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UNDERSTANDING THE SAFETY CULTURE OF SMEs IN THE FINNISH FOOD INDUSTRY

Faculty of Management and Business
Master of Science Thesis
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ABSTRACT

Gideon Bonah Ofori: Understanding the Safety Culture of SMEs in the Finnish Food Industry
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This study investigates the safety culture within small and medium-sized enterprises (SMEs) in the Finnish food industry, using Munax Oy as a case study. The research aims to assess the current state of the company's safety culture and to explore how leadership, communication, and employee participation influence its development. To achieve this, a hybrid methodological approach was adopted, combining the Nordic Safety Climate Questionnaire (NOSACQ-50) for quantitative analysis with semi-structured interviews for qualitative insight.

Fifteen participants representing diverse roles and locations within Munax completed the NOSACQ-50 survey, and selected managers and employees participated in follow-up interviews. The NOSACQ-50 results revealed moderate overall scores across all seven dimensions, ranging from 3.06 to 3.36, indicating a developing but not yet generative safety culture. The highest score was observed in workers' trust in the efficacy of safety systems (3.36), while the lowest appeared in workers' safety priority and risk non-acceptance (3.06), suggesting lingering risk-tolerant attitudes under production pressures. Interview data corroborated these findings, highlighting strong managerial commitment and trust, but also communication gaps and limited employee involvement in safety decision-making.

When interpreted through Hudson's Safety Culture Maturity Model, the results place Munax within the calculative–proactive stage of cultural development, where formal systems exist, but consistent behavioral integration is still evolving. The study concludes that advancing toward a generative safety culture requires sustained management engagement, continuous training, structured communication, and greater employee empowerment.

This research reinforces existing literature and the growing body of knowledge on safety culture in Finnish SMEs. It contributes empirically to understanding how human and organizational factors interact in the food industry context. The findings offer both theoretical insight and practical recommendations for enhancing safety management and cultural maturity in similar organizations.

Keywords: Safety culture, SMEs, NOSACQ-50, Hudson Safety Maturity Model, Finnish food industry, leadership, communication, employee participation, organizational learning.

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PREFACE

The completion of this thesis represents the culmination of a long and enriching academic journey, which has been made possible through the support, encouragement, and contributions of numerous individuals and institutions. It is both a moment of reflection and deep gratitude.

First and foremost, I am deeply grateful to Tiina Hilden for the opportunity to start my career in Finland as a Summer employee and Intern at Munax. I also appreciate the management and staff of Munax Oy for their invaluable collaboration and for granting me the opportunity to undertake this research within their organization. Their openness, cooperation, and trust enabled the study to take shape in a real-world industrial setting. I am especially thankful to all the employees and managers who participated in the survey and interviews, providing honest and thoughtful perspectives that gave life to the data. Conducting this research in partnership with Munax has provided meaningful insight into how safety culture can be developed within small and medium-sized enterprises in Finland's food industry.

I wish to express my heartfelt appreciation to my supervisor, Professor Jouni Kivistö-Rahnasto, whose guidance, patience, and insightful feedback have been instrumental throughout the research process. His ability to balance academic rigor with encouragement allowed me to grow both as a researcher and as a professional. His constructive advice at every stage, from the formulation of the research questions to the final interpretation of results, significantly enriched the quality and clarity of this work.

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To my daughter and the rest of the family, I owe immense gratitude. Your unwavering belief in my potential, your emotional support, and your sacrifices made this achievement possible. You have been my anchor through moments of uncertainty and exhaustion, constantly reminding me of the bigger picture.

I would also like to express my deep appreciation to the African student and professional community in Finland. The mutual support, cultural connection, and friendship offered by this community have been invaluable in navigating both academic and personal challenges in a new environment.

Finally, to everyone who, in one way or another, contributed to the completion of this thesis, whether through words of encouragement, academic input, or simply believing in me, I say a sincere thank you. This work stands as much as mine as it does as a reflection of your support and belief in the value of collective effort.

Tampere, 16 December 202025

Gideon Bonah Ofori

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LIST OF SYMBOLS AND ABBREVIATIONS

NOSACQ	Nordic Safety Climate Questionnaire
OGP	Oil and Gas Producers
PPEL	Personal Protective Equipment
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyse
SME	Small and Medium-Scale Enterprises
SPSS	Statistical Package for the Social Sciences

1. INTRODUCTION

1.1 Background

Safety culture has emerged as a cornerstone of sustainable performance in modern production environments, particularly in industries where operational risks and hygiene demands intersect. In the food production sector, where repetitive tasks, sharp tools, and strict hygiene protocols define the daily work environment, human behavior becomes both a critical control point and a potential source of failure. Organizations are increasingly recognizing that engineering controls and formal systems are insufficient in isolation; they must be embedded within a workplace culture that values, communicates, and practices safety consistently (Griffith et al., 2010; Reason, 1997).

In small and medium-sized enterprises (SMEs), managing safety presents additional complexities. With often limited safety infrastructure and resource constraints, SMEs rely heavily on management visibility, worker initiative, and informal communication (Legg et al., 2015; Yule et al., 2007). The food industry in particular, is characterized by physically demanding and fast-paced work conditions where safety and hygiene obligations often coexist in tension (Yiannas, 2009). Finland's food production sector reflects these global patterns but also presents context-specific challenges, including a multicultural workforce, language barriers, and seasonal employment fluctuations (Tappura and Nenonen, 2023).

Human factors play a central role in shaping safety outcomes. Worker engagement, management commitment, communication practices, and training all contribute to the establishment of a robust safety culture. Studies in Finnish food companies have revealed that while management commitment to safety is often rated highly, areas such as employee involvement, systematic training, and safety-related communication remain underdeveloped (Nenonen and Rantala, 2025). Moreover, supply chain dynamics and relational asymmetries, as discussed by (Suvanto and Lähdesmäki, 2023), highlight how power imbalances and lack of ownership can erode commitment and engagement, factors that are equally relevant to occupational safety culture.

Munax Oy, a medium-sized Finnish company specializing in egg-based food products, is currently in the process of formalizing its safety management system. Until recently, safety efforts were driven by individual managers, with no integrated or participatory

safety strategy in place. This transition presents a unique opportunity to examine how safety culture is constructed, interpreted, and enacted by workers during the formative stages of system development. In particular, there is value in understanding how human factors such as attitudes, communication, and leadership behavior shape safety compliance and culture in high-hygiene environments.

1.2 The Company Context

Munax Oy is a leading and innovative enterprise in the Finnish food industry, with its headquarters located in Laitila, Finland. Established in 2003 as a family-owned company, Munax has steadily grown into a market leader in egg production and processing. The company functions as a comprehensive egg house, overseeing the entire value chain, from sourcing to packaging and the development of a diverse range of egg-based products. Its operations are primarily based in Laitila, with supporting units in Kustavi and Mynämäki.

As a clear example, Munax Oy is not exempt from the challenges faced by SMEs with regard to safety and health at the workplace and is currently in the process of formalizing its safety management system. This thesis responds to these challenges by focusing on the human factors that influence safety culture within a Finnish food production company, Munax Oy. As a company in the process of formalizing its safety management systems, Munax provides a timely case study for examining how safety culture can be assessed, understood, and developed in practice. Using the Nordic Safety Climate Questionnaire (NOSACQ-50), this study will measure perceptions of safety culture across different organizational levels, identify areas for improvement, and link these findings to broader patterns observed in the Finnish food industry.

1.3 Problem statement

Although food companies increasingly acknowledge the importance of cultivating a strong safety culture, translating this recognition into practical, day-to-day operations remains uneven. Small and medium-sized enterprises (SMEs), in particular, face significant challenges in operationalizing safety culture. Their approaches often emphasize compliance with regulations and performance measurement rather than fostering employee engagement, effective communication, and proactive leadership (Legg et al., 2015; Yiannas, 2009).

In Finland, existing research has provided valuable diagnostic insights into workplace safety issues, yet it has not sufficiently addressed the influence of human factors such as leadership behavior, worker involvement, safety communication, and cross-cultural dynamics on the actual implementation of safety culture in SMEs. This gap is especially evident in the food production sector, which is characterized by hygiene-intensive processes, multilingual workforces, and informal supervisory practices.

For Munax Oy, a Finnish food production company currently developing its safety management systems, these gaps are not merely theoretical but of immediate strategic importance. The absence of practical, human-centered approaches to embedding safety culture poses risks not only to regulatory compliance but also to long-term organizational resilience and employee well-being.

1.4 Research Aim and Objectives

The overarching aim of this research is to investigate the role of human factors in shaping safety culture within a Finnish SME in the food industry, with Munax Oy serving as a case study. The research seeks to answer the following research questions:

1. What is the state of safety culture of SMEs in the food industry in Finland?
2. How do leadership, communication, and employee participation shape the safety culture?

1.5 Significance of the Study

This study contributes to both academic knowledge and practical safety management by addressing a critical gap in the literature. While safety culture has been extensively studied in large industrial organizations, much less is known about how it evolves organically within SMEs, particularly in the Finnish food production context. Applying frameworks such as the Nordic Safety Climate Questionnaire (NOSACQ-50) and Hudson's Safety Culture Maturity Model provides a unique opportunity to test these established tools in an underexplored setting.

The findings will have direct practical significance for Munax Oy, offering evidence-based insights into the company's current safety culture, the role of leadership, and the extent of employee engagement. More broadly, the results will inform the food industry in Finland by highlighting how SMEs can move beyond compliance-driven approaches to embed safety into organizational routines and worker behavior. By foregrounding human

factors, the study will also provide a pathway for enhancing communication, cross-cultural understanding, and leadership practices in hygiene-sensitive and safety-critical food production environments.

1.6 Structure of the Thesis

Chapter 1 introduced the research, providing the context, an overview of the subject of the case study, and the problem statement. Chapter 2 provides a comprehensive review of the literature on safety culture, human factors, and the specific context of the food industry. This is followed in Chapter 3 by a detailed account of the research methodology, which combines the use of the NOSACQ-50 survey tool with interviews and observational methods. Chapter 4 presents the findings of the study, focusing on the assessment of safety culture at Munax Oy. These findings are then examined in Chapter 5, where they are discussed in relation to existing research, drawing out both theoretical and practical implications. Finally, Chapter 6 concludes the thesis by offering recommendations for practice, identifying the limitations of the study, and suggesting directions for future research.

2. LITERATURE REVIEW

2.1 Introduction

Safety culture has emerged as one of the most significant concepts in occupational safety and health research over the past three decades. Initially developed within high-reliability industries such as aviation, nuclear power, and oil and gas, the concept has since spread widely into sectors including healthcare, manufacturing, and, more recently, the food industry. Occupational safety and health have become central concerns across industries, with safety culture now widely recognized as a cornerstone for preventing workplace accidents and promoting sustainable performance. Since its emergence following catastrophic events in high-risk industries, the concept of safety culture has been adopted in diverse sectors, including healthcare, transportation, and increasingly, the food industry (Hudson, 2007; Reason, 1997).

At its core, safety culture refers to the shared values, beliefs, and practices within an organization that shape how safety is perceived and enacted (Fargnoli and Lombardi, 2020; Neal and Griffin, 2006). It is not just about written policies or technical controls, but about how those systems are experienced and applied in daily work. According to Swuste et al., (2018) the safety culture is a measure of the participation of management and employees in ensuring an effective and efficient safety management system. Therefore, to improve the safety management system or safety culture of the organization, all employees and stakeholders must have a clear understanding of their roles and responsibilities. However, the implementation of a good safety management system or culture in an organization is difficult to achieve, even when there are strong incentives for management to do so (Hale et al., 2010).

This review examines the theoretical foundations of safety culture, the role of human factors and organizational behavior, the specific challenges faced by the food production sector, and the methodological tools used to assess safety culture. The chapter concludes by identifying research gaps that this study on Munax Oy seeks to address.

2.2 Literature Search and PRISMA Analysis

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method is a structured approach to conducting literature reviews, emphasizing clear objectives, systematic search strategies, and transparent reporting of findings (Liu et al., 2020; Llaja-Poso et al., 2022; Page et al., 2021). This method involves a comprehensive

search of databases, careful screening and selection of relevant studies, meticulous data extraction, and rigorous assessment of study quality (Liu et al., 2020; Llaja-Poso et al., 2022). The primary aim of PRISMA is to minimize bias and ensure the reproducibility of the review process, thereby enhancing the reliability and validity of the findings (Llaja-Poso et al., 2022; Page et al., 2021).

The PRISMA method is particularly crucial for ensuring a comprehensive and transparent systematic review of literature on occupational safety and health (OSH) risks in emerging green technologies. It guarantees the identification, selection, and synthesis of all relevant studies, thereby providing a robust foundation for understanding the current state of research in this field (Barkokébas Jr. et al., 2014; Wandzich and Płaza, 2017). By following PRISMA guidelines, researchers can ensure that their literature review is comprehensive, methodologically sound, and free from bias, contributing to the overall quality and rigor of the review.

2.3 Information sources and search strategy

The systematic literature search carried out in Scopus provided a comprehensive foundation for the thesis. The focus of the search was to find research on safety culture in the food industry in Europe, particularly in Finland. Initially, 318 records were identified through a broad search strategy using the string (TITLE-ABS-KEY (“maturity model" OR "safety culture" OR "safety climate" OR "incidents" OR "accidents" in "Finland" OR finnish "food industry" OR EU OR Europe)). This wide-ranging query was necessary to ensure that no potentially relevant work was missed, especially given the interdisciplinary nature of safety management research, which often overlaps with occupational health, public health, and organizational behavior.

To refine the dataset, additional filters were applied for ‘Finland’, ‘occupational’, and ‘food industry’ contexts. This step was crucial in narrowing down the pool to eight highly relevant articles that directly addressed occupational safety, safety culture, or accident analysis in the Finnish or broader Nordic food industry. The reduction from 318 to 8 highlights both the specificity of the research context and the relative scarcity of published work explicitly addressing safety culture maturity within Finnish food companies. This scarcity, in turn, emphasizes the significance of the present study, which contributes to filling an important research gap.

The eight included studies represent a diverse yet complementary set of perspectives. Epidemiological studies by Jaakkola et al. (2003, 2021), Karjalainen et al. (2002), and Laakkonen et al. (2006) provide evidence of the health risks associated with occupational

environments in food and related industries, ranging from asthma to cancer. While these studies do not explicitly focus on safety culture, they establish the long-term consequences of inadequate safety management and the necessity for more systematic prevention strategies. Kaustell et al. (2019) extend this discussion to aquaculture and fish farming, identifying patterns of injuries and illnesses relevant to the broader agri-food sector.

More directly aligned with the present thesis are the contributions by Tappura and Nenonen (2023) and Nenonen and Rantala (2025). These studies focus on accident data in the Finnish food industry and the maturity of safety culture, respectively. Together, they offer a dual perspective: the quantitative evidence of recurring accidents and the qualitative assessment of cultural readiness within companies. These works not only validate the importance of the thesis focus but also provide a baseline for comparison with the results generated using the Nordic Safety Climate Questionnaire (NOSACQ-50) tool in the current research.

Finally, Suvanto and Lähdesmäki (2023) add a relational dimension by analyzing psychological ownership and commitment within asymmetrical supply chain relationships. Although not directly targeting safety culture, their findings highlight human and relational factors that strongly influence behavior and commitment in the agri-food context. These insights can be adapted to interpret worker engagement and ownership of safety practices in Munax Oy and similar companies.

The PRISMA process has ensured a rigorous methodology in the selection of the literature base. It highlights the emerging yet limited body of Finnish research on safety culture within the food industry, underscoring the clear need for applied case studies like the one presented in this thesis (Image 1). By integrating insights from epidemiology, accident analysis, maturity assessments, and relational factors, this study situates itself at the crossroads of human factors, organizational culture, and industry-specific risks. This positioning not only enhances the academic relevance of the thesis but also underscores its practical significance for advancing occupational safety management in the Finnish food production sector.

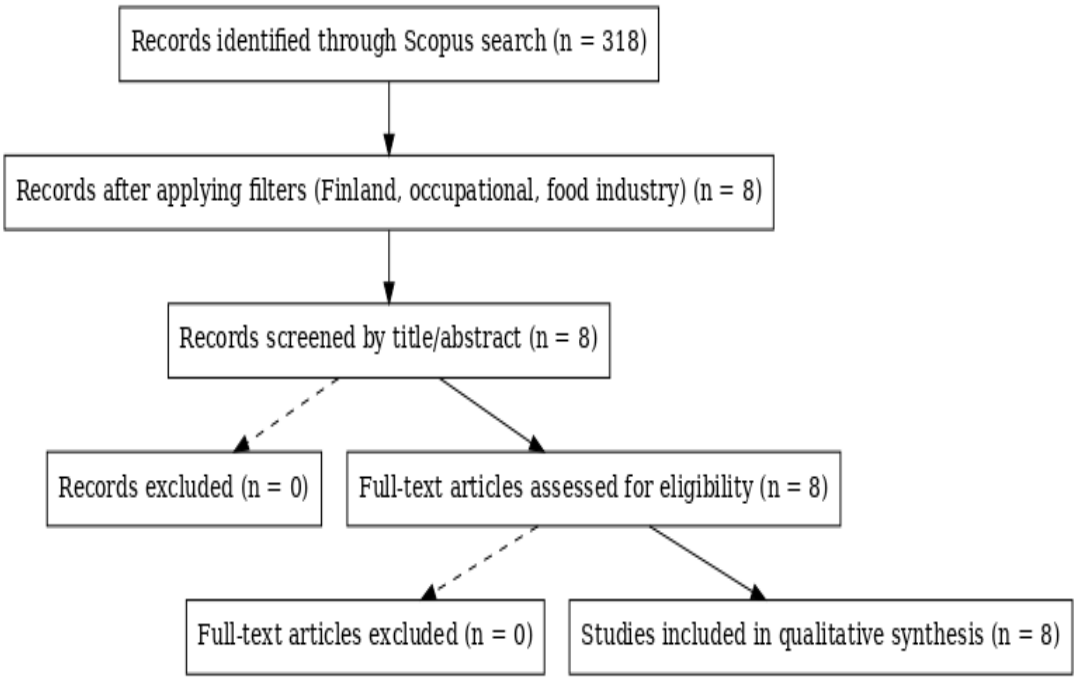

Figure 1: PRISMA flow diagram of search in SCOPUS

2.4 Theoretical Foundations of Safety Culture

The concept of safety culture gained prominence following major industrial accidents in the late twentieth century, most notably the Chernobyl disaster in 1986. Research has consistently highlighted the critical role of management and safety professionals in shaping and sustaining effective safety systems. The conceptual underpinnings of safety culture research have been enriched by contributions from multiple theoretical traditions, ranging from organizational learning and human error to maturity models and metaphors that frame how safety is understood. This diversity has produced both a strong base of knowledge and a recognition of persistent gaps that this study seeks to address.

One important development in this area has been the use of maturity models to assess organizational safety culture. Filho et al. (2018) in their review of a collection of studies noted that maturity models are among the most widely applied tools for diagnosing safety culture across sectors such as construction, oil and gas, and healthcare. Their analysis revealed that these models are particularly valued for providing structured, stage-based descriptions of safety culture development, which organizations can use to benchmark their progress. The authors also identified a significant limitation: most applications tend to be descriptive and offer limited consideration of the validity and reliability of the generated measurements. This observation underscores both the value of maturity models

and the necessity for more robust, evidence-based applications. The present study addresses this challenge by employing tools such as NOSACQ-50 and contextualizing them within the lived experiences of SMEs in the Finnish food industry.

Building on this perspective, Swuste et al. (2014) conducted a comprehensive historical review of occupational safety theories, models, and metaphors that have emerged since World War II. They categorized these theories into four primary types: individual behavior-based, organizational, systemic, and integrated theories. Additionally, they classified models into three categories: accident causation models, safety management models, and safety culture models. Their conclusion highlighted that while the field has generated a wealth of conceptual approaches, it remains lacking in empirical testing. For the current research, this review serves as a crucial reminder that safety culture should not be viewed as an isolated phenomenon but rather must be understood within the context of systemic and organizational dynamics.

Another significant contribution comes from Swuste et al. (2010), who specifically examined the role of metaphors in occupational safety literature. They identified four predominant metaphors: the machine, the organism, the culture, and the political metaphor, each providing a distinct perspective for interpreting organizational safety. For instance, the machine metaphor highlights control and predictability, whereas the culture metaphor focuses on shared values and norms. These metaphors are closely tied to the three categories of theories also identified by the authors: behavior-based, organizational, and systemic theories. Their work suggests that the framing of safety — whether mechanistic, cultural, or political — has profound implications for how safety initiatives are designed and received within organizations. In the context of food production SMEs such as Munax Oy, these insights underscore the need to balance technical compliance with cultural and political dynamics, particularly in multicultural workplaces where informal norms and power relationships significantly shape safety behavior.

Collectively, these studies establish a robust theoretical framework for investigating safety culture within small and medium-sized enterprises (SMEs). They highlight both the strengths and limitations of existing approaches. While maturity models provide valuable benchmarks, they necessitate careful adaptation and validation (Filho et al., 2018). Occupational safety theories contribute conceptual diversity but require empirical validation (Swuste et al., 2014). Metaphors enhance our interpretive tools, yet they also serve as a reminder that safety culture is not a neutral concept; it is deeply embedded within broader organizational narratives and power dynamics (Swuste et al., 2010). These insights inform the current research, which aims to employ robust measurement tools while

remaining mindful of the human factors, communication styles, and leadership behaviors that influence the lived experience of safety culture in a Finnish food production SME.

2.5 Human Factors and Organizational Behavior in Safety Culture

While safety systems and controls provide the structural framework for risk management, it is human factors that determine whether these systems function as intended. Human factors refer to the cognitive, behavioral, and organizational dimensions of work, including leadership, communication, motivation, and perception of risk (Hsieh et al., 2024; Reason, 1997).

Leadership is consistently identified as the most influential factor in shaping safety culture (Hudson, 2007; Yule et al., 2007; Jääskeläinen et al., 2020; Tappura and Nenonen, 2023). Hale et al. (2010) emphasize that an active and committed management body, coupled with an enthusiastic and capable safety professional, makes achieving safety goals possible even under challenging conditions. To strengthen safety culture, organizations must provide consistent psychological and technical support to both managers and employees. According to Tappura et al. (2014), organizations that establish support systems for managers and supervisors enable them to deliver the necessary training and guidance to employees facing safety-related challenges in their daily work. This clearly indicates that leaders signal priorities through their decisions, the allocation of resources, and their visible commitment to safety. Studies by Yule et al. (2007) emphasize that workers are highly sensitive to managerial cues; when leaders are perceived to prioritize production over safety, employees are more likely to cut corners. Conversely, authentic leadership that demonstrates care for employee well-being fosters trust and motivates compliance.

Communication and participation are equally critical. Jääskeläinen et al., (2020) found that while Finnish companies often have sophisticated measurement tools, their effectiveness is undermined when employees are excluded from interpreting or using safety data. This reflects a broader pattern where organizations collect metrics but fail to translate them into actionable knowledge. Similarly, Nenonen and Rantala (2025) observed that food companies in Finland scored highest on management commitment, but lowest on employee involvement and training. These findings suggest a systemic gap between top-down safety initiatives and bottom-up engagement, one that directly relates to the success of safety culture development in SMEs such as Munax Oy. However, Hale et al.

(2010) argue that organizations that embrace inclusivity, open communication, and fair consideration of employee input foster positive relationships that reinforce safety culture.

Another important dimension is risk perception. Research shows that employees interpret hazards not just based on training, but also on their lived experiences and peer norms (Robson et al., 2007). In multicultural and multilingual workplaces, which are common in the Finnish food industry, communication barriers and cultural differences in risk tolerance can exacerbate misunderstandings. Such dynamics underscore the need to examine safety culture not only at the organizational level but also at the level of individual attitudes and group interactions.

2.6 Safety Culture in the Food Industry

The food industry presents a distinctive set of safety challenges that make it an important but underexplored setting for safety culture research. Food production involves repetitive manual tasks, frequent use of sharp tools, heavy lifting, and fast-paced work under hygiene constraints (Tappura and Nenonen, 2023). These conditions create a high baseline of physical risk, which is reflected in accident statistics.

Työturvallisuuskeskus 2024 reports that the food production sector in Finland consistently records one of the highest frequencies of occupational accidents, particularly in meat processing, bakery, and dairy operations (Nenonen, 2024). The most common injuries are cuts, sprains, and slips, with hands and fingers being disproportionately affected. Tappura and Nenonen (2023) similarly found that, out of more than 8,000 recorded food industry accidents, the majority were linked to manual handling and slips. Such findings highlight the urgency of cultivating strong safety cultures that can mitigate these risks.

At the same time, food companies must also manage food safety risks relating to contamination and hygiene. Yiannas (2009) emphasizes that food safety culture and occupational safety culture often intersect and sometimes conflict, creating tension for workers who must balance personal protection with product integrity. This dual responsibility can complicate safety behaviors, particularly in environments with high staff turnover and diverse cultural backgrounds.

The Tampere University project “Turvallisuuskulttuurin kehittäminen” (Nenonen, 2024), underscores the national recognition of these challenges. By collaborating with multiple food companies, the project aims to test tools and interventions for improving safety culture, with a particular focus on communication and participatory practices. This initiative

situates Munax Oy's efforts within a broader Finnish movement to strengthen safety culture in the sector, thereby providing a valuable context for the present study.

2.7 Methodological Approaches to Measuring Safety Culture

The measurement of safety culture is a complex undertaking, as it attempts to capture intangible perceptions, values, and behaviors in an organization. Over the period, several theoretical and practical approaches have been developed to assess safety culture, each offering distinct advantages depending on the research context and organizational maturity. Among the most recognized methods are survey-based frameworks such as the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) and developmental models such as the Hudson Safety Culture Maturity Model.

The NOSACQ-50 is among the most widely used survey instruments in Nordic countries. Its seven dimensions, ranging from management commitment to peer-to-peer communication, allow for a detailed diagnosis of safety climate perceptions (Kines et al., 2011). This multidimensional structure enables researchers to identify specific areas of strength and weakness in organizational safety culture, allowing for nuanced interpretation and targeted interventions. Its cultural adaptability and validation make it particularly suitable for a study of Munax Oy, ensuring comparability with other Finnish and international contexts.

In contrast to NOSACQ-50's diagnostic and survey-based approach, the Hudson Safety Culture Maturity Model (Hudson, 2007) offers a developmental framework for understanding how organizations evolve in their approach to safety management (Ayob et al., 2022). Originally designed for high-risk sectors such as oil and gas, the model conceptualizes safety culture as progressing through five distinct stages: *pathological*, *reactive*, *calculative*, *proactive*, and *generative*. Each stage represents an increasing degree of organizational sophistication and shared responsibility for safety, as shown in Figure 2. At lower maturity levels, safety is treated as a regulatory requirement or management function, whereas in more advanced stages, safety becomes an integral part of organizational values, with all members actively engaged in learning, improvement, and prevention (Gallagher et al., 2001; Hudson, 2007).

Other Maturity Models, such as those applied by Nenonen and Rantala (2025), Santos et al. (2025) provide another approach. These models conceptualize organizations as progressing through stages of safety culture development, from low levels of awareness

to highly integrated, generative cultures. While maturity models are effective for benchmarking, they are often criticized for being overly managerial and insufficiently attentive to the lived experiences of workers.

Performance measurement frameworks, as examined by Jääskeläinen et al., (2020), represent a third category. These focus on the collection and analysis of safety data, such as accident rates, near-miss reports, and compliance audits. However, these frameworks have been found to lack impact when not embedded in participatory processes that involve employees in interpreting and acting upon the results.

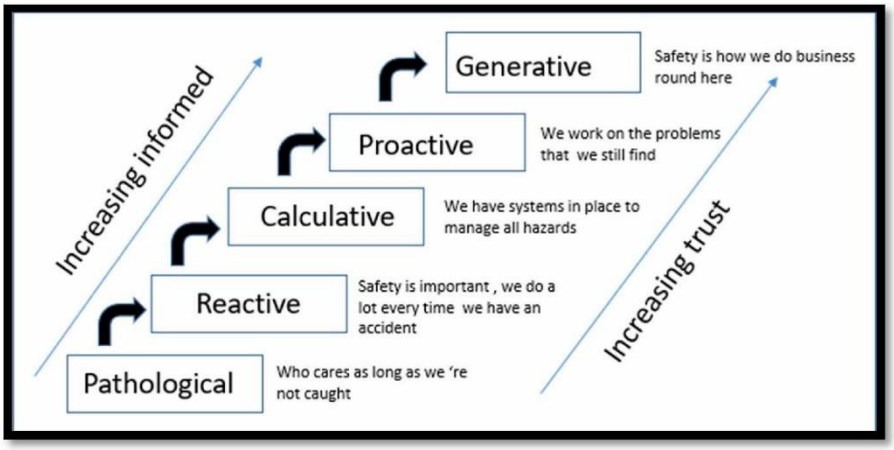

Figure 2: Hudson Safety Culture ladder (Ayob et al., 2022)

It is therefore important that this thesis employs a hybrid methodological approach designed to capture both the structural and experiential dimensions of safety culture within an SME context. This approach is particularly well-suited for examining the human factors that shape safety culture, as it integrates both quantitative measurement and qualitative interpretation. The strength of combining the NOSACQ-50 and the Hudson Safety Culture Maturity Model lies in their complementary analytical perspectives. The NOSACQ-50 provides quantitative insights into the current perceptions and attitudes of employees and management regarding safety, enabling the identification of strengths and areas for improvement. In contrast, the Hudson model offers a developmental framework that explains how these perceptions evolve into behavioral patterns and cultural change over time. In this way, the Hudson model serves as an interpretive lens through which the NOSACQ-50 results can be understood within the broader context of organizational learning and cultural maturation. Together, these two frameworks bridge the gap between measurement and interpretation, providing both a snapshot of Munax Oy's existing safety culture and a roadmap for its continued development toward a more proactive and generative safety culture.

However, it is important to acknowledge the limitations of both models. The NOSACQ-50, while empirically rigorous, primarily captures perceptions rather than observable behaviors, and may not fully reflect underlying systemic or contextual factors influencing safety practices. Conversely, the Hudson model, though conceptually rich, has been critiqued for its managerial bias and insufficient attention to the lived experiences of front-line workers (Guldenmund, 2010). Therefore, to overcome these limitations, this study employs a hybrid methodological design that combines the standardized NOSACQ-50 survey with qualitative data from interviews and observations. This approach ensures that both structural and human factors are examined in depth, aligning with the overarching objective of exploring how leadership, communication, and employee participation shape safety culture within the SME context of the Finnish food industry.

The integration of the NOSACQ-50 and Hudson's Maturity Model allows this research to achieve both diagnostic precision and theoretical depth. The survey quantifies current perceptions of safety at Munax Oy, while the maturity framework situates these findings within a developmental continuum of cultural evolution. Together, this approach provides a comprehensive methodological foundation for assessing not only the current state of safety culture but also the pathways through which Munax can progress toward a more proactive and generative safety culture.

2.8 The Validity and Application of Safety Culture Models

The academic discourse regarding the validity and applicability of safety culture models reveals diverse perspectives. One school of thought argues that such models are valuable for providing a structured overview of an organization's prevailing safety culture (Ayob et al., 2022). However, their study also notes that the majority of studies focus on the development of theoretical models rather than their empirical testing or long-term practical application. This imbalance has led to concerns that many safety maturity models function more as conceptual guidelines or managerial tools rather than validated scientific frameworks applicable across industrial contexts (Antonsen, 2009).

A prime example is the Hudson Safety Culture Maturity Model, which was originally developed within the context of the oil and gas industry (Hudson, 2007). This five-stage model extension of Westrum's (2004) typology of information cultures has been widely adopted and endorsed by the International Association of Oil and Gas Producers (OGP) as an industry standard for assessing cultural development. Its implementation within Shell International formed part of an extensive organizational initiative to foster a proactive and "generative" safety culture. Despite its sector-specific origins, the model has

since been applied across a wide range of industries, including aviation, mining, manufacturing, shipping, and healthcare (Hudson, 2007). In many of these settings, however, it has been utilized primarily as a practical intervention tool for guiding organizational transformation rather than as an instrument for empirical scientific validation.

This practical success has, paradoxically, contributed to ongoing academic critique. Scholars such as Gilbert et al., (2018) and Guldenmund, (2010) argue that the widespread adoption of models like Hudson's has contributed to the "commodification of safety culture," where conceptual models become commercial consultancy products lacking empirical rigor. Moreover, establishing a causal link between cultural interventions and measurable safety performance outcomes remains an enduring methodological challenge.

Inherited from the Westrum typology, Hudson's model has the inherent concept that the flow of information within an organization is a critical determinant of its ability to manage safety effectively. Empirical studies have partially supported this notion, demonstrating correlations between generative leadership styles and improved incident reporting and organizational learning (Westrum, 2004). Yet even Westrum acknowledged that while the association between culture and safety is widely accepted, scientific proof of this relationship remains elusive, noting that culture should be regarded as a commonsense construct requiring further empirical exploration.

Therefore, in practice, the Hudson model continues to serve as a diagnostic and developmental framework, particularly in high-risk industries, where it assists organizations in assessing their safety culture maturity and planning structured improvement processes (Ayob et al., 2022). Its enduring appeal lies in its capacity to provide a clear, staged roadmap for transformation rather than a precise measurement tool. In contrast, the NOSACQ-50 framework (Kines et al., 2011) uses a more empirical and psychometrically validated approach, offering statistically tested scales that enable cross-industry comparisons and quantitative benchmarking of safety climate perceptions.

2.9 Regulatory and Normative Context

The focus on safety management has significantly evolved in developed economies such as the UK, Europe, and the USA over the past century (Swuste et al., 2014, 2010). This has led to numerous studies that evaluate the impact of regulatory structures, technological advancements, and organizational cultures on occupational safety (Swuste et al., 2018). Peer-reviewed articles examine the evolution of safety management systems in

these regions, emphasizing the role of legislation and organizational commitment in fostering a culture of safety (Gagliardi et al., 2012; Howard, 2020).

The regulatory environment provides further impetus for examining safety culture in food production. Within the European Union, recent legislation has begun to formalize expectations around food safety culture, requiring companies not only to comply with hygiene regulations but also to demonstrate cultural practices that support safety (European Commission, 2016).

This regulatory shift is particularly significant for SMEs, which often lack formal systems and dedicated safety professionals. For companies like Munax Oy, embedding safety culture into daily practices is both a strategic necessity and a legal expectation. Aligning organizational culture with regulatory frameworks thus becomes central to both compliance and competitiveness.

2.10 Current Status of Safety Management at Munax Oy

Munax Oy is in the process of strengthening its safety management system, with the stated goal of building a more robust safety culture across the organization. At present, the system provides a baseline level of compliance with statutory requirements but remains insufficient in several key areas.

2.10.1 Leadership and Management Commitment

Munax Oy has established a formal safety policy and objectives, which demonstrate organizational awareness of occupational health and safety. At present, the responsibility for safety management lies with the Factory Manager, who also doubles as the Safety Manager, supported by the Assistant Manager from the Tray Washing Section (kenopesula). While this arrangement ensures that safety matters are addressed at some level, the absence of a dedicated safety professional represents a significant limitation. Considering the complexity of Munax's operations and the high-risk nature of certain tasks, the current arrangement does not provide sufficient leadership capacity to drive safety initiatives systematically. Medium-sized food industry organizations with complex operations benefit from having a dedicated professional whose sole responsibility is to advance safety.

This research will seek to assess how leadership structures and practices influence safety culture at Munax. By providing evidence on leadership gaps and employee perceptions, it will support practical recommendations regarding the need for dedicated safety roles and the strengthening of management's visible commitment to safety.

2.10.2 Training and Competence

Training at Munax follows a basic structure but lacks systematic depth. New employees participate in an onboarding program that provides an overview of general workplace risks and safety knowledge. On-the-job training is primarily delivered informally, with experienced colleagues passing down knowledge verbally. Although training records are maintained, the absence of documented job safety procedures or standardized operating instructions raises questions about whether employees receive adequate guidance, particularly in relation to machine safety features and emergency procedures.

Where legal certifications are required, such as driver's licenses and hygiene cards, the company performs well, arranging accredited training through external providers. However, the broader training culture remains ad hoc. There is little evidence of systematic planning, evaluation of training effectiveness, or structured approaches to developing employee competence over time.

The research will address this gap by capturing employee perceptions of the adequacy and relevance of training. Insights from the survey and interviews will help determine whether the training approach fosters competence and confidence in risk management, and will inform recommendations for structured training programs tailored to the company's operational realities.

2.10.3 Communication and Employee Involvement

Munax operates with a highly diverse workforce, and safety communication is delivered in multiple languages, primarily Finnish, English, and Russian. This multilingual approach is a strength, as it supports understanding of training and workplace rules across different groups of employees. However, a significant proportion of workplace signage and safety instruction documents remains available only in Finnish, limiting the effectiveness of safety communication for all workers. Safety posters and warnings are displayed in relevant work areas, particularly concerning the mandatory use of personal protective equipment (PPE) such as eye and ear protection. Beyond that, PPE is provided free of charge to employees, ensuring accessibility to basic protective measures.

The company has leveraged technology to establish a hazard reporting system, enabling employees to report unsafe conditions either directly to the maintenance team or through their supervisors using social media chat groups. Additionally, QR codes are displayed in various work areas, allowing for digital reporting of hazards. While the QR code system exists, its utilization remains limited, indicating the need for strategies to increase participation and embed reporting as a routine safety behavior.

To maintain employee awareness, Munax Oy organizes biannual or quarterly workshops during which employees are updated on the company's safety performance. While this initiative provides a structured avenue for communication, its limited frequency may reduce opportunities for continuous engagement and the integration of employee feedback, as well as bottom-up communication mechanisms that give employees an active voice in shaping safety practices.

This research is further designed to evaluate the effectiveness of communication practices and participation mechanisms at Munax. By analyzing employee experiences, it will reveal barriers to active engagement in safety and provide evidence-based recommendations to strengthen inclusivity, transparency, and dialogue within the organization.

2.10.4 Safety Practices and Performance

Munax complies with statutory requirements for emergency preparedness, with fire extinguishers, sprinklers, and designated assembly points available throughout its facilities. Emergency procedures are introduced during onboarding, yet documentation and reinforcement of these procedures are limited. Employees are provided with personal protective equipment (PPE) free of charge, and safety posters reinforce the importance of PPE use in high-risk areas. Despite these measures, there is little indication of systematic monitoring or evaluation of compliance with safety practices.

The company's approach to hazard reporting and performance feedback is positive, but it remains primarily compliance-driven. Continuous improvement tools such as structured audits, proactive monitoring of leading indicators, and systematic feedback loops are not fully developed. Consequently, the system fulfills basic regulatory obligations but does not yet embody the proactive characteristics of a mature safety culture.

Through the use of maturity models and employee surveys, this research will identify specific weaknesses in current safety practices and performance monitoring. The findings will highlight opportunities to integrate proactive indicators alongside compliance metrics, thereby helping Munax move beyond minimum requirements toward a stronger and more resilient safety culture.

2.11 Research Gaps

While significant progress has been made in conceptualizing and measuring safety culture, several gaps remain. First, research on safety culture has largely focused on large industrial sectors, with far less attention paid to SMEs in the food industry. Second, existing studies in Finland, such as those by Jääskeläinen et al., (2020) and Nenonen and

Rantala (2025) have diagnosed maturity levels and measurement practices, but have not explored in depth how workers and supervisors shape culture through their daily practices. Third, accident statistics provide valuable context but fail to capture the cultural and behavioral dynamics behind incidents. Finally, the increasing regulatory emphasis on safety culture in Europe has not yet been matched by empirical studies exploring how SMEs operationalize these requirements.

This thesis addresses some of these gaps by investigating safety culture in Munax Oy, focusing on human factors such as leadership behavior, communication, and employee perceptions. By using a combination of NOSACQ-50 surveys, observations, and interviews, the study provides a nuanced understanding of safety culture development in a Finnish SME food production company.

3. METHODOLOGY

3.1 Introduction

This chapter outlines the methodological approach adopted in investigating the development and state of safety culture at Munax Oy. The study employs a mixed-methods approach, combining the Nordic Safety Climate Questionnaire (NOSACQ-50) for quantitative analysis and semi-structured interviews for qualitative insights. This dual approach allows the research to capture both measurable dimensions of safety perceptions and the deeper contextual and behavioral factors that influence them.

The combination of methods is grounded in the need to understand not only what employees and management perceive about safety but also why these perceptions exist and how they relate to leadership, communication, and employee participation

3.2 Research Design

The study adopts a mixed-method design (Tan, 2017), in which quantitative and qualitative data are collected concurrently, analyzed separately, and then integrated to provide a comprehensive understanding of the safety culture at Munax.

The quantitative component uses the validated NOSACQ-50 instrument (Kines et al., 2011), a diagnostic tool for measuring safety climate perceptions across seven dimensions:

1. Management safety priority, commitment, and competence
2. Management safety empowerment
3. Management safety justice
4. Workers' safety commitment
5. Workers' safety priority and risk non-acceptance
6. Peer safety communication, learning, and trust in safety ability
7. Workers' trust in the efficacy of safety systems

The qualitative component consists of semi-structured interviews with selected employees and managers to contextualize and interpret the survey findings.

3.3 Research Setting

The research was conducted at Munax Oy, a medium-sized Finnish egg and food production company operating multiple production sites, including Laitila, Kustavi, and Mynämäki. The company is currently developing a more robust safety management system to strengthen its safety culture. The company operates in a hygiene-sensitive environment typical of the food industry, with a workforce that includes both Finnish and international employees. These contextual factors make Munax Oy an appropriate case study for exploring how safety culture evolves in small and medium-sized enterprises (SMEs) operating under both regulatory and operational pressures.

3.4 Survey Instrument (NOSACQ-50)

The NOSACQ-50 questionnaire was distributed electronically to employees and management across all Munax sites. The survey, developed by the Nordic Council of Ministers (Kines et al., 2011), is a validated and standardized instrument widely applied across industries in Nordic countries, including agriculture and food processing. The decision to use the NOSACQ-50 without modification ensured data reliability and comparability with previous research in similar contexts.

The questionnaire comprises 50 statements grouped under the seven dimensions of safety climate. Respondents rated each item on a four-point Likert scale (1 = Strongly Disagree, 4 = Strongly Agree). The survey was available only in English. Considering the diverse workforce, an additional version in Ukrainian would have been beneficial for augmenting the sample size. Unfortunately, there is no validated NOSACQ-50 version available in Ukrainian. Data collection took place between weeks 43 and 45 of 2025, with voluntary participation encouraged via internal announcements and posters.

3.4.1 Semi-Structured Interviews

Complementing the quantitative analysis, semi-structured interviews were conducted with both management and frontline employees. The interviews explored participants' perspectives on leadership commitment, communication practices, risk management, and participation in safety initiatives.

Each interview lasted between 20 – 30 minutes and was conducted in person. Interview notes were recorded manually to preserve confidentiality. The qualitative data provided a deeper understanding of the organizational dynamics underlying the survey responses and offered context to interpret the statistical results.

3.5 Data Analysis

3.5.1 Quantitative Analysis

Survey data were first analyzed using the NOSACQ-50 Excel analysis template, which automatically calculated mean scores for each of the seven safety climate dimensions.

Additionally, SPSS (Version 29) was used for statistical analysis, including descriptive statistics (mean, frequency, and standard deviation) and cross-tabulations by demographic variables such as role, site, and tenure. This allowed for a nuanced interpretation of whether safety perceptions varied across managerial and non-managerial roles or between sites.

3.5.2 Qualitative Analysis

The interview data were analyzed using thematic analysis (Tan, 2017). Responses were coded under recurring themes such as perception, leadership commitment, safety communication and engagement, training and knowledge transfer, and continuous improvement. These themes were then compared with the NOSACQ-50 quantitative dimensions to identify convergences and divergences in perception.

This triangulated analysis provided both breadth (quantitative generalization) and depth (qualitative explanation), reinforcing the validity of the study's conclusions.

3.5.3 Triangulation

Findings from the survey, interviews, and observations will be integrated through triangulation. This approach enhances the validity of the research by cross-verifying patterns that emerge across different data sources. For example, survey results indicating low worker involvement will be compared with observational data on participation in safety meetings and interview accounts of communication practices.

3.6 Ethical Considerations

Ethical approval will be obtained from Tampere University prior to data collection. Participants will be informed about the purpose of the study, their right to withdraw at any time, and the confidentiality of their responses. Consent will be obtained in writing for both survey participation and interviews. Data will be anonymized and stored securely in compliance with GDPR and university research guidelines.

3.7 Limitations of Methodology

The study acknowledges potential limitations such as reliance on self-reported data in the survey, which may be influenced by social desirability bias. The case study approach, while providing depth, limits the generalizability of findings to other organizations. Nonetheless, the study aims to provide transferable insights that may apply to other SMEs in the Finnish food industry and beyond.

4. RESULTS

4.1 Introduction

The previous chapter outlined the methodology employed in sampling and data collection. This chapter provides a description of the gathered data, methods for gathering the data, research and statistical tools used for the statistical analysis. The purpose of this study was to acquire enough data to assess the current state of safety culture at Munax Oy to provide a path for future improvement.

4.2 Descriptive statistics of the Sample

The targeted population for the survey was Munax employees, comprising both workers and leaders (team leaders, managers, and top management). The means of distribution of the questionnaire was through company notification channels, which include screen displays in employee common rooms and notice boards. The link to the survey was also shared on workers' group platforms.

Table 1: Description of the Sample size of the survey

	Leaders (Team Leaders, Managers)	**Workers**
Sample	5	40
Response	5	10

Source: NOSACQ-50 survey data (Munax Oy, 2025).

In total, fifteen employees participated in the survey, representing a balanced mix of genders, roles, and years of experience across the company's main sites. This diversity strengthens the representativeness of the results, especially in assessing how perceptions of safety leadership, communication, and participation may differ across organizational levels and locations. The survey responses comprised seven females and eight males, reflecting a near gender balance within the sample. This balanced representation is important in safety climate research, as gender can influence perceptions of risk, safety communication, and participation.

Table 2: Demographic Profile of Respondents (n = 15)

Variable	Category	Frequency	Percentage (%)
Gender	Male	8	53.3
	Female	7	46.7
Site	Laitila	7	46.7
	Kustavi	7	46.7
	Mynämäki	1	6.6
Work Role	Employee	10	66.7
	Team Leader	4	26.7
	Manager	1	6.6
Work Tenure	< 1 year	2	13.3
	1–3 years	5	33.3
	3–5 years	6	40.0
	5–10 years	2	13.3

Source: NOSACQ-50 survey data (Munax Oy, 2025).

4.2.1 Worksite distribution

Participants were drawn from all three operational sites of Munax Oy: Kustavi (7 respondents), Laitila (7 respondents), and Mynämäki (1 respondent). This multi-site coverage also provides an opportunity to evaluate whether the organization's safety culture is integrated or varies according to local management practices. For instance, higher safety maturity in one site compared to another may indicate localized leadership strength or differences in workload and operational risk.

4.2.2 Role distribution

Out of the fifteen respondents, five were team leaders or managers, and ten were general employees. This distribution provides valuable perspective from both supervisory and frontline levels—an important factor in assessing the alignment between leadership intent and employee experience.

According to Reason (1997) and Hudson (2007), a mature safety culture is characterized by shared understanding between management and workers regarding safety priorities. By including both groups, this survey captures the degree to which management's stated commitment to safety is perceived consistently by the workforce. For instance, the NOSACQ-50 results showed strong agreement among employees that management encourages compliance with safety rules, yet some expressed uncertainty about whether safety is consistently prioritized over production. This may reflect a communication gap or differing interpretations of management behavior between leaders and workers.

4.2.3 Length of Employment

The participants' length of service ranged from below one year to nearly a decade, offering a broad temporal perspective on safety culture development within Munax. Specifically, five respondents had been with the company for one to three years, six for three to five years, two for five to ten years, and two for less than one year.

This spread indicates that a majority of respondents (11 out of 15) had been employed for between one and five years, representing a cohort that is relatively well-integrated into the organization but not yet part of the long-tenured core staff. This has implications for interpreting responses on communication, training, and trust. Employees in this range are typically familiar with established routines but may still be influenced by onboarding experiences and perceptions of organizational learning. The smaller number of longer-tenured employees provides perspective on the consistency of safety culture over time—whether improvements or changes have been observed as the company develops its safety management system.

From a cultural standpoint, newer employees may be more likely to express uncertainty about risk reporting or management responsiveness, as they are still acclimating to communication norms and expectations. Conversely, those with longer tenure can provide a more longitudinal view, identifying whether the organization has evolved toward greater transparency and participation.

4.3 Synthesis of employee and Management interviews

This analysis presents a synthesized evaluation of the safety culture at Munax, derived from qualitative interviews conducted with nine operational employees and five members of the management and leadership staff. The findings are discussed across critical dimensions of organizational safety, including perception, leadership commitment, communication protocols, training efficacy, and continuous improvement processes.

4.3.1 Perception

The overarching employee sentiment regarding the safety environment is largely positive, with participants describing the culture as generally "good" and expressing satisfaction with the current safety level. However, a significant dichotomy was identified in the foundational understanding of safety. For many employees, the definition of working safely is primarily linked to compliance, characterized by the *provision* of Personal Protective Equipment (PPE) and strict adherence to established work instructions and rules. This perspective suggests a culture where safety is external, a mandated set of company

provisions, rather than an internalized collective responsibility. Conversely, management, particularly the HR and Safety leadership, explicitly frames safety as being on par with production targets, stressing the need to proactively eliminate risks and transform deeply ingrained, sub-optimal work habits. Despite the high satisfaction levels, minor but concerning reflections, such as an employee appearing hesitant to discuss issues and another feeling "rushed" to complete tasks, indicate that underlying anxieties may exist.

4.3.2 Leadership commitment

Management's commitment and visibility received universally strong positive feedback, establishing a robust framework of accessible leadership. Supervisors and managers were consistently described as "always available," easily reachable, and visibly present on the production floor, a presence that employees widely appreciate. This visible commitment translates directly into effective issue resolution. Managers are credited with taking concerns "seriously," providing prompt feedback, and resolving problems quickly, citing specific instances like machine repairs, modifications to PPE (gloves and respiratory masks), and the proactive design of safer operational guidelines. The Warehouse Manager's reported efforts to avoid pressuring employees and assist in work prioritization further reinforce the positive influence of leadership.

4.3.3 Communication and engagement

In terms of communication and engagement, the organization utilizes multiple, effective channels for sharing information and facilitating reporting. The implementation of QR codes has proven to be a particularly successful mechanism, enabling easy and anonymous reporting of hazards and incidents. Employees confirmed they feel empowered to report issues "without fear of prejudice or rebuke." Information dissemination is managed through direct discussions, safety notices on television screens in common areas, and notice boards. Furthermore, employees feel engaged in the safety process, often correcting peers, although this peer correction can be hampered by concerns over personal relationships. Management also supports this engagement through a formal reward system designed to increase safety participation.

4.3.4 Training and knowledge transfer

The most pronounced area for developmental focus is the structural and continuous delivery of safety training. A clear deficit exists in routine, scheduled, and in-depth knowledge transfer. Multiple employees reported that training is "not too routinely" conducted and "not structured," often being confined to the initial employment orientation

process or mandatory national certification requirements (e.g., Lift Truck operation). The content often lacks specificity, leaving employees with a limited understanding of specific, relevant workplace hazards, such as the required steps to mitigate exposure to ammonia. Compounding this, managers also report an absence of dedicated, continuous safety training for themselves, relying primarily on initial certifications or outdated third-party material. This critical gap in continuous learning serves as the main explanatory factor for why the employee culture remains heavily focused on compliance rather than a proactive, risk-based understanding.

4.3.5 Continuous improvement

Regarding continuous improvement, the company exhibits a strong capacity for reactive learning following specific incidents, swiftly implementing excellent corrective actions. Examples include the procurement of sophisticated respiratory protection after chemical concerns, the modification of machine operations following a peroxide leak, and the replacement of all visitor safety footwear after an employee injury involving non-compliant boots. Despite these effective reactive measures, Executive Management expressed a systemic concern that the company “does not learn from accidents enough,” suggesting that while the immediate symptoms are resolved, the root cause analysis may be inadequate. This forces management to rely on "strictness and determination" to enforce compliance rather than fostering inherent preventative behavior.

The collective management vision is aimed squarely at bridging the gap between a compliant culture and an integrated one. The core objective is for safety to be viewed by all employees as being functionally equivalent to production targets and to be fully integrated into “everyday work and discussions.” Currently, the safety culture can be characterized as transitioning from a Dependent (rule-following) model toward an Independent (personal responsibility) one. The stated management goal, where colleagues proactively monitor and support each other's safety, is indicative of the aspiration to achieve an Interdependent safety culture. The primary barriers to achieving this higher state of maturity are the lack of structured, continuous training and the persistence of relying on punitive enforcement rather than systemic behavioral alignment.

5. DISCUSSION

5.1 Introduction

The survey data collected from 15 participants across Munax Oy's three sites (Laitila, Kustavi, and Mynämäki) were analyzed using the NOSACQ-50 Excel analysis template. This template automatically computes dimension scores and benchmarks them against sectoral averages, in this case, the agricultural sector, which was selected as the most relevant comparator due to the similar risk environment and nature of production work. Additional descriptive and inferential analyses were conducted using IBM SPSS Statistics to assess demographic patterns, compute means, and identify any correlations between employee role, experience, and perception of safety culture

The NOSACQ-50 framework evaluates safety culture across the seven dimensions, where each dimension is rated on a four-point Likert scale. Higher values reflect stronger safety culture maturity. Scores between 3.00 and 3.29 are considered moderate positive perceptions but indicate potential for improvement. Scores below 3.00 suggest weak safety perceptions, while those above 3.30 reflect a strong positive safety culture.

5.2 Reliability, Validity and Rigor of the Survey

Reliability refers to the statistical measure of the consistency and stability of measurement outcomes across diverse times and contexts (Litwin, 1995a). The NOSACQ-50 instrument has undergone extensive validation in various sectors, such as construction, manufacturing, and agriculture, demonstrating high internal consistency with Cronbach's alpha coefficients exceeding 0.7 across all seven dimensions (Kines et al., 2011). This establishes it as one of the most reliable diagnostic tools for assessing perceptions of safety climate in Nordic contexts.

The reliability of the NOSACQ-50 survey data from Munax Oy was tested using Cronbach's Alpha in SPSS Statistics (version 27). Out of the 15 cases collected, 14 valid responses were included in the reliability analysis, with one case excluded due to incomplete data (Table 3). This represents a valid response rate of 93.3%, which is sufficient for exploratory reliability testing in small-sample studies, such as this.

Table 3: Summary of analysed data

		N	%
Cases	**Valid**	14	93.3
	Excluded[a]	1	6.7
	Total	15	100.0

a. Listwise deletion based on all variables in the procedure.

The overall Cronbach's Alpha coefficient for the seven safety climate dimensions was 0.947 (Table 5), indicating an excellent level of internal consistency across the scale (Kines et al., 2011). This suggests that the items within the seven dimensions of the NOSACQ-50 instrument measured closely related aspects of the underlying construct of organizational safety climate, within the Munax Oy context.

Table 4: Descriptive summary of the data, including the Cronbach Alpha of each dimension

	N	Mean	Std. Deviation	Cronbach's Alpha if Item Deleted
DIM1	15	3.10	0.61	.929
DIM2	15	3.19	0.67	.937
DIM3	14	3.27	0.66	.926
DIM4	15	3.14	0.44	.954
DIM5	14	3.06	0.62	.948
DIM6	15	3.18	0.46	.938
DIM7	15	3.36	0.46	.936
Valid N (listwise)	14			

Table 5: Reliability Statistics

Cronbach's Alpha	N of Items
.947	7

These results confirm that the NOSACQ-50 framework provides a statistically reliable basis for evaluating safety climate at Munax Oy and is consistent with previous validation studies of the instrument.

Validity of the study relates to whether the survey accurately measures what was intended to be measured (Litwin, 1995b). the survey instrument showed strong content validity as its seven dimensions extensively capture key aspects of safety culture (management commitment, communication, justice, worker involvement, and trust), previously validated in Nordic and Finnish contexts (Kines et al., 2011). Also, the Cronbach Alpha of 0.947 is an indication of high internal consistency, which further supports the construct validity of the instrument. Criterion-related validity emerged through the correspondence between survey results and interview insights, which consistently reflected similar themes in management. Face validity, which is the most basic form, relates to the apparent relevance and clarity of the survey items (Litwin, 1995b). The feedback from the participants in the survey confirms that the survey items were clear, understandable, and contextually appropriate.

Additionally, the survey's reliability was upheld by utilizing the official NOSACQ-50 format without any modifications, which allowed for comparability with previous research and preserved its psychometric integrity. Although the sample size was relatively modest (n=15), it included participants from various hierarchical levels (managers, team leaders, and workers) across all three Munax sites, thereby enhancing its representativeness within the company context.

The rigor of this mixed-methods study was ensured through complementary strategies in both the quantitative and qualitative components. For the quantitative analysis, the use of the validated NOSACQ-50 instrument (Kines et al., 2011) provided methodological robustness, supported by a high Cronbach’s Alpha coefficient (0.947), confirming excellent internal consistency. Adherence to the analytical procedures recommended by the Nordic Occupational Safety Climate Questionnaire research team further strengthened the reliability and replicability of results.

For the qualitative component, rigor was established through credibility, dependability, confirmability, and transferability (Liu, 2017). Credibility was achieved through triangulation between survey and interview findings, while dependability was maintained via consistent documentation of data collection and analysis processes. Confirmability was reinforced by grounding interpretations in participant accounts and established theoretical frameworks such as Hudson’s Safety Culture Maturity Model. Although focused on a single organization, detailed contextual descriptions enhanced transferability to other

Finnish SMEs. While the small sample size limits the generalizability of the findings beyond Munax Oy, the methodological robustness ensures that the conclusions drawn are credible, contextually valid, and theoretically grounded. This rigor supports the practical applicability of the study's recommendations for strengthening safety culture in small and medium-sized food industry enterprises in Finland.

5.3 Description of results

In the context of evaluating workplace safety systems, the collected data reveals significant insights regarding employee perceptions and organizational responses. The highest mean score, 3.36, pertains to Workers' Trust in the Efficacy of Safety Systems, underscoring a robust sentiment that safety equipment is readily available and that management addresses issues promptly. The high score of 3.27 for Management Safety Justice confirms the perceived fairness and promptness of management's response to reported issues. Conversely, the lowest mean score, recorded at 3.06, pertains to Workers' Safety Priority and Risk Non-acceptance. This score indicates a tangible gap between perceived safety priorities and actual behavioral practices. Furthermore, the score for Peer Safety Communication, which stands at 3.18, reflects a generally positive perception of peer interactions regarding safety discussions.

Additionally, the score of 3.10 in management safety priority and ability indicates that management at Munax demonstrates a visible commitment to safety; however, production demands may occasionally challenge this balance. The relatively moderate score of 3.19 in management safety empowerment indicates that while employees perceive management as open to dialogue, structured opportunities for empowerment, such as joint safety planning or participatory hazard assessments, remain limited. Lastly, the worker safety commitment dimension scores 3.14, indicating that employees value safety and are motivated to uphold safe practices, although consistency may vary. Factors such as workload, time constraints, or insufficient reinforcement of safety norms may occasionally hinder full adherence to safe behavior.

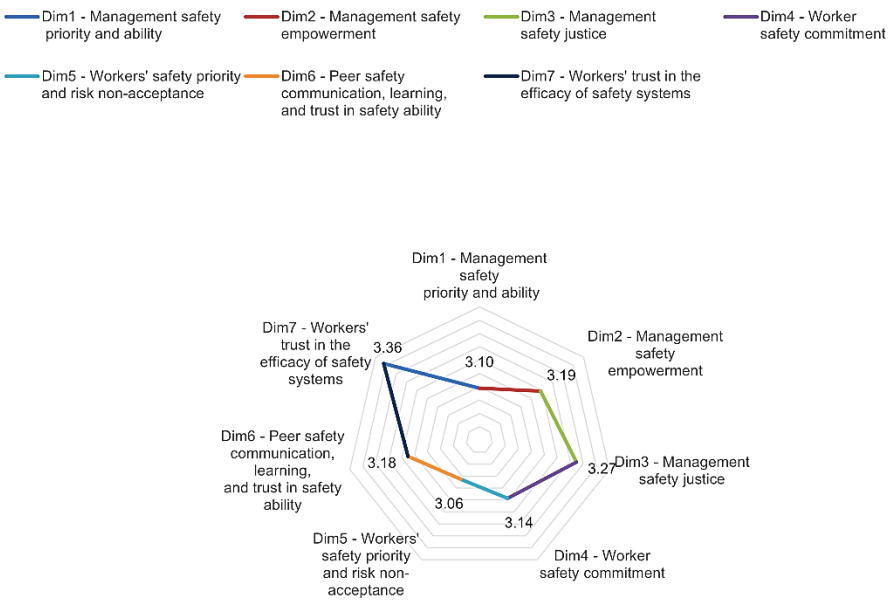

Figure 3: Mean NOSACQ-50 Dimension Scores for Munax Oy

5.4 Interpretation of Results

The overall results demonstrate that Munax Oy's safety culture is moderately positive, averaging 3.18 across all seven NOSACQ dimensions. The highest score (3.36) was observed for "Workers' trust in the efficacy of safety systems," coupled with the score of the "management safety justice" (3.27), suggesting that employees believe the company's safety systems and structures, such as PPE availability, fire equipment, and QR-code reporting tools, are reliable and effective. The finding further indicates that Munax has begun to adopt a "just culture," where transparency and mutual trust underpin safety investigations. Such a perception is vital in creating an environment where employees feel psychologically safe to report near misses or unsafe conditions without fear of unfair sanctions. Employees confirm this high score by reporting that managers are accessible, visible, take issues seriously, and resolve problems immediately. Management is consistent in prioritizing safety over production. Furthermore, the implementation of QR codes for anonymous reporting and instances of learning from incidents (e.g., modifying machinery after a peroxide leak, replacing non-safe boots) substantiates the high perception of safety justice, and responsive systems. This aligns with interview comments highlighting satisfaction with available protective equipment and emergency preparedness.

Conversely, the lowest score (3.06) was found in “Workers’ safety priority and risk non-acceptance,” indicating that while employees understand the importance of safety, production pressures occasionally lead to rule-bending or shortcuts. This score is the closest to a neutral or reactive safety level and represents the primary cultural risk. This quantitative weakness directly validates management concerns that some employees take risks as shortcuts and perform safety tasks only because management insists on it, not seeing the benefit for their own well-being. This behavior is further reinforced by the finding that an employee sometimes feels rushed to do some tasks, a factor that often precipitates risk-taking in manufacturing environments. This suggests a gap between management’s safety standards and the internalization of those standards by the workforce. Survey respondents consistently described training as "not too routinely" and "not structured and adequately done" for continuing employees. Training is primarily provided during the orientation process. This is a critical finding, as an employee expressed limited safety knowledge/understanding and others requested more regular communication, specifically at least weekly safety meetings

The dimensions related to management commitment (3.10) and empowerment (3.19) also scored moderately, pointing to visible leadership engagement but insufficient employee participation in safety decision-making. Interviews confirmed that employees value management’s open-door approach but wish for more regular, structured opportunities for empowerment such as joint safety planning or participatory hazard assessments, structured two-way communication and follow-up on reported hazards. Several participants noted that “feedback on reported risks is not always communicated back,” suggesting a need for stronger feedback loops.

Interestingly, management safety justice (3.27) scored relatively high, indicating that employees generally perceive management as fair when investigating incidents and allocating responsibility. This perception supports the company’s intent to shift toward a “learning rather than blaming” approach, a key marker of a maturing safety culture.

The worker commitment (3.14) and peer communication (3.18) scores suggest a strong foundation of team-based safety responsibility, with most employees expressing that “we help each other work safely” and “we feel safe working together.” Nonetheless, some respondents admitted that safety discussions are not frequent, implying that safety conversations often occur reactively rather than as part of regular daily routines.

5.4.1 Correlation with the Hudson Safety Ladder

The findings from the NOSACQ-50 survey closely align with Hudson’s Safety Culture Maturity Model (Hudson, 2007), which outlines the progression of organizational safety

culture from pathological to reactive, calculative, proactive, and ultimately generative stages. The average scores across Munax Oy's seven safety climate dimensions, which range from 3.06 to 3.36, indicate that the company's safety culture currently sits between the calculative and proactive stages of Hudson's framework. This positioning reflects a workplace where safety management systems are in place and leadership engagement is evident, though proactive behaviors and shared ownership of safety are still under development. The moderately strong results in management justice and worker commitment suggest a growing trust in leadership and a burgeoning culture of collaboration, which are both essential precursors to fostering a proactive safety mindset. However, the slightly lower scores in risk non-acceptance and communication indicate that the approach to safety is somewhat compliance-driven and not yet fully integrated into daily practices.

5.4.2 Alignment of Findings with Previous Research on Safety Culture in the Finnish Food Industry

The findings of this study both support and extend existing research on safety culture within the Finnish food industry. Earlier studies have consistently shown that Finnish food companies demonstrate relatively strong management commitment to occupational safety but face persistent challenges in sustaining employee engagement and proactive communication (Jääskeläinen et al., 2020; Nenonen and Rantala, 2025; Tappura and Nenonen, 2023). The NOSACQ-50 results from Munax Oy mirror this pattern closely. Management-related dimensions, including Management Safety Priority and Ability (3.10), Management Safety Empowerment (3.19), and Management Safety Justice (3.27), scored moderately high, reflecting visible leadership engagement and an emerging culture of fairness in safety management. However, the dimensions associated with employees, Workers' Safety Priority and Risk Non-Acceptance (3.06), and Peer Communication, Learning and Trust in Safety Ability (3.18), scored lower, indicating that safety dialogue, shared learning, and bottom-up communication remain underdeveloped. These findings reinforce the argument made by Tappura and Nenonen, (2023) that employee participation continues to be a weak link in Finnish organizations' safety culture development.

The qualitative interviews conducted at Munax provide further insight into this dynamic. Employees reported appreciating management's openness and fairness but emphasized the lack of structured communication channels and follow-up on reported hazards. Several participants noted that feedback on reported issues was not always communicated

back to the workforce, which aligns with Jääskeläinen et al. (2020) who found that Finnish organizations often excel at measuring safety performance but fall short in translating data into learning and preventive action.

Nevertheless, this study also contributes new and encouraging insights that extend the current understanding of safety culture development in Finnish SMEs. Much of the prior research has focused on large-scale food manufacturers with more formalized safety systems, whereas Munax Oy, as a medium-sized enterprise, operates with more limited resources and managerial capacity. Despite this, the NOSACQ-50 profile suggests that Munax's safety culture is transitioning between Hudson's (2007) "calculative" and "proactive" stages, a promising indicator of cultural maturity. This challenges assumptions in previous Finnish studies that smaller firms inherently lag in safety culture development due to resource constraints. Instead, it demonstrates that strong leadership commitment and targeted communication strategies can drive meaningful safety improvements even within modest organizational structures.

The findings of this study substantiate previous research by confirming the dual pattern of strong management engagement but weaker employee participation within the Finnish food industry. However, they also extend the literature by illustrating that SMEs such as Munax Oy can achieve progressive safety culture development when leadership commitment is paired with inclusive communication and learning practices. By combining the NOSACQ-50 framework with qualitative insights, this research offers a nuanced and empirically grounded contribution to understanding safety culture dynamics in Finland's food production sector, bridging the gap between theory, measurement, and real-world application

5.5 Relation of findings to the Research Questions

The overarching aim of this research was to explore the role of human factors in shaping safety culture within a Finnish SME in the food industry, using Munax Oy as a case study. Specifically, the study sought to answer two key research questions:

1. *What is the state of the safety culture of SMEs in the food industry in Finland?*
2. *How do leadership, communication, and employee participation shape safety culture?*

The State of Safety Culture in Finnish Food Industry SMEs

In response to the question *"What is the state of safety culture of SMEs in the food industry in Finland?"*, the NOSACQ-50 results establish a clear diagnostic picture of Munax

Oy's safety culture maturity. The moderate overall scores across the seven dimensions, particularly in management commitment (3.10), empowerment (3.19), and worker commitment (3.14), indicate a developing safety culture that balances compliance with emerging proactive elements. The strongest result emerged in Dimension 7 - Workers' trust in the efficacy of safety systems (3.36), suggesting confidence in formal safety structures and procedures. Conversely, the lowest score in Dimension 5 — Workers' safety priority and risk non-acceptance (3.06) highlighted an ongoing tendency among employees to accept certain risks under production pressures.

The finding reveals strength and challenge, positioning Munax within the *transitional phase* of safety culture maturity, where systems and procedures exist but employee involvement and consistent leadership follow-through are still evolving. This demonstrates a *management-driven* commitment to safety, typical of the Calculative phase in safety culture models on the Hudson's Ladder.

When compared with previous Finnish research, these results align with findings from Tappura and Nenonen (2023) and Jääskeläinen et al.(2020), which documented similar challenges among Finnish food and manufacturing SMEs, particularly regarding inconsistent communication and limited employee empowerment in safety decision-making. The moderate NOSACQ-50 scores and interview responses at Munax indicate a safety culture transitioning from rule-based compliance to proactive engagement, consistent with the *"calculative–proactive"* stage of Hudson's Safety Culture Maturity Model. This positioning implies that while safety systems exist and are operationally valued, they have yet to become deeply embedded in everyday practices and decision-making behaviors.

The study concludes that the safety culture at Munax Oy reflects a broader trend among Finnish SMEs: it is compliant, progressively improving, and increasingly self-reflective, though not yet fully generative. This finding illustrates both progress and potential; while management's intentions and systems are apparent, their complete integration into organizational routines and employee mindsets is still a work in progress.

The Influence of Leadership, Communication, and Employee Participation

The second research question focused on understanding how leadership, communication, and employee participation shape safety culture. Both quantitative and qualitative data affirm that leadership plays a central role in establishing trust, prioritizing safety, and signaling fairness, which are factors captured in the relatively high NOSACQ-50 score for *Management safety justice (3.27)*. Interview responses revealed that employees perceive management as approachable and open to discussion, which supports a

climate of procedural fairness and accountability. These findings align with Hudson's (2007) view that managerial integrity and fairness form the foundation for advancing from a calculative to a proactive culture, where safety becomes an intrinsic organizational value rather than a compliance obligation.

However, the study also found evidence of gaps in communication and participation, particularly in feedback processes and structured dialogue about safety issues. Employees consistently indicated that hazard reports were not always followed by visible corrective actions or communicated results reflecting what Tappura and Nenonen (2023) described as a “feedback vacuum” that undermines engagement and learning. Similarly, the interviews underscored the need for more inclusive communication channels that empower workers to contribute ideas and share concerns in real time. These insights reinforce the importance of organizational learning mechanisms, as emphasized by Reason (1997) and Guldenmund, (2010) who argue that mature safety cultures are characterized by their ability to translate experiences, both successes and failures, into shared learning.

Furthermore, while Munax’s management demonstrated commitment and justice in handling safety matters, employee participation in defining safety procedures and risk mitigation strategies remained limited. This finding echoes Santos et al. (2025), who note that SMEs often rely heavily on managerial initiative, with worker input occurring reactively rather than through sustained engagement. The study therefore, positions communication and participation as the most immediate developmental priorities for Munax’s progression toward a *proactive and generative safety culture*

The analysis from this research supports previous literature indicating that Finnish SMEs in high-risk industries are in a transitional phase of safety culture development (Jääskeläinen et al., 2020; Tappura and Nenonen, 2023). Leadership commitment and trust are well-established, but deeper worker involvement and systematic communication remain the key levers for cultural maturity. The study’s hybrid application of the NOSACQ-50 and Hudson’s maturity model provided an integrated framework for diagnosing both current perceptions and future growth pathways. Consequently, the research affirms that by strengthening employee engagement, continuous training, and feedback mechanisms, SMEs like Munax can evolve from calculative compliance toward a fully generative, learning-oriented safety culture.

6. CONCLUSION

This thesis set out to investigate safety culture within a Finnish SME in the food industry, using Munax Oy as a case study. The research specifically sought to assess the current state of safety culture and explore how leadership, communication, and employee participation influence safety practices. To achieve these aims, a mixed-methods approach was adopted: the Nordic Occupational Safety Climate Questionnaire (NOSACQ-50) provided quantitative insights, while semi-structured interviews offered qualitative depth. The integration of the Hudson (2003) Safety Culture Maturity Model further enabled the interpretation of findings along a developmental continuum of organizational learning and cultural progression.

The quantitative analysis yielded an overall safety culture profile characterized by moderate to positive perceptions across the seven NOSACQ-50 dimensions. Scores for management-related dimensions—including *safety priority and ability (3.10)*, *safety empowerment (3.19)*, and *safety justice (3.27)*—reflected visible leadership commitment and a fair approach to safety management. However, worker-related dimensions, such as *safety priority and risk non-acceptance (3.06)* and *peer communication and learning (3.18)*, were comparatively lower, indicating that while managerial intent was strong, employee engagement and communication practices required reinforcement.

The qualitative data provided valuable context to these findings. Employees expressed confidence in management's commitment but highlighted deficiencies in feedback loops, formal safety communication, and consistent training. Some respondents noted that safety conversations often occurred reactively after incidents or observations rather than as a proactive daily practice. The interviews also confirmed gaps in structured safety training and the limited visibility of systematic learning mechanisms. Collectively, the results positioned Munax within Hudson's *"calculative-to-proactive"* stage of cultural development, indicating a safety system that is well-intentioned and partially integrated but not yet fully generative.

The study's findings underscore that leadership and communication are pivotal to the development of a mature safety culture in SMEs. Management at Munax has succeeded in establishing trust and fairness in handling safety matters, aligning with Hudson's view that safety culture evolves through shared values and just responses to incidents. However, the persistence of reactive safety discussions and limited employee empowerment mirrors patterns observed in Finnish food industry studies (Jääskeläinen et al., 2020;

Tappura and Nenonen, 2023). This demonstrates that while the organization is progressing, its transformation toward a *"proactive"* and ultimately *"generative"* culture will require deeper employee involvement and systematic communication structures.

Importantly, the NOSACQ-50 scores suggest that Munax's safety culture is not stagnant but in transition. The higher rating for *management safety justice (3.27)* implies a foundation of trust, which is essential for encouraging openness and learning. Yet, the relatively lower *risk non-acceptance (3.06)* dimension reveals that risk-taking under production pressure remains a latent behavioral challenge. This imbalance between managerial intention and worker behavior reflects a common tension identified in Hudson's model, which highlights that organizations often move from rule-based compliance to adaptive responsibility only when employees internalize safety as a shared value rather than an imposed duty.

The findings from both the NOSACQ-50 analysis and the interviews with Munax Oy employees and managers provide valuable insights into the company's evolving safety culture. The analysis indicates that Munax Oy possesses a strong foundation for safety, driven by visible management commitment and robust system trust. However, the key challenge lies in translating this organizational commitment into internalized values and proactive behavior among the workforce, as evidenced by the lowest mean score in Workers' Safety Priority and Risk Non-acceptance. This section discusses key areas where targeted actions could significantly enhance the maturity and sustainability of the organization's safety culture.

Drawing from the discussion of this study, the foremost recommendation is to replace the current reliance on sporadic or onboarding-only safety training with a structured, continuous learning program. Routine refresher training should be institutionalized and conducted at least quarterly, focusing on specific departmental risks, procedural updates, and new safety initiatives. This will ensure that safety knowledge remains current and relevant to the evolving work environment.

Furthermore, training should move beyond mere regulatory compliance to cultivate conviction and intrinsic motivation. By emphasizing the why behind safety rules, employees can better connect adherence to procedures with their personal well-being and overall productivity. This shift is crucial to overcoming the perception observed during interviews that safety practices are followed primarily "because management insists."

Equally important is the introduction of specialized safety training for management personnel. Managers should receive instruction in leadership-based safety coaching, advanced root cause analysis, and techniques for fostering employee engagement in safety

matters. Such training will strengthen management's role as enablers of a generative safety culture and improve the organization's ability to address the root causes of incidents rather than only their immediate symptoms.

Also, considering the relatively low score in the dimension of Workers' Safety Priority and Risk Non-Acceptance (3.06), targeted interventions are essential to mitigate risk-taking behavior and foster open safety communication. Implementing routine safety meetings held either daily or weekly at the team or shift level, would provide an effective platform for discussing near misses, recent hazards, and lessons learned. These meetings would reinforce the company's commitment to prioritizing safety over production while capitalizing on the strong peer communication (3.18) that already exists within the organization.

Furthermore, management should proactively address the issue of time pressure, which has been identified as a contributing factor to occasional shortcuts. By reaffirming and clearly communicating the policy that employees should not feel compelled to rush, even in the face of tight production schedules, the organization can demonstrate a visible commitment to leadership. Managers must also ensure that workloads and shift transitions are organized in a manner that supports safe working practices without sacrificing efficiency.

Moreover, to enhance safety culture improvements, several systemic changes to the Safety Management System (SMS) are recommended. First, it is crucial to centralize safety documentation within a unified digital platform. This platform should consolidate all policies, risk assessments, procedural guidelines, and training records, thereby enhancing accessibility and ensuring compliance. Second, the incident investigation process should be revised to incorporate a standardized, in-depth root cause analysis protocol. This approach will shift investigations from being reactive technical reviews to proactive learning opportunities aimed at preventing recurrence. Lastly, Munax should integrate dedicated safety budgeting into its management framework. By establishing a separate, clearly defined budget line for safety initiatives, which is distinct from general project expenses, Munax can demonstrate a strategic commitment to safety and ensure consistent funding for training, audits, and preventive measures.

To ensure the sustainability and measurable impact of these recommendations, future studies should include a longitudinal assessment of behavioral and cultural change. Readministering the NOSACQ-50 survey one year after implementing structured training and safety communication interventions would provide empirical data on progress, particularly within the dimensions of safety priority and risk non-acceptance.

Moreover, benchmarking with the broader Finnish food sector is recommended to position Munax's results within an industry-wide context and establish comparative performance indicators. Finally, a cultural artifact analysis that examines safety signage, communication language, and informal practices could provide deeper insight into the embedded norms and beliefs influencing safety behavior, allowing for more tailored cultural transformation strategies.

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