.” Participant U2*

With lack of competition in the region and high demand for their product, the urgency to improve is not stimulated by external doctors, rather just from the internal organizational drive. Working with depletable resources also makes it fairly easy to establish prices as the product is finite and *“once it's gone, it's gone. You've got one chance to sell it”* as participant U2 noted.

Similarly, because of the product being a natural product, the location of the quarries is determined by the location of the mineral deposits. In the UK region, there seem to be two extremes of the site locations. Either the sites are located in remote areas that are close to small villages and communities, or on the other hand are in proximity of bigger cities, which brings about different sets of challenges.

For sites located in proximity of bigger sites it becomes difficult to attract the right talent or retain it, because the sites might be competing with bigger employers and not able to match the salary levels. The proximity to bigger cities also shapes the workforce diversity and local site culture. Since it is more difficult to retain employees that are closer to the bigger cities, it also means that the length of service on these sites is much lower and the workforce is more diverse in their backgrounds.

*“So I've got quite a mixed pot of people and they tend to get on with each other quite well... If you had 10 people that were xenophobic or if they all came from Surry and one person from Romania, the integration may be more challenging, but if you've got such a big pot of different people, there's no integration because there's no two or three people from the same place.” Participant U2*

On the other hand, the sites that are in more remote areas have more homogenous workforce. These sites are close to small communities and thus it is not uncommon that the

workers have been working on the sites for the majority of their career and come from line of family generations working on the sites.

*“I find the culture here almost kind of a very small enclave - very much centered around a village or set of villages. Therefore you have lots of family working here. So it's very much like that here. I have lots of family and family members working here and you know historically fathers, grandfathers, mothers and all sorts of stuff really.” Participant U1*

The workforce in the UK in this industry is highly reliant on contractor workers, which can have its negatives as they don't have anything invested in the company and thus it might be more difficult to entice them to get involved in CI activities. The level of workforce education varies across the sites. Part of the workforce has a low level of education to an extent that they can have difficulties to read or write properly. This affects how well the sites work with CI and need to adapt quite a lot of the material to their level of understanding. Additionally, the older staff have more resistance towards digital tools as they are not as technologically savvy as younger generations.

*“They don't want to touch a computer, most of them, really. Let alone to be involved with PowerPoints, graphs and presentations, which is fine to a point because that's not the role they happen to do, but it's just embracing the change as opposed to trying to fight against it or not wanting to get on board with it.” Participant U3*

The sites in the UK have been involved previous to the corporate CI program in a regional CI program called Optima, which focused on similar ways of CI in quarries. Because of the longer exposure to CI, with the longer serving staff on average the sites across the UK are more mature with their CI practices in terms of challenges they are facing.

*“They [shop floor] are certainly more comfortable than they were, if I would take myself back five years, then they certainly are more comfortable. You know, we've got the standard way of working boards incorporated here within team leaders performance management. They're encouraged to do problem solving...but, we're still quite a long way from, you know, perfecting that, if I'm honest.” Participant U1*

As the majority of the sites are small (Appendix 9.6.3), meaning they have less than 30 people to operate them, the challenges are predominantly linked to lack of resources. Specifically, there is a lack of technical resources such as engineering or maintenance present on these sites. Nevertheless, the smaller number of people on site enables creation of a very open and friendly atmosphere, where everyone knows each other.

*“I would say generally we're quite a close knit group really...You know, obviously everyone has disagreements from time to time, and not everyone thinks we should do the same thing, but when it comes back to the safety culture, everyone wants to look out for each other to make sure everyone goes back safely to their family at the end of the day.” Participant U4*

This makes it easy for new ideas to flow without any barriers to the supervisors or operation managers, but sometimes it can bring about difficulties for everyone to voice their opinion especially if it's different from the rest from their 'mates' as they don't want to be the odd one out.

When asked about the national culture traits, the participants described the British people in general as individualistic, not very emotional and people that are quite perseverant. Participant U5 described it as a “don't moan, fix it and get on with it” attitude, which sometimes affects how they cooperate during daily tasks.

Now the length of service is a factor that has been stressed throughout all the interviews from this region. The average length of service is well above 30 years across the sites, which poses several challenges. The length of service creates opportunity for sentiment over the old days and leads to resistance towards change.

*“The site has sort of been managed in the past, you're going back like decades where operators were left to do what they want. They ran what they wanted to. You know that they chose what production they were doing. There was no report of issues unless it was like a major breakdown. They were left alone. So they see it now, as you know, they've got autonomy still, but not full autonomy, which they shouldn't have had ever anyway. But now they don't have that full autonomy anymore. They are accountable and responsible, but I don't think they see that as a positive.” Participant U3*

The people that have been on the sites longer are more settled in their ways and it becomes more difficult to change their routines. Lot of things seem to them as more demanding, which may not necessarily have been so if they haven't been so much accustomed to the way they have been doing things over the years.

*“The culture is sometimes a little bit well, ‘we never used to do it like that, so why are we changing it now? If it's not broken, don't fix it.’” Participant U5*

This also makes it slightly more difficult for newer employees to question why things are done a certain way. They might be sometimes told off and called a trouble-maker if they question longer serving colleagues about their methods. On the other hand, employees that have experience from different companies, or project-work are eager to improve and much more eagerness to change

*I like change, but then that's probably largely because I've been more in the project side of things and I've seen it from the other side. Whereas, quite often people will be resistant to change and that's probably because they know the tasks that they're doing. They don't have to think too hard about how to do them and then obviously when you start implementing changes, at first at least it has to take a bit more thought, and people don't always like that.” Participant U4*

The COVID-19 pandemic didn't have too much influence on CI activities as the majority of the staff working with production has still been on the sites throughout the pandemic. On occasions the workforce levels were low, but that was mainly due to furlough caused by lower volumes from the customers side.

Further, looking at the level of digitalization or automation of the sites in the region of this industry is quite low. As the industry has been described as dated, this very much applies to the equipment and technology used within the processes. Lot of processes are still manual or using analog systems. As Participant 5 has described it *“it's just enough to get us by.”*

### 5.2.2. Critical failure factors (CFFs)

Looking at the CCFs mentioned from this region, among the motives and expectation theme, there was a hint from some participants that when the CI corporate program was originally introduced there was a poor expectation setting. Many employees were scared as the program seemed too intimidating and associated with staff cutbacks. This has improved over the course of time the program has been running, but it still leaves a mark on the name of the program.

*“I think everyone was quite scared at the start because you hear a lot of horror stories that, you know, you got a team of people coming in to see what we do, and they're gonna try and make a lot of cuts. So I think a lot of people were a bit frightened to have someone pry into their working day. You know that was sort of the first take. I think people are a bit apprehensive of people coming to check on them, but once they introduced themselves and started getting people involved into workshops, I think people were quite keen to get their ideas forward.” Participant U5*

From the organizational culture and environment perspective there are some challenges hampering the CI activities. As participant U3 mentioned, for CI to work sustainably “*you have to have the right people in the right places.*” This can be quite challenging if the HR policies are not able to get the right talent or just workforce in place. Due to the global or national policies steering the recruitments it can be very difficult to find talent that is local to the sites.

*“Recruiting and retaining the right people is always a challenge. If I was just allowed to advertise in the local paper or go and find somebody, I could probably find an employee, but they [corporate] do seem to like to use agencies and then we get the wrong type of people. I don't think we go about recruiting people the right way.” Participant U2*

There also seems to be a struggle with inter-site communication. The local communication tends to be quite good since many of the sites have small teams (under 30 employees), however the communication between different sites can be ineffective and cause a lot of frustration at times.

*“I mean, certainly one of the major challenges, going back to that is that our head office where all of our sales and sales support and business support is currently, which is due to change quite soon, the communications between there can be quite poor between us as a site... there's distance between us and some of the other sites. Obviously, they're always on the other end of a Team's call or the phone or what have you, but it just, it doesn't always seem to work very well.” Participant U4*

On the other hand the site culture seems to be very open and favoring CI as everyone is approachable and the perceived structure is quite flat. Nevertheless, the older sites with on average longer serving employees tend to have their historically ‘inbuilt’ culture, which may not always be aligned with the corporate group culture. This can cause further resistance of employees and lack of engagement with the central CI program.

*“I don't need people to come down and check on us. It's in our own interest to do continuous improvement and I mean it's pushed from us anyway. So I don't think we need to be pushed.” Participant U5*

Additionally, because of such low turnover it may sometimes be deemed as there is a lack of influx of new ideas into the company.

*“I find it very difficult to inject new ideas you know in my view. I've been here 10 years now and I've been here too long. My view is that I should be replaced because there will be smarter people out there and more agile, more qualified for the job, more suited for the job and bringing in fresh ideas. We haven't really got that injection of turnover and staff really.” Participant U1*

The UK sites usually have a dedicated change agent per area, which has been really positively viewed from their side, because some of the managers are really overburdened with day-to-day duties that they simply don't have time to dedicate the needed time and attention to the CI activities. That is where the dedicated change agent really makes the difference. The management also recognizes that if CI is not pushed from their side consistently it will fade away as it is still not natural for the shop-floor to carry out the tasks on their own. Nevertheless,

all of the participants mentioned that they as a manager set CI related KPIs and follow up on them or their line managers actively encourage CI practices and make sure the shop floor feels listened to, which plays a key role in their buy-in.

*“I would say we do fairly good job here and again, a lot of that is because of the communication channels and that it is fairly easy really for people to raise any concerns and they know that those concerns will be heard as well. They're not just talking to a brick wall, because if they feel like that, then obviously they won't bother again, and then you'll really start to struggle with them.” Participant U4*

When it comes to implementation approach, the sites were quite comfortable with Lean methodology and that was mainly due to the fact that they were introduced to CI earlier through the Optima CI program. Training was also mentioned alongside enough resources as a critical factor for sustaining CI practices, however the role of local change agent facilitates that need for training and implementation.

However, when it comes to CI project management, some sites deem it difficult to secure financing for improvement projects and sometimes it can be very difficult to get timely decisions on project implementation especially if the prices of raw materials are as volatile as in the last year. Then the speed of decision making really makes a difference for the viability of some projects.

*“It's quite hard work to get the CapEx projects to an approval stage and begin working on it and obviously all the time that's wasted at this stage, now specially with current material costs, the costs of the project is only going to go up and up. So on the financial side, in the CapEx side, that obviously has its challenges as well in terms of the manpower just to get the capital projects being placed and get them to that approval stage.” Participant U4*

Employee involvement has been viewed by all the participants as crucial, since without it, it wouldn't be possible to sustain CI practices. At the stage of maturity where the region is at the moment, it is very crucial that the management keeps consistency of their follow up as CI is not yet fully embedded in the site culture. Many of the longer serving employees don't see the need to change, therefore without the managerial 'push' CI wouldn't be sustainable.

*“As a whole they don't like change...They don't see a problem with what they're doing now.” Participant U3*

Although there is a perceived lack of incentives to engage in CI activities, some of the contractors do feel interested in helping out with CI as it gives them higher chances of contract renewal the following year. It has also been highlighted that CI needs to focus on improvements that have implicit benefit to the operators and not only on the financial gains, to secure their engagement.

*“When we talk about CI, we don't necessarily just talk about financial gains. We talk about quick wins, we talk about things that are going to make us safer or you know we might improve some wrench time by buying a certain set of tools or whatever. So you know there are those kinds of implicit improvements that people will see but won't necessarily have a huge financial benefit, but they will have a benefit to the individual or the site collectively.” Participant U1*

In the UK region, on average the management is quite good locally with follow-up on CI activities, however several of the participants brought up the need for a corporate reporting mechanism similar to the ones used for financial performance. As the site managers have

monthly reporting of energy and performance targets, it would be good to include CI in a similar way so that the focus on it is consistent and sustained.

*“If I think about my daily and weekly and monthly routines, you know, I've got a monthly report for my cluster director to do, which covers OPS\_130 (operations performance report), which covers PEER (energy report), which covers safety metrics. There's no CI metrics in there. Now if there were any CI metrics then my focus would probably be a bit more aligned with that. ...Then you know, CI is sustained and doesn't just drift away and is expected to be in the psyche of everyone when we're all trying to do five or six things at the same time, really.” Participant U1*

## 5.3. Southern Europe

### 5.3.1. Context variables

When discussing the nature of the mineral mining industry in the Italian sites several participants noted that the industry has quite a steady market, which brings about job stability, but it is marked by slow development especially in terms of technology.

The geographical areas of locations for sites in this region have the two extremes, which come with different sets of challenges. On one hand there are sites located around small villages, communities where the company acts as a main employer in the area. This leads to lack of staff diversity as the majority of the workforce comes from the community around the site.

*“It's two villages in the mountains, so most of the people were hired in these two villages. I don't know the exact statistic, but I think that at least 75%-80% of people here are from the valley.” Participant I3*

On the other hand there are sites that are located closer to bigger cities that have a lot of industry situated in their surroundings such as automotive and university hubs. This makes it difficult to retain people if the salary levels offered by the company are not competitive. Moreover, it makes it really difficult to get technicians or maintenance specialists to work as permanent staff on the sites, because the company is not very well known in the region, while the big automotive brand names attract the right talent away.

*“In our region we have many mechanical and automotive industries because the [site] is near Maranello and Bologna for example. In our region, there is Ferrari and that's a very different industry, very different approach... For the mechanic roles it is a disaster, because the salary is very low. Since the past it has been very difficult to take mechanical operators in the plant.” Participant I2*

While discussing how the country of the business units, Italy, influences CI, the characteristics of the national culture as well as the high level of national bureaucracy were mentioned.

*“Italy should reduce the bureaucracy on authorization procedures and new concessions, but for this there should be a common front on a national basis for this to happen. Companies that are most respectful of environmental restoration should benefit and it should be more penalizing for those who do not respect the rules.” Participant I6*

Some of the characteristics describing Italian people included being positive, ingenious, joyful, pragmatic people that like to have fun and speak a lot. Very hands on and dedicated people and since it's in the culture to have dinner later in the day around 20.00 or 21.00 o'clock

it is not strange that many of the workers stay longer hours at work just to finish whatever they need to complete.

*“So I think all of my managers are really dedicated to the plant. All of them are working after the eight hours or so. All of them arrive at 8:00, o’clock in the morning and uh, it is very uncommon that people go home at 5. Normally they stay until 6/7. I push to send them back at 5, but it’s not easy...I have not seen this happening in the Nordics. They are more strict about the office hours, and the time breaks too. There is probably less coffee, less speech during the shift but at 5:00 o’clock everybody goes home. Everyone is gone. In Italy, Spain, in the South, we are as a culture, we stay more in the evening, we don’t have dinner at 18:00 or 19:00 o’clock. We have it at 20.00 or 21.00 o’clock.” Participant I1*

In terms of size, three quarters of the sites in the Southern Europe region can be considered small. While it is easier for smaller sites with dedicated change agents to carry out the training sessions and effectively reach everyone throughout the present communication channels. The smaller sites often endure lack of resources that could take on CI activities due to their already very lean staffing.

*“It’s better with few people, because it’s more easy to speak with a little group.” Participant I4*

Meanwhile the bigger sites have more shifts of workers, thus if they want to start using some new tools they can select one shift that will try it out and if the implementation is successful they can spread the practice to other shifts. The smaller sites don’t have this opportunity as they either have only one day-shift or too few people in several shifts.

*“The advantage of being a big site, if it was decided to proceed with a tool for example, it’s okay. We will do it because we have four shifts. So at least with one of them we can try and see if we wasted the time because we have a big quantity of time and resources and so on. So the advantage is that you try, at least you try.” Participant I3*

Because of the lower predispositions to work with CI as effectively as bigger sites, it is important that the KPIs related to CI are adjusted to the site’s size.

*“Everything depends on the size of the site. Of course in [small site] I don’t ask for three business cases per year because it’s crazy. It is impossible to have three business cases with a payback of one year there. So in [small site], I ask for one.” Participant I1*

Bigger sites can also be disadvantaged as they are always prioritized when it comes to new projects, or deployment of new processes, which can at times overload the site and make it difficult to prioritize where the focus should be placed.

The advantage of the site in this region lies within their CI maturity level, as it is higher than the other regions. The participants described their level of CI embedment as being in the sustaining phase. When asked about how far along they are on a scale from 1 to 10 they described the CI maturity at their sites as being on level 8.

*“Now we are, let’s say, maintaining what was done in the previous project, trying to maintain what has been done so far.” Participant I3*

Further, the region went through a renewal program, which has considerably decreased the staff seniority across the sites in the region. On average the middle management and shop-floor supervisors are in their 30s-40s with less than 10 years of service within the company. This acts as a great enable for CI within the region as the lower age group and

shorter service time allowed for better bonding among the new management team, which further stimulates the cross-departmental collaboration.

*“So the reason for this good collaboration, is starting from the age of people, I think that this could be a start. We entered the roles quite in the same time - within the same year or two. And the technical offices as is now set up has grown in two or three years with people of similar ages and behavior.” Participant 15*

In the past, the middle-management roles were held by senior employees that had grown from operator roles and it was very difficult to get their buy-in on CI.

At the moment, the middle management is on average of younger age and shorter length of service, but the shop floor operators are still older on average with long length of service. It is also very difficult to get their buy-in because of their memory of the past or the ‘good old days,’ especially since the company started reductions in blue collar workers. The operators remember when there was more staff running the plant with less volumes, while they are constantly lowering the blue collar staff numbers and running more volumes, which makes them reluctant to learn new things or to change the way they are working. It’s really “*hard to push them to do more*” as Participant 15 mentioned.

*“If I take the operators, they are old, they have seen 30-40 years of operation. In the past in this plant there was 120 persons. Now it’s 80, so we reduce the 50% more or less and everything we reduced was in the blue collar because the offices are increasing while the blue collars are reducing. So they don’t want to do anything new. They already run more compared to the past. If you hire a new guy, this is the job - you have to do this, this and this. The new guy don’t have the past story and all that.” Participant 11*

Moreover, the older generation of operators has a different mindset. Blame projection instead of collaboration and constructive problem-solving, not inclined to speak up, just to do their job and they also just want to be told what to do. If the younger managers tried to explain to them why they should start using some of the tools, they were perceived as ‘weak’ leaders, as the older generation of workers was used to being just told what to do, no questions asked.

*“Sometimes with the guys in production, I have to be the bad guy, because if not they don’t trust me. If I’m too kind, or if I explain something, then OK, just because I explained I’m not able to do my job for them. For them is the best to tell - ‘do that thing and don’t ask anything because I know what’s better now’. I think that there are not much of them anymore because it’s the older part of the people and then the younger that are in my mind, they prefer to be treated in a kind way and with things that are explained with the contribution that we would like from them.” Participant 13*

The younger employees have more relation to the management, they are more involved and more open to change on average.

*“In my opinion young people are much more open to accept change, especially to see change as a challenge and not as a problem that breaks the balance of everyday life.” Participant 16*

Lastly, the digitalization level within the region is quite good compared to other regions as many of the processes are automated or semi-automated. However the industry itself is still very much behind. Nonetheless, Covid-19 pandemic facilitated use of more digital tools such as MS Teams and other digitals tools.

*“The main obstacles are related to technological innovation which often arrives too slowly compared to the speed with which it travels in the world, but also in Europe itself.” Participant 16*

### 5.3.2. Critical failure factors (CFFs)

In reference to the critical failure factors, this region is practicing many things that could actually be considered critical success factors, so unless stated otherwise this section will present the success factors together with the gaps, e.g. failure factors.

So when it comes to motives and expectations the region is very good at setting goals early on, not waiting for the corporate guidelines, as those have always historically been delayed (set around May). This is especially appreciated by the middle-management as they know what to focus on from the beginning of the year and don't have to wait five months to start delivering on their targets. However, this points to the critical failure factor of the corporate team not being able to release organizational agenda with their goals in a timely manner, leaving the sites to their own devices and without clear expectations. Additionally, poor expectation setting can be seen from some of the operators perspective on CI as they see it as something the management does.

*Yes, I think some people see CI as something for the managers. For example, during the daily meeting with operators I have to always say that these improvements are for everyone and not only to show the target to the manager. Participant 14*

From the point of organizational culture & environment it is clear that the HR policies are sub optimal, especially for the sites located in close proximity of bigger cities and find it difficult to attract talent, as the salary offers are not competitive with other industries in the region.

*"For the mechanic roles it is a disaster, because the salary is very low. Since the past it has been very difficult to take mechanical operators in the plant." participant 12*

Too much internal bureaucracy is also perceived as a challenge and obstacle towards CI sustainability. Too many people and too many decisions that need to be taken above the site level make it many times very difficult to carry out projects or tasks and cause confusion in terms of prioritization and focus.

*"I think we spend a lot of time in bureaucracy and documents and we lose our vision of the problem. So a lot of time I have to stop working on things that are bringing money to the plant and fill an Excel sheet or some other thing just for Sibelco. Lot of time we do double work because we do it for the Italian legislation and then also for Sibelco policies. We are over structured on that." Participant 11*

Misalignment between the corporate strategy and the goals of CI are another challenge this region is facing. The corporate CI program initiated the creation of supervisor roles on the shop-floor so that these people could lead the CI activities on a daily basis, with the support of a local change agent. However, the organization is currently going through a reorganization process, where the roles of supervisors are being eliminated. This means that their tasks will have to be absorbed by the middle-management, which is already overwhelmed with the day-to-day tasks.

*The BSP (corporate CI program) said that we need a supervisor because uh, there are the daily meetings for supervisors and so on and all the structure was created. And now the supervisor for Sibelco doesn't exist anymore. So that's, for example, one of the contradictions. Participant 13*

However, what has been positive about the local on site organization is that due to younger age of leadership on sites the distances between different departments and levels have

shortened, which creates a good environment for open communication, cross-departmental collaboration and effective problem-solving environment.

*“For example things with continuous improvement it’s easier because you are more invited to express your opinion and say in the problem solving sessions - do it like this.” Participant I5*

In regards to management & leadership the region is doing quite well in terms of CI embedment, because the management is committed to it and this can be seen also from the operator’s perspective, not only the managers’. Moreover, it is of a great advantage that one of the site managers has been involved in the COE team in his past and has worked with CI on a higher level, which gave him the opportunity to truly understand the concepts of CI, which he can now translate to the local processes and the way the site is working with CI.

*“It’s about commitment. If people see that you don’t leave things, that for a day you don’t stop certain things, after some time they will change their approach. For example, last time Francesco and Davide (managers) weren’t there and they (operators) filled the dashboard by themselves because now it’s part of their work.” Participant I5*

The sites in the region also have dedicated change agents, which makes it feasible for them to sustain the level of CI even when management or staff is changing. However, the fierce reductions in blue collar workers are shifting more day-to-day work on the shoulders of middle-managers, which in the end results in loss of focus on CI due to being overwhelmed by the daily tasks.

Implementation approach and training or the lack of it, has not been mentioned during the interviews with participants from this region, but what has been mentioned was the project management. Several of the participants indicated that there are too many projects running at the same time and sometimes CI is seen as just one of them. Therefore it takes away focus from CI and makes it to be perceived as a project rather than a way of working.

*“To be honest, every year we introduce new tools, new things, but the problem is that the plant is always running the same. We work 24/7 but on top we have new projects, new things to do. So part of my role is to decide maybe if we add something then we have to remove something that is useless - to have a good balance between the ordinary and the project part of it.” Participant I1*

This is further linked to the change fatigue perceived by some of the employees, which makes it difficult for them to be focused on CI and sometimes even reluctant to take part in it as again it is seen only as a one of the many changes.

*“There are several and several changes at different levels...so this will be the impression of CI, another additional change in the sea of changes that we are facing in the last two, three years or so.” Participant I3*

On the other hand, what is positive from this region is the employee involvement. Even though there are many ongoing changes, there is still the will to try new things. This is partly sustained through the incentive scheme for middle managers, whose variable part of the salary is linked to KPIs directly associated with CI activities and also cross-departmental work. Many managers have shared team objectives to promote teamwork and collaboration across the different functions on site.

In terms of feedback and results there were no mentions of any critical failure factors, but what other sites could benefit from was the good practice of timely KPIs setting, which is

followed by review with the line manager every two months to track the progress and challenges along the way.

*“I check every two months, more or less, we do informal meetings with the manager to check how they are progressing with objectives and one of them is related to the learning part.” Participant I1*

## 5.4. Western Europe

### 5.4.1. Context variables

In the Western Europe region, participants from the sites in the Netherlands were interviewed. When asked about the nature of the industry, the majority of the participants mentioned it being old-fashioned and dated, in many ways behind other industries. When compared to the petrochemical industry in terms of CI, the mineral mining industry is still in the “*children's shoes*” as participant W4 mentioned. When compared to the automotive industry, the mineral mining industry does not have very high standards nor the same urgency. As described by participant W2 it is just a “*bunch of cowboys*” in the industry, which makes it so old fashioned and at times even rude.

*“Most of our jobs can be done by being rude instead of being educated. I think if you look into our type of work that we are cowboys. I think that's the best explanation. And why? Because every group we are working together with, every supplier is also a bunch of cowboys. So you have to be a bit rude.” Participant W2*

Moreover there is high process complexity involved within the mineral mining industry. When compared to the plastics industry, their processes are very predictable, while in mineral mining the processes can be highly unpredictable.

*“That's the nice part about the plastics industry because it's predictable and high performing, high quality, high safety. But yeah, it's also a bit boring and here at Sibelco nothing is predictable.” Participant W1*

The industry is also not very well known to people who don't work within the industry and this may have to do with the nature of the product mineral mining industry produces. The products the industry produces are merely ingredients for other end-products and those are not very often known by the consumers.

*“I think it's because the product that we make is just the ingredients for bigger products. So for example, the paint has various ingredients and one of them is for example our wollastonite. So because of the hardness of the paint, they put in wollastonite, but I don't think when we ask a painter who is painting a house if he ever heard of wollastonite in his paint, he wouldn't know.” Participant W3*

The workforce is also different from other industries. In the Western European region the workforce in the industry has been described as low educated, some can't even read or write properly. Many of the workers are without 'outside' the business experience as many of the operators came to work on the site when they were 15-16 years old and have stayed until now. Additionally, since historically the sites were family owned businesses before being incorporated into the Sibelco Group, there are still a lot of family relatives working across the sites.

*“People have a lot of issues with reorganization because first it was more of a very small family business and we're now settled under the umbrella of Sibelco. But the people in their heart themselves are in that old family business. And of course, now you gonna have more and more younger people in the company*

*who do not have that background, so it's changing. It's similar to what I experienced in the petrochemical industry, only 20 years later." Participant W4*

The digitalization level within the industry in this region is also very behind other industries. Many employees that come to the mineral mining industry, who had experienced data-driven industries before, are shocked at how little data the industry is using to steer the operations.

*"The complete IT function is not fully supporting the company's needs. We are working in Excel, we are working like in 1992." Participant W2*

What is also partly in the industry's nature and partly due to its datedness is the overextended customer focus. In other words, automotive and manufacturing industries are mainly cost driven, while the mineral mining industry is *"ton-driven"* as Participant W3 put it. Production always comes first and the operators would turn the production upside down to satisfy a small customer, regardless of the costs, which is the mindset of the industry historically as it was mainly sales driven.

*"We produce for the customer. When they say we want this, we change our mills to another product and we are mailing it for that customer." Participant W3*

The geographical location of the sites in Western Europe is mainly in areas that are quite close to bigger cities. The regions of Benelux are quite densely populated and there are not many remote areas that are not within reach of a bigger city. The advantage of it is that the sites are well connected in terms of supply chain activities, however it brings challenges with staff retention as lack of competitive salaries in the industry and a lot of other employment opportunities in the area make it easy for the staff to switch employers.

*"When the employee can get €50 more to go somewhere else they pack their bags and they are gone. We have to do a lot to keep the employees here on site, because everyone can switch immediately to another job." Participant W5*

Now, when it comes to the size of the business unit, the participants agreed that smaller sites have an advantage as it is easier to reach all the employees on the site. It allows the change agent to be more dedicated and spend more time hands on with the employees on the smaller sites, compared to bigger sites. This also gives them better control over the consistency of training delivered as well as ability to monitor the buy-in from shop-floor closely and act in a timely manner in case of resistance.

*"It's easier to reach your group of people. When you have it as a smaller group it's easier to talk to those people and it's easier to help out." Participant W5*

On the other hand bigger sites usually have the advantage of having the necessary resources such as site dedicated change agent and engineering team. However, the bigger sites in this region also have higher turnover, which requires additional training capacity, which may not be enough with only one dedicated change agent. This may cause loss of focus on CI over time as the level of dedication to the shop-floor can't be met compared to the smaller sites.

*"At the bigger sites people are leaving so there's a continuous change in the organization and continuous change in the roles and responsibilities and to look at which people can take up the tasks that have to be done." Participant W4*

The sites in this region described their level of CI maturity around 7 (on a scale from 1 to 10), with a note that probably 3 years ago they were somewhere at 4 or 5 and this progress was

mainly possible due to the natural employee renewal program that has happened over the last three years.

Looking at the country of business units, we can talk about the national culture of the Dutch people. When the participants were to describe the Dutch culture all of them mentioned that it's in their culture to question things. Participant W2 described the Dutch as *"structured people with open minds and big mouths"*. This quality brings a lot of positives to CI as the shop floor feels free to question decisions and speak-up when they don't agree with something. However, this can make it extremely difficult to implement changes as every new thing comes under a lot of scrutiny and discussion. The change agents therefore need to be prepared for it and know how to stand their ground.

*"When you come in Belgium or you come in Germany and you say we're going to do it like that, OK, everybody knocks their head and says: 'OK, let's do that'. Dutch people always have their own opinion. It's good to have their own opinion, but you have to know when you have to stop. And the problem with Dutch people is that they don't know when they need to stop."* Participant W5

In terms of age there are some sites that in the last couple of years naturally went through a renewal phase, where the older generation of employees retired so they have younger teams (on average 40 years). This has a lot of advantages for CI as younger people are more agile as they grew up in a world that is changing faster than the older generation is used to. Younger employees are also more comfortable and eager to use digital tools, however the younger generation lacks the workplace ownership of the older generation. This also leads to an increase in changeover as younger employees tend to stay for 3-5 years before they change jobs.

*"They have grown up with this, these kinds of things, computers and the world changing faster then 30 years ago. They are also more equipped from school for that I think."* Participant W3

Contrastingly, the older generation has much more workplace ownership, as they have practically grown up on the sites and tend to also stay for longer periods of time. However, the older generation suffers from lack of technological savviness which makes it more difficult to accept the changes within the company.

*"They don't use the computer, they use their eyes and their ears when they walk around the mill and they see a lot. But that makes it much more difficult (to implement digital tools). I'm now younger (45 years old) in my team."* Participant W2

In parallel, the seniority of employees reflects similar pros and cons as the age variable. Employees that have worked on the sites less than years are much more eager to improve and change, this can be attributed to their previous experience from other industries where they already familiarized themselves with CI and or saw the world class level of CI and thus now in their new roles they don't need convincing why it's important to change, rather the company needs to show them how they can improve.

*"New people, they pick it up far more easily. So as we go year by year it gets easier. You don't have to explain to younger people, they've seen other industries, you don't have to explain to them why we need to improve."* Participant W1

Contrastingly, the long serving employees (on average 25+ years) are more 'rusted' in their own ways of working. There were not many changes in their roles for more than 20 years, which made them comfortable and now they are not willing to get out of their comfort zone, which CI really is about.

*“Those guys had no changes for 25 years. Then we started changing with health and safety improvements 15 years ago. But those guys are a little bit ‘rusted’ in their position.” Participant W5*

Finally, when discussing the effect of Covid-19, all of the participants agreed that the main effect was on workforce availability. At times the sites had to operate at full capacity with only two thirds of their regular staff, which made it difficult at times to prioritize CI activities and led to loss of focus.

#### 5.4.2. Critical failure factors (CFFs)

When it comes to critical failure factors in the western region several participants mentioned that it’s important to set the expectations straight with the employees, what is expected from them and what is their understanding of the tasks assigned.

In terms of organizational culture and environment there were several concepts that came up through the interviews. One of the voiced concepts was the lack of optimal HR policies. Due to geographical locations of the sites, the employees can switch jobs easily, therefore CI practitioners should be working together to build adequate training programs as well incentive schemes to retain employees and motivate them to take part in CI activities.

*“I always say when you start with Lean, you have to connect with HR. HR is very important in all the Lean programs, because it’s about having the right people in the right positions.” Participant W3*

On average the atmosphere on the sites is very pleasant, the structure is viewed as quite flat and open. The collaboration between the departments or sites is really good as the operators are able to voice their ideas freely. However, when we move in the hierarchy towards the corporate organization the openness to freely express ideas lowers, which can bring challenges if the Site directors or VPs don’t feel comfortable voicing their ideas, especially if they are contradicting with other corporate employees.

*There is a problem with social safety here, in terms of ‘can I say everything I want to say without consequences’? It’s mostly on the higher levels like site manager operations and vice presidents. And that is killing for change.” Participant W3*

Further, a high level of internal bureaucracy was mentioned as a barrier towards timely change. What’s more it has been highlighted that not every new change presented is truly an improvement. This can cause change fatigue and skepticism to arise among employees.

*The speed how we can attack problems is not good. It’s a very, very slow bureaucratic system in which we are working... We want to improve a lot, but to get that done is very difficult. Participant W1*

It has been underlined that a change agent is a vital role for sustainability of continuous improvement. As the organization is becoming leaner more tasks are falling on the shoulders of middle management that causes confusion among prioritization. In such instances, CI falls off the list of priorities.

*Safety is only one of the pressures I have. I have an environmental audit I need to focus on from tomorrow.. Last two weeks there were some people on holidays. So I took over some jobs and that’s OK. It’s not exactly written in my job description, but hey, somebody has to do it. So you take over. But I cannot support everybody at the same level continuously. More than 100%. Right then. Then my time runs out. Participant W2*

This can be critical for CI sustainability as the shop floor is very good with noticing inconsistency. It is really important if the focus shifts for a long time for the managers to make sure that the progress within CI doesn't fall back.

*“The responsibility is now more on the management on the sites, but you also need to have the people to make that push and when you let it go, especially in the biggest size, when you are not following it, tending to it, people notice that very quickly.” Participant W4*

Additionally, what has been mentioned is the lack of CI understanding and involvement from the higher management. This can be seen through the reporting mechanisms that are primarily focused on financial performance or energy. For CI to be consistently on the priority list, higher management would need to put it on an equal level with the financial performance or environmental issues.

*“For me, training of higher management is as important as training here as on the shop floor. I think they have some experience, but when I ask, shall we make a strategic A3 for the site? That's difficult. It's not that he doesn't want to do it, it's more because of the lack of time. And what you see is that he also has to deliver his KPI's to his manager so he will do that.” Participant W3*

Regarding the implementation approach, the main factors affecting CI activities was the rigidness of the corporate program and its focus. The current program is very much focused on the CI tools instead of the people that should use those tools.

The training methods are also not always the most effective as some of the materials are too theory heavy and lack the interaction the people need to be able to grasp the concepts being taught. What's more, there is no central training program with materials that are being used to deliver the training across different sites, therefore the training level solely depends on the knowledge and skills of the local trainer.

*“If you have no training program for people then it's all up to people to arrange some meetings to explain it. But it's not a program. So it depends on the level of knowledge of the trainer or the person who is calling in the meetings.” Participant W3*

When it comes to employee involvement, getting a buy-in from the more senior employees can be very challenging as many of the tools are only perceived as “*window dressing*” as participant W1 mentioned. Too lean organizational structure makes it also difficult especially for smaller sites to allocate time to their people that they can spend on training or performing CI activities. The changes are usually responsible for several sites, which takes away empowerment from them to really dedicate time to people who need it.

However, what could be shared as a best practice across other sites is the even though ‘unofficial,’ but still effective incentives designed to get hop floor operators motivated and engaged in the CI activities. The incentives include different forms of employee recognition (employee of the month, mentions in the site newsletter), small cake or a gift card award. This helps to build a healthy competition between different departments and triggers better performance.

*“We don't have official incentives. We only let's say give them some cake, they have an announcement in the newspaper or something like that. Or we are giving them some kind of gift card that they can use by themselves, things like that.” Participant W4*

Finally, within the feedback and results failure theme the participants mentioned that follow-up on CI activities is critical, as if you give some leeway to the shop-floor before CI is fully embedded in their culture, the level of CI embedment will regress over time.

*“When you have three weeks off and you give the guys a little bit of slack, then you have to start all over after three weeks.” Participant W5*

## 6. Data Analysis

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*This chapter contains the analysis of collected data through thematic analysis methodology. The analysis is presented in two different sections. The first section focuses on the connections between the context variables and CFFs, while the second section analyses the individual context variables through a comparative perspective across the different regions.*

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### 6.1. Connections between the context variables and CFFs

This section focuses on illustrating how the context variables influence the CFFs and therefore contribute towards challenges with sustaining CI activities. Summarized data table with the relationships between different context variables can be found in Appendix 9.12 and the table showing the relationships between context variables and CFF Groups in Appendix 9.10. The thematic analysis for data collected from each region can be found through Appendix 9.8.1 to 9.8.4.

#### 6.1.1. Industry affiliation

The first group of context variables that are within the same sphere of influence are predominantly shaping the nature of the mineral mining industry. These are the nature of the product, the market competition and the cost-mindfulness. Starting from the product itself, it being a natural resource that occurs in nature, has historically shaped the industry to overlook costs of production and focus primarily on maximizing the output. This has been further strengthened by the market competition, which in this type of industry is not very high. The entry barriers are very high so it's not easy for new entrants to join the market and therefore there are only a limited number of players on the market. Having control over the market, by being able to set the prices where deemed suitable, further supports the mindset of output maximization, instead of cost mindfulness. This therefore negatively influences CI activities as there is lack of external urgency to improve (lack of competition) and historically this has shaped the organizational mindset towards performance (lack of urgency). Therefore, many times production managers are pushed to deliver on ton-driven targets, instead of looking at how to cut costs or waste in their processes. This has been identified by McLean, Antony and Dahlgard (2015) as the lack of ability to establish urgency and perceived lack of need to change (Rich and Bateman, 2003) contribute towards CI programs failure. By working in such a highly production driven environment if it comes to prioritizing certain projects or processes due to limited time and/or resources CI often falls off the priority list, due to the misalignment of priorities by the organization and CI. The alignment of strategic organizational goals and the goals of CI has been supported by several authors, however Del Angel and Froelich (2008) stress its criticality. Hence it could be argued that these variables from the mineral mining industry affiliation contribute negatively (enhances the CFFs) towards CFF groups 2 and 3.

Second group of context variables that are shaping the nature of the mineral mining industry and are connected are the product, geographical location and workforce. Due to the

nature of the product occurring in nature, the extraction and processing sites have to be geographically located in areas where the mineral deposit is located. This is always in more remote areas within the reach of smaller cities or villages. However several of the sites are in commutable distance of bigger cities and each of these variables has different influence on the workforce variable. While the sites in remote areas struggle with attracting the right talent they are in need of (technical and managerial roles) as there simply is not a market for them in those areas. The sites located in commutable distances of bigger sites find it difficult to retain staff as the switch of employers is much easier in those areas and salary levels are the driving factor for the high turnover. From this it is evident that the variable of geographical location strains the organizational HR policies and thus if these are sub-optimal to begin with the context variable further enhances the deficiencies within the processes and policies. Bhuiyan and Baghel (2005) argued that the lack of organizational systems, policies and processes ability to reinforce mechanisms of CI is a barrier to CI sustainability. Therefore, it can be concluded that the context variable of geographical location has a negative effect on the CFF group 2. Additionally, the workforce within the industry has been identified as lacking outside experience, lacking diversity, low level of education and resembles close family like communities. The lack of outside experience and diversity among the workforce directly affect how adaptable people are in terms of how they perceive change and effectively work together with other people. This has an effect on cross-departmental collaboration and teamwork (Sabater and Garcia, 2011; Gonzalez Aleu and Van Aken, 2015), which are crucial for CI activities, thus affecting the CFF group 2. The lack of ability to adapt to new environments and processes further contributes towards employee resistance (DeSanctis et al., 2018; Sabater and Garcia, 2011; McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Paipa-Galeano et al., 2020; Singh and Singh, 2015) to change which has a negative impact on CFF Group 7. Further, the team leader roles and middle management roles have historically been allocated based on seniority, instead of the right mindset and capabilities, which resulted in lack of leadership and involvement in CI as these employees came from the shop-floor and lacked the buy-in of CI concepts and thus ultimately sided with the shop floor operators creating barriers for CI embedment. Leadership (McLean, Antony and Dahlgaard, 2015; Sanchez-Ruiz, Blanco and Gomez-Lopez, 2019; Singh and Singh, 2015) and active commitment (Kaye and Anderson, 1999; Bhuiyan and Baghel, 2005) play a pivotal role in CI sustainability, therefore we can argue that the nature of workforce as a context variable in this setting has a negative effect on the CFF group 3. The low level of education among the workforce influences mainly the implementation approach and training as the deployment and training materials need to be adjusted to the shop floor level and the trainers should always do a 'reality check' of what the shop floor looks like on every site so that they can adjust the training and deployment accordingly. Sabater and Garcia (2011) highlighted the importance of adapting the implementation approach to local needs and cultural context, while McLean, Antony and Dahlgaard (2015) stressed the necessity of the training programs to have the capability to develop the necessary skills in the workforce as without these factors the success of sustaining CI can be limited. Hence, we can conclude that the context variable, workforce, affects the CFF groups 4 and 5. Moreover, the close communities and family-like relationships on the sites create a caring atmosphere and open culture to share ideas among the shop-floor, which positively affects the environment for CI (Jakelski and Lebrasseur, 1996).

However, since the workforce as a context variable can have both negative and positive influence on the CFF Group 2, it will be marked as a multilateral factor.

Finally, within the context variables associated with the industry affiliation is the product, level of digitalization and nature of the industry. The mineral mining extraction and processing methods highly differ based on the location of the deposit and the nature of the mineral (product) itself. Therefore, a global company working with several minerals in their portfolio will have sites with very different processes, machineries, equipment and varied levels of process complexity. However, what all the sites within mineral mining have in common is the process complexity caused by lack of predictability and weather conditions. Weather conditions such as heavy rain, makes it extremely difficult for excavation especially for clay-type materials, while extreme cold effects all processes are dependent on water, such as the wash plants. The lack of predictability and high variation in processes due to its complexity limits to a certain degree what CI tools can be used and how within the industry, therefore this element affects the CFF group 4. This is in line with Sanchez and Blanco's (2014) argument that to achieve CI sustainability, the implementation approach needs to be continuously adapted to the present environment and organizational needs. As acknowledged by all the participants, the industry is significantly behind other industries in terms of development, digitalization and CI as well. The low level of digitalization is partly caused by the high average age among the workforce which are not as technology savvy as the younger generation, but also much of the equipment comes from the 1960s-70s. Due to the high costs of equipment replacement and the length of the mineral deposit dictating the amount of financial resources that can be allocated to a site for development, there are not many sites that go through strategic site re-modeling to bring them to world class level. This causes lack of data availability and quality across the sites, in combination with the lack of data-driven mindset of the workforce, this makes CI practices, which are very data and results driven, difficult (Chakravorty, 2009; Gonzalez Aleu and Van Aken, 2015). This ultimately has an effect on the feedback and evaluation methods (CFF group 8). Lastly, the industry is considered not very attractive and not very well known by people outside of the industry, which makes it difficult to attract the right people (McLean, Antony and Dahlggaard, 2015) if the companies within the industry want to move forward and improve. Therefore this context variable also affects the CFF group 2.

### 6.1.2. Size of business unit

Moving onto the size of the business unit as a context variable. Here we can look at the two extremes of the size of sites. 78% of the sites in the studied regions can be considered small and have less than 30 people running the operations. While only 10% of the sites have more than 60 employees in the operations. (Appendix 9.6.3) Starting with the small size sites, there is usually a friendly atmosphere present on the sites, due to the small collective of employees, which can resemble a small-family business. Within the concept of organizational culture, open culture and friendly atmosphere were identified as CI enablers by Singh and Singh (2015). Having such a small group of people it also makes it much easier in terms of communication and training to reach everyone and make sure the training was effective (McLean, Antony and Dahlggaard, 2015). Thus this concept can have a positive influence (diminish effect of CFFs) on the CFF groups 2 and 5. On the other hand, because these sites have such a small number of employees taking care of the operations they very often suffer

from lack of resources that can be dedicated to CI activities. Additionally, these sites often lack technical roles such as project, process or reliability engineers, this puts further strain on the employees limiting their time spent on CI (Singh and Singh, 2015). This has a highly negative impact on the employee involvement and thus affects the CFF group 7. Due to the size of the sites and limited resources, the CI related KPIs should be always adjusted for the size of the site to be realistic and achievable (McLean, Antony and Dahlgaard, 2015). Hence the context variable of size of BU has also an effect on the CFF group 8. Now, looking at the bigger sites they often have an advantage compared to the smaller sites as they have bigger shift patterns. More shifts, with more employees within the shifts gives an opportunity always at least for one of the shifts to take part in CI activities, which ensures that there are some resources that can be allocated to CI (DeSanctis et al., 2018). Additionally, it also creates a sense of competition among various shifts and provides learning opportunities from one shift to another, which smaller sites might lack. This has a positive effect on the CFF group 7. Nonetheless, with more employees and shifts to train and monitor the progress of CI it becomes much more complicated. It becomes difficult to reach everyone and assure the employees are learning at the same pace or reaching the same level of knowledge (McLean, Antony and Dahlgaard, 2015). This has a negative impact on the CFF group 5. In larger sites silo mentality can develop across departments, which can make it difficult for cross-departmental collaborations and new idea creation (McLean, Antony and Dahlgaard, 2015), thus negatively affecting the CFF group 2. Further, the bigger sites are usually more prone to be involved in many projects simultaneously, which makes it difficult for management to prioritize (McLean, Antony and Dahlgaard, 2015) and leads to loss of focus on CI, hence the effect on the CFF group 3.

### 6.1.3. Average age and seniority of employees

Next, the context variables of age and seniority will be analyzed. While these context variables are quite interlinked, they still have different effects on the CFFs. Within the age variable from the empirical data there is a perceived difference between employees who are younger than 30 years old and those that are older than 50 years old. When looking at the younger generation of employees they are more technology savvy and much more easily adapt to changes compared to the older generation as they grew up with the world changing at faster pace. This makes them better equipped for teamwork and cross-departmental collaboration (Sabater and Garcia, 2011; Gonzalez Aleu and Van Aken, 2015) which positively affects the CFF group 2 and 4. On the other hand, the older generation clearly struggles with adoption of digital tools. Working with systems and data (Chakravorty, 2009; Gonzalez Aleu and Van Aken, 2015), is a big part of CI and thus this has an effect on the CFF group 8. Further, the older generation can struggle with English as the language of instruction (De Jager et al., 2004), therefore, it is critical that the training and implementation approach (Sabater and Garcia, 2011) are adequately adjusted to the needs of this employee group, hence affecting the CFF groups 4 and 5. Having both generations of employees working together can bring out a generational gap in the mindset towards workplace ownership. As the younger generation is used to more change, they are also used to more frequent change of employers and therefore it is not uncommon for the younger generation to switch jobs every 3-5 years. The younger generation is more strict with their working hours, in a sense once their 8 hours or a shift is over they clock out and go home without second thoughts. This can be seen as normal behavior among the

younger generation, however the older generation that has been used to sticking to the same company for their whole career has managed to build a strong workplace ownership (Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018), therefore they perceive the habits of the younger generation as negative. This generation gap can cause tension in teams with too broad age groups and affect the employee involvement levels (CFF group 7).

Seniority as a context variable has a more direct affect on the CI sustainability as it has a strong effect on the buy-in. Employees that have been with the same company for more than 10 years tend to get settled in their positions and processes and therefore it becomes more difficult for them to change or see things from new perspectives. They have also gone through many changes in the past in the company and remember the 'good old days' which makes them more resistant to change and start doing more things as they are already doing more than they did in the past. Due to this much of the resistance (McLean, Antony and Dahlgard, 2015) towards CI comes from very senior staff (in terms of years served within the company) negatively affecting the CFF group 7. For this group of employees the right expectation setting (McLean, Antony and Dahlgard, 2015), involved leadership (Readman and Bessant, 2007), training (De Jager et al., 2004), adjusted implementation approach (Sabater and Garcia, 2011) and consistent follow-up (Fryer, Antony and Douglas, 2007) are necessary to sustain CI. Without any of those components for this group of employees the CI will slowly regress and won't be possible to sustain. Hence this variable has an indirect effect on CFF groups 1, 3, 4, 5 and 8. Contrastingly, the newer employees that have been with the company less than 5 years, are more eager to improve and usually the ones driving improvements. They are much easier to get buy-in from as often they have experienced CI in other industries and seen the world class practices, thus it is no longer so dire to explain to them why we need to improve. They already understand that the world is changing fast and companies need to constantly improve, evolve and change to stay competitive. Therefore, the lower seniority variable has a positive effect on CFF group 7.

#### 6.1.4. CI maturity level

Continuing with the context variable of CI maturity level, across the four regions the sites have very different levels of CI maturity. Based on this they also have very different requirements in terms of managerial commitment, implementation approach and training (McLean, Antony and Dahlgard, 2015). The higher the maturity level is the less support and flexibility within these factors will be needed (Sunder M and Prashar, 2020), however for the sites still struggling with shop-floor buy-in these are extremely important. Further the goal and expectation setting (Gonzalez Aleu and Van Aken, 2015) as well as feedback and results review (Kaye and Anderson, 1999; Marin-Garcia, Juarez-Tarraga and Santandreu-Mascarell, 2018) are crucial irrespective of the level of CI maturity as without goal setting and subsequent evaluation it cannot be deemed whether the business unit is making improvements or not. Therefore this context variable affects the CFF groups 1, 3, 4, 5, 7 and 8.

#### 6.1.5. Country of business unit

When it comes to the country of BU, in this paper the focus was on the national culture within the country. This context variable is highly specific to each country and should be considered before launching a CI implementation or training as the national culture's values or

traits can affect the effectiveness of the training or implementation approach if it's not adopted to the local culture. For example, in the Netherlands (Western Europe region) explanatory and reasoning approaches need to be used and the trainer needs to be aware of the Dutch trait of questioning everything. If the trainer comes and says how things need to be done and leaves without taking questions from the shop floor it might be quite impossible to get the needed buy-in. On the other hand, in the Nordics culture it is very important to establish relationships with the employees before diving into changes as they are more likely to be open and forthcoming with ideas and willingness to change after you have established some kind of relationship. Thus, from this perspective the implementation approach (Sabater and Garcia, 2011), training (McLean, Antony and Dahlgard, 2015) and buy-in from the shop floor (De Jager et al., 2004) are dependent on the national culture, affecting the CFF groups 4,5 and 7.

#### 6.1.6. Covid-19 pandemic impact

Lastly, the final context variable that has come up throughout the interview process has been the variable of a pandemic state. In most cases the major effect of the COVID-19 pandemic was the lack of workforce availability. As due to the guaranteed country regulations many sites had to operate with a third of the staff less throughout periods of the last two years. This has definitely put a strain on the employee availability (McLean, Antony and Dahlgard, 2015) and therefore led to loss of focus on CI and slow regression in the maturity level, negatively affecting the CFF group 7. On the other hand, the positive effect of the pandemic was that it pushed for use of more digital tools such as online meetings, shareable excel reports instead of paper ones, etc. This push from the external environment facilitated more focus on IT solutions to be introduced within the company and thus making a step towards better data availability (Chakravorty, 2009; Gonzalez Aleu and Van Aken, 2015), which has a positive impact on the CFF group 8.

## 6.2. Regional comparison of context variables' effects

### 6.2.1. Industry affiliation

The mineral mining industry is quite peculiar and can be distinguished from automotive or manufacturing in many dimensions. When asking the participants about the industry's nature, process complexity related to weather conditions and too many variable components of the processes due to the material being a natural product were identified in all regions except the Southern Europe region. Similarly, all of the regions except the Southern Europe region mentioned their heavy production orientation, therefore if they needed to prioritize tasks, CI would be pushed off the priority list just to accommodate production volumes. The Southern European region has a perceived-higher level of CI maturity, which could explain this trend as CI always makes it on the priority list.

When it comes to competition, all of the regions except Western Europe mentioned they have steady market competition or direct lack of competition, which takes away a sense of urgency from the external environment for the business units to improve. However, the Nordics further mentioned that the lack of competition makes it difficult to reach a level of competence

within the industry as knowledge-sharing between the competitors is strictly avoided. This may be an indicator as to why the industry is considered dated. Some participants described it as '20 years behind' other industries. If there was more competition and more knowledge-sharing, the CI may be more mature and better established compared to its current state.

Additionally, the workforce within this industry has been described as lacking diversity and 'outside the business' experience in all the four regions. This signals a lack of fresh ideas and 'outside the box' thinking, which may be necessary for CI embedment. In addition to this, all of the three regions, except Southern Europe, brought up that the workforce consists of a lot of relatives or it has been a generational career path within families that lived close by. Meaning that the mining sites have been a major employer in the remote areas to several generations over the years. This has led to formation of a close family-like atmosphere on the sites, which can be very positive in terms of workplace sense of belonging and friendly atmosphere on the site where everyone can express their ideas freely, which are necessary for CI sustainability. On the other hand, the overly close community can cause stagnation and slow development as there is clear lack of 'fresh ideas' and sometimes may lead to groupthink as some of the individuals don't want to express their opposing ideas to the group as not to stand out or anger their colleagues. Further, the UK and the Western Europe mentioned that the workforce had a low education level, which is not necessarily negative, however it needs to be considered during the implementation approach and when designing the training so that they are suitable for the workforce.

The shape and form of the workforce can be partly attributed to the geographical location of the sites. While the majority of the Nordics sites is primarily in very remote areas, usually only close to small villages and communities, the Western Europe sites, especially the ones in the Benelux area, are all in a commutable distance of bigger more populous cities. This brings several challenges for these regions. While the remote areas usually have long serving employees, who come from the local community, they usually have difficulty finding the right talent for technical and managerial positions as there is a lack of higher skilled labor in these areas. On the other hand, the sites in more crowded areas suffer from high turnover and difficulties to retain employees as it is quite easy for employees to switch employers if they are offered a higher salary. It has been indicated that the inability to offer competitive salaries leads to high turnover in the company, especially in recent years. The UK and Southern European sites unfortunately suffer from both extremes, having sites in very remote areas as well as close to bigger cities. High turnover of employees can lead to more resources required for training and a more structured CI program being in place to cope with the constant on-boarding of new employees specifically in the populous areas. The other sites, in more isolated areas, usually struggle with high average seniority of the employees and to that linked resistance to change.

There are many specific factors that separate the mineral mining industry from automotive or manufacturing. As shown this has a certain level of influence on different CFFs across different regions.

### 6.2.2. Size of the BU

When it comes to size of business units, all of the regions are in consensus of the different effect this variable has on CI. For the smaller sites, in all regions the main problem is related to lack of resources and technical support roles, which are usually allocated to the large

sites. However, the benefit of smaller sites comes with the atmosphere and open, friendly culture as the communication distances are short, everyone knows each other and it's easy to reach all the staff on site. This makes it also easier in terms of CI related training and communication. What can be seen as a negative factor though, in smaller sites there is usually only one or two people working on shift and they don't have natural times to spend together in training as they only meet for 5-10 minutes during shift handovers. This lack of time together affects the level of teamwork possible within a department with only a few operators. Targets or objectives should also be adjusted for the size of the business unit, as a small site cannot realistically deliver the same amount of projects and improvements as the large sites with more resources.

On the other hand, larger sites have the benefit of having more resources and more shifts. Due to this they have better chances of starting testing CI practices at least with one of the shifts and take it from there. This is a luxury the smaller sites operating with one shift or one operator per shift don't have. Mineral mining sites are usually extensive in area and different departments might be physically located very far from each other (several kms), this can make cross-departmental teamwork quite difficult as some of the teams almost never meet in a natural way. This can also make it difficult to reach everyone in terms of communication and training. The distance and challenges linked to reaching everyone put a strain on the management and control of CI buy-in. Therefore, larger sites require more managerial presence and reinforcement of CI, especially if they are still in the beginning stages of CI embedment. Additionally, having more shifts also means that not all of the shifts can be in a training session at the same time. The morning and afternoon shifts can usually receive training together, however the employees from the night shift have to have a training session on another week when they are working an am or pm shift. This puts strain also on the trainer as it takes more time and effort to sustain the CI practices, training and support on larger sites.

It is evident that both small and large sized sites are affected by the contextual variable. However, looking at the performance of sites within CI through the size of sites dimension (Appendix 9.2.3) it is clear that the most successful sites are the medium ones, which have between 30-60 employees. This conclusion would support both streams of thought: Sunder M and Prashar's (2020) who argue that the large sites are disadvantaged due to inability to manage the challenges linked to the size as well as DeSanctis et al. (2018) and Taylor and Wright's (2003) who conclude that smaller sites are disadvantaged due to lack of resources and less stable demand.

### 6.2.3. Country of the BU (national culture)

The national culture context variable has shown some very interesting findings. The cultural differences will be analyzed from Hofstede's cultural dimensions' point of view together with the empirical findings from the study.

Starting from the Nordics, participants from Norway and Sweden were representing this region. From the power distance dimension we can see that the Nordics countries score low within this dimension, which can be interpreted as the organizational structures in this region are typically flat, as the attitude towards management is very informal and direct control is disliked. Employees are expected to be consulted on matters concerning them and the communication style could be described as participative and consensus-oriented. In terms of individualism the

country is quite individualistic, which can also be reflected in management style, which is the one of management of the individuals. When it comes to masculinity, the Scandinavian countries score the lowest from the European region within this dimension. This can be very much reflected in the Swedish 'lagom' culture, which means 'just enough- not too much, not too little.' In the Nordic cultures the focus is on well-being. "Trying to be better than others is neither socially nor materially rewarded" (Country Comparison - Hofstede Insights, n.d.). This reflects in the Scandinavian management style that is much more supportive and decision making is involvement oriented. Both Norway and Sweden have lower uncertainty avoidance and long term orientation scores. This indicates the people are quite flexible, with Norway being little more inclined towards being normative culture rather than pragmatic, thus focusing on quick wins. In terms of indulgence, Sweden scores higher than Norway, but definitely falls into the higher indulgence group, which means that the Scandinavian cultures consider their free time as important and like to enjoy it. This is quite in line with the empirical findings where the participants described their culture as consensus seeking and trust based, which can be also seen from the low power distance variable. The cultures are highly individualistic therefore newcomers need to put effort into building new relationships in these cultures, which has also been identified as a longer process, but necessary for effective collaboration. Now, if we compare the cultural traits from Scandinavia with the corporate culture, which is based on the corporate national culture, we can see quite a big discrepancy in the power distance, where the corporate culture is very hierarchy driven and likes control. Similarly, the corporate culture is very masculine, which shows a natural drive for being better and thus having a natural sense of urgency for development. Additionally the high uncertainty avoidance and long-term orientation indicate more rigidity in their structures which can be reflected in slower decision making process and more pragmatism. From the empirical data, we can see that there is perceived misalignment between the organizational values and processes and the managerial style coming from above the site level may also not be perfectly aligned with the local values causing resistance to change and CI. If the CI corporate program comes to these sites, without considering the local customs and not consulting or seeking consensus on shop-floor the employee involvement and implementation initiatives can quickly fail. Training should also be adjusted to the local narrative to get engagement and understanding from the participants.

Continuing with the United Kingdom as a region. In terms of power distance the UK culture scores low, which also shows in the country's 'fair-play' culture and belief that everyone should be treated equally. Scoring high in the individualism dimension, it can be seen that as a culture the British people are considerably individualistic and private people. This is in line with the empirical data as the participants have described the culture as individualistic themselves. While being very modest, scoring high in the masculinity dimension, the British are very performance oriented. "In comparison to Feminine cultures such as the Scandinavian countries, people in the UK live in order to work and have a clear performance ambition." (Country Comparison - Hofstede Insights, n.d.) Scoring low on the Uncertainty avoidance means that Brits are quite comfortable in ambiguous situations and make do on the go. Due to the average score in terms of long term orientation it can't be determined to which side they incline, however in terms of indulgence dimension the Brits are quite indulgent. While the participants described the British as people with 'don't moan, fix it, get on with it attitude' this could be ascribed to their low uncertainty avoidance, high performance orientation and humility. High performance

orientation can clearly be seen in more urgency towards improvements within CI as well as internal motivation. Thus possibly affecting the managerial and employee involvement to some extent.

Further, we'll look at the Southern region, which has been represented by the Italian participants. Scoring in the middle in the power distance, the Italians prefer "equality and a decentralization of power and decision-making." (Country Comparison - Hofstede Insights, n.d.) Younger generations are also more inclined towards teamwork and open managerial style. Similarly, as the Nordics and the UK, Italian culture is quite individualistic. In terms of masculinity, the Italians score very high, making them a very driven and success oriented culture. Combined with the individualism traits, competition in the workplace is not uncommon as desire to reach career goals can be very high. Scoring high within the uncertainty avoidance signifies that Italians like to plan and it could be quite stressful for them in ambiguous and fast changing environments. While being more pragmatic, in the indulgence dimension the Italians score quite low which indicates that as a culture they don't put a lot of emphasis on their free time. This is quite in line with the way the participants described their culture - 'pragmatic, joyful and hands-on culture.' The high masculinity indicates an inner sense of urgency to improve and be better in the workplace, therefore can affect employee and managerial involvement in CI. If a structured incentive scale to provide individual rewards and sense of accomplishment for the employees is set, then CI can be much more easily embedded in the culture than in other countries, such as Scandinavia where performance would not be an intrinsic motive for involvement. In terms of Hofstede's dimensional scores, Italian culture is closest from the studied four regions to the corporate (the corporate culture). However, in terms of power distance the corporate culture is still significantly more power and hierarchy oriented. In this country the "power is centralized and the way information is controlled is even associated with power, therefore unequally distributed," (Country Comparison - Hofstede Insights, n.d.) which could have a clear effect on the internal bureaucracy and ineffective internal communication.

To summarize, it can be seen that the context variable can have different effects on the CI sustainability, in terms of what CFF groups it relates to in different countries. However, it can be argued that if the corporate culture is very different from the local national culture, there will be more CFFs linked to this context variable as the CI program is centralized from the corporate side. So the context variable can have an effect on the CFF groups 2, 3, 4, 5 and 7 depending on the region and how big are the discrepancies between the corporate 'national' culture and the local cultures. Therefore agreeing with DeSanctis et al. (2018) and Jager et al.'s (2004) conclusion that the country of business unit and thus the national or regional culture have an effect on sustainability of CI through effects on the CFFs.

#### 6.2.4. CI maturity

In terms of CI maturity the regions are in different stages of CI embedment. (Appendix 9.11) Starting from the Nordics region whose participants indicated that on a scale from 1 to 10 on average they are somewhere in the middle (score: 5). At this level they are still constantly struggling with getting buy-in from the shop floor and trying to establish the concepts of CI. As a point of reference, daily shift review meetings and performance management are not part of their daily routines yet. Following the UK region, they have scored themselves as being on average on level 6. The UK has the advantage that it has been part of the national CI program

called Optima, before the company launched the corporate CI program called BSP, therefore the workforce has been exposed to the CI concepts for a longer period of time. According to one of the participants, five years ago they struggled to get the buy-in. Now it's more about sustaining the position and finding the time and resources to move forward. Western Europe, perceives their level of CI maturity as on the level 7. They have performance management in place and shift reviews are part of the daily routines of the operators. As stated by one of the participants, consistency and follow-up are still crucial at this stage not to regress in the embedment stages. Lastly the Southern Europe region benefits from having some of the cluster directors very well experienced in CI. Because of this, a lot of best practices are coming from this region and the site managers keep focus on CI even when other priorities need to be tackled at the same time. These findings are in line with Sunder M and Prashar's (2020) findings, who argue that sites with more mature CI levels face lower levels of CFF occurrence. Additionally, DeSanctis et al. (2018) warn that if companies fail to successfully embed CI from the first deployment stages, they might face the same CFFs throughout the development, while encountering other CFFs linked to higher maturity levels simultaneously, which can lead to higher chances of failure. This can be observed specifically in the Nordics region as the region still struggles to get shop floor buy-in, while facing new challenges brought about by new CI deployment waves.

#### 6.2.5. Average age & seniority of employees

Looking at the average age and seniority of employees, the Nordics and UK could be grouped together as regions that are similar in this variable. In both of these regions the seniority of staff is quite high 20-30 years on average as well as the average age of employees. Some of the sites are reaching above 50 years in average age of employees. This brings a lot of challenges especially with high employee resistance to change or lack of buy-in, which requires extra dedication from the middle managers to monitor and follow-up on CI activities.

On the other hand, the Southern and Western Europe regions went through a renewal program in the last three years, which means that on average they have quite young management and line of supervisors, who haven't been in the company longer than 5 years. Having more people with outside the organization experience and together with the younger generation it makes it much easier to bring CI to a certain level and sustain it, as new employees don't question why they have to do certain tasks, they accept it as part of their job. Mostly it is so because they have had previous experience of CI from other industries and thus understand the necessity of it. Part of it is also that the younger generation is more used to change in general and thus more adoptable and even eager to improve.

This perspective is in line with Sanchez-Ruiz, Blanco and Diaz's (2018) findings, which link resistance to seniority rather than the age of employees, as the longer serving employees become too accustomed and routinized, which makes it more difficult or uncomfortable for them to change.

#### 6.2.6. Covid-19 pandemic impact

The Covid pandemic affected the different regions in different ways. Both the Nordics and Southern Europe indicated that they benefited from the adoption of digital tools. However, in the Nordics this had a negative impact on CI as the Nordics are very dependent on personal

relations to stimulate effective teamwork and cross-departmental or cross-site communication. By moving to digital meetings, the lack of physical meetings and social interactions diminished the relationships between coworkers and hindered collaboration. Therefore, in this sense the pandemic had a negative impact on CI sustainability as it made it difficult for teams to effectively interact in an environment where they felt safe to speak up their minds and contribute towards improvement.

From a different perspective, both the Nordics and the Western Europe region noted that they had to operate with limited staff under the pandemic, which made it very difficult to manage production, let alone CI. Therefore especially in the Nordics region under the pandemic lot of CI efforts died out as there was not enough focus and involvement from the employees. Lastly, participants from the UK didn't think that the pandemic had any effect on CI in any way.

This context variable shows that in pressured situations such as the recent pandemic, other context variables become important to consider in terms of CI sustainability. The lack of resources being the CFF as it directly affects the employee involvement levels. Additionally, this context variable can be more dominant in specific regions as different national cultures and potentially different government measures affect the communication and effective collaboration efforts, which can be crucial elements of CI sustainability.

# 7. Conclusion

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*This chapter summarizes the findings and formulates the answers to the selected research questions. Theoretical contributions and managerial implications of the research are presented as well. Finally, the research limitations and suggestions for future research are discussed.*

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## 7.1. Research findings

The aim of this research was to explore and understand the role of context variables in CI sustainability and answer the selected research questions.

*Q1: What are the factors contributing to failure of firms trying to sustain CI processes in the mineral mining industry?*

By formulating the reviewed conceptual framework based on the literature review and findings from the panel interview with practitioners from the field the data necessary to answer this research question was presented. While the literature review provided a holistic overview of the critical failure factors influencing the success and sustainability of CI practices, the panel interview reviewed and confirmed that these factors are very much relevant for the mineral mining industry, thus making this framework applicable within the industry.

Further, the literature review brought several context variables that influence other industries. The variables namely: country of business unit, type of CI practice, CI maturity, size of the business unit, industry affiliation and average age of employees were identified from the literature. In the panel interview, sub-variables or sub-concepts to the industry affiliation variable have been identified. These sub-variables are cost mindfulness, competition, workforce, geographical location of sites, nature of the industry and the product. All of these sub-variables shape the context of the mineral mining industry and thus influence the failure factors of CI activities. Moreover, the panel interview also confirmed that the size of the business unit, CI maturity and country of business unit are relevant context variables for the mineral mining industry. The context variable of average age of employees has been divided into two separate context variables, the age of employees and seniority of employees. Although these two context variables are highly interlinked, the data shows that they have different implications on the critical failure factors. Lastly, the context variable of the pandemic state has been introduced during the main data collection phase. As presented in the analysis this variable had effect in multiple of the studied regions, thus being deemed as relevant for consideration if a similar state of affairs would arise. The complete list of factors can be found in Appendix 9.9.

*Q2: How do context variables influence the critical failure factors (CFFs) and thus sustainability of CI practices in the mineral mining industry?*

The sub-chapter of data analysis, Connections between the context variables and CFFs, illustrates in detail the effects of context variables and their importance within the mineral mining

industry. While some of the context variables have positive or diminishing effects on the CFFs, there are several factors that have a negative impact on the CFFs and thus further aggravate the possibility of CI failure. However, the majority of the context variables have complex implications with multilateral effects on different CFF groups. It is worth pointing out that the CFF group of project management based on the data collected, has not been affected by any of the context variables, thus it can be concluded that if any failures linked to this CFF group occur they are solely linked to the organizational or managerial failures. The concise overview of the effects can be found in Appendix 9.10.

*Q3: What are the connections between different contextual factors (if any) and how do they differ between different regions?*

Lastly, the sub-chapter of data analysis, regional comparison of context variables' effects, presents the detailed regional comparison as well as differences between different context variables. When it comes to the industry affiliation variable the sub-concepts are particularly interlinked and with similar implications across the different regions. The implications of the variables: size of business unit, seniority and age of employees had similar outcomes across different regions. While the country of business units and Covid impact had more distinct results. As the country of business unit variable is connected to the national culture, the biggest impact this variable has is if the corporate national culture and the local cultures are distinctly different especially in the power distance dimension or the masculinity/femininity dimension. Additionally, the impact of the COVID-19 pandemic illustrates how lack of resources and lack of physical collaboration can have effect on employee involvement and thus cause regression in CI maturity, especially if the pandemic state happens while the CI maturity levels within the organization are still low. The overview of the regional comparison can be found in Appendix 9.11 and the visualization of the connections between different context variables can be found in Appendix 9.12.

## 7.2. Research implications

### 7.2.1. Theoretical implications

This research contributes to the theoretical field by providing the specific context variables relevant for the mineral mining industry. Further, it provides a comparative analysis of the context variables across four different regions and illustrates the connections between different context variables as well as the critical failure factors. The research confirms McLean, Antony and Dahlgaard's (2015) holistic framework of CFFs affecting CI sustainability as well as validates its applicability to the mineral mining industry. Additionally, the research contributes to a more comprehensive understanding of the reasons behind CI failure in the mineral mining industry through application of context variables. In this aspect it confirms the findings of DeSanctis et al. (2018), Taylor and Wright (2003) and Sunder M and Prashar (2020) in terms of the effects of size of the business as a context variable as both the small and large sized sites were disadvantaged through different factors, leaving the medium sized sites as the ones benefiting from the size of the business unit being small, but still having enough resources and not large enough that the communication or cross-departmental collaboration would be ineffective. With regards to the context variable of the country of business unit the findings of

this research support DeSanctis et al. (2018) and Jager et al.'s (2004) conclusions, that the regional and national culture have an effect on the CI implementation and sustainability. The evidence is more dominant if the corporate national culture traits are distant from the local national cultures. In terms of CI maturity as a context variable the research confirms Sunder M and Prashar's (2020) findings indicating that the higher the level of maturity the lower the occurrence of CFFs. Moreover, the findings on the context variables of age and seniority of employees confirms the findings of Sanchez-Ruiz et al. (2018), where the seniority (not age) is directly linked to higher employee resistance. Finally, the findings linked to the context variable of the Covid-19 pandemic state has indicated that this variable can have different effects across different cultures as the lack of physical contact can impact team dynamics, communication flows and cross-departmental collaboration. The direct effect of this variable was the lack of resources, which has been demonstrated in multiple regions. This context variable adds more understanding on how the pandemic state can influence CI sustainability.

### 7.2.2. Practical implications

This research provides insight into the mineral mining industry's attempts to implement and sustain continuous improvement. The findings of this research provide an overview of different factors influencing CI sustainability within the industry, thus providing more ground knowledge for practitioners setting out to implement CI practices within the industry. Further, the research presents the vitality of context variables within the mineral mining industry as it is very distinct from the automotive or manufacturing industries where the CI methodologies were developed. Understanding the context within mineral mining can make a difference in whether the CI practices being implemented are sustainable over longer periods of time, therefore it is essential for practitioners to understand and take action upon them.

### 7.3. Research limitations

Given the time-frame of this research project and the complexity of the studied subject, there are several limitations to the research. The generalizability of the findings is one of the limitations as the case study consists of analysis of only one company, even though four separate branches of the organization were studied.

Due to the limited time-frame of the research, the different variables were analyzed only through data collected from several interviews. For a more in depth analysis each context variable should be studied individually, including more in depth focus and wider geographical area considered in the research.

Lastly, due to the interview language being English, there were some instances of language barriers, which made it more difficult for data collection and interpretation, thus further research if conducted across several geographical regions, it is recommended that the researcher conducts the interviews in the interviewees native language.

## 7.4. Suggestions for future research

For further research validation of the findings through a bigger sample from the mineral mining industry is recommended as this study focused only on one selected company.

Additionally, it would be of interest to conduct a quantitative study across the mineral mining industry with the aim to indicate the magnitude of impact the context variables have on the different CFF groups. This would provide practitioners with insight on what variables may be prioritized or focused on in which contexts and thus making it possible to design 'tailor-made' CI methodology applications for the industry.

Finally, the variable of country of business is very interesting and further cross-cultural research on behavioral change linked to continuous improvement could be beneficial to illustrate the desired management and leadership styles necessary in different cultural and CI contexts.

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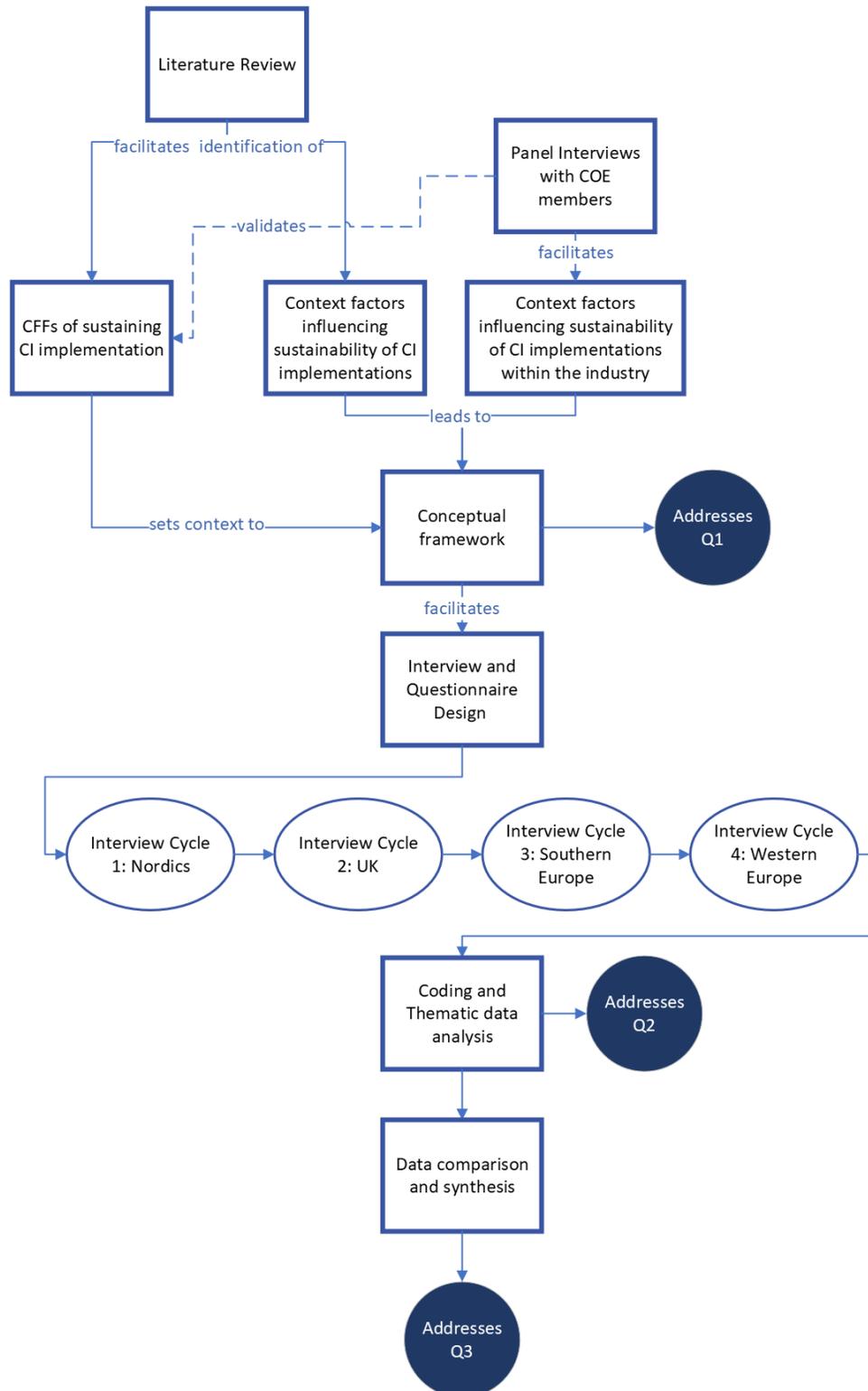
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# 9. Appendix

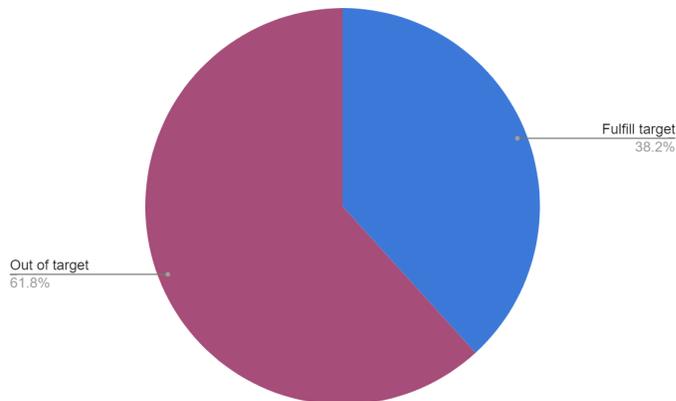
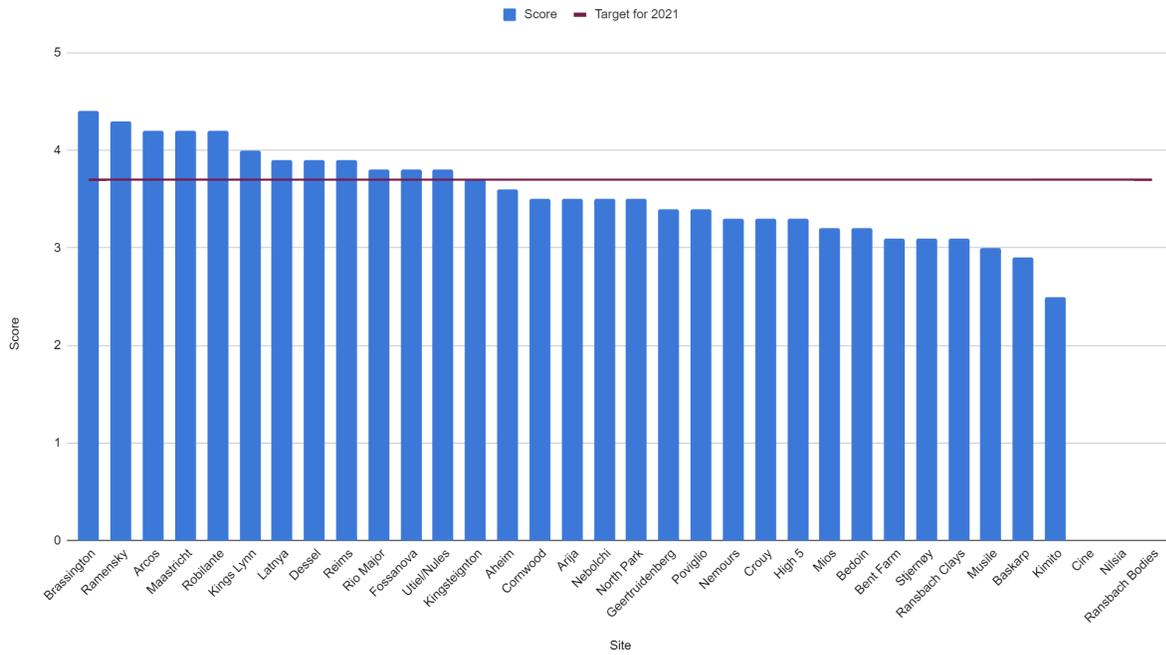
## 9.1. Research Design



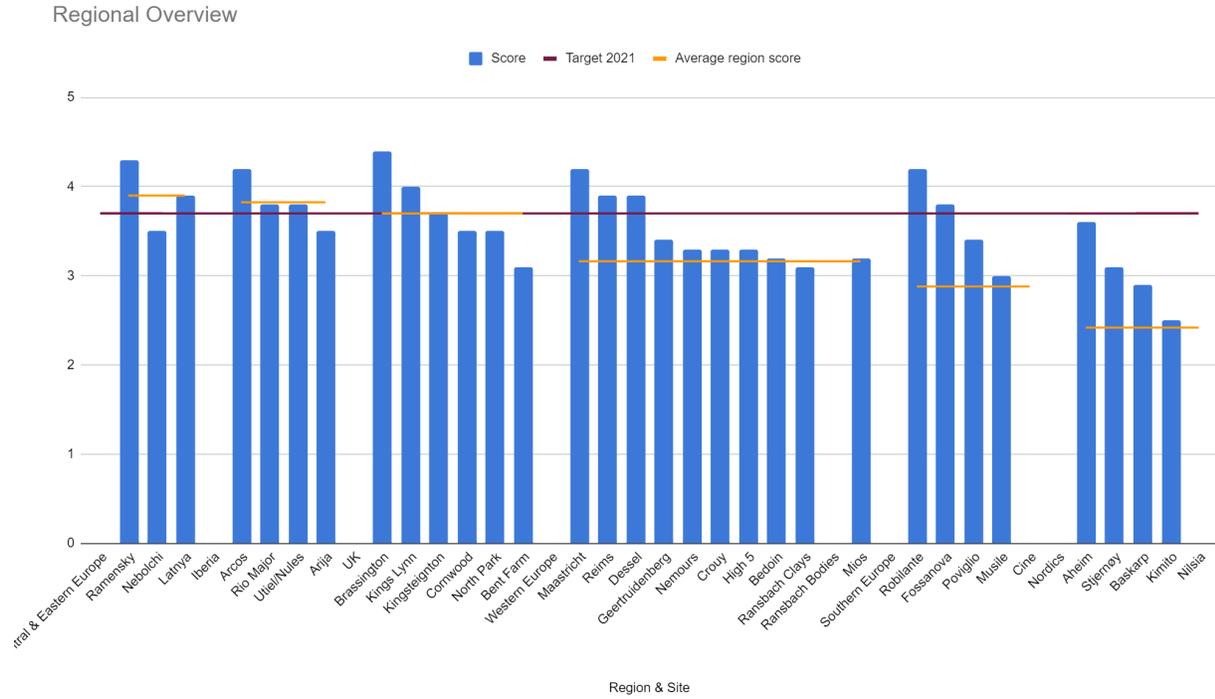
## 9.2. Problem formulation: case study data

### 9.2.1. 2021 CI maturity evaluation

Score vs. Site



## 9.2.2. 2021 evaluation - regional view



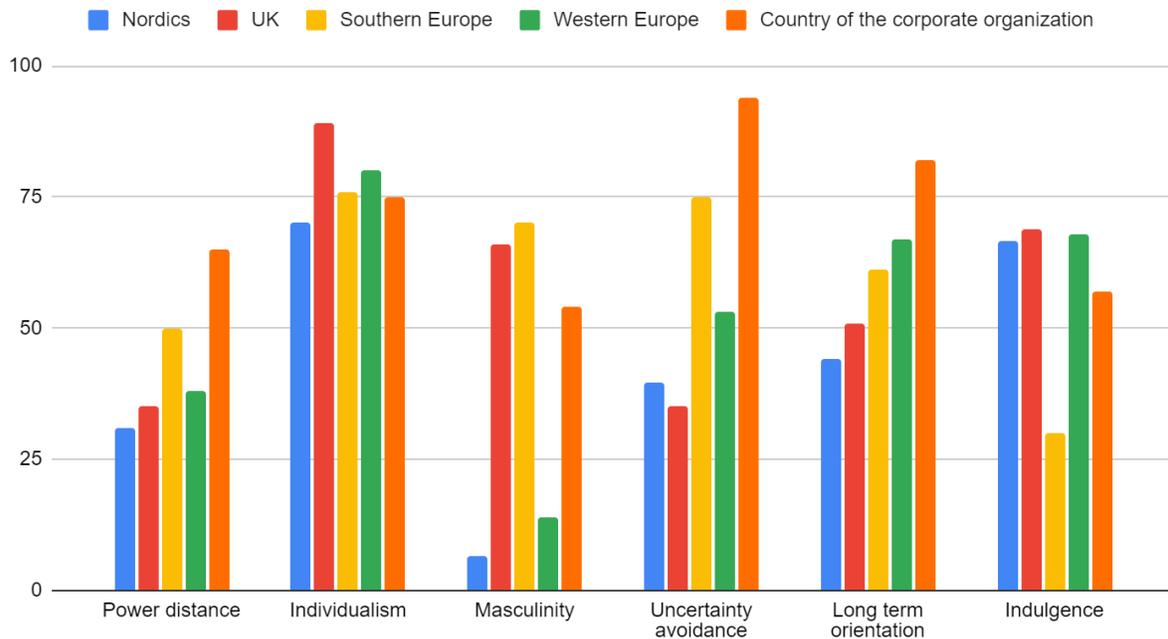
### 9.2.3. Size of the business unit vs 2021 performance comparison

Site size vs. CI performance



## 9.3. Cultural Dimensions

Cultural dimensions by Hofstede Insights



## 9.4. Interview Guide

### Length of employment:

- How long have you been working for Sibelco?
- Have you worked in any other industry than the mineral mining industry?
- Have you been in the same role or have changed roles during the years?
- How would you describe the demographics of the employees in your site?
- What are the reactions of people on the site when new things are being introduced?

### Industry

- How would you characterize the mineral mining industry?
- Have you encountered CI activities in your previous work experience?
  - How do they differ from Sibelco efforts?
  - Would you say that the differences are industry or company related?
- Urgency:
  - Do you have any KPIs you need to follow and contribute towards reaching?
  - Are CI targets part of the individual management roles?
  - Is there a performance dialogue in place where you discuss with your line manager your performance?
- Data & Digitalization

- When was the site built? What is the equipment age?
- Did Covid 19 affect the level of digitalization on site?

**Continuous Improvement**

- How do you perceive the continuous improvement efforts in your site? Why/How so?
- Is it easy to change? How do you perceive change? How do you feel when 'new projects' are brought up on the site?
- What would you say are the main barriers to sustain the CI activities, to build CI into the culture of the site?
- How mature is the CI program in your site? How deeply rooted is it? Why?
- Do you receive the right support for the maturity level you are in?

**Culture**

- National culture
  - How would you describe the national culture? Characteristic traits?
  - Do you think that your national culture has an effect on the CI efforts? How so?
- Company
  - How would you describe the company culture?
  - Does it 'enable' help/support the CI activities?
  - How is the cross departmental collaboration?
  - Are people proud to work in Sibelco?

**Business unit**

Size

- How big is the size of the team you work in?
- How do you think the size of the unit influences the CI efforts?
- Are there any pros/cons related to it?

Organizational structure

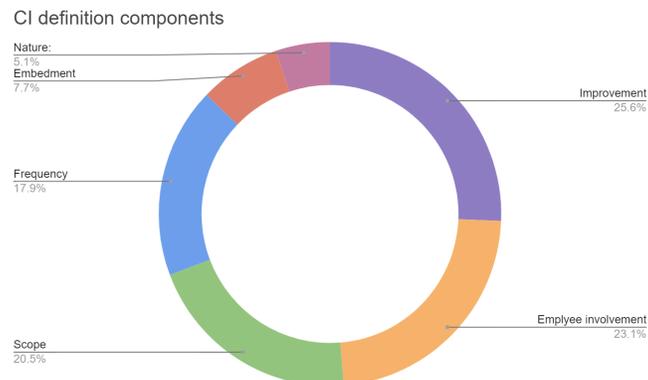
- How do you think the organizational structure is working at the moment?
- Does it make it easier or more difficult to get to decisions, put actions in place?
- Does it affect the CI efforts?

## 9.5. Interview Participants - Overview

| Region:          | Group:                                | Name:          | Cluster:        | Date:      | Interview length: | Format:                        |
|------------------|---------------------------------------|----------------|-----------------|------------|-------------------|--------------------------------|
| Global:          | Center of Excellence: Panel Interview | Participant G  | Global Role     | 3/3/2022   | 1:38:00           | Teams Meeting                  |
|                  |                                       | Participant A  | Global Role     |            |                   |                                |
|                  |                                       | Participant E  | Nordics         |            |                   |                                |
|                  |                                       | Participant F  | Souther Europe  |            |                   |                                |
|                  |                                       | Participant C  | Global Role     |            |                   |                                |
|                  |                                       | Participant B  | Global Role     |            |                   |                                |
|                  |                                       | Participant D  | Global Role     |            |                   |                                |
| Nordics:         | Site Management:                      | Participant N1 | Norway          | 22/03/2022 | 0:56:24           | Teams Meeting                  |
|                  |                                       | Participant N2 | Sweden          | 17/03/2022 | 0:37:20           | In person (recorded via Teams) |
|                  | Change Agents:                        | Participant N3 | Norway          | 11/03/2022 | 0:47:16           | Teams Meeting                  |
|                  |                                       | Participant N4 | Sweden          | 17/03/2022 | 0:22:25           | In person (recorded via Teams) |
|                  | Operations (Planners, Supervisors)    | Participant N5 | Sweden          | 23/03/2022 | 0:49:57           | Teams Meeting                  |
|                  |                                       | Participant N6 | Norway          | 15/03/2022 | 1:03:35           | Teams Meeting                  |
| UK:              | Site Management:                      | Participant U1 | The UK          | 14/03/2022 | 0:37:34           | Teams Meeting                  |
|                  |                                       | Participant U2 | The UK          | 22/03/2022 | 0:55:21           | Teams Meeting                  |
|                  | Change Agents:                        | Participant U3 | The UK          | 15/03/2022 | 0:26:25           | Teams Meeting                  |
|                  |                                       | Participant U4 | The UK          | 29/03/2022 | 0:52:52           | Teams Meeting                  |
|                  | Operations (Planners, Supervisors)    | Participant U5 | The UK          | 12/04/2022 | 0:36:11           | Teams Meeting                  |
| Southern Europe: | Site Management:                      | Participant I1 | Italy           | 16/03/2022 | 1:19:47           | Teams Meeting                  |
|                  |                                       | Participant I2 | Italy           | 21/03/2022 | 0:45:30           | Teams Meeting                  |
|                  | Change Agents:                        | Participant I3 | Italy           | 17/03/2022 | 0:58:36           | Teams Meeting                  |
|                  |                                       | Participant I4 | Italy           | 21/03/2022 | 0:45:30           | Teams Meeting                  |
|                  | Operations (Planners, Supervisors)    | Participant I5 | Italy           | 25/03/2022 | 0:48:16           | Teams Meeting                  |
|                  |                                       | Participant I6 | Italy           | 21/03/2022 | N/A               | Written answers                |
| Western Europe:  | Site Management:                      | Participant W1 | The Netherlands | 23/03/2022 | 0:39:18           | Teams Meeting                  |
|                  |                                       | Participant W2 | The Netherlands | 22/03/2022 | 1:05:11           | Teams Meeting                  |
|                  |                                       | Participant W3 | The Netherlands | 28/03/2022 | 0:56:06           | Teams Meeting                  |
|                  | Change Agents:                        | Participant W4 | The Netherlands | 08/04/2022 | 0:56:19           | Teams Meeting                  |
|                  |                                       | Participant W5 | The Netherlands | 28/03/2022 | 0:50:29           | Teams Meeting                  |

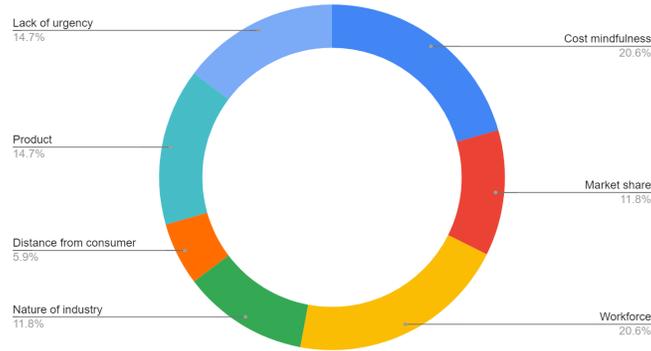
## 9.6. Panel interview

### 9.6.1. CI definition components



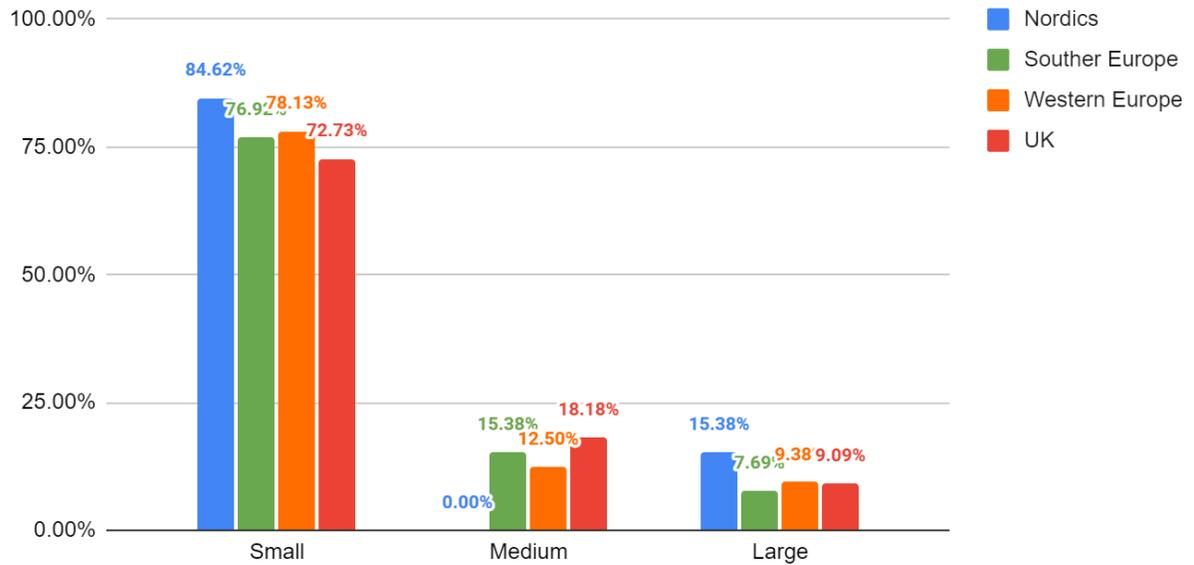
### 9.6.2. Context variables: industry affiliation

Mineral mining industry affiliation - Context variables

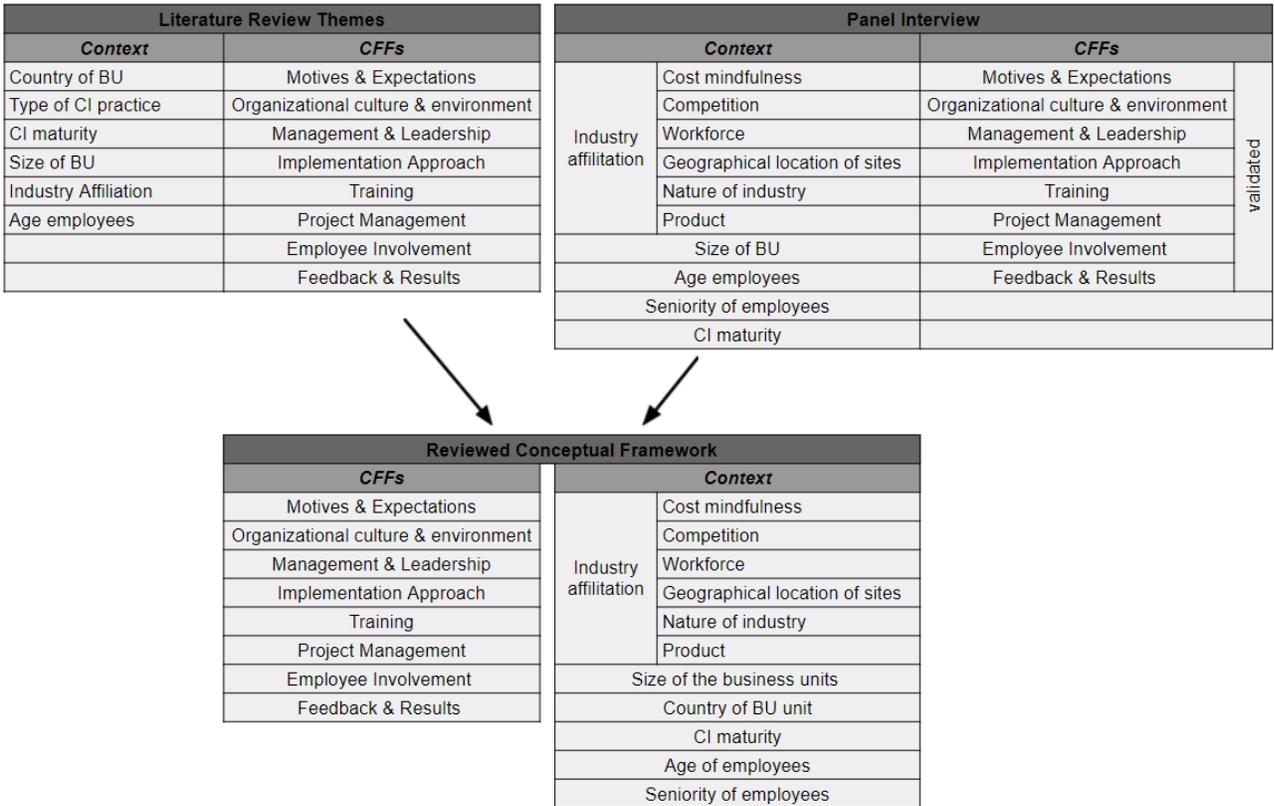


### 9.6.3. Size of the business unit per region

Size of business units per region



## 9.7. Formation of reviewed conceptual framework



## 9.8. Thematic analysis

### 9.8.1. The Nordics

| Context Variables      |  |  |  |
|------------------------|--|--|--|
|                        | Themes   | Concepts   |  |
| Industry affiliation   | Cost mindfulness   | Production-focus mindset   |  |
|                        | Competition  | Lack of competition<br>Lack of knowledge-sharing within the industry<br>Lack of urgency                      |  |
|                        | Workforce  | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Lack of staff diversity      |  |
|                        | Geographical location of sites   | Lack of skilled labour on the market (technicians, engineers, management functions)                          |  |
|                        | Nature of industry   | Process complexity (weather conditions)<br>Lack of integration with customers' processes                     |  |
|                        | Product  | Raw material   |  |
|                        | Digitalization/Automation level  | Behind other industries<br>Lack of system integration<br>Lack of data availability, transparency and quality |  |
|                        | Size of the business units   | <i>Smaller sites (under 30 employees)</i>  | Lack of resources<br>Too much empowerment on shop-floor<br>Lack of 'shared time' for teams |
|                        |  | <i>Larger sites (over 70 employees)</i>  | Difficult to reach everyone<br>Distance between departments<br>Shift dynamics              |
|                        | Country of BU unit   | Trust-based<br>Consensus seeking<br>Importance of building a relation  |  |
| CI maturity            | Varied levels between departments  |  |  |
| Age of employees       | Workplace ownership<br>Language barrier<br>Lack of technology savyness   |  |  |
| Seniority of employees | 10+ years  | Department loyalty<br>'Settled' staff<br>'Show-stoppers'   |  |
|                        | 5 or less years  | Eager to improve<br>Adaptable<br>Loss of motivation  |  |
| COVID impact           | Limited workforce availability<br>Adoption of digital tools (MS Teams, Excell reports)<br>Loss of social interaction |  |  |

| Critical Failure Factors             |   |
|--------------------------------------|---|
| Themes                               | Concepts  |
| Motives & Expectations               | Lack of clear goal setting<br>Poor expectation setting  |
| Organizational Culture & Environment | Sub-optimal HR policie<br>Lack of efficient inter-company communication<br>Lack of 'open' culture<br>Misalignment between the org. values & processes |
| Management Leadership                | Lack of local dedicated CI resource<br>Lack of managerial involvement & understanding   |
| Implementation Approach              | Too ambitious<br>Perceived as a project instead of way of working   |
| Training                             | Variation in level of training among employees<br>Lack of knowledge in how to apply CI tools  |
| Project Management                   | Lack of financial resources<br>Lack of forward-looking plan   |
| Employee Involvement                 | Lack of time & resources<br>Lack of incentives<br>Lack of buy-in  |
| Feedback & Result                    | Lack of consistency in follow-up & review<br>Lack of best-practice sharing<br>Lack of access to data  |

## 9.8.2. The UK

|                            |   |   | Context Variables |          |
|----------------------------|---|---|-------------------|----------|
|                            |   |   | Themes            | Concepts |
| Industry affiliation       | Cost mindfulness  | Production-focus mindset  |                   |          |
|                            | Competition   | Lack of competition   |                   |          |
|                            | Workforce   | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Contractors as part of workforce<br>Low education level |                   |          |
|                            | Geographical location of sites  | Extremes: location close to big cities vs small remote areas  |                   |          |
|                            | Nature of industry  | Process complexity (weather conditions)<br>Dated  |                   |          |
|                            | Product   | Depletable resource   |                   |          |
|                            | Digitalization/Automation level   | Behind other industries   |                   |          |
| Size of the business units | <i>Smaller sites (under 30 employees)</i>   | Lack of technical resources (engineering, maintenance)<br>Friendly site culture   |                   |          |
| Country of BU unit         | want-something for nothing'<br>'individualistic'<br>'don't moan, fix it, get on with it attitude' |   |                   |          |
| CI maturity                | Previous experience with CI before BSP  |   |                   |          |
| Age of employees           | Lack of technology savyness   |   |                   |          |
| Seniority of employees     | <i>10+ years</i>  | Settled' staff<br>Resistance to change  |                   |          |
|                            | <i>5 or less years</i>  | Eager to improve  |                   |          |
| COVID impact               | N/A   |   |                   |          |

|  |                                      | Critical Failure Factors  |          |
|--|--------------------------------------|---|----------|
|  |                                      | Themes  | Concepts |
|  | Motives & Expectations               | Poor expectation setting  |          |
|  | Organizational Culture & Environment | Sub-optimal HR policie<br>Lack of efficient inter-company communication<br>Site culture |          |
|  | Management Leadership                | Lack of time & focus from middle management   |          |
|  | Implementation Approach              | N/A   |          |
|  | Training                             | N/A   |          |
|  | Project Management                   | Lack of financial resources<br>Lack of forward-looking plan                             |          |
|  | Employee Involvement                 | Lack of incentives<br>Lack of buy-in  |          |
|  | Feedback & Result                    | Lack of follow-up mechanism   |          |

### 9.8.3. Southern Europe

| Context Variables                       |  |  |   |
|---|--|--|---|
| Themes                                  | Concepts   |  |   |
| Industry affiliation                    | Cost mindfulness   | N/A  |   |
|   | Competition  | Steady market position                                       |   |
|   | Workforce  | Lack of staff diversity                                      |   |
|   | Geographical location of sites                                       | Extremes: location close to big cities vs small remote areas |   |
|   | Nature of industry   | Slow industrial development                                  |   |
|   | Product  | N/A  |   |
|   | Digitalization/Automation level                                      | Behind other industries                                      |   |
|   | Size of the business units   | <i>Smaller sites (under 30 employees)</i>                    | KPIs adjusted for size<br>Lack of resources<br>Easier to carry out training & communication |
| <i>Larger sites (over 70 employees)</i> |  | Shift dynamics<br>Loss of focus                              |   |
| Country of BU unit                      | Level of national bureaucracy<br>pragmatic, joyful, hands-on culture |  |   |
| CI maturity                             | Sustaining phase   |  |   |
| Age of employees                        | Generation gap (mindset)   |  |   |
| Seniority of employees                  | <i>10+ years</i>   | Settled' staff<br>Resistance to change                       |   |
|   | <i>5 or less years</i>   | Eager to improve   |   |
| COVID impact                            | Adoption of digital tools (MS Teams, Excell reports)                 |  |   |

| Critical Failure Factors             |   |
|--------------------------------------|---|
| Themes                               | Concepts  |
| Motives & Expectations               | Poor expectation setting  |
| Organizational Culture & Environment | Sub-optimal HR policies<br>Internal bureaucracy<br>CI & corporate strategy misalignment |
| Management Leadership                | Lack of time & focus from middle management   |
| Implementation Approach              | N/A   |
| Training                             | N/A   |
| Project Management                   | Too many ongoing projects at the same time  |
| Employee Involvement                 | Change fatigue  |
| Feedback & Result                    | N/A   |

### 9.8.4. Western Europe

|                        |                                 | Context Variables   |  |  |
|------------------------|---------------------------------|---|--|--|
|                        |                                 | Themes  | Concepts                                     |  |
| Industry affiliation   | Cost mindfulness                | Production-focus mindest  |  |  |
|                        | Competition                     | N/A   |  |  |
|                        | Workforce                       | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Low education level |  |  |
|                        | Geographical location of sites  | Close to bigger cities  |  |  |
|                        | Nature of industry              | Process complexity<br>Not very well 'known'<br>Dated  |  |  |
|                        | Product                         | Raw material  |  |  |
|                        | Digitalization/Automation level | Behind other industries   |  |  |
|                        | Size of the business units      | Smaller sites (under 30 employees)  | Easier to carry out training & communication |  |
|                        |                                 | Larger sites (over 70 employees)  | Lack of resources to train                   |  |
|                        | Country of BU unit              | structured people with open mind and big mouth<br>Western decadency                                 |  |  |
| CI maturity            | 7                               |   |  |  |
| Age of employees       | Under 30                        | Lack of connection to workplace<br>Motivated by salary levels<br>Prone to switch jobs every 3 years |  |  |
|                        | Over 50                         | Workplace ownership<br>Lack of technology savyness  |  |  |
| Seniority of employees | 10+ years                       | Settled' staff<br>Resistance to change  |  |  |
|                        | 5 or less years                 | Eager to improve  |  |  |
| COVID impact           | Limited workforce availability  |   |  |  |

|  |  | Critical Failure Factors             |  |
|--|--|--------------------------------------|--|
|  |  | Themes                               | Concepts   |
|  |  | Motives & Expectations               | N/A  |
|  |  | Organizational Culture & Environment | Sub-optimal HR policie<br>Lack of efficient inter-company communication<br>Lack of 'open' culture<br>Internal burreaucracy |
|  |  | Management Leadership                | Lack of time & focus from middle management<br>Lack of higher managerial involvement & understanding                       |
|  |  | Implementation Approach              | Inflexible implementation approach   |
|  |  | Training                             | Lack of effective training program   |
|  |  | Project Management                   | Too many ongoing projects at the same time   |
|  |  | Employee Involvement                 | Lack of time & resources   |
|  |  | Feedback & Result                    | N/A  |

## 9.9. List of factors affecting CI sustainability

| List of factors contributing to failure of firms trying to sustain CI processes in the mineral mining industry |                                |
|--|--------------------------------|
| <i>CFFs</i>  | <i>Context</i>                 |
| Motives & Expectations   | Industry affiliation           |
| Organizational culture & environment   |                                |
| Management & Leadership  |                                |
| Implementation Approach  |                                |
| Training   |                                |
| Project Management   |                                |
| Employee Involvement   | Cost mindfulness               |
| Feedback & Results   | Competition                    |
|  | Workforce                      |
|  | Geographical location of sites |
|  | Nature of industry             |
|  | Product                        |
|  | Size of the business units     |
|  | Country of BU unit             |
|  | CI maturity                    |
|  | Age of employees               |
|  | Seniority of employees         |
|  | Covid-19 pandemic              |

## 9.10. Context variables vs CFFs Matrix

| Context variables/CFFs Matrix |                                    | CFF Group 1: Motives & Expectations | CFF Group 2: Organizational Culture & Environment | CFF Group 3: Management Leadership | CFF Group 4: Implementation Approach | CFF Group 5: Training | CFF Group 6: Project Management | CFF Group 7: Employee Involvement | CFF Group 8: Feedback & Result |
|-------------------------------|------------------------------------|-------------------------------------|---|------------------------------------|--------------------------------------|-----------------------|---------------------------------|-----------------------------------|--------------------------------|
| Industry affiliation          | Lack of cost mindfulness           |                                     | -   | -                                  |                                      |                       |                                 |                                   | -                              |
|                               | Competition                        |                                     | -   | -                                  |                                      |                       |                                 |                                   |                                |
|                               | Workforce                          |                                     | X   | -                                  | X                                    | X                     |                                 | -                                 |                                |
|                               | Geographical location of sites     |                                     | -   |                                    |                                      |                       |                                 |                                   |                                |
|                               | Nature of industry                 |                                     | X   |                                    | X                                    |                       |                                 |                                   | X                              |
|                               | Product                            |                                     | X   | X                                  | X                                    |                       |                                 |                                   |                                |
| Size of the business units    | Smaller sites (under 30 employees) |                                     | +   |                                    |                                      | +                     |                                 | -                                 | X                              |
|                               | Larger sites (over 70 employees)   |                                     | -   | X                                  |                                      | -                     |                                 | +                                 |                                |
|                               | Country of BU unit                 |                                     | X   | X                                  | X                                    | X                     |                                 | X                                 |                                |
|                               | CI maturity                        | X                                   |   | X                                  | X                                    | X                     |                                 | X                                 | X                              |
| Age of employees              | Under 30                           |                                     | +   |                                    | +                                    |                       |                                 |                                   |                                |
|                               | Over 50                            |                                     |   |                                    | X                                    | X                     |                                 | X                                 | X                              |
| Seniority of employees        | 10+ years                          | X                                   |   | X                                  | X                                    | X                     |                                 | -                                 | X                              |
|                               | 5 or less years                    |                                     |   |                                    |                                      |                       |                                 | +                                 |                                |
|                               | COVID impact                       |                                     |   |                                    |                                      |                       |                                 | -                                 | +                              |
|                               | Low digitalization level           |                                     |   |                                    |                                      |                       |                                 |                                   | -                              |

x Multilateral factor  
 + Positive factor  
 - Negative factor

## 9.11. Regional comparison of context variable implications

|                            |  | Context Variables  |  |   |   |   |  |
|----------------------------|--|--|--|---|---|---|--|
| Themes                     |  | Concepts: Nordics  |  | Concepts: UK  | Concepts: Southern Europe   | Concepts: Western Europe  |  |
| Industry affiliation       | Cost mindfulness   | Production-focus mindset   |  | Production-focus mindset  | N/A   | Production-focus mindset  |  |
|                            | Competition  | Lack of competition<br>Lack of knowledge-sharing within the industry<br>Lack of urgency                      |  | Lack of competition   | Steady market position  | N/A   |  |
|                            | Workforce  | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Lack of staff diversity      |  | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Contractors as part of workforce<br>Low education level | Lack of staff diversity   | Lack of 'outside the business' experience<br>Close (family-like) communities<br>Low education level |  |
|                            | Geographical location of sites   | Small remote areas   |  | Extremes: location close to big cities vs small remote areas  | Extremes: location close to big cities vs small remote areas                                | Close to bigger cities  |  |
|                            | Nature of industry   | Process complexity (weather conditions)<br>Lack of integration with customers' processes                     |  | Process complexity (weather conditions)<br>Dated  | Dated (slow industrial development)   | Process complexity (weather conditions)<br>Not very well 'known'<br>Dated                           |  |
|                            | Product  | Raw material   |  | Depletable resource   | N/A   | Raw material  |  |
|                            | Digitalization level   | Behind other industries<br>Lack of system integration<br>Lack of data availability, transparency and quality |  | Behind other industries   | Behind other industries   | Behind other industries   |  |
| Size of the business units | Smaller sites (under 30 employees)   | Lack of resources<br>Too much empowerment on shop-floor<br>Lack of 'shared time' for teams                   |  | Lack of technical resources (engineering, maintenance)<br>Friendly site culture   | KPIs adjusted for size<br>Lack of resources<br>Easier to carry out training & communication | Smaller sites (under 30 employees)  | Easier to carry out training & communication |
|                            | Larger sites (over 70 employees)   | Difficult to reach everyone<br>Distance between departments<br>Shift dynamics                                |  | N/A   | Shift dynamics<br>Loss of focus   | Larger sites (over 70 employees)  | Lack of resources to train                   |
| Country of BU unit         | Trust-based<br>Consensus seeking<br>Importance of building a relation  |  | 'want-something for nothing'<br>'individualistic'<br>'don't moan, fix it, get on with it attitude' | Level of national bureaucracy<br>pragmatic, joyful, hands-on culture  | structured people with open mind and big mouth<br>Western decadency                         |   |  |
| CI maturity                | 5  |  | 6  | 8   | 7   |   |  |
| Age of employees           | Under 30   | N/A  |  | N/A   | Generation gap (mindset)  | Lack of connection to workplace<br>Motivated by salary levels<br>Prone to switch jobs every 3 years |  |
|                            | Over 50  | Workplace ownership<br>Language barrier<br>Lack of technology savyness                                       |  | Lack of technology savyness   |   | Workplace ownership<br>Lack of technology savyness  |  |
| Seniority of employees     | 10+ years  | Department loyalty<br>'Settled' staff<br>Resistance to change  |  | Settled' staff<br>Resistance to change  | Settled' staff<br>Resistance to change  | Settled' staff<br>Resistance to change  |  |
|                            | 5 or less years  | Eager to improve<br>Adaptable<br>Loss of motivation  |  | Eager to improve  | Eager to improve  | Eager to improve  |  |
| COVID impact               | Limited workforce availability<br>Adoption of digital tools (MS Teams, Excell reports)<br>Loss of social interaction |  | N/A  | Adoption of digital tools (MS Teams, Excell reports)  | Limited workforce availability  |   |  |

9.12. Context variable influence network

