

Attention Please!

A Study of NonTechnical Challenges when Scaling Greenfield Projects

Ebba Karlsson
Julia Lyxell Stålnacke

Industrial and Management Engineering, master's level
2025

Luleå University of Technology
Department of Social Sciences, Technology and Arts

[This page intentionally left blank]

ABSTRACT

Purpose - This study examines the non-technical challenges (NTCs) that emerge when scaling greenfield projects, how decision-makers allocate their attention to these challenges, and which challenges receive disproportionate attention relative to their perceived importance throughout the scaling process.

Method - This study is an exploratory single case study of a Swedish mining company. The data collection was conducted in three phases. First, 16 exploratory interviews were conducted and thematically analyzed to identify NTCs that emerge when scaling a greenfield project. Second, the Delphi method was used to assess the perceived importance of these challenges for successful scaling. Third, the Q-method was applied to explore how decision-makers allocate their attention to these challenges. Finally, the findings were synthesized and analyzed using a matrix framework.

Findings - Our findings are divided into three parts. First, we present 33 NTCs in scaling greenfield projects, categorized into organizational, market, and financial dimensions, with organizational NTCs being the most prominent. Second, we analyze how attention is allocated across project phases, showing that organizational NTCs dominate early on, while market and financial NTCs gain importance later. Finally, we highlight misalignments between perceived importance and attention among decision-makers, and offer a framework to guide effective prioritization throughout the scaling process.

Theoretical implications - While prior research emphasizes the challenges associated with scaling, organizations often prioritize technical challenges (TCs), despite evidence that failures are frequently driven by NTCs. Using the ABV, which conceptualizes attention as a limited organizational resource, we argue that it is not sufficient for companies to merely identify NTCs, they must also allocate adequate attention to them. Our framework contributes theoretically by identifying which NTCs decision-makers focus on, how important these challenges are perceived to be, and where discrepancy occurs between attention allocation and perceived importance. Special consideration is given to differences between individuals with formal and informal decision-making authority.

Practical implications - This study offers practical insights into how attention is allocated to NTCs during the scaling of a greenfield project. Building on the ABV, we show that attention is limited and must be directed strategically. Our findings reveal misalignments between formal and informal decision-makers, especially in key organizational areas such as communication, onboarding, and work overload. These issues risk being overlooked at the strategic level. The AP framework helps organizations visualize attention patterns, improve alignment, and ensure focus is placed where it matters most for successful scaling.

Limitations and future research - This study contributes to the understanding of NTCs in the context of scaling greenfield projects, however, it is subject to several limitations, including its single-case study design, the participants' limited experience within greenfield contexts, and the independent nature of one data collection phase, which may have introduced self-assessment biases. Moreover, while the study highlights which NTCs attract managerial attention, it does not investigate how these NTCs are addressed in practice. Future research should therefore explore how attention-attracting challenges are managed and resolved, ideally across multiple cases and industries, to enhance the generalizability and practical applicability of the findings.

Keywords: *Scaling, Greenfield Projects, Non-Technical Challenges, Attention-Based View*

ACKNOWLEDGEMENT

This thesis is the final part of our Master's program in Industrial Engineering and Management, with a specialization in Innovation and Strategic Business Development, at Luleå University of Technology.

We would like to express our gratitude to all those who contributed to the completion of this thesis. First, we would like to thank our supervisor at the university, Johan Frishammar, for his valuable feedback and support, which significantly enhanced the quality of our thesis. Second, we also wish to thank our supervisors at the case company for their guidance and encouragement throughout the research process. Furthermore, we are grateful to all the respondents who generously shared their time and insights, making this study possible. Lastly, we would like to thank our opponents for their constructive peer reviews and helpful suggestions.

Thank you ☺

Luleå, June 2025



Ebba Karlsson



Julia Lyxell Stålnacke

TABLE OF CONTENTS

1. INTRODUCTION	1
2. THEORETICAL BACKGROUND	4
2.1 Definition of Scaling in the Context of Greenfield Projects in the Process Industry	4
2.2 Four Dimensions of Scaling	5
2.3 Non-Technical Challenges in Scaling Greenfield Projects in the Process Industry	6
2.3.1 Non-Technical Challenges in Organizational Scaling	7
2.3.2 Non-Technical Challenges in Market Scaling	8
2.3.3 Non-Technical Challenges in Financial Scaling	9
2.4 An Attention-Based Perspective on Scaling Greenfield Projects in the Process Industry	11
3. METHOD	13
3.1 Research Approach	13
3.1.1 Case Selection	13
3.2 Data Collection	14
3.3 Data Analysis	18
4. FINDINGS	23
4.1 Identified Non-Technical Challenges	24
4.1.1 Organizational	25
4.1.2 Market	27
4.1.3 Financial	28
4.2 How is Attention Allocated?	29
4.2.1 Time Phase 1	30
4.2.2 Time Phase 2	31
4.2.3 Time Phase 3	31
4.3 Perceived Importance of Non-technical Challenges for Successful Scaling	32
4.4 Patterns of Attention and Importance in Addressing Non-Technical Challenges	33
4.4.1 Time Phase 1	33
4.4.2 Time Phase 2	34
4.4.3 Time Phase 3	35
5. DISCUSSION AND CONCLUSIONS	36
5.1 Theoretical Implications	38
5.2 Practical Implications	39
5.3 Limitations and Future Research	41
5.4 Final Reflections	42

REFERENCES	43
APPENDIX 1 - Interview Guide	1
APPENDIX 2 - Organizational Non-Technical Challenges	2
APPENDIX 3 - Market-related Non-Technical Challenges	4
APPENDIX 4 - Financial Non-Technical Challenges	5
APPENDIX 5 - Delphi-method	6

1. INTRODUCTION

Scaling has become an increasingly common growth strategy, driven by globalization, digitalization, and technological advancements (Witschel et al., 2019). As businesses navigate this evolving landscape, the ability to scale quickly and efficiently is seen as a key enabler of competitiveness, and a driver of economic growth, innovation, and societal impact (Jansen et al., 2023). Organizations may pursue scaling through various strategies, such as brownfield or greenfield expansion, mergers, acquisitions, or strategic partnerships. This study focuses on the scaling of greenfield projects within the process industry, which is characterized by the large-scale processing of raw materials or semi-finished products through chemical, physical, or biological processes (Zhu et al., 2017). A greenfield project in this industry involves building entirely new facilities, processes, and organizational structures from the ground up, without relying on existing infrastructure or prior experience (Drogendijk & Andersson, 2013; Axehill et al., 2021). Successfully scaling such projects is far from straightforward. While scaling creates new opportunities, it also introduces various challenges that may hinder the scaling efforts (Shepherd & Patzelt, 2020; Jensen et al., 2023; Demir et al., 2017).

The way organizations approach these scaling challenges is not only a matter of resources or capabilities, but also a matter of attention. Ocasio (1997) conceptualizes this through the Attention-Based View (ABV), which emphasizes that attention is a limited resource within an organization, and that where decision-makers allocate their attention directly influences strategic choices and actions (Brielmaier & Friesl, 2023). According to Ocasio (1997), attention involves *“the noticing, encoding, interpreting, and focusing of time and effort by organizational decision-makers on both (a) issues: the available repertoire of categories for making sense of the environment and (b) answers: the available repertoire of action alternatives”* (p. 189). He further defines decision-makers as individuals in specific organizational roles who participate in procedural and communication channels, process information, and contribute to organizational actions. From the perspective of ABV, scaling challenges can be understood through the concept of *issues* and *answers*. Issues refer to the challenges that gain importance when they capture the attention of decision-makers, whereas answers are the potential solutions, routines, or actions considered in response to those issues. Building on this theoretical perspective, this study defines

scaling as *“a company’s ability to grow rapidly without being hindered by the challenges imposed by its structure and external conditions.”*

Distinguishing between different types of scaling challenges can facilitate a clearer understanding of how attention is allocated in practice. Therefore, in this study, these challenges are categorized as either technical or non-technical. Non-technical challenges (NTCs) refer to obstacles in planning, implementation, and operation that are not directly related to the technical feasibility or performance of the technology (Rae et al., 2020; Tweed, 2016). Instead, these challenges stem from organizational, financial or market-related factors (Rae et al., 2020; Mossberg et al., 2020). Technical challenges (TCs), on the other hand, involve the verification, optimization, and adaptation of a given technology (Mossberg et al., 2020). Although these challenges can be treated analytically as separate, they are deeply interconnected. For example, non-technical aspects often determine how effectively technical innovations can be implemented and sustained in practice (Rae et al., 2020).

Given the inherent characteristics of both the process industry and greenfield projects, scaling greenfield projects in this industry presents unique TCs and NTCs. However, this study focuses on NTCs as they pertain to scaling of greenfield projects, as companies often focus primarily on TCs, even though failures are frequently caused by non-technical factors (Mossberg et al., 2020; Adekoya, 2016). Moreover, NTCs become particularly critical in greenfield projects, as they play a central role in building an organization, managing financial matters, and entering new markets (Drogendijk & Andersson, 2013). In sum, because of their crucial role in determining project success, non-technical aspects become particularly important and interesting to explore within a greenfield context.

The NTCs associated with scaling have become a prominent topic in academic research, particularly focusing on identifying challenges such as organizational complexity, financial limitations, and market uncertainty (Shepherd & Patzelt, 2020; Jensen et al., 2023; Demir et al., 2017). In addition, the literature offers a wide range of proposed solutions, including behaviors, capabilities, and strategic actions aimed at overcoming these challenges (Jensen et al., 2023; Shepherd & Patzelt, 2020; Demir et al., 2017; Monteiro, 2019). However, while the literature assumes that organizations are aware of and capable of addressing these challenges, it largely overlooks how decision-makers actually direct their attention in practice. As Ocasio (1997)

argues, attention is a limited resource within an organization. This means that only a subset of all possible challenges will be noticed, interpreted, and prioritized by decision-makers. Consequently, even well-documented NTCs may go unaddressed if they are not enacted as salient *issues* within the organization. In sum, although NTCs and solutions are well-documented, there is limited insight into how attention is allocated within organizations, and how this, in turn, shapes the outcomes of the scaling process.

Given the identified research gap, the purpose of this study is to examine the NTCs that emerge when scaling greenfield projects within the process industry. Specifically, the study seeks to explore how decision-makers allocate their attention to these challenges throughout the scaling process. This is examined from the perspective of ABV, using the concept of *issues* to understand how such challenges are noticed, interpreted, and prioritized within the organization (Ocasio, 1997). Moreover, the study aims to enhance the practical relevance of its findings by examining which NTCs may receive disproportionate attention relative to their importance. In doing so, the study seeks to support companies in making more informed decisions when scaling greenfield projects. To achieve this purpose, the study seeks to answer three research questions (RQs). The first question will receive the least focus but has been included due to its significant importance for the subsequent two questions. The research questions are as follows:

RQ (1): *What are the non-technical challenges companies face when scaling greenfield projects?*

RQ (2): *How do decision-makers allocate their attention to non-technical challenges when scaling greenfield projects?*

RQ (3): *Which non-technical challenges receive disproportionate attention relative to their importance when scaling greenfield projects?*

In order to answer these questions, we conducted a single case study at a Swedish mining company. Similar to the company, this study will focus on large enterprises (LEs) that have an established core business and industrial presence but have chosen to scale up through a greenfield project. LEs are defined as companies with more than 250 employees and annual revenue exceeding €50M (European Commission, 2020). However, we do not exclude the possibility that the practical implications of this study could also be valuable to other industries and company sizes.

2. THEORETICAL BACKGROUND

This chapter provides the foundation for understanding how NTCs influence the scaling of greenfield projects within the process industry, and how decision-makers direct their attention toward these challenges. First, a contextualized definition of scaling is presented, tailored to the specific setting of greenfield projects in the process industry, clarifying how the concept is understood and applied in this study. Second, four key dimensions of scaling are introduced, to analyze the ability to scale. The chapter then explores NTCs within three of these dimensions in greater depth, as they are considered especially critical for enabling scaling. To further examine how different decision-makers notice, interpret, and prioritize these challenges, ABV is introduced in the final step.

2.1 Definition of Scaling in the Context of Greenfield Projects in the Process Industry

There is no universally accepted definition of scaling in the literature, as the concept has been described in various ways depending on the theoretical perspective. For instance, Jansen et al. (2023) defines scaling as “*the organizational and strategic routines by which firms grow exponentially through the expansion, replication, and synchronization of resources and practices over time*”. Shepherd and Patzelt (2020) defines scaling as “*spreading excellence within an organization as it grows*” (Shepherd & Patzelt, 2020). Additionally, Montiero (2018) defines scaling as “*a company’s ability to grow rapidly without being hindered by the constraints imposed by its structure*” (Monteiro, 2019).

As already pointed out, we define scaling as “*a company’s ability to grow rapidly without being hindered by the challenges imposed by its structure and external conditions.*”. The definition builds on Monteiro’s (2019) work, but has been adapted and further refined to ensure clear alignment with the specific context of this study, in line with the theory presented in sections 2.2 to 2.4. First, the “ability to grow” can be understood through the lens of the four interrelated scaling dimensions: *financial, organizational, market, and volume*, as highlighted by Palmié et al. (2023). Second, given the process industry’s high capital intensity (Frishammar et al., 2012), rapid growth from pilot plants to full-scale is often essential. Third, the challenges refer to the non-technical obstacles in planning, implementation, and operation that hinder the scaling process. In line with ABV (Ocasio, 1997), these challenges also reflect what organizational

actors direct their attention to, as issues become salient and actionable only when they are noticed, interpreted, and prioritized. Lastly, in addition to focusing on internal structural constraints as outlined by Monteiro (2019), the definition has been expanded to also include external factors. This extension is supported by Stanley et al. (1996) and Jansen et al. (2023), who emphasize the importance of considering both internal and external factors in scaling efforts.

2.2 Four Dimensions of Scaling

Scaling can occur across multiple aspects of a company, with each dimension contributing to the company's overall ability to grow efficiently. Palmié et al. (2023) divide scaling into four main categories: *financial*, *organizational*, *market*, and *volume*. *Financial scaling* focuses primarily on growing in a manner that allows revenues to increasingly outpace costs (Baumers et al., 2016). Scaling greenfield projects within the process industry requires high initial capital investments (Frishammar et al., 2012). Understanding the financial dimension is therefore critical for analyzing the challenges related to managing upfront costs. *Market scaling*, on the other hand, revolves around business expansion, where companies grow their presence by reaching new customer segments or expanding geographically (Palmié et al., 2023). Greenfield projects typically lack an established market position (Axehill et al., 2021). As such, the market dimension is of importance for understanding the challenges associated with market entry, customer acquisition, and competitive positioning. Moreover, *organizational scaling* entails adjustments to activities, processes, and resources to support expansion effectively (Palmié et al., 2023). Therefore, this dimension is essential for understanding the complexities of establishing a new structure, including workforce development and internal process adaptation. Finally, *volume scaling* refers to the gradual increase in production capacity, ensuring that companies can meet demand (Palmié et al., 2023). In industrial settings, this typically involves scaling up from pilot projects to full-scale production. Therefore, this dimension is important for understanding the operational and technological challenges associated with such scaling efforts. In sum, we consider that these four dimensions provide a starting point for understanding the key challenges of scaling.

2.3 Non-Technical Challenges in Scaling Greenfield Projects in the Process Industry

Mossberg et al. (2020) classify NTCs as managerial and organizational difficulties, including issues such as a lack of organizational structure, unclear roles and responsibilities, and deficiencies in resources and competencies. Furthermore, NTCs may encompass policy and regulatory constraints, social acceptance, and behavioral aspects, as well as limited resources, such as financial constraints (Rae et al., 2020). Moreover, competence in the development of technology extends beyond technical expertise to include the ability to navigate and manage these non-technical factors as well (Mossberg et al., 2020).

In the context of scaling greenfield projects within the process industry, both TCs and NTCs can be identified across all four dimensions. However, in this study, we focus on the NTCs that are related to *organizational*, *financial*, and *market* scaling. As illustrated in Figure 1, we argue that it is these three dimensions that lay the foundation for, and enable, the technical scale-up, particularly in terms of building the capability to handle larger volumes. For instance, it is reasonable to conclude that without sufficient financial resources, production capacity cannot be expanded. Without market demand, scaling production becomes inefficient or even irrelevant. Moreover, we argue that without organizational readiness, increased production is simply unsustainable. In sum, while TCs and NTCs are treated as separate categories in this study, they are deeply interconnected (Rae et al., 2020). Therefore, we argue that failing to address NTCs can hinder technical progress, and vice versa.

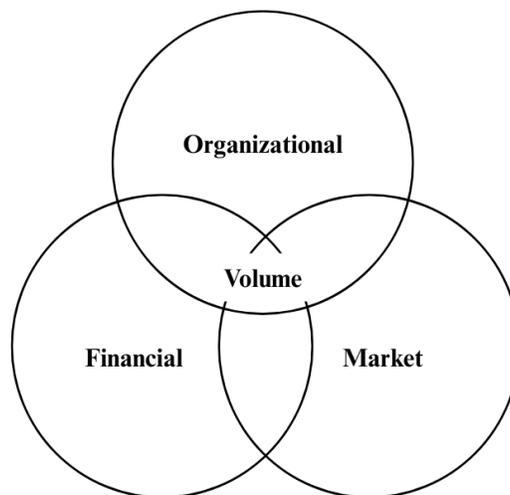


Figure 1. Interaction Between the Four Dimensions of Scaling.

2.3.1 Non-Technical Challenges in Organizational Scaling

The organizational dimension presents significant challenges when a company within the process industry scales up. As companies grow, their organizational structure must evolve, as **structures and processes that were effective at a smaller scale may become inefficient at a larger one** (Jansen et al., 2023; Shepherd & Patzelt, 2020; Bohan et al., 2023; Schou, 2023). This transformation requires a **revised organizational design** (Kaehr Serra & Thiel, 2019; DeSantola, 2021) and the **introduction of new functions and job roles** (DeSantola et al., 2017; Van Lancker et al., 2023). These challenges are further compounded by the characteristics of the process industry and greenfield projects. First, the industry's strong geographical concentration in one or a few physical locations (Frishammar et al., 2012) poses additional challenges in accessing the required expertise, as companies must **attract specialized professionals to specific locations** (Gabe & Abel, 2011). Secondly, in greenfield projects, **entirely new organizations must be established from the ground up** (Axehill et al., 2021). Accordingly, it becomes even more critical to ensure that **all individuals involved possess the necessary competence from the outset**, as hiring the wrong person can be extremely costly and may negatively impact the organization's functionality and efficiency in both the short and long term (Tennby, 2023; Lindelöw Danielsson, 2003). However, even when the right competence is available, **ineffective resource mobilization** can prevent a company from reaching its full potential, ultimately limiting its ability to scale successfully (Belitski et al., 2022; Bohan et al., 2023).

Another critical aspect of organizational scaling is the **shift in leadership approach**, particularly when transitioning from a founder-led or small-scale management structure to a more formalized and professional organization (Shepherd & Patzelt, 2020). This shift places high demands on leadership, where the **leader's experience and competence** become critical factors. The ability to make strategic decisions, manage resources effectively, and steer the organization's focus is essential for ensuring sustainable growth (Belitski et al., 2022). Additionally, other aspects, such as a **leader's openness to innovation and willingness to take risks**, can significantly influence the pace of growth (Ahmadi et al., 2016). Leaders who embrace change and proactively seek new opportunities are more likely to drive sustainable expansion and competitive advantage (Shepherd & Patzelt, 2020).

The last critical aspect of organizational scaling is **organizational culture**. Organizational culture refers to the shared values, norms, and behaviors that shape how employees interact, make decisions, and approach their work (Schneider et al., 2012). As organizations scale, maintaining or shaping organizational culture becomes increasingly challenging. The introduction of a new organizational structure and leadership can significantly disrupt existing cultural norms, requiring employees to adapt to new ways of working and decision-making. In turn, this disruption may create uncertainty among employees, potentially leading to **resistance to change** (Frishammar & Parida, 2019; Oghazi & Mostaghel, 2018). Once again, this challenge becomes even more pronounced in greenfield projects, where an entirely new organization must be built from the ground up (Frishammar et al., 2012). Unlike established companies, where culture has gradually evolved over time, greenfield projects lack pre-existing traditions, shared experiences, and ingrained behaviors to build upon.

2.3.2 Non-Technical Challenges in Market Scaling

Market scaling within the process industry is heavily influenced by external factors. First, companies often rely on **external partners and a well-functioning supply chain**, meaning that disruptions in these areas can have significant consequences (Vermunt et al., 2019). For example, the process industry is highly **dependent on material availability** (Frishammar et al., 2012), which presents a significant challenge as it places high demands on suppliers. It is therefore reasonable to conclude that unpredictable material availability can create significant uncertainties in the scaling process. Second, **regulations and bureaucratic barriers** may further slow down growth and lead to increased costs (Oghazi & Mostaghel, 2018). This challenge becomes even more pronounced in greenfield projects within the process industry, where companies must navigate complex approval processes, environmental regulations, and permitting requirements before construction and operations can even begin. Lastly, another challenge is ensuring **customer and market acceptance**. Even if a company successfully scales production, growth may be limited if customers are not ready to adopt the product (Reim et al., 2021; Frishammar & Parida, 2019). Establishing a strong market position and gaining acceptance is particularly challenging in greenfield projects, where companies **lack an existing customer base and supplier network** (Axehill et al., 2021).

2.3.3 Non-Technical Challenges in Financial Scaling

One of the key challenges in financial scaling is managing resource constraints, such as **limited capital** (Jansen et al., 2023; Belitski et al., 2022). Insufficient **access to funding** can create bottlenecks that hinder the scaling process (Belitski et al., 2022). Financial scaling is especially challenging in capital-intensive industries like the process industry, where **significant upfront investments are required** (Frishammar et al., 2012). For instance, the **volatility of raw material prices** can have a substantial impact on production costs and profitability (Napoleone et al., 2023). Within a greenfield project, where everything is built from the ground up (Axehill et al., 2021), the demand for capital is even higher, as it requires substantial investments in infrastructure, employees, and diversification. A summary of the NTCs across the three scaling dimensions is presented in Table 1.

Table 1. *Non-Technical Challenges When Scaling Greenfield Projects.*

Dimension	Non-Technical Challenges	Selected Authors
Organizational	Structures and processes become inefficient at a larger scale.	Jansen et al., 2023; Shepherd & Patzelt, 2020; Bohan et al., 2023; Schou, 2023
	Need for revised organizational design.	Kaehr Serra & Thiel, 2019; DeSantola, 2021
	Introduction of new functions and job roles.	DeSantola et al., 2017; Van Lancker et al., 2023
	Attract specialized professionals to specific locations.	Gabe & Abel, 2011
	Need to build an entirely new organization.	Axehill et al., 2021
	Ensure necessary competence.	Tennby, 2023; Lindelöw Danielsson, 2003
	Ineffective resource mobilization.	Belitski et al., 2022; Bohan et al., 2023
	Shift in leadership approach.	Shepherd & Patzelt, 2020
	A lack of experience and competence among leaders.	Belitski et al., 2022
	A lack of key attributes such as openness to innovation and risk-taking among leaders.	Ahmadi et al., 2016; Shepherd & Patzelt, 2020
	Resistance to change.	Frishammar & Parida, 2019; Oghazi & Mostaghel, 2018
Shaping and maintaining organizational culture.	Schneider et al., 2012.	
Market	Rely on external partners and a well-functioning supply chain.	Vermunt et al., 2019
	Dependence on material availability.	Frishammar et al., 2012
	Regulations and bureaucratic barriers.	Oghazi & Mostaghel, 2018
	Ensuring customer and market acceptance.	Reim et al., 2021; Frishammar & Parida, 2019
	Lack an existing customer base and supplier network.	Axehill et al., 2021
Financial	Managing limited capital.	Jansen et al., 2023; Belitski et al., 2022
	Insufficient access to funding.	Jansen et al., 2023; Belitski et al., 2022
	High upfront investment.	Frishammar et al., 2012
	Volatility of raw material prices.	Napoleone et al., 2023

2.4 An Attention-Based Perspective on Scaling Greenfield Projects in the Process

Industry

In the context of scaling greenfield projects within the process industry, we view all employees in the organization as decision-makers, since everyone contributes to organizational actions at some level, in line with Ocasio's (1997) definition. Serrat (2017) builds on this by distinguishing between individuals with formal and informal decision-making authority. According to Serrat (2017), *formal decision-makers* are employees who occupy official positions within the organizational hierarchy, which grants them explicit authority to make decisions. In contrast, *informal decision-makers* may lack formal titles or mandates, yet they still exert considerable influence through personal credibility, trust, respect, or accumulated knowledge and experience. Building on Ocasio's (1997) definition, we interpret the concept of "actions at some level" by distinguishing between decision-makers with formal and informal decision-making authority, as this allows for a more nuanced understanding of how decisions are shaped and enacted within complex organizational settings.

To understand how decision-makers allocate their attention to NTCs when scaling greenfield projects within the process industry, Ocasio (1997) proposes three interrelated principles: *focus of attention*, *situated attention* and *structural distribution of attention*. The *focus of attention* refers to the fact that decision-makers have limited cognitive resources and must selectively direct their attention to specific issues and answers, ultimately shaping organizational actions. *Situated attention* emphasizes that attention is influenced by the organizational and environmental context, meaning that situational factors determine what becomes prominent (Ocasio, 1997). Lastly, *structural distribution of attention* explains how organizational structures, routines, and rules regulate and guide where decision-makers direct their attention. These three principles build upon each other, as visualised in Figure 2.

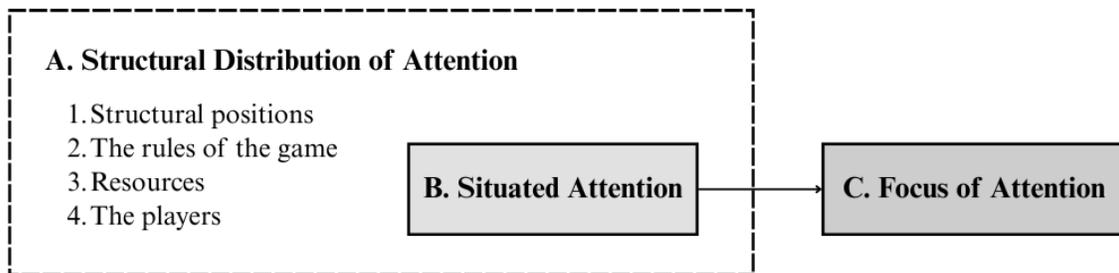


Figure 2. Breakdown of Attention Based View (ABV).

Within the third principle, Ocasio (1997) identifies four attention regulators that influence how attention is structured within organizations. First, *structural positions* determine how attention is allocated among decision-makers, as different roles carry varying levels of influence. In the process industry, organizational roles such as technical manager, production manager, and marketing manager are often clearly defined and functionally distinct (Frishammar et al., 2012). It is therefore of interest to analyze which organizational roles hold formal and informal decision-making authority. Second, *the rules of the game*, including organizational norms, policies and procedures, establish the context for how issues are framed and which actions are considered acceptable (Ocasio, 1997). Projects in the process industry are typically shaped by stringent environmental regulations and formal internal procedures (Kungl. Ingenjörsvetenskapsakademien, 2022). Given this, it is relevant to analyze how these norms and policies shape problem definition, determine which issues are perceived as important, and influence which solutions are considered legitimate. Third, *resources* significantly impact attention allocation since the availability and scarcity of resources can shift towards certain strategic priorities (Ocasio, 1997). Greenfield projects within the process industry also require substantial resources, both in terms of capital and expertise (Axehill et al., 2021). When resources are limited, it becomes important to analyze what is prioritized, and how such prioritization affects the handling of NTCs. Lastly, *the players* involved in the decision-making process, including their experiences and perspectives, influence attention allocation as they negotiate which issues gain prominence (Ocasio, 1997). The individuals involved in the decision-making process, along with their experiences, perspectives, and roles, have an impact on which issues are prioritized (Belitski et al., 2022; Ahmadi et al., 2016; Shepherd & Patzelt, 2020). For that reason, it is of interest to analyze how the backgrounds, roles, and interactions of individuals involved in the decision-making process shape the prioritization of attention within organizations. In sum, analyzing the four attention regulators enables a deeper understanding of the *focus of attention* in relation to the NTCs that arise when scaling greenfield projects within the process industry.

3. METHOD

This chapter provides a detailed overview of the research methodology used in this study to support transparency and enable transferability. It is structured into three main sections: *Research Approach, Data Collection and Data Analysis,*

3.1 Research Approach

The research design of this study is an exploratory single case study, involving an in-depth investigation of a specific case within its real-life context (Gerring, 2004). An exploratory approach was considered appropriate due to the limited amount of existing research on the specific context examined in this study. Consequently, a qualitative research approach was adopted to enable an in-depth analysis of the abstract and complex nature of the subject, particularly given the absence of clear or predefined answers. However, to complement the qualitative inquiry, quantitative elements were also incorporated to support the analysis and strengthen the identification of patterns. This combination prioritizes in-depth insights while enabling a structured examination of emerging trends, with the aim of addressing the identified research gap.

The research process followed a linear structure, where each phase of data collection and analysis built upon the previous one. Figure 3 illustrates the overall research process, highlighting the interaction between data collection and analysis. White boxes represent data collection activities, grey boxes represent data analysis steps, and rounded boxes denote key outputs.

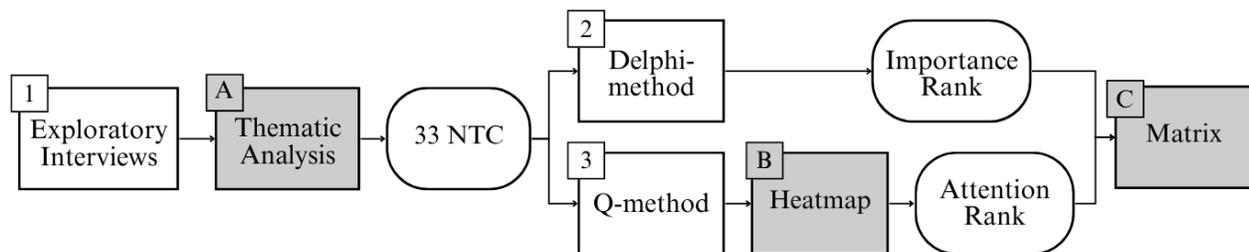


Figure 3. Overview of the Research Approach.

3.1.1 Case Selection

This study investigates a single case involving a mining company based in Sweden. The selection of the case company was guided by three criteria to ensure its relevance to the research

objectives. First, the company needed to be engaged in an active scaling process, as the study aims to explore NTCs that emerge during an upscaling. Second, the scaling activity had to take place within a greenfield context, referring to the development of an entirely new facility, rather than expansion or modification of existing infrastructure (Axehill et al., 2021). This criterion was essential, as greenfield projects are associated with unique organizational and strategic complexities. Third, the company was required to operate within the process industry, a sector characterized by continuous production flows, high capital intensity, and complex supply chains (Frishammar et al., 2012).

3.2 Data Collection

The data for this study were collected in three phases. The first phase consisted of exploratory interviews, during which a total of 16 interviews were conducted. In the second and third phases, selected participants from the initial interview cohort took part in two additional research activities. Each phase will be described in greater detail in the following

Phase 1 - Exploratory Interviews

In the first phase, the objective was to identify NTCs related to scaling. This was achieved by conducting 16 exploratory interviews with employees at the case company. Respondents were selected to ensure representation across all functions involved in the project and were categorized based on whether they held formal or informal decision-making authority. This approach aimed to enhance the credibility of the study by capturing diverse perspectives and ensuring a dependable basis for analysis. The respondent profile is presented in Table 2.

During the interviews, both researchers participated, with one leading the interview while the other took notes. However, the notetaker was also responsible for asking follow-up questions. All interviews were recorded, and after each session, the notetaker transcribed the interview to facilitate analysis. The roles remained consistent throughout the interview process to ensure reliability. An interview guide was developed based on the theoretical background and was structured into 4 sections to gain relevant insights from the respondent (see Appendix 1). Interviews were conducted either face-to-face (F2F) or via Microsoft Teams, depending on the respondents availability. To allow respondents time to prepare, a description of the interview focus was sent to them in advance.

Table 2. Phase 1 - Respondent Profile.

Category	ID	Date	Duration	Type
Decision-maker with formal authority	R2	2025-02-24	66 min	Teams
	R7	2025-03-06	28 min	Teams
	R8	2025-03-07	35 min	Teams
	R13	2025-03-10	29 min	F2F
Decision-maker with informal authority	R1	2025-02-21	67 min	F2F
	R3	2025-03-03	38 min	Teams
	R4	2025-03-03	33 min	Teams
	R5	2025-03-03	29 min	Teams
	R6	2025-03-04	27 min	F2F
	R9	2025-03-07	36 min	Teams
	R10	2025-03-10	33 min	F2F
	R11	2025-03-10	33 min	Teams
	R12	2025-03-10	30 min	F2F
	R14	2025-03-11	24 min	Teams
	R15	2025-03-12	34 min	Teams
	R16	2025-03-26	30 min	Teams

Phase 2 - Identifying Perceived Importance of Non-Technical Challenges

To gain an understanding of how the importance of the NTCs is perceived in relation to successful scaling, the Delphi method was applied. This method was chosen for its ability to systematically gather expert insights through structured feedback, enabling reflection and comparison among participants (Skulmoski et al., 2007), thereby enhancing the credibility and dependability of the results. The aim of this phase was to establish a prioritized ranking of the identified NTCs, serving as a foundation for in-depth analysis in the subsequent stage of the study. Four participants were selected based on their expertise and early involvement in the project.

Each participant received a list of the 33 NTCs, with each challenge assigned an ID and a short description to ensure clarity and shared understanding. Participants were then asked to independently rank the 33 NTCs according to their perceived importance. A forced distribution method was used, requiring participants to assign a unique rank on a scale from 1 to 33. This ranking process was conducted separately for three distinct time phases of the project: (1) From feasibility study to integrated pilot being operational, (2) from integrated pilot being operational to demonstration plant being operational, and (3) from demonstration plant being operational to full-scale plant being operational. This approach made it possible to identify both the most and least critical challenges across the project timeline. While the forced ranking enabled a clear prioritization, it may also have introduced certain limitations. The forced ranking process may have placed pressure on participants to differentiate between challenges of similar perceived importance, which could have skewed the prioritization and introduced bias.

Once all responses had been collected, the results were analyzed to identify trends in how challenges were perceived across the different phases. These trends were then presented to the participants, who were given the opportunity to revise their individual rankings. The process was repeated until all four participants reached consensus on their final rankings.

Phase 3 - Identifying Attention Allocation

To complement the understanding gained from Phase 2 regarding the perceived importance of NTCs, Phase 3 aimed to explore how attention is actually allocated to these challenges over time. For this purpose, the Q-method was adapted. This method was chosen for its ability to systematically examine subjective perspectives while combining the strengths of both qualitative and quantitative research (van Oortmerssen et al., 2025). Of the 16 respondents who participated in the exploratory interviews, 12 respondents (R2, R3, R4, R6, R7, R8, R9, R11, R13, R14, R15, R16) were also involved in this phase. The remaining 4 were not included in the process due to two main reasons: (1) they had only been involved in the project for a short period of time, or (2) they were only engaged in a limited part of the project and therefore lacked sufficient insight to make a representative assessment.

Each participant was asked to perform an individual Q-sorting task, in which they ranked all 33 NTCs based on the amount of attention they personally allocated to each challenge during the three defined time phases of the project. The ranking was conducted using a forced distribution

on a quasi-normal scale ranging from -4 (least attention) to +4 (most attention). Table 3 shows how many NTCs were placed at each level of the scale, along with a description of what each point on the scale represents. Participants were provided with the IDs of the NTCs and brief descriptions and were instructed to assign each challenge to a position of the scale according to the level of attention they had allocated during each phase. All participants received identical instructions and materials to enhance reliability. The ranking was carried out in an Excel spreadsheet, with one tab corresponding to each of the three time phases.

Table 3. Description of the Quasi-Normal Scale.

Scale	Number of Non-Technical Challenges	Description
+4	2	I devote the most attention to these challenges, they dominate my focus.
+3	3	I devote a lot of attention to these.
+2	5	I devote quite a lot of attention .
+1	6	I devote slightly above average attention .
0	6	I am neutral/average, I devote some attention but nothing extreme.
-1	5	I devote slightly below average attention .
-2	3	I devote quite little attention .
-3	2	I devote very little attention .
-4	1	I devote the least attention to this challenge.

3.3 Data Analysis

In this study, the data analysis was structured into three distinct phases. Each phase was strategically aligned with the research objectives and contributed to addressing the overarching research questions, with each phase corresponding to one specific research question.

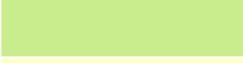
Phase A - Thematic Analysis

The objective of Phase A was to answer the first research question regarding identifying what NTC occurs when scaling greenfield projects. To analyze the exploratory interviews we applied a thematic analysis approach as proposed by Braun and Clarke (2006). This process was conducted in five steps: (1) familiarization with the dataset, (2) identifying themes, (3) generating initial codes, (4) identifying subthemes, and (5) refining codes and subthemes. While this order slightly deviates from the original sequence proposed by Braun and Clarke (2006), the modification was made to better align with the structure and aims of this study. First, we thoroughly reviewed the interview transcripts and highlighted relevant quotations, which were then transferred into a Microsoft Excel spreadsheet in their original language. Quotations were considered relevant if they clearly illustrated NTCs, reflected common patterns across interviews or offered particularly rich or nuanced insights into the respondents experience or perceptions. In total, 241 quotations were extracted. Second, the themes were derived directly from the theoretical background on the three scaling dimensions, resulting in three themes. This approach was intentionally chosen to structure the results in a clear and systematic way while also ensuring that the analysis remained closely connected to the research questions. Basing the themes in prior research strengthened both the analytical focus and theoretical relevance of the analysis. Third, the quotations were analyzed to create a descriptive set of codes, which were translated into English. The original wording was simplified where necessary, while preserving the intended meaning. Fourth, codes were grouped into subthemes based on patterns and thematic connections. Fifth, codes and subthemes were refined and clarified, resulting in a total of eleven subthemes and 33 codes. Each code represented an identified NTC and served as input for the subsequent phases of data collection and analysis.

Phase B - Heatmap

The aim of Phase B was to understand how the participants' attention to different NTCs evolve over time. To analyze the result from Phase 3 of the data collection, a heatmap was created. This visualization method was deemed appropriate for illustrating how each respondent allocated their attention across all 33 NTCs. Each participant's responses were extracted from the quasi-normal scale and entered into a Microsoft Excel spreadsheet. Based on the ranking each NTC received, the corresponding cell was colored according to the scale outlined in Table 4. This assisted the analysis by making it clearly what challenges each participant allocated their attention to. Separate heatmaps were generated for each time phase, incorporating results from all participants, in order to observe how attention shifted over time.

Table 4. Color Scheme for Heatmap.

	Scale	Color in Heatmap
Most attention	+4	
	+3	
	+2	
	+1	
	0	
	-1	
	-2	
	-3	
Least attention	-4	

After creating the heatmaps for each time phase, patterns of attention allocation were examined. The analysis focused on how individual challenges received attention, whether specific sub-themes received more or less attention, whether any participants' responses deviated notably from the overall trends, and how attention shifted across the three different time phases. Differences between participants with formal and informal decision-making authority were also analyzed. For instance, if a challenge appeared in a darker red shade (ranging from -2 to -4) on the heatmap for most participants, it indicated that the challenge received little attention. Lastly,

each participant's results were converted from the original -4 to +4 scale to a simplified 1-9 scale to facilitate comparison in Phase C.

Phase C - Matrix, The Attention Compass

The objective of Phase C was to address the third research question by analyzing the relationship between perceived importance and allocated attention for the 33 NTCs. To support this analysis, a 2x2 matrix was developed, named “The Attention Compass” (see Figure 7). The matrix was constructed with two axes: the X-axis representing the perceived importance of each NTC (based on output from Phase 2), and the Y-axis representing the level of attention allocated (based on output from Phase B). Each NTCs was plotted on the X-axis according to its ranking from 1 to 33, where a higher number indicated greater perceived importance, while the Y-axis reflected the corresponding attention score, from 1 to 9. One matrix was generated per respondent, resulting in a total of 36 matrices, twelve for each time phase.

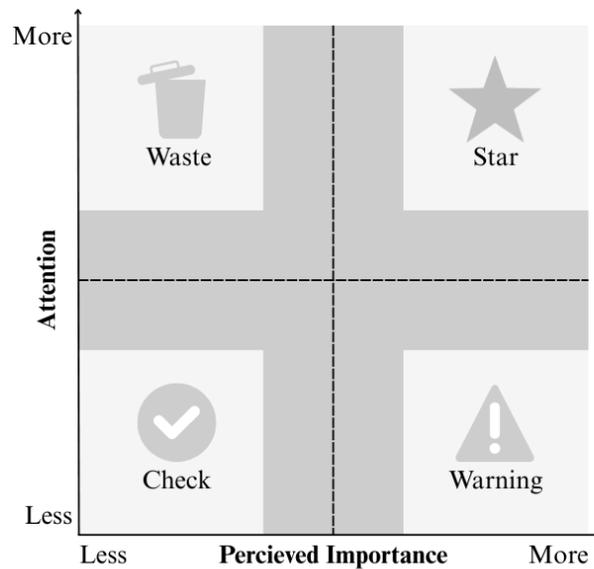


Figure 7. *The Attention Compass.*

The matrix consisted of four quadrants, each representing a combination of how important the challenges were perceived to be for successful scaling and how much attention they had received. In the quadrant labeled *check*, we placed NTCs that were perceived as less important and that, according to our finding, also received less attention. In the quadrant labeled *waste*, we placed NTCs that were considered to have low importance and received high levels of attention. The quadrant labeled *star*, included NTCs that were both perceived as highly important and had

received significant attention in practice. The last quadrant, *warning*, contained NTCs that were seen as important but received limited attention according to the findings.

We considered the NTCs in the *check* and *star* quadrants to be “safe,” as there was alignment between perceived importance and attention. Less important challenges received less focus, while more important ones received more, indicating that no special interventions are needed. In contrast, the *waste* and *warning* quadrants were regarded as critical and required closer examination. The *waste* quadrant contained challenges that received more attention than necessary, despite being considered less important, indicating a possible misallocation of resources. The *warning* quadrant was assessed as particularly critical, as it included challenges that were viewed as important for successful scaling but were not receiving sufficient attention. This misalignment posed a potential risk of neglecting key factors.

To determine whether a challenge should be classified as waste or warning, a three-step selection process was conducted. First, challenges that fell within a predefined area of the matrix were filtered. For *waste*, the range was $0 \leq x \leq 8$ and $6 \leq y \leq 9$; for *warning*, it was $25 \leq x \leq 33$ and $0 \leq y \leq 3$. In the second step, we examined how many participants placed the challenge within these areas. If a clear majority did so, the challenge was subjected to deeper analysis. Otherwise, it was excluded, based on the reasoning that the attention it received was reasonably proportional to its perceived importance for scaling. In the final step, results were compared between participants with formal and informal decision-making authority, with a focus on identifying signs of misalignment. For the remaining challenges categorized as *waste*, we analyzed whether individuals with formal decision-making authority allocated more attention to them than those with informal influence. This was considered relevant, as it may indicate that formal decision-makers, those with explicit authority to make decisions, are focusing disproportionately on less critical issues, which warrants attention. For the remaining challenges classified as *warning*, similar patterns were analyzed. The focus here was on identifying cases where a clear majority of formal decision-makers paid insufficient attention, in contrast to those with informal influence. Such patterns suggest that key challenges may be overlooked by formal decision-makers and should therefore be given particular consideration.

Since the input data in this phase is based on participants’ self-reported experiences and reflections, we took into account the potential influence of self-deception, as it could affect the

credibility of the findings. To further strengthen credibility, particular attention was given to a light gray zone visible in the matrix, representing NTCs located near the boundary between two quadrants. These challenges were highlighted separately, as their placement indicated an ambiguous position between categories. Given their location, it was not possible to confidently assign them to a single quadrant, and they were therefore treated with particular analytical caution.

4. FINDINGS

This chapter presents the empirical findings, structured around the study's three RQs, as illustrated in Figure 8. *Section 4.1* addresses the first research question by presenting the identified NTCs encountered in the scaling of greenfield projects. *Section 4.2* answers the second research question through an analysis of how decision-makers allocate their attention to these challenges over time. *Section 4.3* complements this by examining the perceived importance of each challenge, providing essential input for the final analysis. Building upon the insights derived from sections 4.2 and 4.3, *section 4.4* addresses the third research question by analyzing how the relationship between perceived importance and attention allocation impacts project success across the three phases of the scaling process.

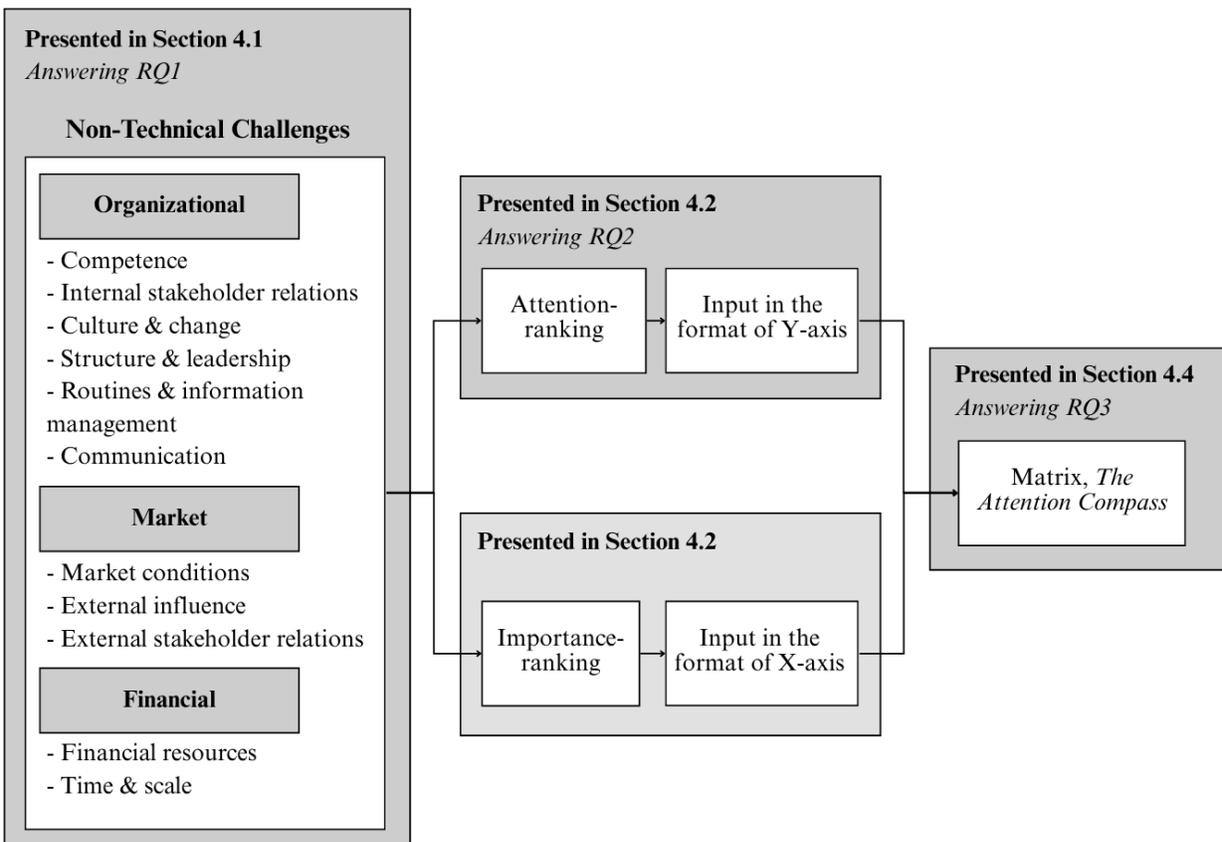


Figure 8. Data Structure.

4.1 Identified Non-Technical Challenges

The 16 interview respondents represent a broad range of expertise and functions within the organization, including roles in HR, finance, project management, sustainability, communication, R&D, and executive leadership. Among the roles are key individuals such as the CHRO, CFO, CTO, and VP, as well as key roles within the PMO, business development, environmental and energy management, and laboratory operations. The insights from these respondents indicate that companies scaling a greenfield project within the process industry must navigate a broad spectrum of NTCs, spanning organizational, market-related, and financial dimensions (see Figure 9). Specifically, the respondents confirm the 21 NTCs identified in the theoretical background and highlight an additional 12 challenges. Table 5 to 7 present all the 33 identified NTCs, categorised in representative subthemes.

Non-Technical Challenges		
Organizational	Market	Financial
Competence	Market conditions	Financial resources
Internal stakeholder relations	External influence	Time & scale
Culture & change	External stakeholder relations	
Structure & leadership		
Routines & information management		
Communication		

Figure 9. Identified Themes and Sub-Themes from the Thematic Analysis.

Among the three dimensions of scaling, organizational challenges clearly emerge as the most prominent theme. All respondents refer to NTCs related to organizational aspects, in contrast to market-related challenges, which are mentioned by 9 respondents (R2, R3, R5, R6, R7, R8, R11,

R12, R15), and financial challenges, which are brought up by 8 respondents (R1, R2, R3, R5, R7, R8, R11, R12). Several respondents emphasize that without the right people in the right roles, both the implementation and long-term sustainability of the project are at significant risk. As highlighted by R1:

If we do not have the right people in finance to manage financial follow-up, if we do not have the right people in marketing and competence development, then this will not succeed. If we do not have the right managers to lead the work effectively, it will not succeed either. And if we fail to secure the necessary technical competence for the project, we will not be able to carry it out. [...]. Having the right people in the right positions within the organization is seen as a critical key to success. Without it, there will be no project.

While organizational dimension is identified as fundamental, several respondents also stress that the technological aspect is equally crucial. Without a functioning technological solution, the project itself is not viable (R1, R3, R7, R13, R16). Furthermore, the financial dimension is emphasized as a critical enabler, as securing sufficient funding is essential for the development and realization of the technology (R1, R2, R3, R5, R7, R8, R12). As R3 explains: “It is about proving that the technical solution works and that we can do it profitably. That is absolutely essential. Everything else is secondary. If we cannot achieve that, the entire project will collapse.” Lastly, the market dimension is highlighted by some respondents as the ultimate determining factor (R2, R3, R5, R6, R7, R8). Without access to viable markets, the existence of an organization, sufficient financial resources, or a functioning technical solution becomes meaningless. As R6 expressed it: “The focus is on the markets and where our products are going. That is the most important thing for me. Because if there are no markets where we can sell, then we might as well put down the wheelbarrow.” In sum, although organizational challenges are most frequently mentioned, respondents also point to the interdependence between organizational capabilities, technological validation, financial resources, and market access as critical conditions for the scaling of a greenfield project within the process industry.

4.1.1 Organizational

When exploring organizational NTCs, six main areas are identified: *competence, internal stakeholder relations, culture & change, structure & leadership, routines & information management* and *communication* (see Table 5). The findings show that these areas have a strong focus on internal organizational capabilities, relationships, and work processes that are critical

for building competence, establishing effective structures, and ensuring efficient communication during scaling. Representative quotations for each NTC in Organizational Scaling are presented in Appendix 2.

Table 5. Organizational Non-Technical Challenges.

Subtheme	ID	Non-Technical Challenges	Respondents
Competence	1	Lack of internal competence due to the organization operating in an entirely new area.	R1, R2, R3, R4, R5, R6, R8, R12, R14, R15, R16
	2	Knowledge being developed outside the organization through extensive use of external consultants.	R4, R8, R16
	3	Recruiting at the right scale, considering both short-term resource needs and long-term organizational development.	R1, R2, R10, R12
	4	Critical knowledge concentrated among a few individuals, creating vulnerability in cases of staff turnover, absence, or changes in role distribution.	R16
	5	Finding and attracting the right competence, considering the project's geographical location.	R1, R3, R4, R5, R8, R9, R10, R12, R13, R15
	6	Making effective use of the available competence within the organization.	R1, R4, R12, R13
	7	Recruiting with regard to the surrounding community, to avoid draining competence from other companies, municipalities, or sectors.	R1
Internal stakeholder relations	8	Creating internal acceptance for the project's goals and ways of working.	R1, R2, R3, R5, R7, R9, R11, R12, R15
	9	Meeting the expectations of internal stakeholders.	R11, R12
Structure & leadership	13	Designing an organizational structure with clearly defined tasks, roles, and responsibilities – where everyone works toward common goals.	R1, R2, R3, R8, R9, R11, R12, R13, R15, R16
	14	Work overload due to insufficient staffing.	R4, R9, R12, R15, R16
	15	Developing leadership that understands the organization's conditions and drives the project toward shared objectives.	R1, R2, R5, R9, R10, R12, R16
	16	Enabling collaboration across internal organizational boundaries and business areas.	R1, R2, R3, R5, R8, R9, R12, R13, R14, R15, R16

Subtheme	ID	Non-Technical Challenges	Respondents
Culture & change	17	Shaping a shared corporate culture that supports the project's goals and ways of working.	R1, R2, R4, R5, R6, R9, R10, R11, R12, R13, R15, R16
	18	Internal resistance to change.	R3, R7, R9
	19	Operating in the unknown – where the business is largely based on assumptions and theoretical models not yet tested in practice.	R1, R3, R6, R7, R16
Routines & information management	20	Inadequate or unclear routines for onboarding new personnel.	R9, R12, R16
	21	Establishing and adhering to structured routines for document management that ensure information security, traceability, and accessibility.	R2, R4, R6, R8, R9, R15, R16
Communication	22	Ensuring that communication and information sharing are secure, use appropriate channels, and are conducted with the right level of detail – based on a shared understanding of what should and should not be communicated.	R3, R4, R5, R6, R7, R8, R9, R10, R12, R13, R14, R15, R16
	23	Establishing a meeting structure that enables effective coordination and information sharing without creating an unnecessary meeting burden.	R9, R10, R11, R13, R16
	24	“Speaking the same language” and creating mutual understanding between individuals – looking beyond one's own perspective to understand both what others need to know and what one needs to understand to enable effective collaboration.	R3, R5, R10, R12, R13, R15, R16
	25	Maintaining effective communication when teams are geographically dispersed and do not share the same physical workspace.	R4, R11, R12, R13, R14, R15, R16

4.1.2 Market

When exploring market-related NTCs, three main areas are identified: *market conditions*, *external influence*, and *external stakeholder relations* (see Table 6). The findings show that these areas have a strong focus on external factors, such as networks, political and regulatory conditions, and stakeholder relationships, that are critical for establishing market presence, ensuring operational viability, and securing the necessary external support for scaling. Representative quotations for each NTC in Market Scaling are presented in Appendix 3.

Table 6. Market-related Non-Technical Challenge.

Subtheme	ID	Non-Technical Challenges	Respondents
Market conditions	26	Ensuring there is a market and a well-functioning customer network.	R2, R3, R5, R6, R7, R8
	28	Positioning the business in a competitive market.	R7, R8
External influence	27	Ensuring the presence of a well-functioning supplier network.	R6, R8
	29	Political and regulatory conditions, such as permitting processes, legal requirements, and trade policy changes, that affect the ability to establish and operate the business.	R2, R6, R8, R11, R12
External stakeholder relations	10	Creating external acceptance for the project's purpose and impact.	R3, R5, R6, R7, R8, R11, R12, R15
	11	Meeting the expectations of external stakeholders.	R2, R15
	12	Ensuring collaboration with external stakeholders to secure necessary support in areas such as infrastructure, housing, and other conditions for establishment and growth.	R7, R8, R15

4.1.3 Financial

When exploring financial NTCs, two main areas are identified: *financial resources* and *time & scale* (see Table 7). The findings show that these areas reflect both external and internal aspects, where the external aspects concern securing the necessary financial conditions and the internal aspects involve managing the balance between time, speed, and scale to enable project implementation and long-term viability. Representative quotations for each NTC in Financial Scaling are presented in Appendix 4.

Table 7. Financial Non-Technical Challenges.

Subtheme	ID	Non-Technical Challenges	Respondents
Financial resources	30	Securing financing that enables project implementation and long-term sustainability.	R1, R2, R3, R5, R7, R8, R12
	31	Managing price volatility and declining market prices.	R5
Time & scale	32	Establishing a realistic and clear timeline and ensuring that it is followed throughout the project lifecycle.	R2, R3, R5, R11, R12
	33	Managing the trade-off between the speed and scale of scaling in order to achieve profitability.	R2, R3

4.2 How is Attention Allocated?

The findings indicate that the allocation of decision-makers' attention differs across the three phases of the project, although certain similarities can also be observed. A clear pattern emerges, indicating that attention is consistently concentrated on internal aspects across all three phases of the project. *Structure and leadership* stands out as a subtheme that receives significant attention throughout the entire timeline. In the first phase, particular emphasis is placed on *competence*, while the later phases show a shift in focus toward *internal stakeholder relations* and the shaping of a *shared corporate culture*. In contrast, *market conditions*, *external influence*, and *financial resources* receive relatively little attention overall, although a clear pattern indicates that focus on these areas gradually increases throughout the project timeline. Table 8 presents an overview of the findings, while a more detailed description of how attention is allocated across the three time phases is provided in subsections 4.2.1 to 4.2.3.

Table 8. Allocation of Attention Across the Three Time Phases.

Time Phase	Less Attention (Subtheme / ID)		More Attention (Subtheme / ID)	
Phase 1	Competence	7	Competence	1, 3, 4, 6
	Market conditions	26, 28	Structure & leadership	13, 14, 15, 16
	External influence	27, 29		
	Financial resources	30, 31		
Phase 2	Market conditions	26, 28	Competence	1, 2, 3, 4, 6
	External influence	27	Internal stakeholder relations	8, 9
	Financial resources	30, 31	Structure & leadership	13, 15
	Time & scale	33		
Phase 3	Culture & change	18, 19	Structure & leadership	13, 15
	Market conditions	28	Culture & change	17
	Time & scale	33		

Another pattern that emerges is the influence of respondents' roles on their focus areas. Those in core project management or executive leadership roles tend to maintain a broader perspective, encompassing the overall success of the scaling process. In contrast, respondents from

supporting functions, such as HR and finance, often concentrate on specific subareas of the project. Their more limited scope of involvement naturally restricts their insight into the full complexity of the project, even though their contributions remain critical within their respective domains. This variation in perspectives is well captured by R1, who illustrates the dynamic nature of attention through a sports metaphor:

The best outcome is achieved when the goalkeeper focuses on guarding the goal and saving shots, instead of trying to score. So from the goalkeeper's perspective, saving the goal is the most important part of the match, otherwise, we will lose. Similarly, the defenders will say that their main task is to protect the goalkeeper and prevent the opponent from scoring. Meanwhile, the forwards will argue that unless we score goals ourselves, we cannot win the game. This is the kind of team we need to build. That is what drives success. On the sidelines stands supporting roles, such as HR and QHSE coordinator, shouting and trying to coach in a good way, but it is always the people in the project who do the actual work.

4.2.1 Time Phase 1

In time phase 1, a clear trend emerges indicating that the majority of respondents (R3, R4, R7, R9, R11, R13, R14, R15, R16) devote very little attention to challenge 31, *managing price volatility and declining market prices*, within the subtheme of *financial resources*. All challenges related to the subthemes of *market conditions*, *external influence*, and *financial resources* show a similar pattern of limited attention by the majority of the respondents (R3, R4, R9, R11, R13, R14, R15, R16), with the exception of R2 and R6. These two respondents display the opposite pattern, placing the most attention on these particular subthemes. Moreover, challenge 7, *recruiting with consideration for the surrounding community to avoid draining competence from other companies, municipalities, or sectors*, receives little attention from all respondents except R3.

The subtheme *structure and leadership* stands out by receiving considerable attention by the majority of the respondents (R3, R4, R8, R9, R11, R14, R15, R16) in phase 1. Among the four NTCs within this area, challenges 13 and 16 are particularly prominent, attracting more attention than the others. R7 is an outlier in this regard, being the only one who reports placing no focus on these NTCs. Challenge 1, *lack of internal competence due to the organization operating in an entirely new area*, also receives considerable attention from all respondents except R6. Additionally, challenge 3, 4, and 6 within the subtheme *competence*, also receive attention from the majority of the respondents.

4.2.2 Time Phase 2

In time phase 2, the four NTCs within the subtheme *structure and leadership* continue to receive considerable attention. Challenges 13 and 15 stand out by receiving the most attention from half of the respondents (R2, R3, R4, R9, R15, R16). Moreover, R2, R3, R4, R8, R9, R13, R15, and R16 continue to place considerable attention on Challenges 1, 2, 3, 4, and 6 within the subtheme of competence.

Challenges 26 to 33, those within the subthemes *market conditions*, *external influence*, *financial resources*, and *time and scale*, receive limited attention from the majority respondents (R3, R4, R9, R11, R13, R14, R15, R16). In contrast, R6 and R7 stand out by devoting a significant share of their attention to these challenges. R8 follows the same pattern by placing considerable attention on these challenges, except for challenge 33. Further, R2 places considerable focus on challenges 27 and 28. R14, however, is notable for maintaining a neutral stance toward challenges 26 to 33, meaning they are neither among the most nor the least prioritized. Moreover, despite variation in how much attention challenges 8 and 9 within the subtheme *internal stakeholder relations* receive, several respondents assign them the highest degree of attention. Thus, the subtheme emerges as one of the most prioritized, even though the overall picture is mixed.

4.2.3 Time Phase 3

During time phase 3, challenges 13 and 15 stand out as those that generally receive the most attention from the majority of the respondents (R2, R3, R4, R8, R9, R11, R15, R16). Challenges 3 and 4 also attract significant attention (R2, R3, R4, R7, R9, R11, R13, R14, R16), indicating a strong focus on competence. Within the subtheme *culture and change*, challenge 17, *shaping a shared corporate culture that supports the project's goals and ways of working*, receives considerable attention from most respondents (R2, R3, R4, R6, R9, R11, R14, R16). In contrast, challenges 18 and 19 receive significantly less attention from all respondents. These latter two NTCs have shifted notably from time phases 1 and 2 and now clearly receive the least attention from the majority of respondents.

Similar to time phase 2, challenges 26 to 33 generally continue to receive limited attention. Challenge 33 stands out as receiving the least attention from the majority of the respondents (R2, R3, R4, R6, R7, R11, R14, R16). Challenge 28, *positioning the business in a competitive market*,

also receives very little attention, with the exception of respondents R6, R7, R8, and R14. In sum, the subthemes *market conditions*, *external influence*, *financial resources*, and *time and scale* still attract limited attention, although there are clear signs that attention toward them has increased slightly compared to earlier time phases.

The attention to challenge 24 is considered neutral or slightly above/below average by the majority of respondents (R2, R3, R4, R6, R7, R9, R11, R13, R14, R15) in time phase 3, whereas it previously received more attention. However, R16 stands out by reporting that they have maintained attention on this challenge throughout all phases. A final finding is that, during this later phase, the NTCs across the different subthemes are more dispersed and receive varying levels of attention. This contrasts with time phases 1 and 2, where the challenges appear more consistently grouped within their respective subthemes.

4.3 Perceived Importance of Non-technical Challenges for Successful Scaling

The data collected during Phase 2 reveals several emerging patterns, and the full ranking can be found in Appendix 5. Notably, challenges within the organizational dimension are consistently perceived as important, ranking highly across all three time phases. Within this dimension, certain subthemes stand out. For example, the subtheme of *competence* was highly prioritized throughout all phases, with the challenge *lack of internal competence* identified as the most important across the entire timeline. Similarly, challenges related to recruitment and workforce expansion are also considered critical, particularly in the early stages. The subthemes *communication* and *structure & leadership* are likewise perceived as especially important during the early to middle phases, reflecting the need to establish effective communication channels and a functioning organizational structure as the project expands and coordination becomes more complex. However, in the last phase, the perceived importance of the *communication* subtheme declines significantly, while the *structure & leadership* subtheme demonstrates a wide variation in importance, with NTCs distributed across both high and low rankings.

Other subthemes within the organizational dimension demonstrate a more varied level of importance over time. *Internal stakeholder relations*, including gaining internal acceptance and managing expectations, are perceived as consistently important across all phases. *Culture & change* challenges, such as *internal resistance to change* and *fostering a shared corporate culture*, are particularly relevant in the initial stages but tend to decline in perceived importance

as the project progresses. In contrast, *routine-based challenges*, such as *onboarding procedures* and *document management*, are consistently ranked lower throughout the timeline, suggesting they are not regarded as key determinants of project success.

The market and financial dimensions exhibit a clear increase in perceived importance during the later phases of the project. *Ensuring a viable market and a well-functioning customer network* stand out as a consistently high-ranking challenge across all phases. Additionally, challenges such as *ensuring the presence of a well-functioning supplier network* and taking *external stakeholder demands into account* become increasingly important in the final time phase, as the project nears full-scale implementation.

In sum, the data highlight how the perceived importance of various challenges evolves over time, with challenges within the organizational dimension maintaining a consistent role throughout the project timeline. In contrast, challenges within the market and financial dimensions gain prominence as the project approaches implementation, underscoring the growing need for external alignment and operational readiness. These patterns provide a valuable insight into how different dimensions must be prioritized at different stages of the scaling process.

4.4 Patterns of Attention and Importance in Addressing Non-Technical Challenges

First, the findings highlight which NTCs are classified as either *waste* or *warning* in the matrix. Second, the analysis identifies the challenges where a clear misalignment exists between individuals with formal and informal decision-making authority. The results reveal a consistent pattern, with organizational NTCs clearly emerging as the dominant theme associated with misalignment. Subsections 4.4.1 to 4.4.3 provide a detailed account of all these NTCs within each respective time phase.

4.4.1 Time Phase 1

In time phase 1, one NTC is classified as *waste* and one as *warning* (see Table 9). Within the *waste* quadrant, challenge 20, *inadequate or unclear routines for onboarding new personnel*, is particularly notable. A large proportion of informal decision-makers allocate their attention to this challenge, while few with formal authority do the same. This suggests that the informal decision-makers view onboarding routines as a challenge that requires attention. In contrast, the fact that individuals with formal decision-making authority do not direct attention to this

challenge in time phase 1 aligns with the perception of its limited importance for successful scaling. Within the *warning* quadrant, challenge 14, *work overload due to insufficient staffing*, stands out. The majority of those with informal authority pay attention to this challenge, whereas only one out of four individuals with formal decision-making authority does.

Table 9. *Non-Technical Challenges Classified as Waste and Warning in Time Phase 1.*

	Theme	Subtheme	ID	Non-Technical Challenges
Waste	Organizational	Routines & information management	20	Inadequate or unclear routines for onboarding new personnel.
Warning	Organizational	Structure & leadership	14	Work overload due to insufficient staffing.

4.4.2 Time Phase 2

For time phase 2, three NTCs are classified as *waste* and none are classified as *warning* (see Table 10). Within the *waste* quadrant, challenge 20, *inadequate or unclear routines for onboarding new personnel*, displays the same pattern as in time phase 1. Challenges 14, *work overload due to insufficient staffing*, and 18, *internal resistance to change*, exhibit similar patterns to challenge 20, namely, a clear misalignment in which individuals with formal decision-making authority pay little attention, while a larger proportion of those with informal authority do. The fact that no NTC is classified as *warning* suggests that participants, both those with formal and informal decision-making authority, allocate sufficient attention to the challenges perceived as important for successful scaling.

Table 10. *Non-Technical Challenges Classified as Waste and Warning in Time Phase 2.*

	Theme	Subtheme	ID	Non-Technical Challenges
Waste	Organizational	Structure & leadership	14	Work overload due to insufficient staffing.
		Culture & change	18	Internal resistance to change.
		Routines & information management	20	Inadequate or unclear routines for onboarding new personnel.

4.4.3 Time Phase 3

For time phase 3, three NTCs are classified as *waste* and none are classified as *warning* (see Table 11). The findings indicate that challenges 20, 23, and 24 show a misalignment, in which individuals with formal decision-making authority allocate little attention, while a larger proportion of those with informal authority do. This pattern is especially pronounced for challenges 23 and 24. As in time phase 2, no challenges are classified as *warning*, suggesting that the NTCs considered important for successful scaling receive sufficient attention from all participants.

Table 11. *Non-Technical Challenges Classified as Waste and Warning in Time Phase 3.*

	Theme	Subtheme	ID	Non-Technical Challenges
Waste	Organizational	Routines & information	20	Inadequate or unclear routines for onboarding new personnel.
		Communication	23	Establishing a meeting structure that enables effective coordination and information sharing without creating an unnecessary meeting burden.
		Communication	24	“Speaking the same language” and creating mutual understanding between individuals – looking beyond one’s own perspective to understand both what others need to know and what one needs to understand to enable effective collaboration.

5. DISCUSSION AND CONCLUSIONS

This study proposes a method for categorizing and addressing NTCs in the context of scaling greenfield projects. The approach involves identifying the NTCs that receive disproportionate attention relative to their actual importance for the success of a scaling project. In order to achieve this, our study not only presents the types of NTCs that may arise during the scaling of greenfield projects, but also offers an attention-based perspective that deepens our understanding of how such challenges are perceived. By exploring this subject, our study contributes to the literature on scaling by adding the lens of attention.

Figure 10 presents the Attention Prioritization Framework (APF), which outlines a step-by-step process designed to ensure that NTCs are effectively identified, evaluated and addressed. The APF is grounded in the findings of this study and serves as a practical tool for guiding organizations when scaling greenfield projects. The framework does not advise specific actions for transforming NTCs from a *warning* to *star* or from *waste* to a *check*, as this falls outside the scope of this study.

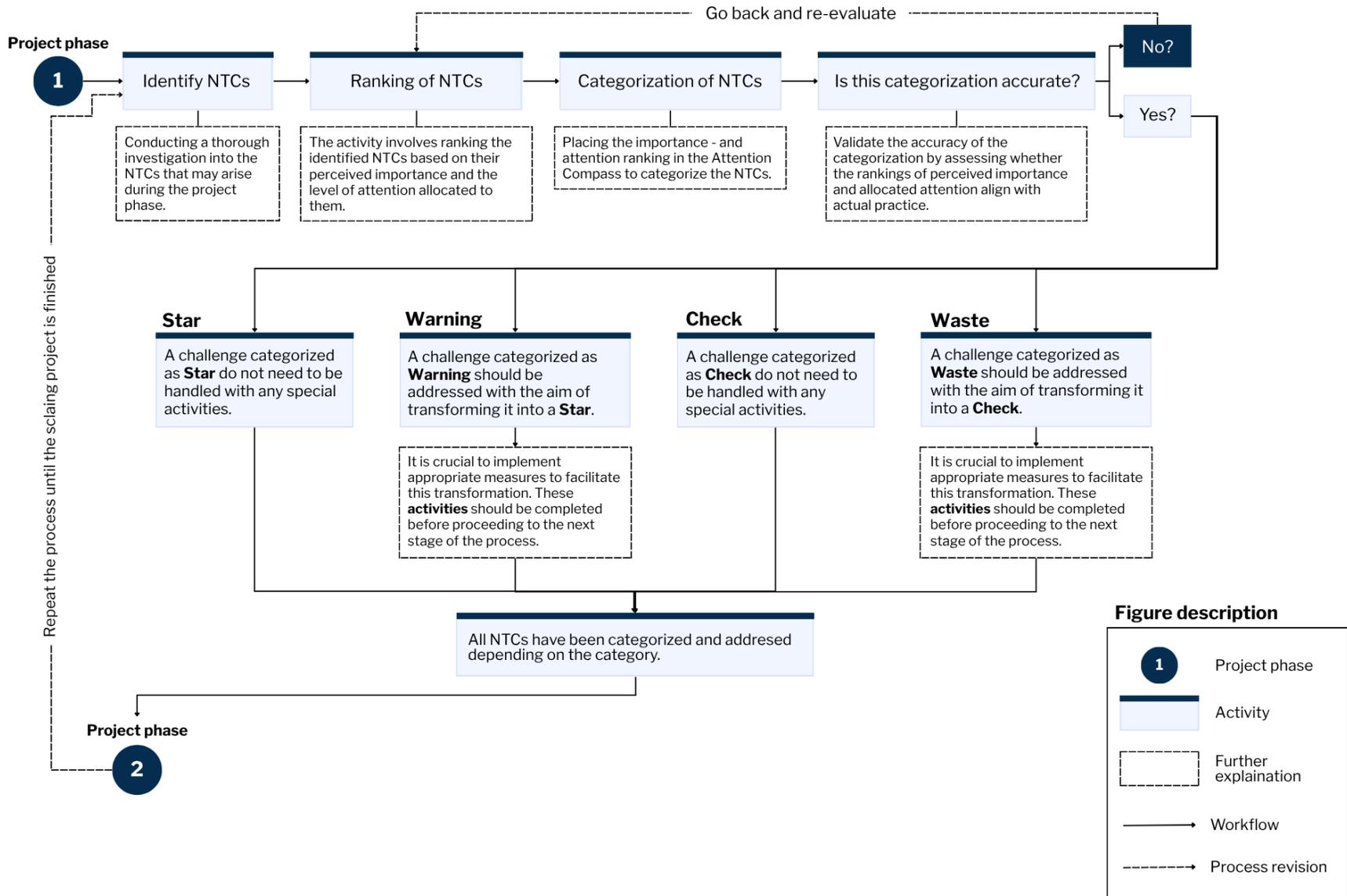


Figure 10. Attention Prioritization Framework (APF).

5.1 Theoretical Implications

Our study provides insights into NTCs associated with scaling a greenfield project, adding an attention-based lens to the analysis of these challenges. Prior theoretical assumptions suggest that (1) while scaling creates new opportunities, it also introduces a range of challenges that may hinder scaling efforts (Shepherd & Patzelt, 2020; Jensen et al., 2023; Demir et al., 2017); (2) organizations tend to focus primarily on TCs, even though failures are often driven by NTCs (Mossberg et al., 2020; Adekoya, 2016); and (3) identifying NTCs is therefore essential for developing solutions involving behaviors, capabilities, and strategic actions aimed at addressing these challenges (Jensen et al., 2023; Shepherd & Patzelt, 2020; Demir et al., 2017; Monteiro, 2019). Ocasio (1997) adds a further theoretical assumption through the ABV, specifically that attention is a limited resource within organizations. This implies that only a subset of all possible challenges will be noticed, interpreted, and prioritized by decision-makers, challenges which, according to Ocasio (1997), are referred to as *issues*. Consequently, our study argues that it is not sufficient for a company to only identify and be aware of its NTCs if these are not taken into account and given adequate attention. In line with Serrat (2017), it is also important to consider whether the attention comes from individuals with formal or informal decision-making authority, as these actors possess different levels of influence when it comes to decision-making at higher organizational levels.

Our theoretical implication helps clarify which NTCs decision-makers focus on during the scaling process and how this attention affects the outcomes. This is achieved by (1) identifying potential NTCs, (2) gaining an understanding of how important these challenges are perceived to be for successful scaling, (3) analyzing where decision-makers direct their focus, and finally, (4) identifying which challenges receive disproportionate attention relative to their perceived importance throughout the scaling process, with specific consideration given to differences between individuals with formal and informal decision-making authority. This can be clearly linked to the concepts of *issues* and *answers*, which represent a central component of the ABV (Ocasio, 1997). *Issues* refer to challenges that draw the attention of decision-makers, while *answers* represent the possible solutions, routines, or actions considered in response, depending on how the *issue* is understood within the framework. The concept of answers is not explored in this study and is instead suggested for future research.

5.2 Practical Implications

The findings of our study provide valuable practical implications for organizational practices by highlighting how attention is allocated across various NTCs during the scaling process. These insights are especially relevant at the organizational level, where all employees, as decision-makers, influence outcomes through their allocation of attention (Ocasio, 1997). Given that attention is a limited resource, it is crucial that it is directed appropriately to avoid overlooking NTCs that could hinder successful scaling. Our findings indicate that this is a complex area, where certain challenges receive disproportionate attention relative to their perceived importance. Therefore, the APF has been developed to help understand these attention patterns, enabling organizations to take actions that ensure focus is directed where it is most needed, reducing the risk of critical challenges being overlooked.

First, our findings show that employees in core project management or executive leadership roles tend to maintain a broader perspective, directing their attention toward NTCs that span multiple dimensions. In contrast, supporting functions, such as HR and finance, often focus on specific subareas of the project. Their more limited scope of involvement naturally constrains their insight into the broader complexity of the scaling process, even though their implications remain essential within their respective domains. This distinction aligns closely with Serrat's (2017) differentiation between formal and informal decision-makers. Those with formal decision-making authority typically belong to core project management or executive leadership, while individuals with informal authority are more often found in non-leadership positions. In sum, it is crucial that individuals focus on their specific areas of expertise, neglecting this can lead to failure. However, maintaining a broader perspective is equally important. Becoming too absorbed in one's own responsibilities without regard for the bigger picture can undermine the overall success of the project. This becomes particularly critical when misalignment arises between individuals with formal and informal decision-making authority, as their differing levels of authority can lead to conflicting priorities. Recognizing these role-based attention patterns enables organizations to prevent critical challenges from being overlooked due to gaps in perspective or authority.

Second, our findings show that the organizational dimension clearly stands out from the other dimensions. When identifying NTCs, 70 percent of all challenges were categorized under the

theme of organization. Furthermore, our findings indicate that all challenges classified as either *waste* or *warning*, those receiving disproportionate attention relative to their importance, also fell within this dimension. This suggests that the organizational dimension is the most complex and critical source of NTCs during scaling, as it not only dominates in frequency but also includes all challenges that receive disproportionate attention. Understanding this pattern helps organizations identify where attention blind spots exist and take action to ensure that the most strategically relevant organizational challenges are not neglected during the scaling process.

Third, within the organizational dimension, our findings highlight three particularly prominent areas: *communication*, *onboarding*, and *work overload*. Across these areas, a recurring pattern of misalignment between individuals with formal and informal decision-making authority emerges, posing significant risks to the success of the scaling process. In the subtheme of *communication*, challenges received attention that aligned with their perceived importance during phases 1 and 2. However, in phase 3, they receive disproportionate high attention. A deeper analysis shows that this heightened attention primarily stems from informal decision-makers, indicating that they still regard communication as a critical factor for success. In contrast, formal decision-makers no longer view it as a pressing concern, likely because they feel adequately informed. As a consequence, there is a tangible risk that communication-related challenges may be neglected at the strategic level. A similar pattern is seen in *onboarding*, where respondents with informal decision-making authority consistently place high attention on onboarding, while those with formal authority do not. This disparity suggests that onboarding is undervalued by those in formal leadership positions, despite its potential importance. This misalignment is especially critical in greenfield projects, where large numbers of new employees are expected to be onboarded rapidly. Without clear and effective onboarding routines, new hires may struggle to integrate and contribute, ultimately affecting the speed and quality of project execution.

Furthermore, in phase 1, the majority of informal decision-makers directed their attention to the challenge of *work overload*, while only one in four formal decision-makers acknowledged the challenge, despite some informal actors reporting that they had already raised concerns internally. By phase 2, although the perceived importance of the challenge had declined, informal actors continued to emphasize it, resulting in its classification as *waste*. This raises concerns that the issue may have been prematurely dismissed rather than genuinely resolved. If work overload

remains unaddressed, it could negatively impact employee wellbeing and overall project efficiency. In sum, the findings concerning *communication*, *onboarding*, and *work overload* provide clear practical implications, especially for individuals in formal decision-making roles. Recognizing and addressing these misalignments is crucial to avoid overlooking critical NTCs. Without such awareness, organizations risk misallocating attention and underestimating challenges that significantly impact the success of the scaling process.

Lastly, although the organizational dimension is often highlighted as the most critical, our findings reveal a clear interdependence between the four dimensions of scaling: *financial*, *organizational*, *market*, and *volume*, as defined by Palmié et al. (2023). The results illustrate that this interdependence is essential for successful scaling: (1) no project can begin without a market opportunity; (2) without technology, there is no project, and consequently, no market offering; (3) financial resources are necessary to develop the technology; and (4) a functioning organization is required to manage and integrate the market, technology, and financial components. Although this study clearly focuses on NTCs, it is important to maintain an understanding of the broader context. We therefore believe that this finding offers practical implications by contributing to a more holistic view, helping organizations recognize the importance of all dimensions and how they interact.

5.3 Limitations and Future Research

Although this study contributes to the understanding of NTCs in the context of scaling greenfield projects, three key limitations should be considered when interpreting the findings. First, while the findings are derived from an in-depth case study, the generalizability of a single case remains limited. Future research should therefore examine whether the findings are valid in a multiple case study. Second, the study focuses specifically on greenfield projects, which differ in several key aspects from brownfield projects, such as the absence of an existing organization. Most participants in the study were relatively new to the greenfield context, which we acknowledge may have influenced their responses. Notably, the participants' reflections on the later time phases of the project were based mostly on assumptions, as they have not yet experienced those phases. While our study focuses on greenfield projects, we do not exclude the possibility that our findings may be applicable to other types of scaling projects. Future research should explore its relevance across other contexts of scaling projects, for example, brownfield cases or other

industries such as the manufacturing industry. Third, in Phase 3 of the data collection, participants completed an activity independently. As the task required personal reflection and involved identifying how they themselves allocated attention to various NTCs, we identified a potential risk of self-deception. This limitation emerged due to time constraints and the results would benefit from monitoring the activity in real time to ensure consistent understanding across all respondents.

Additionally, since this study focuses on identifying and understanding NTCs through an attention-based lens, it does not examine how these NTCs are addressed in practice. Consequently, the proposed framework does not provide specific recommendations for transforming NTCs; for example, from a *warning* to a *star* or from *waste* to a *check*, as such considerations fall outside the scope of this study. Future research should therefore explore how these NTCs can be effectively managed within the same context.

5.4 Final Reflections

As a final reflection, in addition to the theoretical and practical implications discussed above, we would also like to highlight an observation that emerged during the course of our study. The NTCs encountered by companies when scaling greenfield projects can be broadly categorized into two types. Some challenges are clearly defined and can be addressed through concrete actions, such as implementing a structured onboarding process. Others are more dynamic and require continuous attention and adaptation over the course of the project, such as those related to communication and organizational culture. We therefore believe that it is important to take this distinction into account when identifying NTCs and developing strategies to address them. Lastly, this categorization presents a valuable opportunity for future research, particularly in exploring how organizations can effectively manage dynamic challenges over time.

REFERENCES

- Adekoya, A. (2016). *Managing non-technical risk in E&P projects*. International Association for Impact Assessment (IAIA). Retrieved from [LINK](#)
- Ahmadi, S., Khanagha, S., Berchicci, L., & Jansen, J. J. P. (2016). Are managers motivated to explore in the face of a new technological change? the role of regulatory focus, fit, and complexity of Decision-Making. *Journal of Management Studies*, 54(2), 209–237. [DOI](#)
- Axehill, J., Herzog, E., Tingström, J., & Bengtsson, M. (2021). From Brownfield to Greenfield Development - Understanding and Managing the Transition. Proceedings of the 31st Annual INCOSE. [LINK](#)
- Baumers, M., Dickens, P., Tuck, C., & Hague, R. (2016). The cost of additive manufacturing: machine productivity, economies of scale and technology-push. *Technological Forecasting and Social Change*, 102, 193-201. [DOI](#)
- Belitski, M., Stettler, T., Wales, W., & Martin, J. (2022). Speed and Scaling: An investigation of Accelerated Firm growth. *Journal of Management Studies*, 60(3), 639–687. [DOI](#)
- Bohan, S., Tippmann, E., Levie, J., Igoe, J., & Bowers, B. (2023). What is scaling? *Journal of Business Venturing*, 39(1), 106355. [DOI](#)
- Braun, V., & Clark, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. [DOI](#)
- Brielmaier, C., & Friesl, M. (2023). The attention-based view: Review and conceptual extension towards situated attention. *International Journal of Management Reviews*, 25(1), 99-129. [DOI](#)
- Demir, R., Wennberg, K., & McKelvie, A. (2017). The Strategic Management of High-Growth Firms: A Review and Theoretical Conceptualization. *Long Range Planning*, 50(4), 431-456. [DOI](#)
- DeSantola, A., & Gulati, R. (2017). Scaling: Organizing and growth in entrepreneurial ventures. *Academy of Management Annals*, 11(2), 640–668. [DOI](#)
- Drogendijk, R., & Andersson, U. (2013). Relationship development in Greenfield expansions. *International Business Review*, 22(2), 381-391. [DOI](#)
- European Commission. Directorate General for Internal Market, Industry, Entrepreneurship and SMEs. (2020). User guide to the SME definition. *Publications Office*. [DOI](#)
- Frishammar, J., Lichtenthaler, U., & Kurkkio, M. (2012). The front end in non-assembled product development: A multiple case study of mineral- and metal firms. *Journal of Engineering and Technology Management*, 29(4), 468-488. [DOI](#)
- Frishammar, J., & Parida, V. (2019). Circular business model transformation: A roadmap for incumbent firms. *California Management Review*, 61(2), 5-29. [DOI](#)

- Gabe, T. M., & Abel, J. R. (2011). Specialized knowledge and the geographic concentration of occupations. *Journal of Economic Geography*, 12(2), 435–453. [DOI](#)
- Gerring, J. (2004). What Is a Case Study and What Is It Good for? *American Political Science Review*, 98(2), 341-354. [DOI](#)
- Jansen, J. J. P., Heavey, C., Mom, T. J. M., Simsek, Z., & Zahra, S. A. (2023). Scaling-up: building, leading and sustaining rapid growth over time. *Journal of Management Studies*, 60(3), 581-604. [DOI](#)
- Jensen, J., Heavey, C., Mom, T., Simsek, Z., & Zahra, S. (2023). Scaling-up: Building, Leading and Sustaining Rapid Growth Over Time. *Journal of Management Studies*, 60(3), 581-604. [DOI](#)
- Kaehr Serra, C., & Thiel, J. (2019). Professionalizing entrepreneurial firms: Managing the challenges and outcomes of founder-CEO succession. *Strategic Entrepreneurship Journal*, 13(3) 241-43. [DOI](#)
- Kungl. Ingenjörsvetenskapsakademien. (2022). *Miljöprövning och industrins konkurrenskraft: Hur bör miljöprövningen av industriell verksamhet utformas för att reglera lokal miljöpåverkan utan att äventyra framtida investeringar?* IVA. [LINK](#)
- Lindelöw Danielsson, M. (2003). *Kompetensbaserad rekrytering: intervjuteknik och testning* (1 edition) Stockholm: Natur Kultur Läromedel och Akademi
- Monteiro, G F. (2019). High-growth firms and scale-ups: a review and research agenda. *RAUSP Management Journal*, 54(1), 96-111. [DOI](#)
- Mossberg, J., Frishammar, J., Söderholm, P., & Hellsmark, H. (2020). Managerial and organizational challenges encountered in the development of sustainable technology: Analysis of Swedish biorefinery pilot and demonstration plants. *Journal of Cleaner Production*, 276, 124150. [DOI](#)
- Napoleone, A., Pozzetti, A., Macchia, M., & Anderson R. (2023). Time to be responsive in the process industry: a literature-based analysis of trends of change, solutions and challenges. *Production Planning & Control*. 34(6), 572-586. [DOI](#)
- Ocasio, W. (1997). Towards an attention-based view of the firm. *Strategic Management Journal*, 18 (Summer Special Issue), 187-206. [DOI](#)
- Oghazi, P., & Mostaghel, R. (2018). Circular Business Model Challenges and Lessons Learned - An Industrial Perspective. *Sustainability*, 10(3), 739. [DOI](#)
- Palmié, M., Parida, V., Mader, A., & Wincent, J. (2023). Clarifying the scaling concept: A review, definition, and measure of scaling performance and an elaborate agenda for future research. *Journal of Business Research*, 158, 113630. [DOI](#)
- Rae, C., Kerr, S., & Maroto-Valer, M. M. (2020). Upscaling smart local energy systems: A review of technical barriers. *Renewable and Sustainable Energy Reviews*, 131, 110020. [DOI](#)
- Reim, W., Sjödin, D., & Parida, V. (2021). Circular business model implementation: A capability development case study from the manufacturing industry. *Business Strategy and the Environment*, 30, 2745-2757. [DOI](#)

- Schneider, B., Ehrhart, M. G., & Macey, W. H. (2012). Organizational climate and culture. *Annual Review of Psychology*, 64(1), 361–388. [DOI](#)
- Schou, P. K. (2023). Coming apart while scaling up – adoption of logics and the fragmentation of organizational identity in Science-Based ventures. *Journal of Management Studies*, 60(3), 688–721. [DOI](#)
- Serrat, O. (2017). Informal authority in the workplace. *Knowledge solutions: Tools, methods, and approaches to drive organizational performance*, 725–730. [DOI](#)
- Skulmoski, G. J., Hartman, F. T., & Krahn, J. (2007). The Delphi method for graduate research. *Journal of Information Technology Education*, 6, 1-21. [DOI](#)
- Stanley, M. H. R., Amaral, L. a. N., Buldyrev, S. V., Havlin, S., Leschhorn, H., Maass, P., Salinger, M. A., & Stanley, H. E. (1996). Scaling behaviour in the growth of companies. *Nature*, 379(6568), 804-806. [DOI](#)
- Shepherd, D.A., & Patzelt, H. (2020). A Call for Research on the Scaling of Organizations and the Scaling of Social Impact. *Entrepreneurship Theory and Practice*, 46(2), 255-268 [DOI](#)
- Tennby, M. (2023, July 5). *Så undviker du felrekrytering*. Finance Recruitment. [LINK](#)
- Tweed, S. (2016). *Risk management: A new approach to right of way projects*. Right of Way. Retrieved from [LINK](#)
- van Lancker, E., Knockaert, M., Collewaert, V., & Breugst, N. (2023). Preparing for scaling: A study on founder role evolution. *Journal of Business Venturing*, 38(4), 106315. [DOI](#)
- van Oortmerssen, L.A., Peeters, E.R., Kampermann, A. & van Montfoort, I. (2025). The Q method as research and intervention tool in organizations: a systematic literature review. *Journal of Organizational Effectiveness: People and Performance*, 12(5), 112-136. [DOI](#)
- Vermunt, D., Negro, S., Verweij, P., Kuppens, D., & Hekkert, M. (2019). Exploring barriers to implementing different circular business models. *Journal of Cleaner Production*, 222, 891–902. [DOI](#)
- Witschel, D., Döhla, A., Kaiser, M., Voigt, K., & Pfletschinger, T. (2019). Riding on the wave of digitization: insights how and under what settings dynamic capabilities facilitate digital-driven business model change. *Journal of Business Economics*, 89(8–9), 1023-1095. [DOI](#)
- Zhu, L., Johnsson, C., Mejlvik, J., Varisco, M., & Schiraldi, M. (2017). Key performance indicators for manufacturing operations management in the process industry. In Proceedings of the 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM) (pp. 969-973). IEEE. [DOI](#)

APPENDIX 1 - Interview Guide

Section 1 - Introduction

The purpose of Section 1 is to briefly explain the purpose of the interview.

1. Give a brief introduction about who we are and the purpose of the thesis project.
2. Inform the respondent that the interview will take approximately 30 to 40 minutes.
3. Explain that the respondent will remain anonymous.
4. Ask if it is okay to record the interview for the purpose of transcription.
5. Emphasize that there are no right or wrong answers — we are interested in the respondent's personal experience.

Section 2 - Information About the Respondent

The purpose of Section 2 is to gain an understanding of the respondent's role in the project — including the area in which he or she is involved, as well as the respondent's background.

1. What is your role in Ree-map, and how long have you been working at LKAB?

Section 3 - Identification of Non-Technical Challenges

The purpose of Section 3 is to identify non-technical challenges that the respondent believes are associated with the scaling up of greenfield projects in the process industry.

[Describe how we define non-technical challenges]

1. What do you consider to be the non-technical challenges of the project?

Section 4 - Closing

The purpose of Section 4 is to capture any additional input the respondent may have, or anything that may have been missed.

1. Ask if the respondent has anything else to add or if there is something they feel we have missed.
2. Ask if the respondent has any suggestions for other individuals we should interview or contact.
3. Ask if the respondent would be open to completing an individual task later this spring.

APPENDIX 2 - Organizational Non-Technical Challenges

ID	Non-Technical Challenges	Quotation
1	Lack of internal competence due to the organization operating in an entirely new area.	<i>“We are breaking new ground, which means it is incredibly important to stay humble and recognize that we do not yet have the necessary expertise.”</i> [R3]
2	Knowledge being developed outside the organization through extensive use of external consultants.	<i>“I feel that we are building up a lot of knowledge outside the company. So I see that as a disadvantage with the way we are working.”</i> [R4]
3	Recruiting at the right scale, considering both short-term resource needs and long-term organizational development.	<i>“So it is important that we do not hire people who do not have the right profile for the long term.”</i> [R3]
4	Critical knowledge concentrated among a few individuals, creating vulnerability in cases of staff turnover, absence, or changes in role distribution.	<i>“It is really only two of them who have the expertise for the entire process.”</i> [R16]
5	Finding and attracting the right competence, considering the project’s geographical location.	<i>“But the geographical location, in terms of competence and such, definitely plays a role.”</i> [R1]
6	Making effective use of the available competence within the organization.	<i>“There is an incredible amount of competence in these different groups, but using it in the right way is complex.”</i> [R4]
7	Recruiting with regard to the surrounding community, to avoid draining competence from other companies, municipalities, or sectors.	<i>“We come in and drain regions, municipalities, and small businesses [...]”</i> [R1]
8	Creating internal acceptance for the project’s goals and ways of working.	<i>“If we do not believe in this, no one else will either.”</i> [R15]
9	Meeting the expectations of internal stakeholders.	<i>“There are also internal political issues that need to be resolved.”</i> [R12]
13	Designing an organizational structure with clearly defined tasks, roles, and responsibilities – where everyone works toward common goals.	<i>“You still need to be clear with all employees. Why are they at work? What is their purpose? An employee needs to know that.”</i> [R1]
14	Work overload due to insufficient staffing.	<i>“We need visible leadership. I believe it is crucial that we appoint strong leaders who have the time to truly lead, and that we also bring in experts who can support the other areas.”</i> [R12]
15	Developing leadership that understands the organization’s conditions and drives the project toward shared objectives.	<i>“But also getting a new group to move in the same direction. That can definitely be challenging.”</i> [R9]
16	Enabling collaboration across internal organizational boundaries and business areas.	<i>“I would say the biggest thing is collaboration. This project is so large and divided into so many areas and parts. All of it needs to be synchronized.”</i> [R16]

ID	Non-Technical Challenges	Quotation
17	Shaping a shared corporate culture that supports the project's goals and ways of working.	<i>"It is like two camps have formed. We need to bridge that gap so that it becomes a unified project where we work together."</i> [R12]
18	Internal resistance to change.	<i>"We tend to like what we feel comfortable with, what we are used to, and what we are familiar with, and so on."</i> [R3]
19	Operating in the unknown – where the business is largely based on assumptions and theoretical models not yet tested in practice.	<i>"Because in theory, it's one thing, but in practice, it's something else."</i> [R6]
20	Inadequate or unclear routines for onboarding new personnel.	<i>"There are some routines around onboarding, but even there we are not quite where we need to be yet."</i> [R9]
21	Establishing and adhering to structured routines for document management that ensure information security, traceability, and accessibility.	<i>"I feel that we do not really have a full grasp of all of the company's routines and guidelines. So it often becomes a lot of trial and error as we try to figure things out on our own. It feels like we are reinventing the wheel every time."</i> [R9]
22	Ensuring that communication and information sharing are secure, use appropriate channels, and are conducted with the right level of detail – based on a shared understanding of what should and should not be communicated.	<i>"So it is clear that sometimes information is not shared with everyone who might need it, because the person holding the information does not always see who needs it."</i> [R7]
23	Establishing a meeting structure that enables effective coordination and information sharing without creating an unnecessary meeting burden.	<i>"How are you supposed to get information in a project or an organization without being booked into endless meetings all the time?"</i> [R9]
24	"Speaking the same language" and creating mutual understanding between individuals – looking beyond one's own perspective to understand both what others need to know and what one needs to understand to enable effective collaboration.	<i>"If everyone keeps their eyes on their own feet, we risk losing sight of the bigger picture."</i> [R3]
25	Maintaining effective communication when teams are geographically dispersed and do not share the same physical workspace.	<i>"I think it is definitely a challenge that we are spread across different offices [...]. You miss out on the informal hallway conversations that usually add a lot."</i> [R14]

APPENDIX 3 - Market-related Non-Technical Challenges

ID	Non-Technical Challenges	Quotation
26	Ensuring there is a market and a well-functioning customer network.	<i>“And then the next question is, do we have a market to sell the products?” [R5]</i>
28	Positioning the business in a competitive market.	<i>“We are also competing with many other interesting projects geographically up in the north.” [R8]</i>
27	Ensuring the presence of a well-functioning supplier network.	<i>“We are highly dependent on strong collaboration with external suppliers.” [R6]</i>
29	Political and regulatory conditions, such as permitting processes, legal requirements, and trade policy changes, that affect the ability to establish and operate the business.	<i>“It is the political issues related to permits, making sure we actually get to start our production.” [R12]</i>
10	Creating external acceptance for the project’s purpose and impact.	<i>“One challenge is to explain this in a non-technical way so that all stakeholders can be brought along.” [R15]</i>
11	Meeting the expectations of external stakeholders.	<i>“There is a lot of messaging to the public, sharing good news and proving that we are succeeding in what we do. That makes people more interested, and it might even attract people from the south and from other countries.” [R15]</i>
12	Ensuring collaboration with external stakeholders to secure necessary support in areas such as infrastructure, housing, and other conditions for establishment and growth.	<i>“How can we gain public support and create the opportunities to actually make this happen?” [R7]</i>

APPENDIX 4 - Financial Non-Technical Challenges

ID	Non-Technical Challenges	Quotation
30	Securing financing that enables project implementation and long-term sustainability.	<i>“But all of these issues also have to be balanced against the project budget, a cost that needs to be monitored and controlled to ensure that, in the end, it is a profitable investment.” [R8]</i>
31	Managing price volatility and increasing market prices.	<i>“But it has a huge impact if market prices start to increase.” [R5]</i>
32	Establishing a realistic and clear timeline and ensuring that it is followed throughout the project lifecycle.	<i>“Time is absolutely crucial for a project of this size, sticking to the schedule and avoiding constant delays is essential.” [R5]</i>
33	Managing the trade-off between the speed and scale of scaling in order to achieve profitability.	<i>“We should not move at a faster pace than we have planned for. That could compromise safety.” [R2]</i>

APPENDIX 5 - Delphi-method

From 33 (most important) to 1 (least important)

Scale	Phase 1	Phase 2	Phase 3
33	1	1	1
32	26	3	4
31	13	2	15
30	8	4	26
29	32	8	27
28	2	9	32
27	15	26	9
26	19	15	10
25	14	22	5
24	16	24	28
23	24	23	13
22	9	6	12
21	22	16	3
20	10	32	29
19	17	19	21
18	23	13	22
17	4	10	17
16	3	33	11
15	6	21	16
14	30	30	6
13	33	29	2
12	25	5	14
11	5	27	8
10	7	28	31

Scale	Phase 1	Phase 2	Phase 3
9	11	11	7
8	28	17	24
7	20	25	23
6	21	14	30
5	27	20	25
4	31	18	33
3	29	31	20
2	18	7	18
1	12	12	19
