10.13147/SOE.2026.13

University of Sopron

István Széchenyi Economics and Management Doctoral School

PROACTIVE BALANCING STRATEGIES OF ORGANIZATIONAL STRUCTURE AND INNOVATION CULTURE TO INCREASE CORPORATE PERFORMANCE

Doctoral (PhD) Dissertation

Written by:

Mike Weiß MSc

Supervisors:

Prof. Dr. István János Bartók

Prof. Dr. Joachim Hafkesbrink

Sopron

2026

10.13147/SOE.2026.13

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Dissertation to obtain a PhD degree

Written by:

Mike Weiß MSc

Prepared by the University of Sopron

István Széchenyi Economic and Management Doctoral School

within the cooperation between University of Sopron and FOM Hochschule für Oekonomie & Management

Supervisor: Prof. Dr. István János Bartók

Prof. Dr. Joachim Hafkesbrink

The supervisors have recommended the evaluation of the dissertation be accepted: yes / no

_____ 1st supervisor signature

_____ 2nd supervisor signature

The evaluation has been recommended for approval by the reviewers (yes/no)

1. judge: Dr. _____ yes/no _____

(signature)

2. judge: Dr. _____ yes/no _____

(signature)

Result of the public dissertation defense: _____ %

Sopron, 20 ____ year _____ month _____ day

_____

Chairperson of the Judging Committee

Qualification of the PhD degree: _____

_____

UDHC Chairperson

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ABBREVIATIONS

AI	Artificial Intelligence
AVE	Average Variance Extracted
BANI	Brittle, Anxious, Non-linear, Incomprehensible
CMB	Common Method Bias
CTA	Confirmatory Tetrad Analysis
FMEA	Failure Mode and Effects Analysis
HOC	Higher-Order-Constructs
HTMT	Heterotrait-Monotrait Ratio
IPMA	Importance-Performance Map Analysis
LOC	Lower-Order-Constructs
LV	Latent Variable
MAE	Mean Absolute Error
MICOM	Measurement Invariance of Composite Models
MV	Manifest Variables
NCA	Necessary Conditions Analysis
NPD Performance	New Product Development Performance
OLS	Ordinary Least Squares
PLS-SEM	Partial Least Squares Structural Equation Modeling
RBV	Resource-Based View
RMSE	Root Mean Squared Error
SEM	Structural Equation Model

ABSTRACT

This dissertation investigates proactive balancing strategies required for organizations to enhance corporate performance in the highly dynamic environments characterized by VUCA (Volatility, Uncertainty, Complexity, Ambiguity). Moving beyond models of reactive coping, the core objective of this study is to define how the mutual interplay between organizational structure and innovation culture must be configured to sustainably increase effectiveness and efficiency. The research utilizes a quantitative design, combining Partial Least Squares Structural Equation Modeling (PLS-SEM) with Necessary Condition Analysis (NCA). This integrated methodological approach is critical, as it enables the simultaneous identification of two causal logics: The sufficient conditions (*should-have* factors that enhance performance) and the necessary conditions (*must-have* structural and cultural thresholds that are preconditions for success). The survey data collected from professionals especially in central Europe (n=428) were analyzed to test the full model of direct, mediating and moderating effects. The findings confirm that an open-minded innovation culture is a significant mediator, translating the advantages of an organic organizational structure into performance gains. While VUCA generally exhibits a significant negative influence on performance, it is also found to moderate the relationship between both organizational structure and efficiency and innovation culture and efficiency. This suggests a complex dynamic where environmental turbulence both stresses resources and demands specific internal alignment. NCA results establish that minimum thresholds of fluid configurations, high level of cross-functional integration and decentralized decision autonomy are needed for an organic organizational structure and to enable organizational performance levers. Thus, based on NCA both an activating leadership style and a culture of continuous development are necessary for an open-minded innovation culture resulting in enhanced overall corporate performance embodied in effectiveness and efficiency. The research will advance the strategic management field by providing empirical evidence on the importance of integrating proactive strategies balancing characteristics of organic organizational structure and open-minded innovation culture to counteract the threats of the VUCA environment. This dissertation contributes to the development and evaluation of an eclectic, proactive coping strategy for organizations operating in a dynamic environment.

Keywords

Strategic Management, Organizational Structure, Innovation Culture, Performance, VUCA, Proactive Coping-Strategies, Activating Leadership

1 INTRODUCTION

In the contemporary business landscape organizations face increased environmental dynamics characterized by the acronym VUCA equaling volatility, uncertainty, complexity and ambiguity (Pourkarimi, 2025). Threats used to be top of mind for individuals decades ago like victims of terrorism, the number of people who died as a consequence of bad health care or the loss of life due to organized crime in certain parts of the world decreased drastically and result in increased prosperity and comfort in society (Pszcel, 2022). Although an uncountable number of improvements should decrease instability and perils to society and economy, there have been instances such as the recent terroristic attacks of Hamas in Israel causing logistical threats due to Houthi rebels attacking cargo vessels in the red sea (Sugiura & Holder, 2024), Russia's war of aggression in Ukraine causing high rates of inflation due to increased costs for energy in central Europe or external shocks like COVID-19 pandemic that have intensified uncertainty. These observations were confirmed by studies showing a significant rise in uncertainty reaching a peak with start of Covid-19 pandemic in Q1.2020 and an overall peak in Q3.2025 due to the new era of political uncertainties exemplarily announcements of trade wars by the US president (World Uncertainty Index, 2025). The contemporary world is characterized by a succession of social and economic threats, which have led to the perception of a progressive, radical and unpredictable environment. This development of increased uncertainty can be noticed within the World Uncertainty Index during the past 60 years with an increase in trend within the past two decades (World Uncertainty Index, 2025).

With increased environmental dynamics a tremendous impact on organizations and its overall performance has been unleashed resulting in diverse research related to that topic. Especially the concept of VUCA has gained recent scholarly attention, highlighting the need for adaptable strategies for organizations facing the threats of today’s world (Abdullah, 2023; Du & Chen, 2018; Gao et al., 2021; Hameed & Sharma, 2020; Murugan et al., 2020; Rimita, 2019; Szpitter & Sadkowska, 2016).

The first research on VUCA phenomena is dating back to 1985 where the economists Warren Bennis and Burt Nanus described the challenges to management and leadership caused by external factors (Warren & Nanus, 1985). In response, the dominant scholarly focus has centered on reactive coping strategies, such as developing organizational agility or ambidexterity, to mitigate the immediate fallout of disruptive events (Abdullah, 2023;

Codreanu, 2016; Kaya, 2022; Rožman et al., 2023). While valuable, this reactive focus frames organizations as perpetual shock absorbers, waiting for the next crisis. This dissertation has been motivated by an imperative to affect a fundamental shift in perspective, towards a proactive management approach that is designed not to survive turbulence, but to sustain and enhance corporate performance regardless of environmental dynamics. This is achieved by balancing the interplay between organizational structure and innovation culture, with a view to identifying patterns that proactively enhance organizations' overall performance with a focus on effectiveness and efficiency amid the dynamic VUCA environment.

1.1 Research Background and Motivation

In recent years the VUCA phenomenon which is representative to a modern, globalized and fast spinning world sets new standards in business concepts and theories. The scientific community agrees that long-used procedures and theories lose validity and significance due to deviating initial criteria as a basis for assumptions and decisions noticing VUCA phenomenon gaining ground. As mentioned above this is one of the reasons why VUCA can currently be counted to one of the most important foods for thought in scientific community (Howe et al., 2021; Minciu et al., 2025). VUCA continuously influences the organizational performance and its output as described by Bennett & Lemoine (2014a), who ascertain that the VUCA environment renders any efforts to plan the future and to understand upcoming threats. In their study, they develop strategies for leaders to make decisions in situations where the outcome is unknown to allocate the right resources needed for a decision that positively influences the organization's performance.

Reading about their inspiring approach for facing and tackling the threats of the modern business world and experiencing these threats in the personal daily lives of individuals, the idea of finding a proactive approach to equipping organizations with resources to deal with the unpredictable threats is more relevant than ever. It is important to consider the potential benefits for organizations that are able to proactively address the threats posed by the modern world. Such a proactive approach has the capacity to not only mitigate the negative effects of external events but also to facilitate the maintenance and growth of existing business. Furthermore, a strategic approach of this nature has the potential to generate significant employment opportunities and to transform the way in which people view change.

The high relevance of this issue is evidenced by the fact that a practical, yet scientific approach has the capacity to generate a wide range of opportunities for businesses that were previously unknown.

1.2 Problem Statement and Research Gap

When analyzing the huge body of literature related to VUCA, it becomes obvious that organizational responses have evolved significantly, yet a decisive research gap remains. The initial management discussion for dealing with environmental dynamics focused primarily on reactive, ex-post adaptation strategies. These approaches, such as traditional crisis management or defensive resource strategies (e.g., downsizing and concentrating on core competencies), were designed to minimize damage and restore stability after a disruption occurred. Similarly, classic risk management tools like FMEA (Failure Mode and Effects Analysis) aimed to analyze and mitigate known risks rather than actively shape future scenarios (Cascio, 1993; Coombs, 2007).

Subsequently, the field progressed to include ex-ante approaches focused on anticipation. Concepts like weak signal detection (Ansoff, 1975) and scenario planning (Schoemaker, 1995) enabled organizations to prepare for multiple potential futures. However, with the intensification of VUCA, where ambiguity and complexity make prediction unreliable, a new class of comprehensive, proactive concepts is necessary. These modern strategies include agility and ambidexterity and represent the first initial proactive frameworks for thriving in turbulence (Horney et al., 2010). Agility is not just a reaction strategy but a proactive capability aimed at building organizational resilience, enhancing learning and fostering anticipation (Horney et al., 2010). At the same time ambidexterity is an approach following a strategic balancing of exploration for dynamic environments and exploitation for stable environments (Du & Chen, 2018). These concepts, along with adaptive approaches like supply chain resilience (Gao et al., 2021) and agile project management (Szpitter & Sadkowska, 2016) have underlined the need for an proactive approach.

To sum up, literature shows multiple approaches to generally deal with a dynamic environment to reactively absorb the impacts of specific VUCA drivers and to measure their influences on an organization. However, a significant research gap remains regarding empirical evidence on the systematic interplay between organizational structure and innovation culture impacting the corporate performance under moderation of a VUCA environment. In order to illustrate this interaction, a thorough empirical investigation into these relationships is required, particularly one that examines how proactive internal

configurations and an open-minded culture of innovation can enable and leverage ongoing competitiveness and adaptability in the dynamics of a VUCA environment.

1.3 Significance of this Research based on Research Gap

The proactivity outlined within the definition of the research gap can be conceptualized by a balancing *must-have* that are considered essential to organizational structure and innovation culture reflecting indispensable necessary conditions for enabling leverage effects on performance and *should-have* factors (KPIs) that are considered desirable and can leverage efficiency and effectiveness within the dynamics of a VUCA world, presupposed that the identified necessary conditions (*must-have* factors) are in place. Since this study is based on a quantitative research design (see Chapter 3), data and impact analysis of necessary conditions and KPIs will revert to a NCA and PLS-SEM to reveal which factors act as strong drivers for enhancing performance and to identify *must-have* factors that represent the minimum thresholds of a construct that must be in place for a desired outcome to be even possible. This combined approach of NCA and PLS-SEM has been introduced by Richter et al. (2020) who - in this regard - published comprehensive implementation guidelines (Richter et al., 2023).

However, the specific relationship between Organizational structure and innovation culture has already been evaluated based on PLS-SEM but has not yet applied NCA (García-Fernández et al., 2018; Valaei, 2017).

Therefore, it is evident that this proposed approach based on the combination of Necessary Condition Analysis (NCA) and Partial Least Squares Structural Equation Modelling (PLS-SEM) has not yet been conducted in the above-mentioned context and depicts a relevant research gap as a starting point in the dissertation at hand.

1.4 Contribution to Theory

Research on the interplay between organizational structure and innovation culture under VUCA conditions is rooted in several established theories. The combination of these perspectives elucidates the rationale behind the designation of certain design elements as indispensable *must-haves*, while others are categorized as performance-enhancing *should-haves*.

This research is grounded in Contingency Theory, which provides the theoretical basis for the research (Lawrence & Lorsch, 1967; Woodward, 1958). The argument is posited that no single optimal organizational arrangement exists. The effectiveness of such systems is

contingent upon the congruence between structural arrangements and environmental demands. In volatile environments decentralization, the capacity for effective information processing and coordination mechanisms become essential requirements. By contrast, liaison roles, cross-functional teams and digital collaboration platforms offer beneficial, context-specific advantages. Contemporary studies reaffirm that the effect of structure on performance is conditional on external dynamisms and uncertainties, validating the relevance of contingency thinking for VUCA environments (Kaushik et al., 2024; Pacheco-Cubillos et al., 2024).

The Resource-Based View (RBV) is a complementary theoretical framework that emphasizes the significance of unique, valuable, rare and inimitable resources as the foundations of sustainable advantage. Innovation culture characterized by the presence of shared norms, values and routines that foster creativity in conjunction with adaptive structural designs can be considered a resource in this context (Barney, 1991; Wernerfelt, 1984). The Dynamic Capabilities framework extends RBV by focusing on how firms sense changes, seize opportunities and reconfigure resources (Teece et al., 1997). The enabling conditions for these processes are provided by an aligned structure - culture interplay. For illustration purpose the sensing process necessitates the establishment of open information channels, the leveraging of cultural openness to experimentation and the transformation process is contingent on reconfigurable governance. Recent reviews have emphasized that dynamic capabilities cannot be considered in isolation; rather, they are contingent on supportive structures and innovation-oriented cultures (Silva et al., 2025; Sipos et al., 2025). In the present dissertation, these background theories provide the conceptual foundation for the development of hypotheses (see Chapter 2.3.3) and will be revisited in light of the empirical findings to inform subsequent theory development (see Chapter 5).

1.5 Research Objectives

To move beyond the limitations of reactive approaches, the dissertation introduces a proactive strategy aimed at systematically enhancing organizational performance in the face of VUCA conditions. Central to this strategy is the question of how structural and cultural levers within organizations can be effectively and proactively configured and balanced to overcome VUCA threats. The core idea is to identify those organizational characteristics that, when aligned appropriately, enable organizations not only to withstand external disruptions but to respond to them with strategic foresight.

The following main research question will be addressed in the quantitative research of the dissertation, as derived from the above-mentioned objectives:

- How can organizations proactively balance their organizational structure and innovation culture to sustain or enhance corporate performance in a turbulent VUCA environment?

Further to that leading research question seven subordinated research questions will be reviewed:

- To what extent does organizational structure and innovation culture influence corporate performance under VUCA conditions?
- How does VUCA moderate the effects of organizational structure and innovation culture on corporate performance?
- Which structural and cultural characteristics exert the strongest impact on key performance indicators such as efficiency and effectiveness?
- How does innovation culture mediate the relationship between organizational structure and performance in dynamic and uncertain environments?
- What are the necessary conditions for a balanced relationship between organizational structural and cultural characteristics that enable proactive adaptation to VUCA and thus ensure high corporate performance?
- What are critical bottlenecks (*must-have* factors) to ensure a balance of structure and culture which is most resistant to VUCA?
- Which critical success factors are pivotal for organizational performance and how can their impact be optimally leveraged through targeted actions?

1.6 Structure of the Dissertation

The dissertation at hand is structured into eight main chapters, each addressing a specific aspect of the above-described research questions due to the lack of proactive balancing strategies for organizations facing the threats of a VUCA environment.

The structure follows a logical progression from defining the research problem and its theoretical foundations to develop the research model, applying empirical methods, analyzing results and concluding with key findings and managerial implications.

The first chapter introduces the research topic and its relevance in the context of contemporary business challenges. It outlines the research problem, demonstrates the

research gap and formulates the research objectives. Furthermore, the chapter provides a summary of the structure of the dissertation.

The second chapter defines the conceptual basis of the dissertation by presenting the theoretical key constructs, which are relevant for the research. It provides a comprehensive review of the dynamics of today's environment by referring to VUCA phenomena explaining its origin and impact on organizational performance. Additionally, chapter two explores the interdependencies between organizational structure, culture of innovation and corporate performance characterized by effectiveness and efficiency. This emphasizes how organizations can proactively balance these dimensions to navigate the threads of today's environment. Scientific key theories and approaches will be presented as groundwork for the assumptions of the VUCA environment. In this chapter also hypotheses are derived from basic theories and current literature providing a structured foundation for the following empirical examination.

Within the third chapter the conceptual research model based on the theoretical insights discovered in the preceding chapter is presented. The general research design, the operationalization of the research model and the process of survey development will be underlined. Furthermore, the sampling strategy, data collection process and statistical tools used are explained in detail.

Followed by the fourth chapter the empirical analysis and its results will be presented in detail and the chosen Structural Equation Model (SEM) and Necessary Conditions Analysis (NCA) as the primary statistical approaches will be explained. Within the fourth chapter the empirical findings based on the collected data will be presented. Descriptive statistics and sample characteristics will be the first part of the chapter followed by model specification and evaluation done using PLS-SEM (Partial Least Squares Structural Equation Modeling). The reliability and validity of the outer measurement model are assessed. Further to that the inner structural model is examined based on the determination coefficient, effect size and Stone-Geisser Criterion followed by an evaluation of path coefficients, mediator / moderator effects and an Importance-Performance Map Analysis (IPMA). The results of the Partial Least Squares Structural Equation Model (PLS-SEM) and Necessary Conditions Analysis (NCA) will also be presented to provide further insights into the relationships between the constructs. An overview of the complex research process of this dissertation can be found in Figure 1.

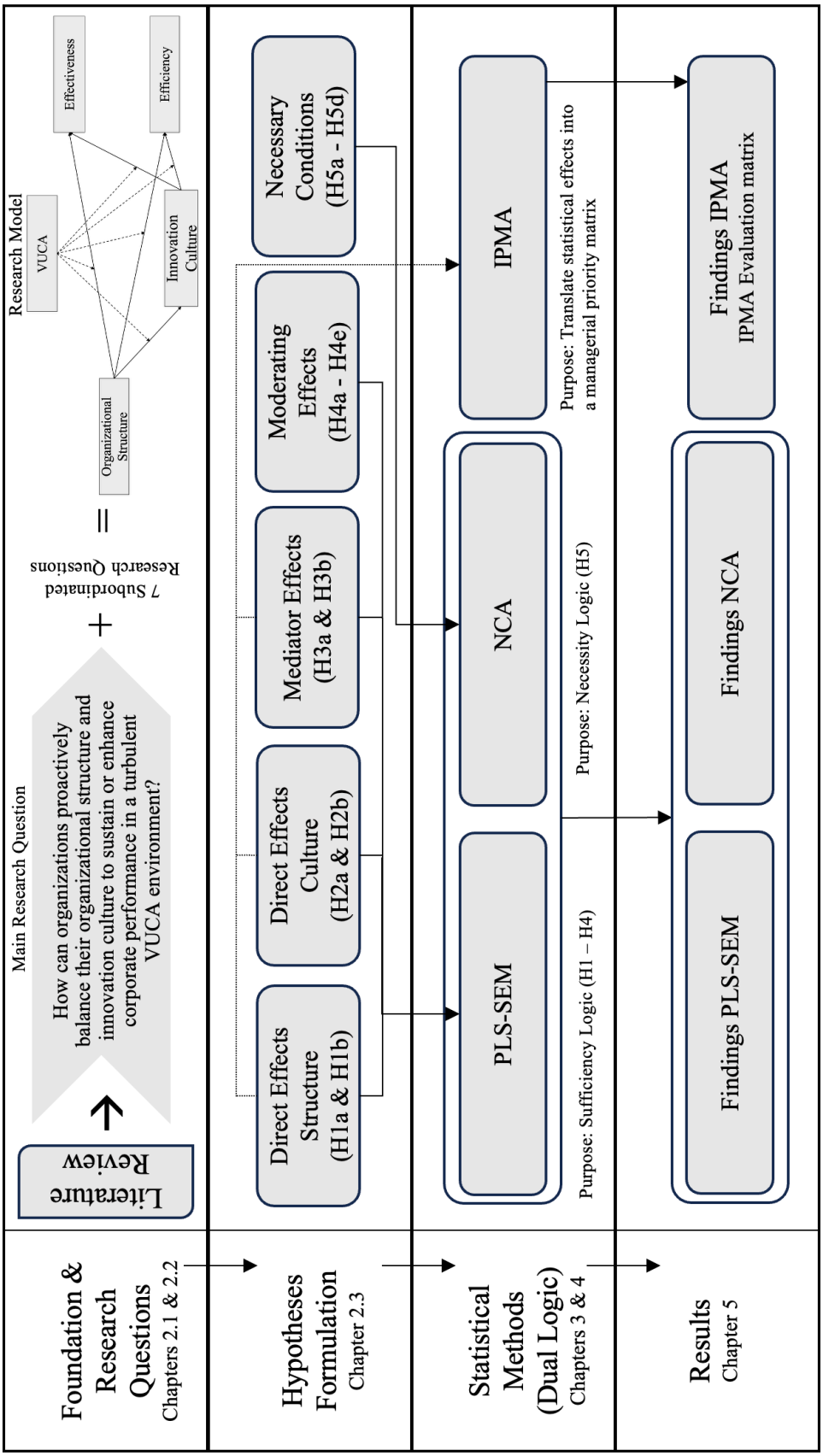


Figure 1: Comprehensive Research Process

Source: Own representation

The fifth chapter is a critically evaluation of the empirical results in the light of the formulated research questions and hypotheses. Findings from the existing literature are compared to the empirical results. Next to that comparison the chapter discusses the implications for organizations to offer practical recommendations for them seeking to enhance corporate performance (effectiveness and efficiency) by a balanced integration of structure and culture within a dynamic environment.

The examination is then followed by sixth chapter presenting the new scientific results of the dissertation. This key chapter underlines the high scientific value of the dissertation and further states the contributions to management literature.

The seventh chapter outlines the limitations of the study and formulates suggestions for further potentials of future research.

The last chapter (chapter 8) provides a short summary of the results depicting the most relevant findings.

2 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1 Focus Constructs and Dimension

2.1.1 Organizational Structure

The organizational structure determines the arrangement of functions, lines of responsibility, authority and communication. It provides a fundamental framework for decision-making, workflow coordination and employee interaction, thereby influencing efficiency, adaptability and long-term performance outcomes. A central element of structure is the division of labor, which allocates specific tasks across individuals or units. While specialization can enhance productivity and expertise, it may also create silos if not effectively integrated. Hierarchy and chains of command establish reporting relationships and authority levels, ensuring clarity and accountability. However, overly hierarchical structures may slow decision-making and reduce flexibility, potentially limiting responsiveness to environmental change (Gomathy et al., 2023).

Organizational structures can be conceptualized as a continuum ranging from mechanistic to organic frameworks (Burns & Stalker, 1961; Cruz & Camps, 2003; Lawrence & Lorsch, 1967; Olden, 2012; Rapert & Wren, 1998).

- Mechanistic structures are rigid, highly formalized and centralized, with clearly defined roles, hierarchical reporting and formal communication channels. These structures are effective in stable environments where predictability and control are essential but may hinder knowledge sharing, cross-functional collaboration and innovation (Nagano et al., 2014).
- Organic structures, by contrast, are decentralized, low in formalization and characterized by fluid hierarchies and flexible roles. They support adaptability by their configuration, cross-functional collaboration and knowledge dissemination, creating an environment conducive to innovation (Szczepańska-Woszczyna, 2014).

Key characteristics of organic structures include decentralized decision-making, cross functional integration via horizontal and informal communication and decision autonomy via dynamic roles. Decentralization distributes autonomy to employees, allowing for faster responses to change, while fewer hierarchical levels accelerate decision-making and enhance organizational responsiveness (Agha Kazem Shirazi et al., 2019). Horizontal communication across all levels fosters collaboration and cross-functional integration while informal channels enable rapid information flow, supporting adaptability in novel situations

(Agha Kazem Shirazi et al., 2019; Sisaye & Birnberg, 2012). Dynamic roles reduce formalization and standardization, enabling employees to adapt to organizational needs rather than adhere strictly to predefined job descriptions (Sisaye & Birnberg, 2012; Vossebrecher et al., 2012).

Although organic structures enhance innovation, collaboration and responsiveness, they can also introduce ambiguity, role conflicts and coordination challenges. Balancing flexibility with clarity is therefore crucial to optimize organizational performance (Sisaye & Birnberg, 2012).

To sum up the mechanistic - organic continuum illustrates how structural characteristics evolve in response to environmental demands. Mechanistic structures, with centralized decision-making and rigid hierarchies, are suited to stable, predictable contexts, while organic structures, with flexible roles and decentralized decision-making, are ideal for dynamic, fast-paced, and innovative environments. This continuum highlights the importance of aligning decision-making, communication, specialization and role definitions with environmental conditions to foster efficiency, adaptability and sustained innovation (Cruz & Camps, 2003; Olden, 2012; Rapert & Wren, 1998).

2.1.2 Innovation Culture

Innovation culture is defined by a set of values, norms and practices that encourage innovation, experimentation and calculated risk-taking. It establishes the behavioral foundations for ideation and the acceptance of change within organizations, thereby fostering organizational innovativeness (Schneider et al., 2013; West & Farr, 1991).

Research indicates that adhocratic cultures, characterized by flexibility, autonomy and a forward-looking mindset, are strongly correlated with innovation and enhanced organizational outcomes (Naranjo-Valencia et al., 2016).

Innovation culture also serves as a mediating mechanism, translating cultural values into performance by enhancing the organization’s capacity for idea generation, learning and transformation (Akhter & Chaity, 2024). This implies that innovation culture can evolve from a reactive to a proactive orientation, thereby strengthening organizational performance.

In a proactive innovation culture, employees actively seek opportunities to improve and innovate, rather than merely responding to problems as they arise. Such a culture encourages an anticipatory mindset, which is primarily fostered through activating leadership, e.g.

transformational or transactional leadership (Kauffeld et al., 2004; Unsworth & Parker, 2002).

Activating leadership is a pivotal element of an open-minded innovation culture, as it creates surroundings where employees are motivated and engaged to generate new concepts, take risks and experiment. By promoting continuous reflection, activating leaders enhance both the effectiveness and efficiency of organizational processes (Kauffeld et al., 2004).

Organizations that promote trust, collaboration and continuous development enable employees to take risks without fear of failure (Jończyk, 2011). This approach strengthens commitment and alignment with organizational innovation strategies, ensuring that efforts are consistently invested in long-term innovation initiatives (Eckermann et al., 2003).

A culture of continuous reflection and development is critical for assessing the effectiveness of innovations and making necessary adjustments, thereby contributing to a dynamic innovation climate (Kauffeld et al., 2004). Continuous reflection allows employees to critically evaluate processes and outcomes, fostering problem-solving skills and the generation of innovative solutions. This dual emphasis on idea generation and implementation ensures that innovations are not only conceived but also effectively executed (Kauffeld et al., 2004).

Continuous development reflects an organization's commitment to learning, adaptability, and constant improvement. Change is treated as a normal and expected part of organizational life, encouraging members to challenge assumptions and adapt strategies in response to new insights. Over time, employees develop resilience in coping with ambiguity and the occasional setbacks inherent in experimentation, further reinforcing the innovation-oriented character of the organization (Chanani & Wibowo, 2019; Siegel & Kaemmerer, 1978).

A strong focus on continuous development also nurtures a work environment that values creativity, initiative and ownership over outcomes. Diverse perspectives are welcomed, engagement is enhanced and the organization's sustained capacity for innovation is supported at all levels (Kauffeld et al., 2004; Siegel & Kaemmerer, 1978).

As mentioned above innovation culture can be conceptualized as a continuum between open (open-minded) and closed innovation cultures, reflecting varying levels of internal and external collaboration (Herzog & Leker, 2010).

- Open-minded innovation cultures actively engage with external partners such as customers, suppliers and competitors to foster creativity, knowledge sharing and idea

generation. This approach enhances organizational agility and responsiveness and is supported by activating leadership practices (Chesbrough, 2003; Herzog & Leker, 2010; West & Farr, 1991).

- Closed innovation cultures prioritize internal resources and knowledge, relying on proprietary R&D and strict control over innovation. While this approach can yield significant advancements, it may reduce adaptability, stifle creativity and constrain overall innovation effectiveness (Herzog & Leker, 2010; Schneider et al., 2013).

Overall, a proactive, open-minded innovation culture, supported by activating leadership and a commitment to continuous development, is essential for sustaining innovation and competitive advantage in dynamic environments. By fostering creativity, collaboration and reflection, organizations can translate cultural values into tangible performance outcomes, ensuring both short-term adaptability and long-term strategic success.

2.1.3 Corporate Performance

Corporate performance reflects the results of transforming inputs into measurable outcomes. As an output variable, it serves as the dependent measure that reflects how well a company transforms its inputs (e.g. capital, labor, technology, knowledge) into desired outcomes across multiple dimensions (Richard et al., 2008).

The core components of corporate performance can be distinguished between financial performance indicators, operational performance measures and a shareholder value creation process (Crowther, 1996; Porter, 1985). The financial performance indicators are focusing on KPIs like revenue growth, profitability metrics, market value and cash flow generation. Those indicators can be easily measured and operationalized but within a broad study with participants of multiple organizations a comparison of results can hardly be made. This also applies to the shareholder value creation which can be defined by e.g. customer value, employee performance, social impacts and quality of supplier relations. A statistically clear derivation of results based on those KPIs resulting from participants from multiple organizations cannot be made. Therefore, operational performance measures can be operationalized to create a comprehensive and comparable derivation for corporate performance within an organization. Operational performance measures include productivity indicators like team performance or new product development performance creating a certain competitiveness of an organization. This can be completed by operational measures like resilience, goal alignment or flexibility (Anand & Ward, 2004; Bardi et al.,

1994; Bohn, 2010; Cantu, 2007; Griffin & Page, 1993; Kostopoulos et al., 2013; Lee et al., 2015).

Accordingly, the majority of studies characterize performance as multidimensional, comprising two distinct yet interconnected components that focus on operationalizing the latent construct of operational performance by two single components called effectiveness and efficiency.

A distinction between effectiveness and efficiency provides a crucial framework for understanding how companies create value. Effectiveness ensures organizations pursue the right objectives and create meaningful stakeholder value, while efficiency ensures optimal resource utilization in achieving those objectives.

- Efficiency is defined as the internal use of resources, e.g. the degree to which inputs are converted into outputs. It focuses on optimizing resource utilization to minimize costs while maintaining or improving output quality and quantity (Thanassoulis, 2001).
- Effectiveness is a metric for organizational success. It is defined as the degree to which an organization achieves its strategic objectives and creates value for stakeholders, regardless of resource consumption. The concept of effectiveness encompasses the realization of organizational objectives and the alignment of external stakeholder or market requirements (Gaertner & Ramnarayan, 1983).

Organizations often face trade-offs between effectiveness and efficiency, balancing short-term and long-term goals, innovation and optimization, quality and cost, as well as flexibility and standardization. The most successful companies are those that master both dimensions, allowing them to adapt their strategies based on market conditions and competitive pressures. This balanced approach fosters sustainable competitive advantage and long-term value creation for all stakeholders. Continuous monitoring and adaptation are essential, as the dynamic nature of corporate performance requires organizations to remain responsive to changing market conditions (Bennett & Lemoine, 2014b; Eze et al., 2017; Tewolde & Gubán, 2010).

Therefore, the performance of organizations will be subclassified into the two dimensions of effectiveness and efficiency in the study at hand. This will be done to evaluate the trade-offs within the continuums of mechanistic and organic structures, as well as open and closed innovation cultures.

2.2 Environmental Context: Today's Dynamics, VUCA and its Limits

2.2.1 Introduction to the VUCA Concept

VUCA is an acronym employed in modern business and management literature, standing for volatility, uncertainty, complexity and ambiguity. The initial use of the acronym can be traced back to 1987 by the US Army War College. It was originally used to describe the unpredictability of the geological landscape during the Cold War (Horney et al., 2010). Since then, it has been adopted into multiple different fields. Scientific research into the VUCA phenomenon was initiated in 1985 with the work of Warren Bennis and Burt Nanus. In their seminal study, the economists examined the challenges that management and leadership face due to external factors (Warren & Nanus, 1985). The extant research in this area predominantly focuses on individual events and the possibilities for reaction to the mechanics of VUCA. In the contemporary business environment, the term has gained prominence in addressing the challenges posed by rapidly evolving external factors (Green et al., 2019; Minciu et al., 2025; Murugan et al., 2020).

The concept of unpredictability, which forms the basis of the acronym, has gained traction in business literature to denote the volatility of the contemporary economic environment. This notion encompasses the predicaments confronting management and leadership in the context of erratic external dynamics and the fallibility of planning security. Researchers such as Horney et al. (2010) were the first to propose structured frameworks with the aim of understanding the necessity for agile approaches in VUCA environments. These frameworks were intended to enable a high level of adaptation within organizations and the alignment of resources in the face of unpredictability and the unknown that lies ahead. This can be regarded as the foundation for an assertive approach in confronting the challenges posed by a VUCA environment.

Nevertheless, VUCA provides not only a diagnostic lens for environmental scanning, but also a conceptual foundation for the redefining of management and decision-making processes under uncertainty. It thereby challenges the long-established methods and theories utilized in both science and management in recent decades (Horney et al., 2010).

The prevailing scientific concept of VUCA shows an increased empirical relevance within the past years. As one can see within the World Uncertainty Index (2025) the global uncertainty measured within the past decades peaks during Covid-19 pandemic and remains on an elevated level until the peak of Q3.2025 caused by a new era of political insecurities.

In the aftermath of crises such as the Russian war in Ukraine, which has precipitated elevated energy costs in Europe and substantial inflation, organizations find themselves in a persistent state of uncertainty and anxiety. The multiple additional drivers of uncertainty that have been identified (e.g. geopolitical conflicts in the Middle East, recent terrorist attacks in Europe, growing political instability as a consequence of Brexit, the rise of anti-democratic political parties in Europe and the implementation of tariffs by the 2024 reelected US president) justify the growing academic and practical interest in VUCA to develop frameworks and approaches to explain environmental turbulence.

2.2.2 Dimensions of VUCA

The first of the four dimensions of the acronym VUCA stands for *volatility*. Volatility is mathematically referring to a rate that is subject to rapid change over short periods of time. In this context changes can happen rapidly and often without further notice or warning making is difficult for organizations to maintain continuity in operations, resource allocation or planning (Bennett & Lemoine, 2014b). Taking a closer look into the context of an organization volatility can be found in various forms impacting supply chains causing disruptions, sudden shifts in demands, shortages in raw materials or geopolitical crisis. Volatility is often linked to the amount of information available and is characterized by frequent, unpredictable changes. (Bennett & Lemoine, 2014b).

The rate for a standard 40-foot container used for the transportation of goods from Asia to Europe is an example of the high degree of volatility observed in this field. The price of this standardized mode of transportation fluctuates between approximately 1,300 USD in October 2023 and approximately 6,000 USD in July 2024. This has an effect on the capacity of traders to plan import processes, making it impossible for them to do so (Drewry, 2024).

Uncertainty is the second component of the VUCA acronym, denoting an absence of predictability and clarity about future events. A state of uncertainty can be engendered by incomplete, ambiguous or unavailable information, which hinders decision-making processes. This primarily impedes decision-makers within organizational management when assessing the probability of future developments or planning effectively (Milliken, 1987). In contrast to volatility, which is characterized by rapid but comprehensible change, uncertainty specifically denotes a gap in knowledge and the occurrence of a lack of sufficient information to create an understanding of a situation ahead. Due to a lack of knowledge, the implications of an event are uncertain. While the cause and effect of an event are

comprehensible, it is unclear whether it will result in a substantial change (Bennett & Lemoine, 2014b).

To provide an illustration of this phenomenon, it is relevant to consider the initial phases of the global Covid-19 pandemic or the emergence of a major geopolitical conflict, such as that witnessed in Eastern Europe with the war in Ukraine. During such circumstances organizations have invariably faced significant uncertainty about the stability of their supply chains, customer behavior and potential regulatory responses. Milliken (1987) identified three types of uncertainty which are relevant for management. There is state uncertainty which focuses on the general difficulty of understanding what is happening in the environment. Further to that effect uncertainty can be found which is about the impact of external events within organization. The third type is called response uncertainty which underlines the difficulty to identify suitable strategic responses.

Complexity is defined as the presence of multiple interconnected elements within a system, where the relationships between variables are frequently non-linear and difficult to comprehend or predict. In contrast to volatility and uncertainty, which focus on the rate and predictability of change, complexity highlights the structural intricacy of the environments in which organizations operate (Bennett & Lemoine, 2014b). In an environment characterized by complexity, organizations are confronted with a high volume of variables, including diverse stakeholder expectations, global supply chains, growing regulatory frameworks and rapidly changing technologies. The defining characteristic of complexity, however, is not the presence of change itself, but rather the difficulty of analyzing the cause-and-effect relationship due to the high density of interdependencies (Snowden & Boone, 2007).

A multinational corporation operating across multiple jurisdictions must consider the political, economic, legal and cultural dimensions. These interact in unpredictable ways, which makes strategic planning and risk management particularly challenging. Actions in one part of the system may produce unforeseen effects elsewhere (Codreanu, 2016).

In the context of VUCA *ambiguity* can be defined as the unpredictable and multifaceted consequences of decisions and actions within complex environments. It can be defined as a situation in which information is incomplete, contradictory or open to multiple interpretations, making it difficult to draw clear conclusions or define problems with precision (Milliken, 1987).

This aspect of VUCA highlights the challenges organizations face when navigating unclear situations, where outcomes are not easily discernible, leading to potential misinterpretations and strategic miscalculations. It is therefore proposed that ambiguity may be defined by the presence of unpredictable outcomes arising from a lack of clarity regarding the implications of decisions and by complex interactions between various actors in a system. These interactions contribute to ambiguity and complicate the decision-making process (Cernega et al., 2024). In contradistinction to uncertainty, which is characterized by an absence of information, ambiguity emerges when information is present, but its meaning is ambiguous or when the decision-maker lacks the conceptual framework to interpret it correctly (Cernega et al., 2024).

It is evident that ambiguity frequently results in interpretive confusion necessitating managers to not only gather additional information but also to attempt to provide a framework for the situation. Consequently, addressing ambiguity necessitates advanced sensemaking capabilities, thereby enabling an organization to act in the absence of complete comprehension of all variables or outcomes (Horney et al., 2010).

2.2.3 Managerial Implications of VUCA

In recent years the VUCA framework has become a central concept in business and management scholarship, as well as in educational settings and leadership practice. Originally employed in military contexts, the acronym has been embraced by scholars and professionals alike to explain the conditions that are shaping today's strategic and organizational environments. Each of the VUCA dimensions represents a distinct challenge and the extant literature provides rich insights into how firms must adapt in response (Horney et al., 2010).

As Codreanu (2016) emphasizes in his VUCA action framework, effective management of volatility necessitates preparedness, responsiveness and resource adaptability capabilities that must be integrated into both the organizational architecture and leadership behavior.

From a strategic management perspective, volatility has been shown to have several consequences for business. Firstly, it has been demonstrated that it undermines long-term planning. Secondly, it has been shown to complicate forecasting. Thirdly, it has been demonstrated that it increases the risk associated with capital investments (Rimita, 2019). To remain competitive, it is vital for firms to build agile operational capabilities that allow for the rapid reconfiguration of assets and workflows. This includes the development of

resilient infrastructures and buffer capacities to absorb shocks without undermining performance (Wenzel et al., 2021).

The prevailing literature in the field of management has underscored the significance of enhancing information-processing capabilities and situational awareness to effectively navigate the complexities of uncertain environments (Rimita, 2019). In this regard, organizational entities are compelled to allocate resources towards the development of dynamic sensing mechanisms, such as real-time analytics or scenario planning. The seminal work of Horney et al. (2010) introduced the concept of leadership agility, defined as the capacity to exercise decisiveness in the face of ambiguity. Codreanu (2016) further elaborates on this notion, underscoring the significance of flexible governance, organizational learning and structured experimentation as pivotal instruments for effective navigation of uncertain environments.

According to Horney et al. (2010) the management of complexity necessitates systems thinking, cross-functional coordination and a culture of organizational learning. Codreanu (2016) emphasizes that integration and alignment across departments, functions and geographies are imperative strategies in complex settings, highlighting the limitations of traditional hierarchical models in such contexts. As Mintzberg (1979) and Hameed & Sharma (2020) have previously observed, it is essential for organizations to adopt decentralized and flexible structures that facilitate local responsiveness while preserving strategic coherence. Literature on organizational design also underscores the significance of modularity and adaptable roles in effectively handling complexity (Burton et al., 2020).

The fourth VUCA dimension ambiguity pertains to situations where the causal relationships are unclear or where existing knowledge is not applicable. This is particularly evident when organizations encounter emerging technologies, market disruptions or unprecedented regulatory shifts. To navigate such ambiguity, Codreanu (2016) emphasizes the need for structured dialogue, clarity of roles and iterative interpretation processes. In addition, leaders must rely on sensemaking as articulated by Weick (1995) to construct meaning from incomplete or unfamiliar information. Organizational responses to ambiguity often involve prototyping, design thinking and collaborative learning platforms that help build a shared understanding before action is taken.

2.2.4 Limitations of the VUCA Concept

It is evident that both the extant scientific literature and the more business-related management literature are excessively reliant on the framework of a VUCA environment to depict the dynamics of today's business world. Nevertheless, the acronym in question is so broad in its application that it is frequently difficult to employ in specific contexts due to its lack of precision. Therefore, a systematic and scientifically approved measurement of VUCA is difficult. The operationalization of the widely defined parts of the acronym hinders empirical measurement. There are only few standardized scales and scientifically sound methodologies to quantify the degree of volatility or ambiguity an organization faces. This absence of empirical precision limits the framework's utility in quantitative research and performance modeling. Consequently, while the framework is extensively referenced in leadership and strategy literature, it is less frequently employed in robust empirical studies (Fridgeirsson et al., 2021).

Due to this background it is evident that the term in question fails to provide any clear guidance on how to address each dimension effectively (Stahl, 2022). The rationale behind this phenomenon is that the VUCA framework predominantly characterizes external conditions offering minimal prescriptive directives for their management. Despite contributions by scholars such as Codreanu (2016) and Horney et al. (2010) who have proposed action frameworks and leadership competencies aligned with each VUCA element, these contributions are not universally adopted nor systematically integrated into mainstream management theory. Consequently, VUCA frequently functions as a buzzword rather than a fully-fledged analytical tool that results in actionable outcomes (Stahl, 2022).

In addition, the notion of VUCA places excessive emphasis on the negative aspects of the contemporary business environment. In the context of VUCA, discourse frequently focuses on the challenges associated with e.g. complexity, while neglecting the potential for strategic change. This negative framing has the potential to hinder organizations from perceiving VUCA as an opportunity for innovation and growth, consequently resulting in a reactive rather than proactive approach (Gläser, 2023).

Having mentioned above critics on the concept new competing frameworks are emerging. Those alternative models attempt to address the perceived shortcoming of the VUCA concept. The most notable example is BANI model (acronym: Brittle, Anxious, Nonlinear, Incomprehensible) proposed by Jamais Cascio (2020). BANI builds on the limitations of VUCA by offering more emotionally and behaviorally grounded concepts, such as anxiety

and brittleness, which reflect not only environmental conditions but also organizational and psychological responses to them. Despite its recent emergence, BANI remains in a state of academic immaturity. Consequently, the recommendation is to direct future research efforts towards the VUCA model (Cascio, 2020).

2.3 Derivation of Hypotheses based on the State of Research

2.3.1 Mutual Interplay of the Constructs

The relationship between organizational structure, innovation culture and corporate performance is multifaceted and reciprocal. Each component exerts influence on the others, forming a dynamic system that determines an organization's ability to innovate, adapt and sustain competitive advantage (Naranjo-Valencia et al., 2016; Szczepańska-Woszczyna, 2014).

In the context of the Resource-Based View (RBV), both organizational structure and innovation culture are considered strategic internal resources that can enhance corporate performance when effectively aligned and leveraged. The RBV posits that firms possessing unique, valuable, and difficult-to-imitate resources can achieve sustainable competitive advantages (Barney, 1991). A well-aligned combination of these elements constitutes a valuable and rare organizational resource capable of positively influencing firm performance. Specifically, a strong innovation culture facilitates the effective utilization of structural resources, thereby supporting improved outcomes at the firm level. Moreover, organizations that proactively balance structural efficiency such as formalization and control with cultural flexibility, including learning orientation and risk-taking, are better positioned to achieve superior resource-based advantages (Wilden et al., 2013).

Furthermore, Contingency theory emphasizes the importance of aligning internal organizational configurations, such as structure and culture, with external environmental conditions including dynamism and complexity. This theory posits that a universally applicable approach to organizational design is illusory. Instead, the optimal configuration depends on the specific context in which an organization operates (Fiedler, 1978). The impact of proactively balancing organizational structure and innovation culture on corporate performance is contingent on environmental dynamism. In highly turbulent environments, flexible innovation cultures amplify the positive effects of dynamic capabilities on performance. Conversely, in more stable contexts, formalized structures enhance the

efficiency-performance relationship is supporting more predictable and effective organizational outcomes (Fiedler, 1978).

Empirical research increasingly indicates that organizations capable of aligning structure and culture towards innovation objectives tend to outperform those that treat these elements in isolation (Nagano et al., 2014). Recent studies have identified an interplay between organizational structure, innovation culture and performance. Since these coherences were identified in a world characterized by increasing complexity and rapid changes in global markets, a certain impact of VUCA can be expected. In contrast during the recent decades, studies have evolved from examining isolated organizational elements to integrated frameworks that address adaptability and innovation as dynamic capabilities essential for sustained performance (Dewi et al., 2025; Francis et al., 2023). The significant relevance of this research lies in its practical implications for organizations navigating uncertainty, with evidence showing that flexible structures and innovation-oriented cultures enhance strategic agility and competitive advantage (Kasamani et al., 2024). These empirical data indicate that organizations with adaptive organizational designs outperform their peers in turbulent contexts, underscoring the need for further research into these relationships (Rybalka, 2024; Zhang et al., 2025).

The specific problem addressed in this study concerns how organizational structure and innovation culture jointly influence performance outcomes under VUCA conditions, a subject that remains insufficiently explored within the *should-have* and *must-have* perspective of this research. According to the research questions of this study there are *must-have* factors (NCA) which must be present and orchestrated for a proactive approach in facing the VUCA threats and there are *should-have* factors that only unfold their leveraging effect on the outcome variables if the *must-have* factors are achieved.

2.3.2 Conceptual Research Model

To structure the above-mentioned coherences which will be explained in detail in the following chapters a research model (see Figure 2) has been created to understand the organizational characteristics that allow a proactive orientation of an organization so that corporate performance operationalized by effectiveness and efficiency can be maintained or enhanced in best case.

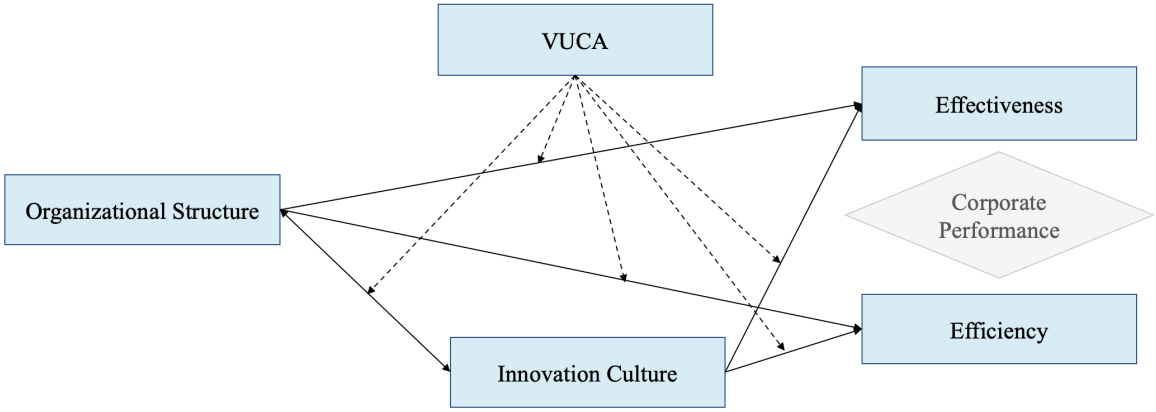


Figure 2: Research Model

Source: Own representation

This approach asserts that innovation culture functions as a mediator between organizational structure and performance, particularly in environments characterized by volatility and complexity (Al-Qahtani, 2025; Astuti et al., 2023). This present scientific standpoint is aligned with the contemporary strategic management models, which place significant emphasis on agility and continuous innovation as fundamental capabilities (Albannai et al., 2024; Liu et al., 2024).

2.3.3 Hypotheses Development

Based on the pertinent literature organizational structure is having an effect on the performance of an organization (Eze et al., 2017). Further to that the intensity of VUCA conditions significantly influences the relationship between organizational structure and efficiency. In a VUCA environment, traditional hierarchical structures may hinder responsiveness and adaptability, necessitating a shift towards more organic, flexible and flat organizational designs. Carillo & Kopelman (1991) state that structural variables like size, vertical complexity and administrative intensity influence efficiency. Bavyko et al., (2022) support this thesis and underline that organizational transformations improve efficiency amid economic turbulences. Both Mezhevov et al. (2022) and Mijušković & Todorović (2020) identify the influence of VUCA on this effect. Depending on the intensity of VUCA conditions organizations necessitate to adopt their structures to enhance flexibility and improve efficiency. Traditional hierarchical models may hinder adaptability, making it crucial for organizations to realign their structures to effectively navigate uncertainty (Mezhevov et al., 2022).

In addition to organizational structure it is essential to recognize that a culture of innovation plays a dual role, functioning not only as a direct influence on organizational performance but also as a mediating construct that effectively translates the underlying cultural values into measurable performance outcomes by significantly enhancing the organization's overall capacity for generating new ideas, facilitating learning processes and driving transformative initiatives within the organization (Akhter & Chaity, 2024). The specific innovation culture - that is the focal point of this research endeavor - is characterized by the activation of leadership roles and the cultivation of a mindset that is oriented towards continuous development and improvement. In a proactive innovation culture, it is observed that employees actively and intentionally seek out opportunities to enhance existing processes and innovate new solutions, rather than simply reacting to issues as they emerge in real-time. Such a culture, which is deeply embedded in the organizational fabric, promotes an anticipatory mindset, a quality that is primarily nurtured through the activation of leadership styles, particularly those aligned with transformational leadership principles (Kauffeld et al., 2004; Unsworth & Parker, 2002). Organizations that prioritize and promote a culture of trust, collaborative efforts and ongoing development create an atmosphere in which employees feel enabled to accept calculated risks without the looming fear of facing negative consequences in the event of failure (Jończyk, 2011). This particular approach not only strengthens the commitment of employees to the organization's goals but also fosters a greater alignment with the broader innovation strategies that the organization has set forth, thereby ensuring that significant efforts and resources are consistently directed towards long-term innovation initiatives that are vital for maintaining a competitive edge in the market (Eckermann et al., 2003).

To successfully deduct the research hypotheses, it is vital to undertake an investigation of the individual latent constructs identified within the current study, as well as their complex relationships with organizational performance. The previous discussion has emphasized the pivotal interplay between organizational structure, innovation culture and performance influenced by dynamic environments. A comprehensive understanding of these constructs will enable the acquisition of valuable insights regarding the effective navigation of VUCA environments by organizations and the enhancement of their overall performance. To provide a more thorough elucidation of these dynamics, the latent constructs and their impact towards the organizational performance will be explored individually. Based on that the research hypothesis will be derived.

2.3.3.1 Organizational Structure and Organizational Performance

As already defined in chapter 2.1.1, organizational structure as the main predictor in the research model at hand (see Figure 2) serves as a so called Higher-Order Construct (HOC) which is characterized on a continuum between mechanistic and organic properties and further operationalized through three Lower-Order Constructs (LOC), i.e. the degree of standardization/configuration, of decision autonomy and of cross-functional integration. The conceptual model assumes that key characteristics of organic structures include decentralized decision-making, high cross-functional integration via horizontal and informal communication and decision autonomy via dynamic role definitions. In contrast, mechanistic structures are characterized by rigid configuration (formalization/ standardization), centralization of decision making and low cross-functional integration. Thus, for the purpose of hypotheses development the state-of-research refers primarily to empirical evidence on LOC- level and derived from this later on HOC-level relationships, i.e., LOC-level hypotheses are supposed to be later aggregated to HOC-level hypotheses.

Cross-functional Integration

Cross-functional integration is defined as the degree to which departments and units collaborate and share information. It is evident that high-performing organizations frequently employ integrative mechanisms, including liaison roles, project teams and cross-departmental workflows to ensure the alignment of goals and coordination across boundaries. The integration process has long-standing been shown to have a number of benefits, including enhanced innovation capacity, reduced redundancies and the ability to respond more quickly to complex problems (Galbraith, 1973; Lawrence & Lorsch, 1967).

Cross-functional integration enhances organizational performance through improved collaboration, coordination and communication across departments. Research demonstrates that cross functional integration positively impacts operational performance, though effects vary by performance dimension (Turkulainen & Ketokivi, 2012). In semiconductor companies, cross-functional integration creates supportive organizational cultures that drive performance improvements (Laco et al., 2024).

The integration benefits are particularly evident in new product development, where cross-functional teams achieve higher performance outcomes (Nakata & Im, 2010), though the complexity of relationships varies by project type and innovation degree (Brettel et al.,

2011). The effectiveness of cross-functional integration depends on both formal and informal integration factors while minimizing conflicts (Ferreira et al., 2019).

Beyond performance metrics, cross-functional integration enhances mission alignment through improved communication and knowledge sharing among stakeholders (Elikwu, 2019). Organizations can systematically combine knowledge management principles with cross-functional teaming to purposefully enhance knowledge flows and achieve significant improvements in cost, time and quality (Mohamed et al., 2004).

Configuration/Standardization

Standardization and formalization are terms used to describe the extent to which rules, procedures and work processes are predefined and documented creating a certain configuration of an organization. Whilst standardization ensures consistency, compliance and quality, excessive formalization has the potential to inhibit creativity and flexibility. It is imperative to strike a balance between rigid formal structures and the need for adaptability particularly in contexts where dynamism and innovation are the primary drivers of progress (Hall et al., 1967; Pugh et al., 1968).

Configuration refers to the overall structural design, including aspects such as hierarchy, span of control and departmentalization. The configuration of these systems has a profound impact on the way authority is distributed, the way tasks are grouped and the way coordination is achieved. Flat, decentralized configurations have been shown to foster autonomy and agility, while more hierarchical structures may enhance control and scalability. The optimal configuration is contingent upon organizational goals, size and market context (Daft, 2016; Mintzberg, 1979).

Research on organizational configuration's impact on performance reveals complex relationships that depend on various contingencies. Standardization generally enhances organizational performance, with studies showing positive effects across different contexts (O'Donnell & Jeong, 2000; Waheeduzzaman & Dube, 2003).

However, the standardization-performance relationship is moderated by organizational factors such as size of the organization, product homogeneity, global market penetration and coordination capabilities (Schilke et al., 2009). Formalization's impact varies across organizational life cycles, contributing to efficiency early in an organization's development but potentially hindering effectiveness in later stages (Walsh & Dewar, 1987).

Environmental characteristics and organizational design significantly influence both performance efficiency and effectiveness (Stanwick & Pleshko, 1995). Research identifies multiple effective configurations ranging from organic to mechanistic structures, with organizations benefiting from movement between these configurations rather than rigid adherence to only one type (Meuer & Rupietta, 2015). The structure-performance relationship involves both formal hierarchical elements and informal network relationships (Hunter, 2015).

Decision Autonomy

Decision autonomy, defined as the degree of discretionary power and freedom granted to organizational members in making choices within their roles, represents a critical structural characteristic that fundamentally shapes organizational performance. As organizations navigate increasingly complex and dynamic business environments, the distribution of decision-making authority has emerged as a pivotal factor influencing both effectiveness (achieving strategic objectives) and efficiency (optimizing resource utilization). Decision autonomy operates along a continuum from highly centralized structures, where decision-making authority concentrates at senior management levels, to highly decentralized arrangements that distribute decision rights across organizational hierarchies. This structural characteristic encompasses several dimensions: The scope of decisions employees can make independently, the level of authority required for approval, the speed at which decisions can be implemented and the accountability mechanisms governing autonomous choices (Aghion & Tirole, 1997).

Decision autonomy significantly impacts organizational effectiveness by improving strategic responsiveness to market changes and customer needs. When employees possess decision-making authority within their domains, organizations can respond more rapidly to emerging opportunities and threats. Frontline employees with customer interaction autonomy can address client concerns immediately, leading to higher customer satisfaction and retention rates. This responsiveness translates into improved market positioning and competitive advantage (Menon et al., 1996). Decision autonomy facilitates a utilization of distributed organizational knowledge. Employees closest to specific problems or opportunities often possess unique insights that centralized decision-makers lack. By granting autonomy, organizations tap into this distributed intelligence, leading to more informed and contextually appropriate decisions. This knowledge leverage enhances problem-solving capabilities and strategic decision quality (Grant, 1996).

Furthermore, decision autonomy promotes organizational learning by encouraging experimentation and risk-taking. When employees have the authority to try new approaches, organizations accumulate valuable learning experiences that inform future strategies. This learning orientation contributes to long-term effectiveness by building adaptive capabilities (Argyris & Schön, 1978).

Additionally, decision autonomy can significantly enhance organizational efficiency by reducing bureaucratic delays and streamlining decision processes. When employees can make decisions within defined parameters without seeking multiple approvals, organizations eliminate time-consuming bottlenecks that impede operational efficiency. This streamlined approach decreases expenses for administration and accelerates task execution (Williamson, 1983).

Recent empirical studies provide quantifiable evidence of autonomy's efficiency benefits. Modern information technologies for instance enable new forms of decision autonomy by providing real-time data, decision support tools and communication platforms. These technologies can enhance both the effectiveness and efficiency of autonomous decision-making by improving information quality and reducing coordination costs.(Brynjolfsson & McAfee, 2014).

In accordance with the principles of contingency and configuration theories, this study conceptualizes organizational structure as a higher-order construct, representing the balance between cross-functional integration, standardization and decision autonomy. These lower-order dimensions serve as definitional indicators and are validated as formative measures (see Chapter 4.4.1.2). Consequently, the structural relationships are modelled exclusively among higher-order constructs. This specification ensures theoretical simplicity and interpretational clarity, as the hypotheses concern the overall organizational structure rather than isolated dimensions.

H1a: Organic organizational structures characterized by decentralized decision-making, high cross-functional integration and strong decision autonomy are positively associated with effectiveness.

H1b: Organic organizational structures, characterized by centralized decision-making, low cross-functional integration and low decision autonomy are positively associated with efficiency.

2.3.3.2 Innovation Culture and Organizational Performance

Activating Leadership

As already defined in chapter 2.1.2, the Higher-Order Construct “Innovation Culture” can be conceptualized on a continuum between open and closed innovation, with an open-minded innovation culture supported by activating, transformational leadership and a commitment to continuous and collaborative development and a closed innovation culture prioritizing internal resources and knowledge through transactional leadership, relying on proprietary Research & Development and strict control over innovation.

Activating leadership represents a dynamic leadership approach that energizes and mobilizes organizational members to embrace innovation as a core cultural value. Unlike traditional command-and-control leadership, activating leaders function as catalysts who create conditions for innovation to flourish throughout the organization (Zhu et al., 2019).

Research demonstrates that activating leadership styles positively impact organizational performance. E.g., transformational leadership enhances both follower development and performance, with experimental evidence showing leaders trained in transformational approaches had more positive impacts on direct followers' development and indirect followers' performance compared to control groups (Dvir et al., 2002).

Similarly, transformational leadership facilitates increased organizational performance by inspiring individuals to work harder and achieve higher performance levels (Hurduzeu, 2025). Empowering leadership also positively affects organizational performance, with higher workplace leadership correlating with improved employee performance (Setiawan et al., 2020). Recent studies show that engaging with others emerges as a significant predictor of organizational performance, while leadership capabilities alone do not predict performance (Alimo-Metcalfe et al., 2008).

Additionally, this leadership style shows positive relationships with business performance, particularly among employees with greater age and seniority (Bebitoğlu, 2021). Further to that studies underline that women's leadership effectively activates performance in educational settings (Filali, 2022) and different leadership styles generally impact organizational performance through employee innovativeness and strategic vision (Htike, 2019).

Research consistently demonstrates that activating leadership styles, particularly transformational leadership, enhance organizational efficiency and performance.

Transformational leadership inspires employees to work harder and achieve higher performance levels by providing positive influence, inspirational motivation and individual consideration. This leadership approach generates greater employee involvement, resulting in higher efficiency and satisfaction that translates to improved organizational performance (Garad et al., 2022; Hurduzeu, 2025). However, literature has also shown negative correlations between an open-minded innovation culture and efficiency depending on the context. Innovation culture can affect organizational efficiency through knowledge inflows, collaboration routines and changes in governance and processes. Empirical syntheses and multi-firm studies report both efficiency gains and circumstances where opening creates costs that can reduce net efficiency, so the effect depends on organizational fit and mediating processes. While high tech organizations often benefit from sustained open-minded innovation culture when strategic alignment, collaboration routines and customer knowledge are present manufacturers and large organizations do not benefit due to an inefficient structuring of processes and collaborations resulting in duplications of work (Li et al., 2024; Stanisławski, 2022). Additionally, empowering leadership enhances employee productivity and maximizes organizational performance through improved motivation and job satisfaction (Setiawan et al., 2020).

Furthermore, research demonstrates that activating leadership, especially transformational leadership enhances organizational effectiveness. According to Lin et al. (2022) transformational leadership, which is conceptualized as a component of an activating leadership, is distinguished by its capacity to inspire, stimulate intellectually, demonstrate individual consideration and embody idealized influence. This leadership style has been demonstrated to exert a positive influence on organizational performance, characterized by heightened levels of employee motivation, engagement and commitment. Activating leaders inspire employees to achieve higher performance levels by aligning personal values with organizational goals, fostering cohesive work environments (Hurduzeu, 2025).

The relationship between leadership and organizational effectiveness extends beyond transformational approaches. Four-factor leadership theory identifies support, interaction facilitation, goal emphasis and work facilitation as key dimensions affecting organizational outcomes (Bowers & Seashore, 1966). As a result different leadership styles impact employee innovativeness and organizational task accomplishment through high-performance skills, behaviors and strategic vision (Htike, 2019). Additionally, democratic

and participative leadership approaches, combined with positive organizational culture, enhance effectiveness in non-governmental organizations (Metin & Coşkun, 2016).

Continuous Development

Continuous development as a part of an innovation culture represents an organizational philosophy and systematic approach to ongoing, incremental improvement that creates the foundational conditions necessary for sustained innovation. It encompasses both formal methodologies (such as Kaizen, PDCA cycles, and Six Sigma) and cultural orientations that embed learning, experimentation and adaptive capacity into the organizational DNA (Ghaleb, 2025; Sihombing et al., 2025).

Unlike episodic innovation initiatives, continuous development operates through small-cycle improvements supported by feedback loops, learning practices and data-driven decision-making that collectively build innovation capability and adaptive capacity. This approach transforms innovation from sporadic breakthrough events to an embedded organizational capability that emerges from accumulated incremental advances (Moses et al., 2024).

A fundamental dimension involves cultivating an organizational learning culture that emphasizes knowledge sharing, competence development and continuous skill building. Chakraborty et al. (2025) found that organizational learning culture increases knowledge sharing and employee competencies, which in turn raise organizational effectiveness through a serial mediation pathway. This learning orientation creates the intellectual infrastructure necessary for innovation by ensuring that insights and capabilities are developed and disseminated throughout the organization (Chakraborty et al., 2025).

Recent research also demonstrates that continuous organizational development initiatives positively impact organizational performance. Research has demonstrated that initiatives directed towards organizational development have the capacity to enhance a number of key performance indicators in the short term, including employee engagement, productivity and morale. In addition to these immediate benefits, such initiatives have also been shown to contribute to long-term benefits such as enhanced profitability, effective market targeting and organizational stability (Hasyim & Bakri, 2023).

Training and development programs significantly improve organizational performance through enhanced employee skills, attitudes and behaviors (Katou, 2009). The impact is

mediated by factors such as employee engagement and job satisfaction, which reduce turnover costs and improve retention rates (Pandey, 2024).

Continuous improvement processes are also fundamental for enhancing organizational efficiency and competitiveness (Jerab, 2024). However, successful implementation requires comprehensive assessment and alignment with organizational goals, as weak development processes can negatively affect performance (Al-Tarawneh et al., 2013). Organizations must adopt coordinated approaches to maximize benefits from continuous organizational development efforts (Mwanzia Mulili & Wong, 2011).

To sum up, continuous organizational learning primarily fosters organizational effectiveness, while gains in efficiency usually arise as secondary effects. It enhances an organization's ability to adapt, innovate and maintain strategic alignment with changing environments by continuously acquiring, disseminating and applying knowledge (Argyris & Schön, 1978). Through these learning processes, organizations develop dynamic capabilities meaning the capacity to integrate and reconfigure resources to achieve sustained competitiveness (Teece et al., 1997). Such capabilities strengthen innovation performance and responsiveness, enabling organizations to *do the right things* (fostering effectiveness) rather than merely *do things right* (fostering efficiency). Empirical studies confirm that organizational learning significantly improves innovation outcomes and long-term adaptability (Chen et al., 2009). Although efficiency improvements such as streamlined operations and reduced errors often emerge as by-products of accumulated knowledge and process refinement, they are not the primary intent of continuous learning systems (Chen et al., 2009).

H2a: An open-minded innovation culture is positively associated with effectiveness.

H2b: An open-minded innovation culture is positively associated with efficiency.

Innovation Culture as Mediator

Organizational structure shapes the behavioral and cognitive environment in which innovation occurs. Mechanistic structures characterized by high formalization, centralization and rigid hierarchies tend to constrain communication and individual autonomy, whereas organic structures foster flexibility, decentralized decision-making and cross-functional collaboration (Burns & Stalker, 1961). These structural attributes influence the emergence of an innovation culture, providing the framework for activating leadership

and organizational learning. An innovation-oriented culture thus acts as a mediating mechanism translating structural features into organizational outcomes. When organizational design supports open communication and continuous learning, employees are more likely to engage in innovative behaviors, which enhance effectiveness through goal achievement and market responsiveness, and improve efficiency via process optimization and resource utilization (Damanpour, 1991). Empirical evidence confirms that innovation culture amplifies the positive impact of structural flexibility on performance outcomes. Recent studies further substantiate this relationship, showing that innovation-oriented culture and leadership jointly mediate the link between organizational structure and overall performance, thereby enhancing organizational agility and adaptability (Dewi et al., 2025; Iranmanesh et al., 2021; Zeb et al., 2021). Consequently, fostering a strong innovation culture supported by effective leadership represents a critical pathway through which structural design translates into superior organizational effectiveness and efficiency.

H3a: Innovation culture mediates the relationship between organizational structure and effectiveness.

H3b: Innovation culture mediates the relationship between organizational structure and efficiency.

2.3.3.3 Environmental Context Considerations

A comprehensive review of extant scientific studies, systematically incorporating the components of VUCA (volatility, uncertainty, complexity and ambiguity), illustrates the pivotal relationship to the necessities of agility and innovation within contemporary organizational frameworks. These investigations elucidate the imperative for enterprises to foster a flexible approach to succeed within the volatile landscape of current markets (Dewi et al., 2025; Kasamani et al., 2024; Zhang et al., 2025).

Specifically, a number of studies have focused on the dynamics which are characteristics of emerging markets, the difficulties engendered by crisis scenarios and the methodologies for rehabilitation subsequent to the pandemic. These analyses emphasize the substantial moderating function that environmental dynamism exerts in influencing organizational reactions and strategies. These findings suggest that entities operating in rapidly evolving environments must demonstrate a high level of sensitivity to external transformations if they maintain their competitive standing (Beltramino et al., 2020; Nosike et al., 2024; Trieu et al., 2024).

A particular field of research has highlighted the vital role of strategic flexibility (open-minded innovation culture) and adaptive governance (organic organizational structures) as crucial mechanisms for navigating disruptive market conditions. The studies suggest that such concepts enable organizations to respond swiftly and effectively to unexpected challenges and opportunities. By emphasizing these adaptive strategies, organizations can enhance their resilience and maintain their competitive advantage in an increasingly intricate and uncertain global landscape (Ahmed et al., 2024; Tuhai, 2024).

Accordingly, the following hypothesis on the moderating effect of the environmental dynamics of VUCA can be deduced from recent state-of-the-art literature:

H4a: VUCA moderates the relationship between organizational structure and effectiveness.

H4b: VUCA moderates the relationship between organizational structure and efficiency.

H4c: VUCA moderates the relationship between innovation culture and effectiveness.

H4d: VUCA moderates the relationship between innovation culture and efficiency.

As proposed by Garg & Ma (2005) culture is having an impact on the organizational performance including effectiveness and efficiency. Their study revealed discrepancies in performance related not only to financial perspectives but also on innovation, learning and technology assessment. Based on this study it can be assumed that VUCA conditions influence how innovation culture mediates the relationship between organizational structure and effectiveness. The interplay between these components is of critical importance for organizations seeking to prosper in dynamic environments.

Further to that Patterson et al. (2022) exemplary show that a decentralized organic structure allows quicker decision-making fostering an environment where innovation can flourish amidst uncertainty. Ashraf et al. (2014) confirm that organizational innovativeness has an impact towards the effectiveness of an organization. A strong innovation culture promotes creative problem-solving, which is essential in VUCA contexts. Therefore, an open-minded innovation culture can bridge gaps in traditional organizational structures leading to improved effectiveness. Within their study they identified a moderate positive correlation between organizational innovativeness and organizational effectiveness. This suggests that

an organic organizational structure is supportive for an open-minded innovation culture that led to innovative practices consequently enhancing overall performance.

Accordingly, an additional hypothesis based on the moderation effect of VUCA can be formulated:

H4e: VUCA moderates the relationship between organizational structures and innovation culture.

While VUCA presents challenges, it also offers opportunities for organizations to innovate and adapt. In the context of a highly unpredictable landscape, companies that proactively embrace change and foster a culture of innovation are more likely to thrive (Pinto et al., 2025).

2.3.3.4 Necessary Conditions for Enhanced Performance

The interplay between organizational structure and performance has long been a central theme in organizational theory. Pioneering research by Burns & Stalker (1961) made a key distinction between mechanistic and organic organizational systems, suggesting that these structures influence performance outcomes in different contexts. In their study, 'The Management of Innovation', they demonstrated that organic structures characterized by low formalization, decentralized authority and open communication enable organizations to remain adaptive and effective in dynamic, uncertain environments. Conversely, mechanistic structures defined by rigid hierarchies, formal rules and centralized decision-making were found to enhance efficiency in stable, predictable contexts (Burns & Stalker, 1961). Thus, structural organicity or rigidity can be interpreted as a necessary condition for achieving context-appropriate performance outcomes: Organicity for effectiveness and mechanistic formality for efficiency.

This principle was further elaborated in Contingency Theory, particularly in the works of Lawrence & Lorsch (1967) and Donaldson (2001). Lawrence and Lorsch's empirical studies across industries demonstrated that high-performing organizations exhibit a structural fit between environmental uncertainty and organizational form. More organic structures were found to be essential for success in complex, dynamic industries, while mechanistic designs were found to be conducive to efficiency in stable environments (Lawrence & Lorsch, 1967). Donaldson (2001) built upon this logic, providing robust evidence that misfit between structure and environmental contingencies systematically reduces performance. It can be

posited that both organicity and mechanistic form can be conceptualized as contextually necessary antecedents of specific organizational outcomes.

The validity of this assertion is further substantiated by the consistent corroboration from empirical studies. Khandwalla (1977) discovered that organic structures are associated with adaptability and innovation, particularly in volatile markets where flexibility and effective communication are paramount. Similarly, Anderson & Tushman (1990) study demonstrated that organic configurations facilitate technological adaptation across industry cycles. In a meta-analysis encompassing 23 studies, Damanpour (1991) confirmed that low formalization and decentralized decision-making hallmarking organic structures strongly predict innovation and change effectiveness. Subsequently, Jansen et al. (2006) demonstrated that organicity is a structural prerequisite for exploratory innovation (linked to effectiveness), while mechanistic elements support exploitative innovation (linked to efficiency). Volberda (1999) advanced the concept of structural flexibility as a pivotal catalyst for responsiveness and strategic effectiveness. The author posited that organizations must preserve a certain degree of organizational complexity to sustain competitiveness in volatile environments.

Parallel research has demonstrated that mechanistic structures are indispensable for achieving efficiency in stable contexts. Adler & Borys (1996) distinguished between coercive and enabling bureaucracies, finding that well-designed mechanistic systems improve process efficiency by reducing variability. As demonstrated by Siggelkow & Rivkin (2005) in their simulation and empirical work, mechanistic coordination has been shown to enhance short-term efficiency, albeit at the expense of adaptability. Raisch & Birkinshaw's (2008) study built on the ambidexterity perspective, integrating insights from various fields to propose a novel framework for understanding organizational performance. Their study concluded that efficiency (exploitation) requires mechanistic control, while effectiveness (exploration) requires organic flexibility.

More recent meta-analyses and empirical reviews have corroborated these findings. Damanpour & Aravind's (2012) study revealed a consistent correlation between organicity and innovation, as well as adaptability. Conversely, excessive formalization was found to impede performance in the context of change. As Wilden et al. (2013) demonstrated, structural flexibility serves as a necessary contextual enabler for the effective deployment of dynamic capabilities. This effect between structural design and organization-level effectiveness is direct. In a similar way, Cameron & Quinn's (2011) study identified that clan

and adhocracy cultures which are analogous to organic structures are associated with organizational effectiveness, whereas hierarchical cultures reflecting mechanistic structures are associated with efficiency. Furthermore, Ramezan (2011) demonstrated that organic structures facilitate knowledge sharing and learning processes that enhance overall organizational effectiveness. The integration of these findings unveils a clear structural disparity between organic and mechanistic forms. Organic structures emerge as pivotal catalysts for organizational effectiveness, particularly in contexts characterized by environmental uncertainty and innovation pressure. Conversely, mechanistic structures are instrumental in fostering efficiency within stable, standardized environments.

A comprehensive review of existing studies has also revealed further characteristics that considerably facilitate the establishment of an innovation-oriented culture within organizational contexts. The principal attributes identified encompass empowerment by an activating leadership style, which cultivates a sense of ownership and autonomy among personnel and psychological safety, which promotes individuals to articulate ideas and undertake risks devoid of apprehension regarding adverse repercussions. Further to that continuous development including creativity support fosters innovative thought processes and problem-solving capabilities. These cultural characteristics are complemented by continuous reflection and continuous learning, which advance development, adaptability and risk-taking, which is indispensable for the exploration of novel opportunities and the impulse for transformative change (Zeb et al., 2021; Zhang et al., 2025). Furthermore, an open-minded innovation culture is increasingly regarded as a necessary condition for the dynamic capability that equips organizations with the necessary tools to adapt and thrive in VUCA environments.

This logic aligns conceptually with Necessary Condition Analysis (Dul, 2016), which distinguishes between necessary and sufficient causal relationships. Despite the absence of empirical studies that have directly applied NCA to the relationship between organization structure and innovation culture and performance outcomes, the contingency and innovation literatures implicitly exhibit the same asymmetric bottleneck logic. That is to say, high levels of effectiveness cannot occur without at least a threshold level of organic structure and high efficiency cannot occur without a minimum degree of mechanistic structure. This understanding provides a robust foundation for future empirical analyses, especially for applying NCA to identify critical bottlenecks in organizational structure and innovation culture that limit the achievement of high performance.

Accordingly, the following hypotheses can be deducted based on the above summarized findings on necessary conditions for the research constructs:

H5a: A minimum level of organic organizational structure properties is a necessary condition for unfolding enhanced organizational effectiveness.

H5b: A minimum level of organic organizational structure properties is a necessary condition for achieving enhanced organizational efficiency.

H5c: A minimum level of open-minded innovation culture is a necessary condition for achieving enhanced organizational effectiveness.

H5d: A minimum level open-minded innovation culture is a necessary condition for achieving enhanced organizational efficiency.

2.3.4 Summary of Interdependencies

In summary, the interplay between organizational structure, innovation culture and performance is critical in navigating the challenges posed by a VUCA environment. Recent studies emphasize that flexible (organic) organizational designs and innovation-oriented cultures significantly enhance strategic agility and competitive advantage. The research indicates that firms exhibiting adaptive structures outperform their counterparts in turbulent contexts, underscoring the necessity for further exploration of these relationships. Innovation culture, characterized by attributes such as activating leadership and continuous development serve as a vital mediator between organizational structure and performance outcomes (Badar et al., 2024; Iranmanesh et al., 2021; Lazarević & Ružičić, 2023). Furthermore, the mediating influences of organizational culture on strategic effectiveness highlight the importance of a holistic assessment of the organizational environment to overall enhance performance (Dewi et al., 2025; Iranmanesh et al., 2021; Zeb et al., 2021). In the context of mounting environmental dynamism, it has become imperative for organizations to cultivate an agile and innovative framework, thereby ensuring sustained performance and resilience within a VUCA environment (Ahmed et al., 2024; Tuhai, 2024). Acc. to the deduction of above delineated coherences of the lower order constructs overall the following hypotheses were derived (see Figure 3).

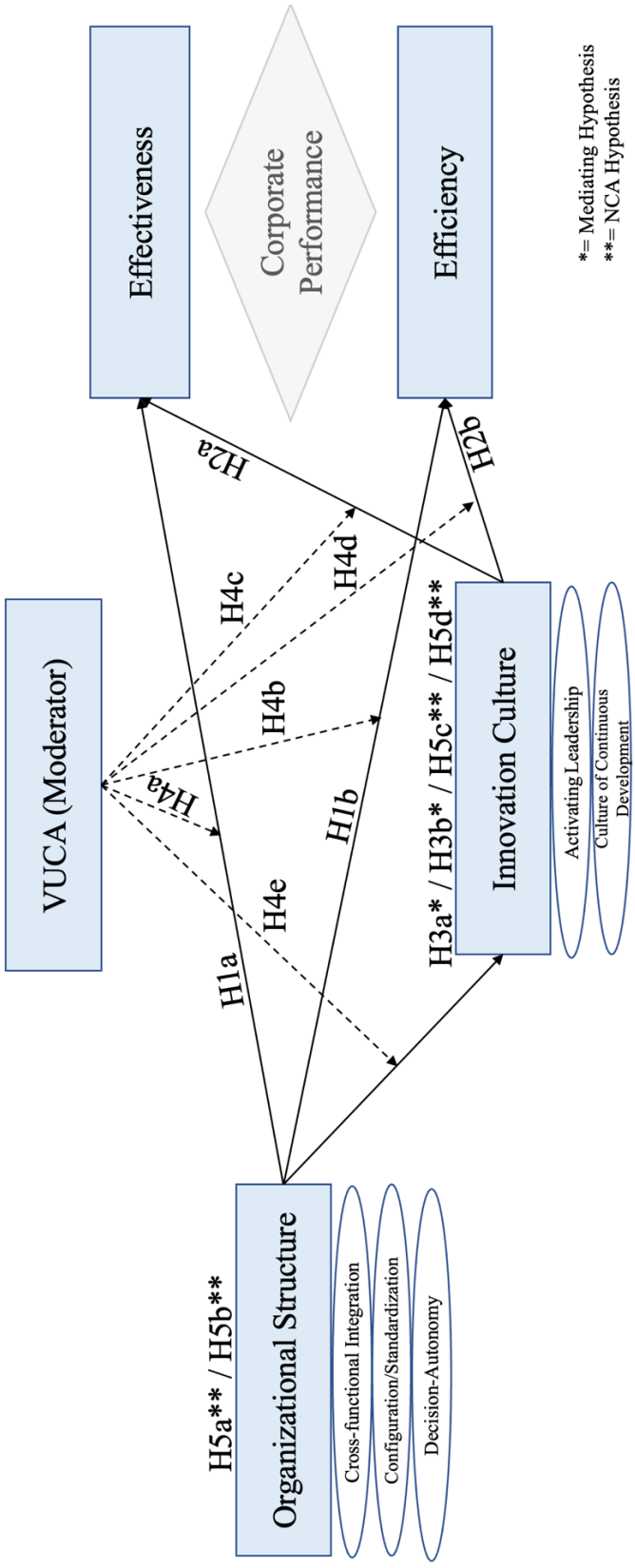


Figure 3: Research Model with Hypotheses

Source: Own representation

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Research Philosophy

This dissertation follows a deductive research approach based on state-of-the-art literature functioning as a theoretical background which is the basis for the derived hypotheses. The hypotheses derived from this literature are subjected to empirical testing using quantitative methods, specifically Structural Equation Modelling (SEM) and Necessary Condition Analyses (NCA). This deductive approach is consistent with the study's objective to validate the conceptual model, which was also derived from literature and examines the causal and conditional relationships among the key constructs of organizational structure, innovation culture and performance within a VUCA environment.

3.2 Research Design

Structural Equation Modeling (SEM) stands as a mathematical methodology that is utilized to investigate and analyze complex research models, particularly in instances where multiple relationships intricately interweave between various constructs, which is the scenario being examined in the current context. These multifaceted models are classified into two primary categories designated as covariance-based approaches and variance-based methodologies. The covariance-based SEM predominantly serves the purpose of theory testing or comparative analyses, allowing researchers to validate or contrast theoretical propositions. Conversely, the variance-based approach, which is frequently referred to as the Partial Least Squares (PLS) approach, is prevalently employed to tackle exploratory research inquiries, with the objective of predicting and clarifying constructs in a manner that enhances understanding (Boßow-Thies & Krol, 2022).

In the context of the present study, the PLS approach has been selected and adopted due to the inherent complexity of the structural model under examination both of which strongly substantiate and validate the rationale for its utilization (Hair et al., 2024).

Structural equation models (SEM) offer a graphical depiction that illustrates the intricate theoretical relationships that exist between various variables, thereby facilitating the estimation of effect coefficients and measurement errors in a coherent manner. These models hold significant value for the identification, description and examination of relationship structures, even when faced with the challenges posed by complex causal interrelationships. As a result, SEMs empower researchers to rigorously test the hypotheses that have been delineated in chapter 2.3.3 of the study.

The formulation of hypotheses entails a differentiation between independent variables, which signify the antecedents of the relationships and dependent variables, which are indicative of the consequences that arise from those relationships. However, within the framework of a causal system, the terminology evolves to encompass endogenous and exogenous variables. Endogenous variables are those that are elucidated by the system and are influenced by other variables that exist within that same system, thus serving as criterion variables that capture the outcomes of interest. In contrast, exogenous variables are not elucidated by the system itself, as they are introduced from external sources and operate as predictor variables, with the aim of providing explanations for the endogenous variables in question. Additionally, the concept of intervening variables emerges when a variable assumes the dual role of being both a predictor and a dependent variable, strategically positioned between other predictor variables within the structural model (Hair et al., 2024).

Furthermore, a distinction is made between manifest and latent variables, wherein manifest variables are those that can be objectively observed and whose characteristics can be measured in a straightforward manner. Latent variables, however, cannot be directly observed, necessitating the implementation of appropriate measurement models to accurately capture and reflect their true characteristics. In addition to the ability to accommodate non-normally distributed data, usage of formative measurement models and the inclusion of single-item measurement models that encompass nominal, ordinal and interval-scaled items, a myriad of other considerations exerted a crucial and pivotal influence in the selection of the Partial Least Squares (PLS) approach for this study (Dul, 2016).

The motivation behind the choice to employ the PLS approach was largely driven by its robust predictive capabilities, which enable the thorough examination of mediation and moderation effects making it an ideal choice for the current research context. These various considerations collectively underscore and reinforce the rationale behind the selection of the PLS approach for this research endeavor, highlighting its appropriateness in addressing the specific research objectives and questions at hand (Ali et al., 2018).

The evaluation and assessment of structural equation models necessitate a comprehensive two-step process that is designed to acertain the quality and robustness of the findings derived from the analysis (Weiber & Sarstedt, 2021). The initial step involves an examination of the outer measurement model to evaluate its reliability and validity, which are critical aspects for ensuring the integrity of the measurement process. Following this, the second step entails a thorough scrutiny of the inner structural model to assess the

relationships that exist between latent constructs, which are essential for understanding the overall framework of the model. Subsequently, the results that have been obtained from these evaluations are analyzed in order to test the hypothesized relationships that have been formulated. This sequential approach allows for a comprehensive evaluation of the model's quality, ultimately facilitating meaningful interpretations of the findings that emerge from the study. Thus, the methodology of PLS-SEM is fundamentally grounded in a form of *should-have* thinking, which is also referred to as a sufficiency approach, aimed at testing and evaluating the pre-assumed causal dependencies that occur between multiple independent and dependent variables within the structured framework of the research (Hair et al., 2024).

In addition to the approach concerning sufficiency that characterizes the modeling framework of Partial Least Squares Structural Equation Modeling (PLS-SEM), a methodology using Necessary Condition Analyses (NCA) will be conducted (see Figure 4). This approach uncovers the absolute essential conditions that must be established and maintained to guarantee the achievement of the desired outcomes that are investigated within the PLS-SEM framework, as highlighted by the work of Richter and colleagues in their 2020 publication (Richter et al., 2020).

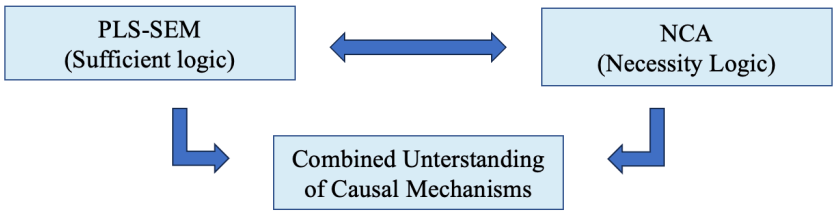


Figure 4: Interaction of PLS-SEM and NCA

Source: Own representation

Therefore, it is important to note that NCA does both concentrate on the testing of hypotheses or the modeling of causal relationships between various variables and focus on the analysis of critical success factors that are necessary for a specific outcome to manifest effectively. According to Richter et al., (2020) the theoretical underpinnings of NCA are firmly established in several crucial concepts that are paramount to its application:

- Necessary Conditions: Within the context of NCA, a necessary condition is defined as a factor that must unequivocally be present to ensure a particular outcome to take place; this implies that the absence of this condition would result in the non-

occurrence of the desired outcome. Nevertheless, it is essential to recognize that the mere presence of a necessary condition does not, by itself, ensure that the outcome will be realized, as there may be additional factors that are also required to achieve the intended result (Richter et al., 2020).

- Sufficient Conditions: In contrast to necessary conditions, sufficient conditions refer to those specific factors or unique combinations of factors that, when present, will guarantee the occurrence of the desired outcome; in simpler terms, thinking in terms of sufficiency involves focusing on what is adequate to produce a specific result (Richter et al., 2020).

The concepts of necessity and sufficiency thinking represent two fundamentally distinct approaches to understanding the intricate relationship between factors, which are often referred to as conditions and the resulting outcomes that they produce:

- Necessity Thinking: This approach is primarily concerned with pinpointing the necessary conditions that are crucial for an outcome to be realized, exemplified in a business context where having a high-quality product could be deemed a necessary condition. Without such a product, it is highly improbable that a company would achieve any significant level of success. However, it is important to acknowledge that possessing a high-quality product alone does not automatically ensure success, since other critical factors, such as effective marketing strategies or well-structured distribution channels, may also be necessary components of a successful business model (Richter et al., 2020).
- Sufficiency Thinking: Conversely, the sufficiency thinking paradigm places its emphasis on identifying the sufficient conditions that, when met, will inevitably lead to the desired outcome; for instance, in the realm of business success, having effective marketing strategies coupled with a robust distribution network may serve as sufficient conditions. If both elements are in play, the likelihood of the company achieving success increases substantially (Richter et al., 2020).

Nonetheless, it is crucial to remain open to the possibility that other influential factors, such as the existence of a competitive product or the presence of talented employees, may also contribute to overall success. Therefore, in the context of this research it is important to highlight the combined utilization of partial least squares structural equation modeling (PLS-SEM) alongside necessary condition analysis (NCA) which collaboratively empowers

researchers to delve into and validate hypotheses that adhere to a sufficiency logic, in addition to those hypotheses that are derived from a necessity logic (Richter et al., 2020).

3.3 Operationalization of Constructs and Measurement Model

The operationalization of the research model is the critical step for valid research. Based on a detailed and systematic literature review within a first step papers analyzing the specific relationships between the latent constructs in scope were identified. Those papers usually refer to questionnaires used in the past to measure impacts between certain latent constructs. Using these scientifically verified and well-known questionnaires (Cronbach's alpha as a proof of reliability checked with min. requirement >0,708), which usually apply Likert scales, are building the basis for the operationalization of the research model.

All scales used within this research were identified in high quality papers and operationalize the relevant lower order constructs by generalizing statements to specific topics. On this basis the scales measure the level of agreement or disagreement of the test persons with the particular Likert scale which shows a certain level of (dis-)agreement.

The same approach is chosen within the quantitative research since the existing scales used in high-reputation journals can be considered as high-quality and evaluated starting point to set up a questionnaire focusing on the latent variables of the scientific research model enabling proactive strategies by using existing and standardized items for the survey to collect reliable data.

Based on all the knowledge and findings mentioned above, an open survey oriented on existing scales and items was conducted to measure the impacts of VUCA on the relevant latent constructs interplaying and potentially impacting the performance of an organization.

Only the most highly regarded and reputable journals, known for their stringent peer-review processes and high academic standards, were utilized as a solid and high-quality foundation for the scales that were employed to effectively operationalize the latent research constructs, ensuring that the research is grounded in credible and reliable sources. Furthermore, the reliability of the constructs was ensured by verifying Cronbach's Alpha or Composite Reliability, thereby guaranteeing that the scales employed in the study maintained a high level of reliability, a prerequisite for the validity of the research findings. The following scales (see Table 1), which were carefully selected and validated, were used for the operationalization of the relevant constructs within the study. All scales were available in English language and were translated to German language for a bilingual survey conduction.

Table 1: Reliability of utilized Scales

Higher Order Construct	Lower Order Construct	Origin	Composite Reliability	Cronbach's Alpha
Organizational Structure	Cross-functional Integration	Zacharia & Mentzer (2004)		0,876
	Configuration	Pereira-Moliner et al. (2016)	0,855	
	Decision Autonomy	Delery & Doty (1996)		0,800
VUCA	Volatility	Fridgeirsson et al. (2021)		0,920
	Uncertainty	Fridgeirsson et al. (2021)		0,860
	Complexity	Fridgeirsson et al. (2021)		0,900
	Ambiguity	Fridgeirsson et al. (2021)		0,880
Innovation Culture	Activating Leadership	Kauffeld et al. (2004)		0,810
	Culture of Continous Development	Siegel & Kaemmerer (1978)		0,940
Effectiveness	Flexibilty	Lee, et al. (2015)		0,972
	Goal Allignment	Lee, et al. (2015)		0,921
	Organizational Resillience	Bohn, J. (2010)		0,935
Efficiency	Competitiveness	Bardi et al. (1994)		0,870
	NPD Performance	Griffin & Page (1993); Zahra & Covin (1993)		0,910
	Team Performance	Kostopoulos, et al. (2013)		0,920

Source: Own representation

The initial operationalization deviates from the final research model. To ensure an accurate overview the initially used scales for operationalization can be found. As depicted in chapter 4 certain constructs were adjusted and optimized based on item dropping. The final set of constructs can be found in Table 1.

For operationalization of the exogenous construct organizational structure three existing Likert scales were used. The seven level Likert scale from Zacharia & Mentzer (2004) which has a good Cronbach's Alpha of 0,876 was used to operationalize the lower order construct cross-functional integration with five items. Pereira-Moliner et al. (2016) seven level Likert scale from their study on organizational design with a Composite reliability of 0,855 was used to operationalize the lower order construct configuration with 11 items. The lower order construct decision autonomy was also operationalized by a seven level Likert scale from Delery & Doty's (1996) study on modes of theorizing in strategic humas resource management. Thes four items show a good Cronbach's Alpha of 0,800. All lower order constructs of the higher order construct VUCA covering volatility, uncertainty, complexity and ambidexterity were measured based on a Likert scale from Fridgeirsson et al. (2021) who created a VUCA Meter to measure the environmental dynamics within their case study. This scale is based on a total of 20 items and shows a good to excellent reliability (Cronbach's Alpha 0,880 - 0,920). Innovation culture was operationalized by two lower order constructs. Based on the six level Likert scale used within the study from Kauffeld et al. (2004) on innovation climate the lower order construct activating leadership and continuous reflection were operationalized by a total of 11 items with a good Cronbach's Alpha of 0,810. Culture of continuous development was operationalized by the Siegel Scale

of Support for Innovation (Siegel & Kaemmerer, 1978). This six level scale has an excellent reliability with a Cronbach's Alpha of 0,940. Effectiveness was operationalized by seven lower order constructs and 25 items. Performance as a lower order construct of effectiveness, was operationalized based on the study on coping mechanisms for the dynamics of an environment in production and operation management. This seven level Likert scale shows a good Cronbach's Alpha of 0,830. Based on the study from Kostopoulos et al. (2013) team performance was operationalized with a good to excellent reliable seven level Likert scale. New product development performance has been operationalized by a study from Griffin & Page (1993) based on a report on measuring product development success and failure with excellent reliability with a Cronbach's Alpha of 0,910. A seven level Likert scale was used to operationalize agility covering the lower order constructs flexibility and goal alignment. This study from Lee et al. (2015) on ambidexterity impacting organizational agility shows acceptable to good reliabilities. The lower order construct target orientation from Cantu (2007) bases on a five level Likert scale with a good reliability of 0,850 (Cronbach's Alpha). Efficiency was operationalized by the lower order constructs comparative organizational performance, adaptability and decision making. Comparative organizational performance has been operationalized with three items with a five level Likert scale based on study of Bardi et al. (1994) on logistics information systems with a good Cronbach's Alpha of 0,870. With an excellent Cronbach's Alpha of 0,972 adaptability has been operationalized based on the above mentioned study from Lee et al. (2015). Decision-making marking the third initial lower-order construct operationalizing efficiency is based on Bohn's (2010) study on the development and explanatory validation of an organizational efficacy scale. This six-level scale also has an excellent reliability with a Cronbach's Alpha 0,935. The entire survey instrument can be found in Annex 1.

The Likert scales that were employed within the existing body of literature exhibit a range of different potential levels of acceptance, varying in the number of response options provided. However, to ensure a high level of reliability throughout the research process, the scales were retained in their original structure. This resulted in the scales applied in the study differing in the amount of response options, ranging from a minimum of four to a maximum of seven. This ensured that the data collected is both robust and reliable.

4 EMPIRICAL ANALYSIS AND RESULTS

4.1 Sampling

The survey was carried out via the internet, utilizing the capabilities of a website known as SosciSurvey.de, with the primary aim of achieving a minimum sample size that meets or exceeds n ≥ 153 participants, a threshold that was determined by employing the statistical tool G*Power sample size calculator (Faul et al., 2009). The establishment of this minimum sample size is based on a linear multiple regression model, which is determined through a thorough a priori power analysis that sets an effect size benchmark of $f^2 = 0,15$.

Nevertheless, in an effort to ensure that the study is scientifically robust and of high quality, the researcher sets a more ambitious goal of recruiting at least 400 participants who would complete a standardized online questionnaire designed for the study.

The study has been conducted from February 2025 until including May 2025 and was available in German and English language to increase the number of potential participants. The survey consisted of seven pages, two of them for general information each one page in the beginning and the end section (full survey can be found in Annex 1).

After the agreement for data protection and optional social demographics the Likert scales for measuring the latent variables / key elements of the research model were presented. In total 110 items were tested. The average duration of the survey was 12 minutes for the participants.

Since some of the terms and concepts used within the items were not self-explanatory for participants outside this search field, a short explanation has been prefixed for each latent variable.

Ultimately, a total of 428 participants actively engaged in the survey, contributing valuable data for analysis. The items included in the survey were specifically designed to measure the hypotheses and were subjected to rigorous testing through various tests and analyses conducted within the framework of a structural equation model, utilizing sophisticated computer programs such as SmartPLS. This program provides researchers with the ability to formulate, assess and measure specific relationships that exist between distinct characteristics of organizational structure, the culture of innovation and performance indicators such as effectiveness and efficiency, all while considering the moderating effects presented by a VUCA environment. Furthermore, SmartPLS empowers researchers to

perform comprehensive multivariate analyses, thereby enhancing the depth and reliability of the findings.

4.2 Data Preparation

The final data set, which was assembled and provided by the online survey platform SosciSurvey.de in the widely used and accessible format of a CSV file, was intended to be processed using an information and data processing software such as Microsoft Excel, which was chosen for its analytical capabilities. In a first step of this comprehensive data processing journey, every single data set was examined for completeness to ensure that no critical information was overlooked or omitted in the analysis. If it was determined that any particular data set was less than 90 % complete, that specific data set was systematically filtered out and excluded from the final compilation of data sets, thereby ensuring the integrity and reliability of the overall data. All the data that remained and fell within the 10 % threshold of partially completed data sets underwent a manual completion process, where the median response for each specific item was entered to fill in the gaps and enhance the dataset's overall robustness.

Furthermore, to identify any unengaged or inattentive responses, a calculation of the standard deviation for each data set was conducted, providing insights into the variability of responses provided by participants. Specifically, data sets that exhibited a standard deviation of less than 0,5 were filtered out, as the minimal deviation among the participants' answers suggested a concerning lack of diversity in individual responses and raised questions about the validity of the dataset.

A check for univariate outliers was performed by examining the Z-standardized values (standard deviations from the mean). No values with $Z > 3$ were identified, indicating that no significant univariate outliers were present (Hair et al., 2024).

In the final step of this process, a careful recoding of items (for item code list see Annex 2) that had been formulated in a reverse manner was executed, ensuring that all items were accurately aligned and consistent for analysis. This included the items AM01_01_rc, AM01_02_rc, AM01_03_rc, AM01_04_rc, AM01_05_rc, CD01_07_rc, CD01_08_rc, CD01_09_rc, CO01_01_rc, CO01_02_rc, CO01_03_rc, CO01_04_rc, CO01_05_rc, DM01_01_rc, DM01_02_rc, DM01_03_rc, OE01_14_rc, OE01_15_rc, OE01_16_rc, OE01_17_rc, SF01_04_rc, SF01_05_rc, UN01_02_rc, UN01_03_rc, UN01_04_rc, UN01_05_rc, VO01_01_rc, VO01_02_rc, VO01_03_rc, VO01_04_rc, VO01_05_rc.

4.3 Descriptive Statistics

4.3.1 Sample Description

The 428 participants (see Figure 5) show a relevant share of female participants with 70,5 % (301). 28,8 % (123) of the participants were male and 3 participants diverse (0,7 %).

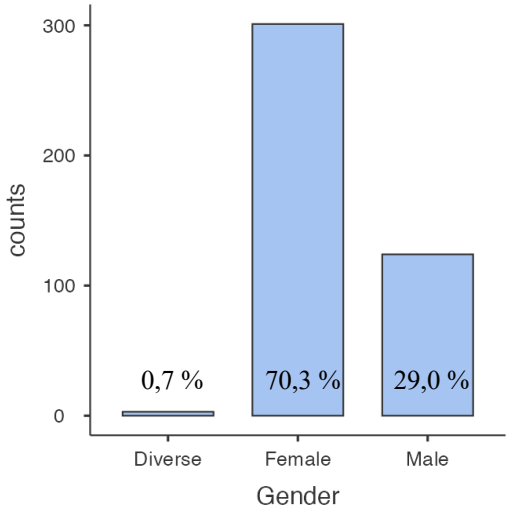


Figure 5: Visual Distribution of Gender

Source: Own representation

The minimum age for participation within the survey was 18. The oldest participant was aged 68. The highest share of participants was aged between 20 and 30 covering 298 persons (69,7 %). Due to the large number of ages, no tabular overview will be displayed next to Figure 6.

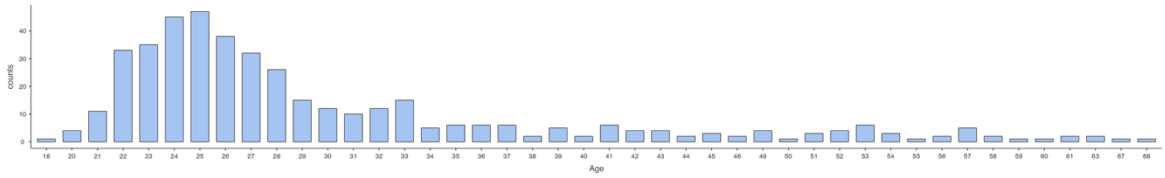
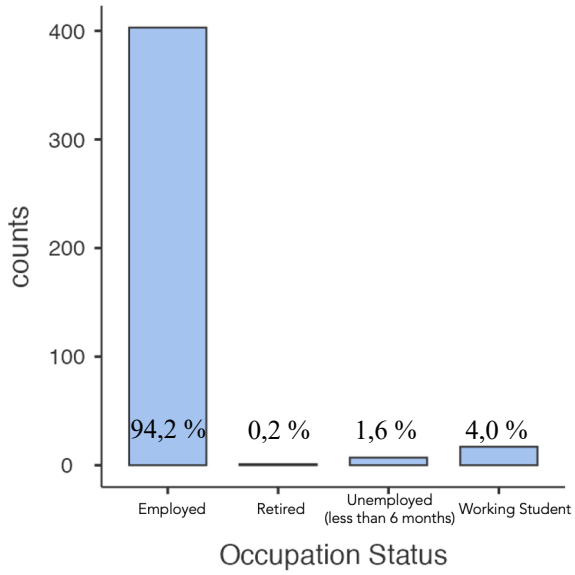


Figure 6: Visual Distribution of Age

Source: Own representation

To ensure that alle data sets can be considered professionally relevant the participants were also requested to specify their employment status. With this socio democratic data, it can be ensured that the person participating is currently or has been actively working within an organization within the past 6 months. This information ensures that the participant is aware

of the structures and culture within an organization they are referring to when rating their level of agreement or disagreement within the Likert scales. It needs to be underlined that in total 17 participants stated they are currently not having a full-time job but work in an organization as a working student which is why those participants were also counted into the data set. Further to that one participant is already retired but stated in the open comment section that the latest work experiences were collected less than six months ago (see Figure 7).



Source: Own representation

Figure 7: Visual Distribution of Occupation Status

4.3.2 Descriptives of Key Constructs

The descriptive statistics (see Table 2) consolidate the mean (M), standard deviation (SD) and median for the HOC and LOC variables.

Overall, the variables under VUCA (Volatility, Uncertainty, Complexity, Ambiguity) exhibit the lowest average means in the table, suggesting these challenges are perceived as less dominant compared to other capabilities but VUCA as well has been the only construct operationalized by a four level Likert Scale. Therefore, the overall environmental dynamic is perceived high by the participants. Complexity has the highest mean in this group (M = 2,58) and a Median of 3, indicating a slightly negative skew (left-skew) towards higher values. Conversely, Uncertainty shows the lowest variability (SD = 0,492) of all variables measured.

In contrast, the capabilities grouped under structure, culture, and effectiveness generally show the highest means, suggesting a strong presence of these traits. Variables like configuration (M = 4,84), cross-functional integration (M = 4,74), and team-performance (M = 4,97) are near the maximum possible value with Medians of 5. This extreme position suggests a positive skew (right-skew), where the majority of responses clustered at the high end of the scale. Despite these high means, cross-functional integration (SD = 1,267) and flexibility (SD = 1,294) show considerable variability.

The efficiency variables, competitiveness (M = 3,72) and NPD-performance (M = 3,71), have similar means, with their Medians (both 4) being higher than their means, indicating a minor negative skew. Notably, NPD-performance shows the highest variability of all variables measured (SD = 1,491), followed by goal alignment (SD = 1,332), signaling the greatest divergence in responses for these two capabilities.

Taking the continuum of organizational structure into consideration the data set at hand suggest a rather ambidextrous to organic characteristic followed by culture also suggesting a rather ambidextrous to open-minded characteristic.

In summary, the data reflect a strong perceived environmental dynamic alongside with usual distributions of the remaining constructs.

Table 2: Descriptives of Key Constructs

HOC	LOC	M	SD	Median
VUCA	Volatility	2,32	0,609	2
	Uncertainty	2,41	0,492	2
	Complexity	2,58	0,555	3
	Ambiguity	2,33	0,628	2
Structure	Decision-Autonomy	4,52	1,112	5
	Configuration	4,84	1,194	5
	Cross-functional Integration	4,74	1,267	5
Culture	Activating Leadership	4,53	1,100	5
	Continous Development	3,65	0,900	4
Effectiveness	Flexibility	4,71	1,294	5
	Goal Allignement	4,08	1,332	4
	Organizational Resillience	4,24	0,839	4
Efficiency	Competitiveness	3,72	0,751	4
	NPD-Performance	3,71	1,491	4
	Team-Performance	4,97	1,051	5

Source: Own representation

4.4 Quality Evaluation of the PLS-SEM

4.4.1 Assessment of the Outer Measurement Models

The evaluation and assessment of measurement models can differ significantly based on whether these models are specified reflectively, where the indicators are seen as manifestations of underlying constructs or formatively, where the indicators are viewed as components that collectively define the construct (Weiber & Sarstedt, 2021). Each classification adheres to its own unique set of considerations and principles, which leads to the implementation of different quality criteria tailored to ensure the integrity and efficacy of the measurement process. To accurately determine the specific nature of the measurement models in question, a confirmatory tetrad analysis (CTA) was performed utilizing the capabilities of SmartPLS4. The results of this comprehensive analysis indicated that there are both reflective and formative constructs identified. Based on the help of the CTA the p-values of each item were reviewed. If minimum 80 % of the p-values were not significant, a reflective construct was at hand. If < 80 % of the tetrad p-values were not significant a formative construct was assumed (Gudergan et al., 2008). The data set at hand showed that the latent constructs of organizational structure and effectiveness are formative whereas innovation culture, VUCA and efficiency are reflective.

Furthermore, the confirmatory tetrad analysis is recognized as an invaluable method for substantiating the reflective characteristics of the majority of measurement models, consequently instilling a greater sense of confidence in the subsequent stages of data analysis and interpretation processes that will follow. Therefore, considering the critical importance attributed to the current measurement model under review, the next subchapters will not only concentrate exclusively on the quality assessment pertaining to measurement models that have been specified reflectively but also formative. The primary focus of reflective measurement models is on indicator reliability, internal consistency reliability, convergent reliability and discriminant validity. By contrast, formative measurement models assess indicator collinearity, indicator significance and convergent reliability.

4.4.1.1 Assessment of Reflective Constructs

With the help of factor loadings, Cronbach's Alpha, Composite Reliability and the Average Variance Extracted (AVE) the validity and reliability can be assessed at the construct level for reflective measurement models. The thresholds for Cronbach's Alpha and Composite Reliability were set at 0,708, suggesting that the reflective measurement models exhibit

satisfactory internal consistency and reliability (Hair et al., 2024). AVE represents the variance in an indicator that can be attributed to a latent construct. It indicates the proportion of an indicator's variance that can be attributed to the construct. A value of 0,5 is typically considered the minimum threshold (Chin & Marcoulides, 1998; Ohlwein, 1999). Once the AVE reaches this value, the construct is responsible for the explanation of a minimum of 50 % of the variance in the indicator (see Table 3). For formative constructs no Cronbach's Alpha, Compositive Reliability and AVE can be calculated (for further details see Chapter 4.4.1.2).

Table 3: Construct Reliability and Validity

Reliability and Validity	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Efficiency	0,853	0,866	0,886	0,530
Innovation Culture	0,923	0,924	0,936	0,619
VUCA	0,911	0,914	0,924	0,506

Source: Own representation

By examining the external loadings, the indicator reliability can be assessed. It indicates the extent to which variables are loaded by their indicators. As mentioned above according to Hair et al. (2012) a loading value of min. 0,708 is desired. However, in social and economic sciences also loadings >0,6 are mostly considered sufficient (Boßow-Thies & Panten, 2009; Chin & Marcoulides, 1998). Next to the magnitude of the loadings it is also important to check their statistical significance. Therefore, all p-values for indicator loadings need to be <0,05 according to the significance level.

To test for significance a predefined number of random subsamples is drawn from the original data including replacement. This method is called bootstrapping. All indicators which did not meet the above defined criteria were removed from the data set. However, this has been performed within a two-stage approach where in a first step all indicators below 0,4 were removed. In a second step all loadings between 0,4 und 0,7 were considered according to their impact on the internal consistency reliability so that even indicators below 0,7 stayed within the model since the average of the loadings still surpasses 0,7.

Focusing on item indicator reliability of the data set attached a total of 53 items has been used for the research model after quality assessment. All of these items are highly significant

with a p-value = 0,000. The loadings of these items range from 0,367 (AG01_05 -> Effectiveness) to 0,850 (DM01_07 -> Structure). It is imperative to emphasize that items exhibiting moderate loadings must also be incorporated into the research model. The present study posits that the exemplary DM01_07 model plays an essential role in the research, as it can depict a conceptual facet of decentralized decision-making within an organizational structure. Therefore, in confirmatory models, it is also necessary to consider the theoretical coverage in addition to the statistical criteria. Moreover, it is important to note that, according to the original study data, the item reliability has proven to be more effective. This suggests the possibility that due to a potentially heterogeneous sample the loading may deviate from the true population loading.

Further details can be found in Annex 3.

In addition to the above-mentioned measurements, discriminant validity has been assessed for the purpose of identifying whether the property of a construct is independent from other constructs. Based on the pertinent literature the Fornell-Larcker criterion is a well-known instrument for identifying cross loadings. According to Hair et al. (2012) when using the Fornell-Larcker criterion "the square root of the AVE is compared to the correlations of the latent variables, where the square root of the AVE of each construct should be greater than its highest correlation with any other construct" (Hair et al., 2017, p. 100). The application of the AVE is to verify whether the constructs show a higher degree of variance with the designated indicators than other constructs do with these same indicators in a model. However, since this method often shows weaker results, HTMT (Heterotrait-Monotrait Ratio) was used (see Table 4). HTMT is a more modern, correlation-based and more reliable method for assessing discriminant validity.

In general, the HTMT can be defined as the ratio of between-construct correlations (heterotrait-heteromethod) to within-construct correlations (monotrait-heteromethod). By calculating correlations between indicators across different constructs and dividing them by correlations from the same construct the HTMT is tested. Values <0,85 are considered strict, values <0,90 are considered liberal. If the value is higher than that an overlapping is indicated which shows a lack of discriminant validity (Henseler et al., 2015).

Within the present data all values can be considered strict according to Table 4. For formative constructs no HTMT can be presented (further details can be found in Chapter 4.4.1.2).

Table 4: Discriminant Validity

HTMT	Efficiency	Innovation Culture	VUCA	VUCA x Structure
Innovation Culture	0,688			
VUCA	0,577	0,681		
VUCA x Structure	0,232	0,332	0,205	
VUCA x Innovation Culture	0,199	0,355	0,271	0,831

Source: Own representation

4.4.1.2 Assessment of Formative Constructs

The quality assurance of a formative measurement model differs substantially from that of a reflective model, because formative indicators cause the construct rather than reflect it. Consequently, conventional reliability metrics such as Cronbach's Alpha or Composite Reliability are no longer applicable in this context. Conversely, the quality of a model's formative capacity is evaluated based on criteria such as content validity, multicollinearity, indicator relevance and external validity (Hair et al., 2012).

Within formative constructs in a first step also indicator significance and relevance are assessed by reviewing the outer weights after bootstrapping (see Annex 4). The outer weights of the 53 items at hand differed from -0,125 to 0,461. However, for an assessment of the formative constructs only those items were relevant for review at this stage that illustrate the formative constructs organizational structure and effectiveness. Organizational structure is reflected by six items with weights ranging from 0,129 to 0,461. The average weight was 0,224. Effectiveness is reflected by 10 items with weights ranging from -0,125 to 0,140. The average weight was 0,046. It is important to say that negative weights indicate an inverse relationship between two variables. Negative values do not imply a model error. According to Petter et al. (2007) content validity is the decisive measure to ensure accuracy of the indicators to capture the domain of the constructs.

Next to the outer weights the indicator collinearity was checked by VIF (Variance Inflation Factor). When using VIF each predictor is regressed on all the other predictors. VIF measures how much variance of a predictors estimated coefficient is inflated because of collinearity. According to Kock (2015) a VIF >3,3 is an indication that the model is contaminated with collinearity. However, in economic science values <5 are also acceptable (Diamantopoulos & Riefler, 2008; Hair et al., 2012). Details can be found in Table 5 with all values meeting above defined criteria.

Table 5: Multicollinearity

Collonearity Statistics	VIF	Collonearity Statistics	VIF
AD01_01	2,516	**CN01_04**	2,233
AD01_03	2,744	**CO01_05_rc**	1,809
AG01_02	2,160	**DM01_06**	1,996
AG01_03	2,239	**DM01_07**	1,857
AG01_04	2,429	**OE01_01**	2,333
AG01_05	2,095	**OE01_02**	2,266
AG01_06	2,926	**OE01_04**	2,751
AG01_07	3,829	**OE01_05**	3,628
AG01_08	4,273	**OE01_06**	3,943
AG01_09	4,425	**OE01_07**	2,895
AL01_01	4,028	**OE01_08**	2,393
AL01_02	4,611	**OE01_09**	2,342
AL01_03	4,146	**OE01_11**	2,017
AL01_04	3,863	**OG01_02**	2,103
AL01_06	1,929	**OG01_03**	2,126
AM01_01_rc	2,210	**PD01_01**	3,819
AM01_02_rc	2,422	**PD01_02**	4,244
AM01_03_rc	2,146	**PD01_03**	2,878
AM01_04_rc	1,605	**TG01_02**	1,411
AM01_05_rc	1,987	**TP01_05**	1,399
CD01_02	2,612	**UN01_03_rc**	1,918
CD01_04	2,813	**UN01_04_rc**	2,403
CD01_06	3,117	**UN01_05_rc**	2,205
CD01_10	2,558	**VO01_02_rc**	1,638
CI01_03	1,674	**VO01_04_rc**	1,623
CI01_05	1,539	**VO01_05_rc**	2,079
CN01_03	2,359		

Source: Own representation

4.4.2 Inner Structural Model Assessment

4.4.2.1 Quality Criteria for Inner Structural Model

To verify the quality of the inner structural model multicollinearity (VIF), the path coefficients significance, the explained variances of the endogenous constructs (R^2), the effect sizes (f^2) and the predictive relevance (Q^2) of the model were tested.

The key criterion within the evaluation of a structural model is the coefficient of determination R^2. The explanatory power for in-sample-data R^2 is indicating the degree of the variance of a latent endogenous variable that is described by the associated exogenous variables. There is also a corrected R^2 available in science, which is called the adjusted coefficient of determination (R^2adj). This value is recommended to use since the R^2 is afected by the amount of regressors (Hair et al., 2012). The R^2 value ranges from 0 to 1 and should range from 0,25 to 0,75 according to Chin & Marcoulides (1998). The values are generally considered as weak >0,19, moderate >0,33 und substantial >0,67.

Within the model at hand all R^2adj of the endogenous variables can be considered moderate to substantial (see Table 6).

Table 6: Coefficient of Determination

Level of Determination R^2	R-square	R-square adjusted
Effectiveness	0,629	0,625
Efficiency	0,466	0,459
Innovation Culture	0,674	0,672

Source: Own representation

Next to the coefficient of determination the effect size f^2 was considered when evaluating the inner structural model. The effect size represents the strength of the influence of a latent exogenous variable on the explained variance of a latent endogenous variable. To check for the effect size the impact of removing an exogenous construct on the explained variance (R^2) of the endogenous construct is measured. When comparing the R^2 with the exogenous construct in the SEM and once without it in the SEM the effect on the explained variance of the endogenous construct (f^2) can be measured. These values of f^2 can range from f^2 >0,02 small influence to f^2 >0,15 medium influence to f^2 >0,35 large influence (Chin & Marcoulides, 1998; Cohen, 1988). As depicted in Table 7 the effect sizes of the present study were strongly fluctuating showing small and even large influences indicating that innovation culture shows the highest impact on the R^2adj values of their respective target constructs.

Table 7: Effect Size

Effect Size f^2	Effectiveness	Efficiency	Innovation Culture
Innovation Culture	0,208	0,183	
Structure	0,014	0,002	0,716
VUCA	0,111	0,062	0,211
VUCA x Structure	0,003	0,012	0,003
VUCA x Innovation Culture	0,001	0,014	

Source: Own representation

The above presented values provide information about the explanatory power of a model within the sample at hand. However, all of these values do not provide any information to the extent to which the model can make assumptions about observations outside the sample. Q^2, which is called the Stone-Geisser Criterion, is a value to forecast the accuracy of data

outside of the sample at hand (Chin et al., 2020). Within SmartPLS the PLSpredict method is able to calculate Q^2. When applying this method, the sample was divided into a manually defined number of parts of equal size. The calculations shown below do always refer to 10 equal portions. When using the method PLSpredict utilizes 9 of the 10 portions called training sample and estimates the missing sample portion called holdout sample (Sarstedt et al., 2021). This process is repeated the number of times as portions were manually chosen until each part was once used as a holdout sample. The result of this process is the Q^2predict value (see Table 8). This process was done for both latent variables and manifest variables. When focusing on the latent variables values for Q^2 should be >0 (Hair et al., 2024). Values <0,25 indicate a low accuracy in forecasting whereas values >0,5 show a high forecast accuracy (Hair et al., 2024). The latent variables at hand indicated a medium to high forecast accuracy with the highest value for innovation culture (0,661).

Table 8: Forecast Accuracy Latent variables

Q^2 (LV)	Q^2predict	RMSE	MAE
Effectiveness	0,496	0,714	0,543
Efficiency	0,350	0,811	0,635
Innovation Culture	0,661	0,586	0,464

Source: Own representation

However, for a profound interpretation of the PLSpredict results multiple steps must be considered. For the latent variables (LV) all values need to be >0. If the values are not >0 the variable has no predictive relevance. In a next step for the manifest variables (MV) a comparison of prediction errors of the PLS-SEM model and a naive linear model (LM) is done. There are two statistic values which must be considered called (Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE). The RMSE is utilized when the prediction errors show a symmetric distribution. If the distribution is deviating from symmetry the MAE is used. The data at hand showed a rather symmetric distribution when checking the histograms of the manifest variables which is why the RMSE was used.

For the final evaluation of the predictive power of the model according to Sarstedt et al. (2021) it is vital to ensure that none of the PLS-SEM RMSE values on the level of Manifest Variables (MV) are lower than the associated LM RMSE values to prevent the model from a lack of predictive power. If only a minority of the PLS-SEM RMSE values are lower the model has a low predictive power. In addition, it has been determined that in instances where

the majority of PLS-SEM values are lower than the associated LM RMSE values, the model exhibits medium predictive power. It is evident that a high predictive power is present if all values of PLS-SEM RMSE are lower than the associated LM-RMSE values. For the indicators at hand according to Table 9 only six of the 35 PLS-SEM RMSE indicators were larger than their corresponding LM RMSE resulting in a medium predictive power of the model.

Table 9: Forecast Accuracy Manifest Variables

Q^2 (MV)	Q^2predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
AD01_01	0,241	1,244	0,945	1,265	0,956
AD01_03	0,217	1,321	1,058	1,363	1,085
AG01_02	0,227	1,403	1,125	1,435	1,143
AG01_03	0,214	1,432	1,174	1,439	1,171
AG01_04	0,180	1,500	1,217	1,526	1,248
AG01_05	0,046	1,669	1,381	1,675	1,346
AG01_06	0,164	1,575	1,292	1,584	1,296
AG01_07	0,189	1,554	1,241	1,598	1,273
AG01_08	0,141	1,626	1,299	1,671	1,333
AG01_09	0,212	1,456	1,145	1,468	1,155
OE01_01	0,261	0,991	0,773	1,014	0,784
OE01_02	0,295	1,041	0,806	1,066	0,822
OE01_04	0,375	0,925	0,703	0,942	0,719
OE01_05	0,337	0,924	0,708	0,924	0,714
OE01_06	0,381	0,873	0,659	0,890	0,672
OE01_07	0,396	1,000	0,785	1,009	0,787
OE01_08	0,269	0,972	0,779	0,998	0,793
OE01_09	0,298	1,028	0,819	1,056	0,834
OE01_11	0,292	1,090	0,872	1,101	0,866
OG01_02	0,104	0,863	0,683	0,886	0,694
OG01_03	0,069	0,828	0,611	0,847	0,618
PD01_01	0,104	1,630	1,324	1,658	1,340
PD01_02	0,107	1,700	1,379	1,713	1,419
PD01_03	0,092	1,530	1,243	1,551	1,261
TG01_02	0,340	0,858	0,698	0,827	0,660
TP01_05	0,283	1,217	0,958	1,240	0,954
AL01_01	0,491	0,859	0,651	0,838	0,616
AL01_02	0,483	0,908	0,705	0,885	0,666
AL01_03	0,534	0,859	0,669	0,848	0,649
AL01_04	0,436	1,006	0,770	0,999	0,739
AL01_06	0,435	1,043	0,812	1,032	0,791
CD01_02	0,268	1,175	0,941	1,205	0,959
CD01_04	0,334	1,042	0,834	1,062	0,844
CD01_06	0,385	1,062	0,842	1,074	0,846
CD01_10	0,326	1,017	0,796	1,030	0,805

Source: Own representation

4.4.2.2 Path Coefficients (Direct Effects)

The utilization of the PLS-SEM algorithm is essential in this context, as it facilitates the identification of path coefficients, which are indicative of the strength and direction of the

causal effects. This causal effects depict the impact of an exogenous variable on an endogenous variable (Weiber & Sarstedt, 2021). If the exogenous variable leads to an increase of the endogenous variable the path coefficient will be >0. The opposite effect of a decreasing effect between exogenous and endogenous variables is assumed if the path coefficient is <0. The closer the effect is to +/- 1 the higher is the leverage of the effect. There is no scientific classification stating an assessment of the values of the path coefficient since even smaller values like 0,25 can be considered relevant depending on the study. However, all path coefficient require a p-value below 0,05 to be considered significant (Hair et al., 2024). As displayed in Table 10 the highest increasing effects were measured from organizational structure to innovation culture (β = 0,526) and structure to innovation culture (β = 0,587). Both effects were highly significant. But significant negative effects from VUCA to Innovation culture (β = -0,334) and VUCA to effectiveness (β = -0,273) were also determined.

Table 10: Path Coefficients

Direct Effects: Path Coefficients	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Innovation Culture -> Effectiveness	0,486	0,482	0,052	9,304	0,000
Innovation Culture -> Efficiency	0,526	0,521	0,066	7,996	0,000
Structure -> Effectiveness	0,113	0,117	0,054	2,102	0,036
Structure -> Efficiency	-0,044	-0,040	0,058	0,755	0,451
Structure -> Innovation Culture	0,587	0,586	0,037	15,810	0,000
VUCA -> Effectiveness	-0,273	-0,275	0,043	6,369	0,000
VUCA -> Efficiency	-0,278	-0,281	0,051	5,431	0,000
VUCA -> Innovation Culture	-0,334	-0,336	0,037	9,025	0,000
VUCA x Innovation Culture -> Effectiveness	-0,024	-0,024	0,048	0,504	0,614
VUCA x Innovation Culture -> Efficiency	-0,147	-0,144	0,061	2,414	0,016
VUCA x Structure -> Effectiveness	0,067	0,066	0,048	1,407	0,160
VUCA x Structure -> Efficiency	0,116	0,111	0,058	1,989	0,047
VUCA x Structure -> Innovation Culture	0,020	0,020	0,026	0,791	0,429

Source: Own representation

4.4.2.3 Mediation and Moderation Effects

Mediating effects differ from moderating effects, which is why they must be clearly distinguished. While mediation explains how or why an independent variable X influences a dependent variable Y with the help of an intervening variable, moderation explains under which conditions the effect of X on Y changes. The strength and direction of the X → Y relationship is subject to the moderator variable. In this study, VUCA functions as a moderator, interacting with X to influence Y, but it does not directly cause Y. A mediation effect comes into play in situations where the influence exerted by one variable on another variable is altered or obstructed by the presence of a third variable, which serves to intervene

in this relationship. This third variable effectively mediates the impact that exists between the two primary variables currently under consideration. Innovation culture functioned as a mediator within this study (see Figure 8).

Figure 8: Visualization Moderator (left) and Mediator Effect (right)

Source: Urban & Mayerl, 2018, S. 326

When performing a mediator analysis, the mediator can also be understood as an intermediary. As shown in Table 11, for a mediation to occur, the exogenous variable X must have a significant effect on the mediating variable Z, which in turn must have a significant impact on Y. All mediator variables were endogenous variables and were distinguished into two different types: There were total and partial mediations. When considering a total mediation there is no direct relationship between X and Z but the entire effect goes via the mediator Z. Considering a partial mediation next to the mediating effect also a direct effect from X to Z occurs (Hair et al., 2024; Urban & Mayerl, 2018).

The study at hand depicted one mediating variable which is innovation culture. Innovation culture functions as a partial mediator. The research model (see Figure 2) shows that on the one hand there were direct effects assumed from the exogenous variable organizational structure (X) to the endogenous variables of effectiveness and efficiency (Y). On the other hand, innovation culture functioned as a mediating variable (Y) significantly intervening the relationship between organizational structure and effectiveness and efficiency (according to hypotheses 3a & 3b and effect sizes in Table 11).

Table 11: Specific indirect Mediator and Moderator Effects

Specific-indirect Effects	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Structure -> Innovation Culture -> Effectiveness	0,285	0,283	0,039	7,405	0,000
Structure -> Innovation Culture -> Efficiency	0,309	0,306	0,046	6,695	0,000
VUCA -> Innovation Culture -> Effectiveness	-0,162	-0,162	0,024	6,784	0,000
VUCA -> Innovation Culture -> Efficiency	-0,176	-0,175	0,028	6,193	0,000
VUCA x Structure -> Innovation Culture -> Effectiveness	0,010	0,009	0,012	0,797	0,426
VUCA x Structure -> Innovation Culture -> Efficiency	0,011	0,010	0,013	0,792	0,428

Source: Own representation

Considering the hypothesis 4a to 4e moderator effects from VUCA to the modelled relationships of the latent variables of organizational structure, innovation culture and effectiveness / efficiency were expected. As demonstrated in Table 12, the moderation effect of VUCA was statistically significant in respect of the interaction between innovation culture and efficiency, as well as between organizational structure and efficiency. It is important to note that all significant moderation effects had an amplifying decreasing effect towards the endogenous output variables of effectiveness and efficiency.

Table 12: Total Direct and Mediator / Moderator Effects

Total Effects	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Innovation Culture -> Effectiveness	0,486	0,482	0,052	9,304	0,000
Innovation Culture -> Efficiency	0,526	0,521	0,066	7,996	0,000
Structure -> Effectiveness	0,398	0,400	0,044	9,068	0,000
Structure -> Efficiency	0,265	0,266	0,048	5,561	0,000
Structure -> Innovation Culture	0,587	0,586	0,037	15,810	0,000
VUCA -> Effectiveness	-0,435	-0,437	0,042	10,414	0,000
VUCA -> Efficiency	-0,453	-0,456	0,046	9,854	0,000
VUCA -> Innovation Culture	-0,334	-0,336	0,037	9,025	0,000
VUCA x Innovation Culture -> Effectiveness	-0,024	-0,024	0,048	0,504	0,614
VUCA x Innovation Culture -> Efficiency	-0,147	-0,144	0,061	2,414	0,016
VUCA x Structure -> Effectiveness	0,077	0,076	0,049	1,573	0,116
VUCA x Structure -> Efficiency	0,127	0,121	0,059	2,159	0,031
VUCA x Structure -> Innovation Culture	0,020	0,020	0,026	0,791	0,429

Source: Own representation

As visualized in Figure 9 next to the significant partial mediation effect of innovation culture between organizational structure and effectiveness / efficiency also the significant moderation effect of VUCA towards the interaction between innovation culture and efficiency, as well as between organizational structure and efficiency was identified. This chapter exclusively provides a presentation of path coefficients. The interpretation of the data is presented in chapter 5.

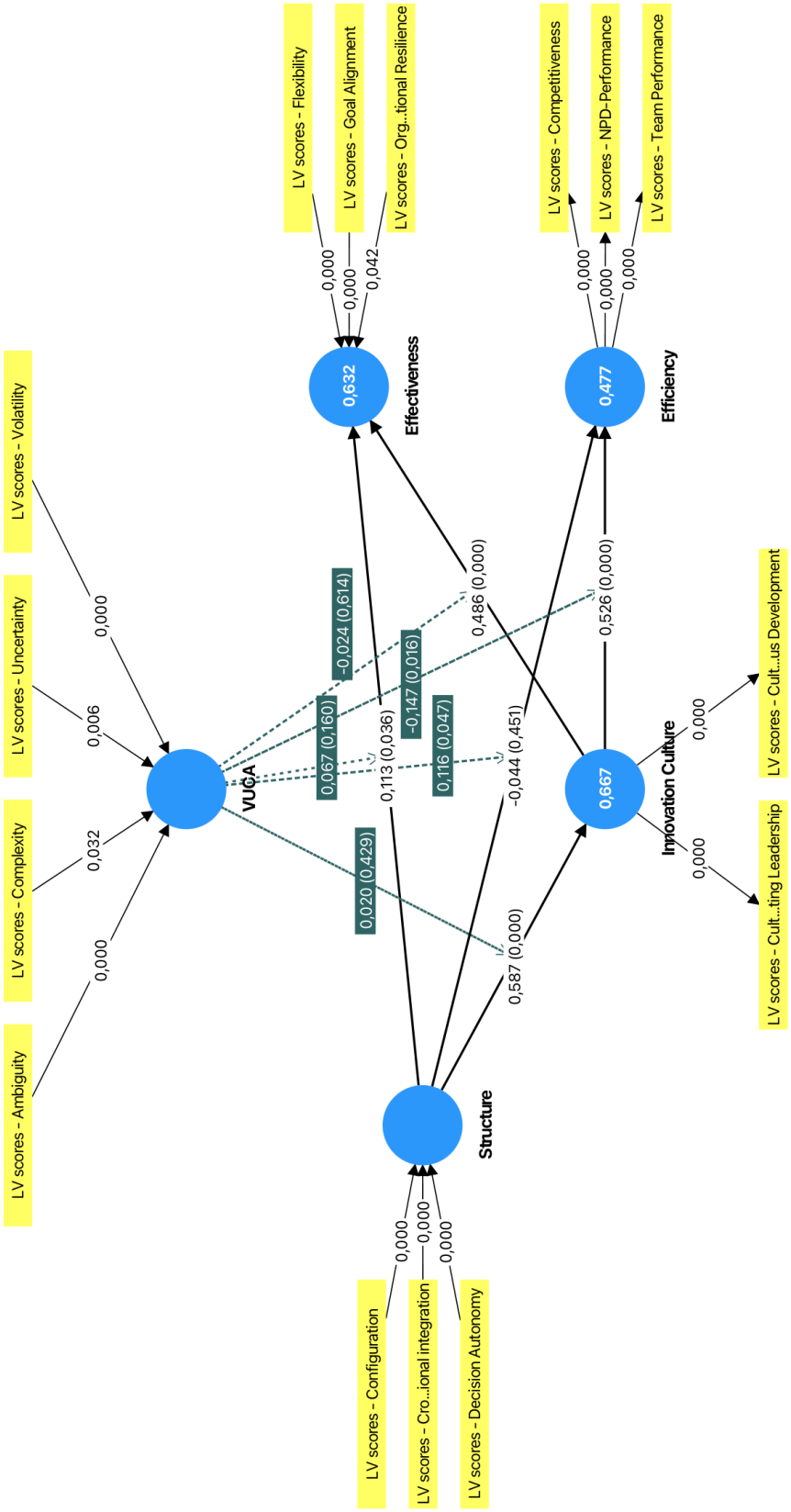


Figure 9: Visualization Mediation and Moderation Effects

Source: Own representation

4.4.3 Importance-Performance Map Analysis

The Importance-Performance Map Analysis (IPMA) enables the evaluation of the importance (total effects) of a particular predictor on a target construct compared to how well that factor is performing. Within that tool both direct and indirect effects from a predictor to the target construct are measured. By doing that a standardized scale is applicated to transform the performance of the latent construct usually measured on Likert-Scales from 1-5 into a range from 0 % to 100 %. The objective of IPMA is the systematic discovery of predecessors that possess significant importance yet demonstrate inadequate performance, thus establishing the basis for focused improvement strategies and subsequent enhancements (Ringle & Sarstedt, 2016).

For IPMA a normalized data set has been used where all scales were normalized to a value of 0 to 1. By normalizing the data set, a consistent interpretation of the matrix (visual output of IPMA) was guaranteed. The visual output shows four different quadrants symbolizing a strategy to cope and improve (see Figure 10).

When a predictor and its relationship to the target construct is placed within the first quadrant (see Figure 10) high performance and high importance of the construct is assumed. In consequence the already good work on this construct should be continued. Quadrant two symbolizes a potential overkill. Based on the assumption that the importance is low, but the performance is high a waste of resources can be assumed. Being in third quadrant equals a low priority construct because it shows both low importance and low performance. When locating on quadrant four the full concentration of management should be placed on those constructs since they show a high importance but a low performance symbolizing high potential.

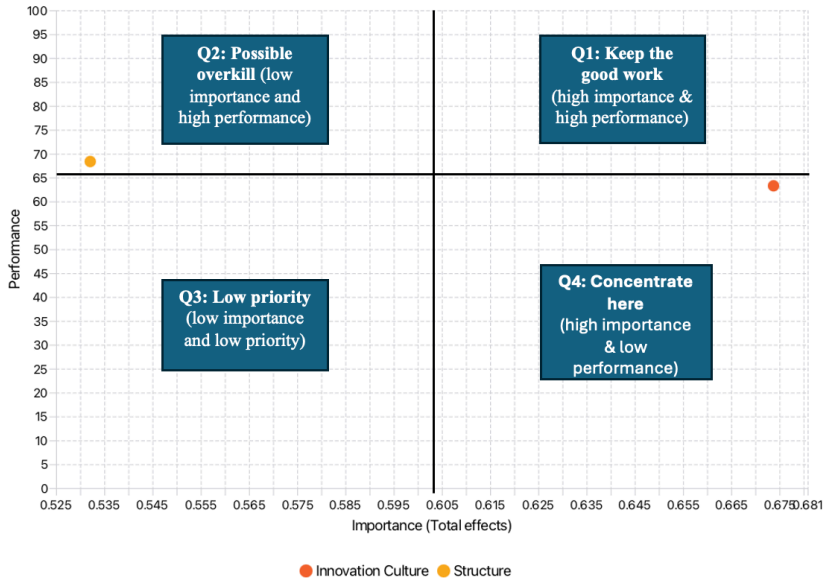


Figure 10: Exemplary Visual Output IPMA

Source: Own representation

Within this study an IPMA has been performed for all three endogenous variables covering effectiveness, efficiency and innovation culture.

Based on the IPMA two relevant triggers for the target construct efficiency were identified within the IPMA. The overall importance of structure composed of the total effects was 0,532 with a performance of approx. 68 %. Further to that innovation culture showed an overall importance of 0,674 with a performance of approx. 63 %. Diving deeper into detail on construct level (see Figure 11) and taking the latent variables into account configuration showed an importance of 0,135 and a performance of approx. 63 %. Cross functional integration showed an importance of 0,170 and a performance of approx. 63 %. Culture of continuous development showed an importance 0,388 and a performance of 56 %. Decision autonomy showed an importance 0,336 and a performance of 73 % whereas activating leadership showed an importance 0,364 and a performance of 71 %.

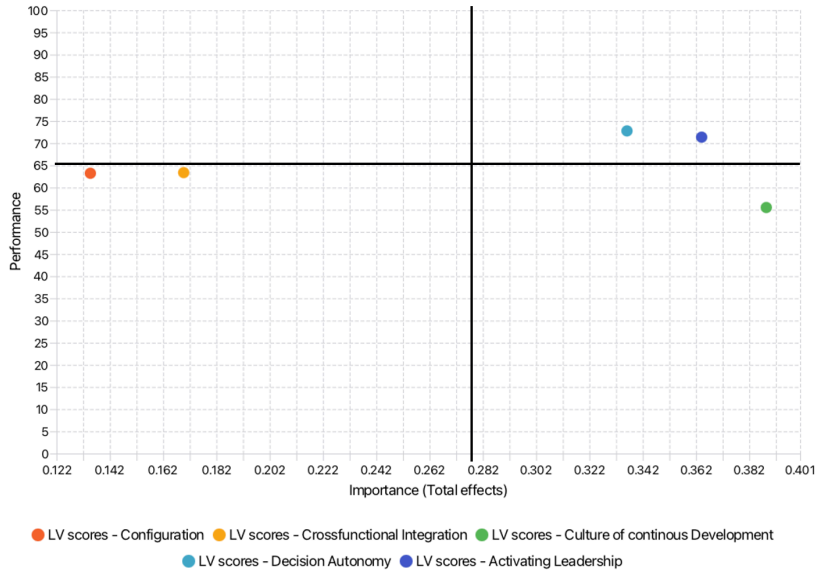


Figure 11: IPMA Indicators Efficiency

Source: Own representation

Based on the IPMA two relevant triggers for the target construct effectiveness were identified within the IPMA. The overall importance of innovation culture composed of the total effects was 0,638 with a performance of approx. 63 %. Further to that organizational structure showed an overall importance of 0,645 with a performance of approx. 68 %. According to a deep dive depicted in Figure 12 on construct level taking the latent variables into account configuration showed an importance of 0,163 and a performance of approx. 63 %. Cross functional integration showed an importance of 0,206 and a performance of approx. 63 %. Culture of continuous development showed an importance 0,368 and a performance of 56 %. Decision autonomy showed an importance 0,407 and a performance of 73 % whereas activating leadership showed an importance 0,345 and a performance of 71 %.

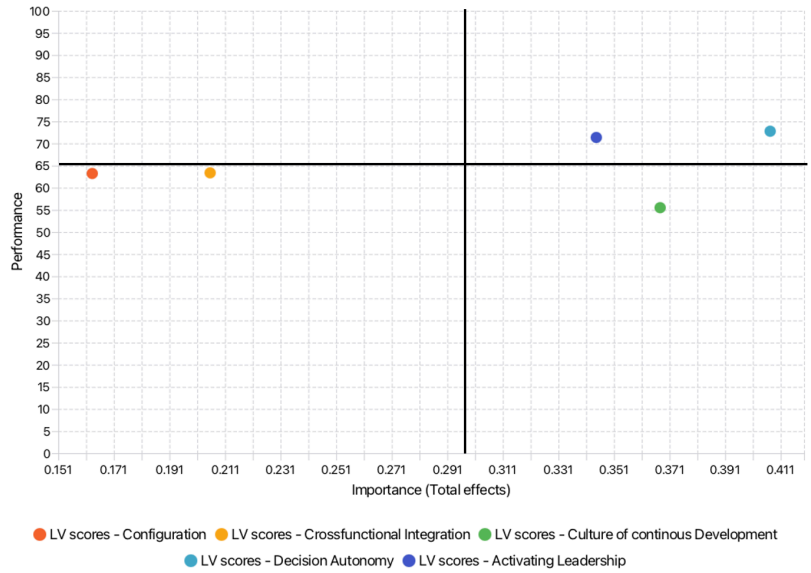


Figure 12: IPMA Indicators Effectiveness

Source: Own representation

Diving deeper into detail on construct level (see Figure 13) and taking the latent variables into account configuration showed an importance of 0,194 and a performance of approx. 63 %. Cross-functional integration showed an importance of 0,245 and a performance of approx. 63 %. Decision autonomy showed an importance 0,485 and a performance of 73 %.

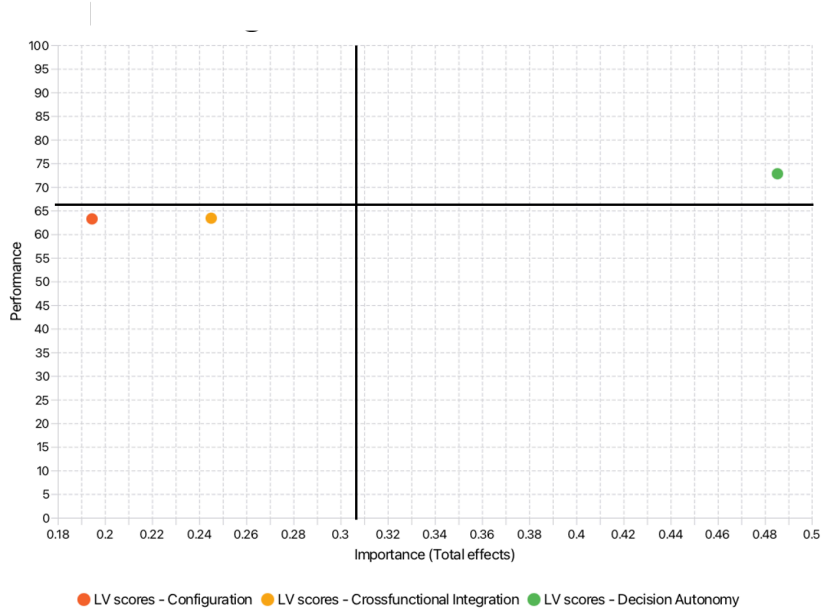


Figure 13: IPMA Indicators Innovation Culture

Source: Own representation

Further recommendations for action based on the IPMA will follow in chapter 5.

4.5 Combination of PLS-SEM and NCA

4.5.1 Introduction to Necessary Condition Analysis

In management and organizational research, understanding the causal mechanisms underlying outcomes often requires examining both sufficient and necessary conditions. Partial Least Squares Structural Equation Modeling (PLS-SEM) and Necessary Condition Analysis (NCA) offer complementary perspectives in this regard. PLS-SEM estimates path coefficients and explains variance in dependent variables, thereby identifying relationships that are sufficient for producing changes in outcomes across the sample (Hair et al., 2022).

However, PLS-SEM alone may fail to detect asymmetrical relationships where certain conditions are required for an outcome to occur but do not strongly vary with it. In contrast, NCA explicitly identifies necessary conditions or bottlenecks which must be present at a minimum level for the outcome to occur, irrespective of their correlation with outcome variance (Dul, 2016). The combination of PLS-SEM and NCA allows researchers to capture both sufficient and necessary causal mechanisms in a single analytical framework. While PLS-SEM provides a comprehensive understanding of the strength and direction of relationships and the relative importance of predictors, NCA identifies thresholds. This dual perspective enhances theory testing, particularly in fields such as contingency theory, ambidexterity research or studies on innovation and organizational performance, where certain structural or behavioral factors may be indispensable for success (Becker et al., 2013).

Moreover, from a managerial standpoint, the integration of these methods offers actionable insights. PLS-SEM highlights factors that can be optimized to improve outcomes, whereas NCA identifies the minimum requirements that must be ensured to avoid failure. Methodologically, the approaches are compatible because NCA can be applied to latent variable scores derived from PLS-SEM, allowing seamless integration using the same dataset (Richter et al., 2020).

As illustrated in Figure 14-21, two default ceiling lines can be identified. The first is designated as the Ceiling Envelopment Free Disposal Hull (CE-FDH) line, characterized by its non-decreasing, stepwise linear nature. The second is termed the Ceiling Regression Free Disposal Hull (CR-FDH) line, represented by a simple linear regression line fitted according to the CE-FDH line. This ceiling line plays an essential role in delineating the boundary that

distinguishes the observed data points from those that remain unobserved in the analysis. A larger void beneath this ceiling line indicates a stronger constraint imposed by variable X on variable Y. This also reflects the minimum threshold of X needed to reach a specific level of Y.

Accomplished with a bottleneck table the same relationships as the ceiling line, but in tabular format are displayed. The initial column displays the outcome (Y), with subsequent columns enumerating the conditions that must be fulfilled to achieve the specified outcome. The bottleneck table specifies the necessary usage levels for various success levels (Richter et al., 2020).

Two essential parameters in NCA are ceiling accuracy and the necessity effect size. Ceiling accuracy is defined as the proportion of data points that are situated on or below the ceiling line. This accuracy is calculated by dividing the number of data points on or below the ceiling line by the total number of data points. The CE-FDH ceiling line typically achieves a 100 % accuracy rate, while alternative lines such as the CR-FDH may result in lower accuracy due to their regression-based approximation. The necessity effect size quantifies the degree to which the independent variable constrains the outcome variable and its significance can be assessed through bootstrapping. Although no universally accepted standard exists for an acceptable level of ceiling accuracy, comparing the observed accuracy with a benchmark (e.g., 95 %) can provide valuable insights into the quality of the NCA solution. The necessity effect size, often denoted as (d), plays a critical role in determining the extent to which a variable or construct can be classified as a necessary condition within the context of research and analysis. This effect size is calculated by taking the ratio of the amount of graphical empty space, which is commonly referred to as the ceiling zone, to the total area that can contain observations known as the scope with the values of this ratio ranging from 0 to 1. This is providing a comprehensive understanding of necessity in relation to the constructs being studied. According to established guidelines, it is suggested that a necessity effect size of $0 < d < 0{,}1$ indicates a small effect while a range of $0{,}1 \leq d < 0{,}3$ signifies a medium effect, further extending to $0{,}3 \leq d < 0{,}5$ which reflects a large effect and an effect of $d \geq 0{,}5$ is indicative of a very large effect as outlined from Dul in 2016. In the realm of previous research, scholars have often utilized the criterion of $d \geq 0{,}1$ as a cutoff point to accept hypotheses pertaining to necessity so that this threshold serves as a benchmark for determining the validity of the hypotheses. Nevertheless, it is relevant to also take into

account the substantive significance of the effect size d, which refers to its practical implications and real-world meaning beyond the statistical calculations (Richter et al., 2020).

Overall, combining PLS-SEM and NCA provides a comprehensive understanding of causal structures, revealing both the conditions that are necessary for an outcome and the drivers that are sufficient to enhance it. This integrated approach ensures that researchers and practitioners capture the full spectrum of factors influencing organizational and behavioral phenomena (Richter et al., 2020).

4.5.2 Conduction of Necessary Condition Analysis

4.5.2.1 Applying NCA on Research Data

SmartPLS and its function for NCA has been used to perform the following analyses. During the analyses the proposed process from Richter et al. (2020) has been followed:

- Preparation of data: The same normalized data set, which has already been generated for IPMA (see Chapter 4.4.2.4) has been used.
- Definition of target constructs: Mainly the target constructs of effectiveness and efficiency have been used. For the main constructs of organizational structure and innovation culture a NCA has been processed on the lower order construct (LOC) level.
- Depicting of effects: A PLS-SEM model including all relevant inner structural and outer measurement model quality testing was used to depict the significant direct and indirect effects.
- NCA: To develop the effect sizes and accuracy information the NCA has been run within SmartPLS.

Combined use of PLS-SEM and NCA: An overview compiling the PLS-SEM and NCA results has been prepared to support the interpretation of the results in a structural way (see Table 21).

4.5.2.2 Applying NCA on Endogenous Variables

As deducted from the research model (see Figure 2) the NCA focusses on two core research questions.

Firstly, the identification of *must-have* factors (i.e., critical bottlenecks in organizational structure and innovation culture) for the endogenous variables (output) of effectiveness and efficiency were focused.

For those two success *must-have* factors the scatter plots can be found below. The scatter plots for effectiveness can be found in Figure 14 and Figure 15. The scatter plots for efficiency can be found in Figure 16 and Figure 17.

Within this graphical output the relation between a dependent and independent variable is depicted to detail out areas where a potential necessary condition can be assumed (Richter et al., 2020).

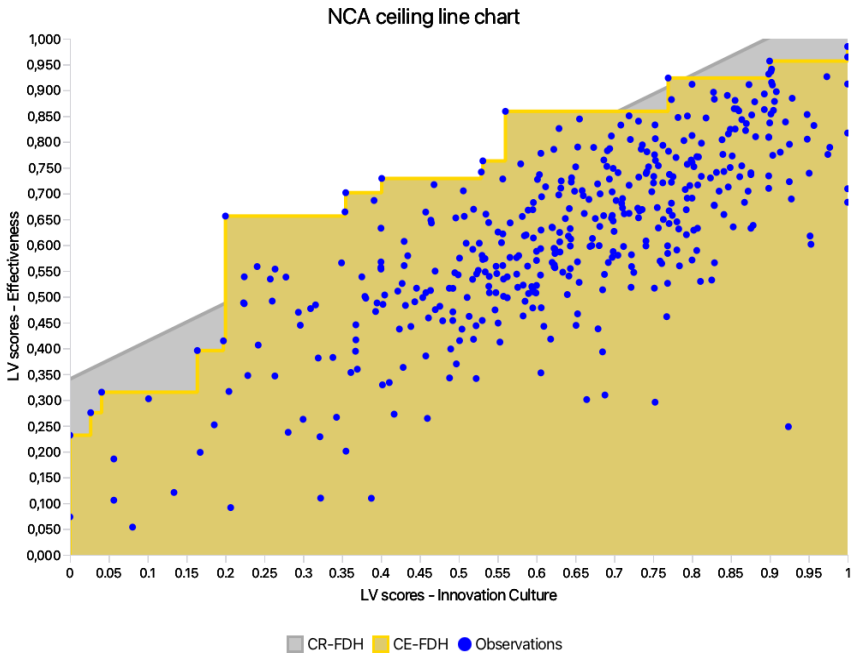


Figure 14: Scatter Plot Effectiveness: Success Factor Innovation Culture

Source: Own representation

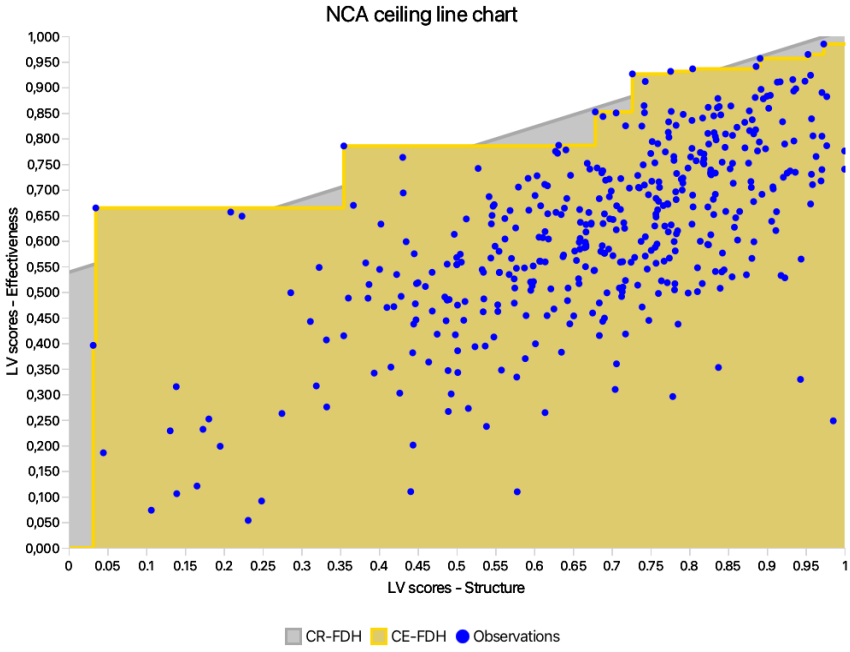


Figure 15: Scatter Plot Effectiveness: Success Factor Organizational Structure

Source: Own representation

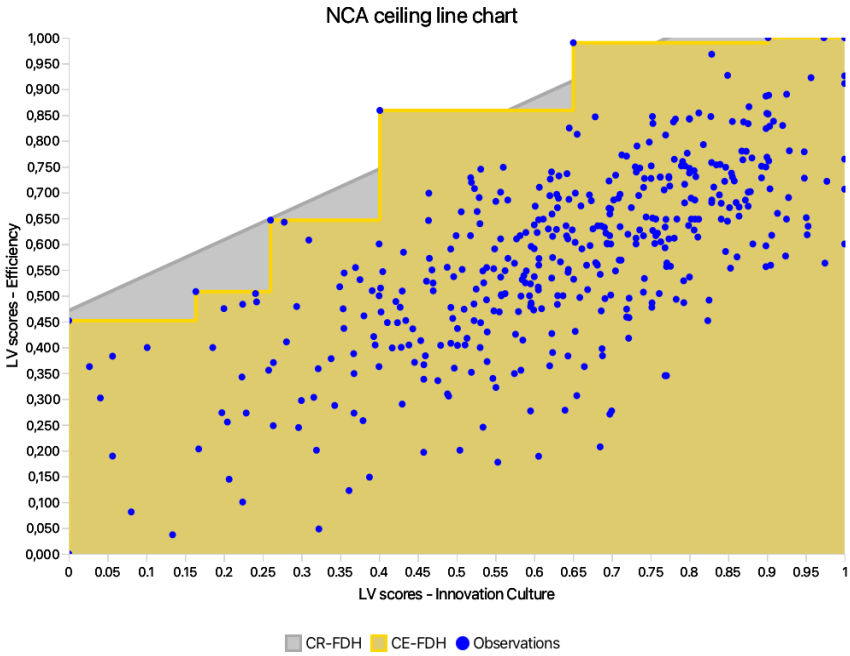


Figure 16: Scatter Plot Efficiency: Success Factor Innovation Culture

Source: Own representation

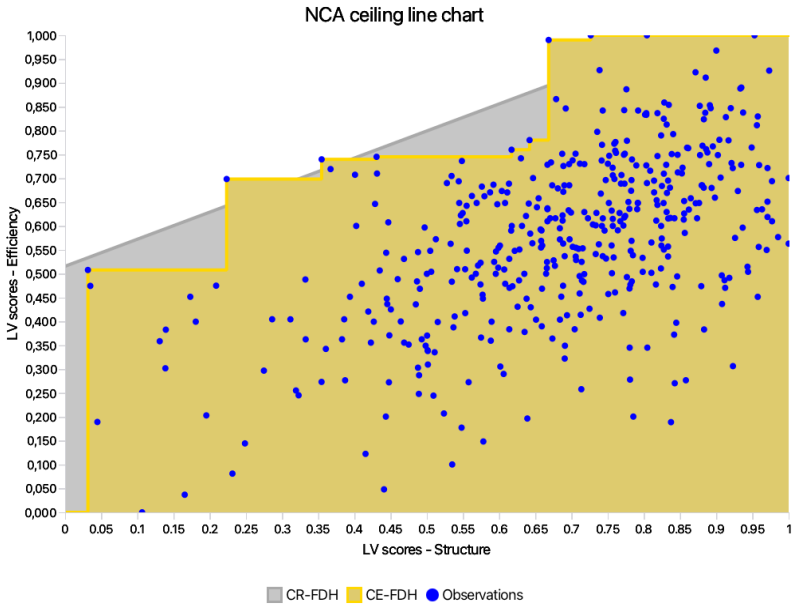


Figure 17: Scatter plot Efficiency: Success Factor Organizational Structure

Source: Own representation

The results from the NCA can also be found in the respective bottleneck Table 13 and bottleneck Table 14 for effectiveness and efficiency. These tables show the individual configuration of the relevant success factors (organizational structure and innovation culture) that allow the endogenous variables effectiveness and efficiency to be realized.

Table 13: Bottleneck Table Effectiveness

Bottleneck tables - CE-FDH	**LV scores - Effectiveness**	**LV scores - Innovation Culture**	**LV scores - Structure**	**LV scores - VUCA**	**LV scores - VUCA x Innovation Culture**	**LV scores - VUCA x Structure**
0,00%	0,000	NN	0,032	NN	NN	NN
10,00%	0,100	NN	0,032	NN	NN	NN
20,00%	0,200	NN	0,032	NN	NN	NN
30,00%	0,300	0,041	0,032	NN	NN	NN
40,00%	0,400	0,197	0,035	NN	NN	NN
50,00%	0,500	0,200	0,035	NN	NN	NN
60,00%	0,600	0,200	0,035	NN	NN	NN
70,00%	0,700	0,355	0,355	NN	NN	NN
80,00%	0,800	0,560	0,679	NN	NN	NN
90,00%	0,900	0,769	0,726	NN	NN	NN
100,00%	1,000	1,000	0,973	0,295	0,293	0,284

Source: Own representation

As shown in the table, achieving 80 % organizational effectiveness requires a specific configuration of necessary conditions. For this level of effectiveness, the innovation culture

must reach at least the 56th percentile and the organizational structure must reach at least the 67.9 percentile. These thresholds indicate that both factors are necessary but not sufficient on their own to achieve the targeted effectiveness.

Table 14: Bottleneck Table Efficiency

Bottleneck tables - CE-FDH	LV scores - Efficiency	LV scores - Innovation Culture	LV scores - Structure	LV scores - VUCA	LV scores - VUCA x Innovation Culture	LV scores - VUCA x Structure
0,00%	0,000	NN	0,032	NN	NN	NN
10,00%	0,100	NN	0,032	NN	NN	NN
20,00%	0,200	NN	0,032	NN	NN	NN
30,00%	0,300	NN	0,032	NN	NN	NN
40,00%	0,400	NN	0,032	NN	NN	NN
50,00%	0,500	0,164	0,032	NN	NN	NN
60,00%	0,600	0,260	0,223	NN	NN	NN
70,00%	0,700	0,401	0,355	NN	NN	NN
80,00%	0,800	0,401	0,668	NN	NN	NN
90,00%	0,900	0,650	0,668	0,055	0,061	0,059
100,00%	1,000	0,901	0,726	0,055	0,061	0,059

Source: Own representation

Following in Table 14 there is specific set and configuration of success factors necessary to ensure 80 % of efficiency. For this level of efficiency 40,1 percentiles of innovation culture and 66,8 percentiles of organizational structure are necessary.

There was no further focus on VUCA and its moderating role within the NCA since according to the permutation tests the effects were not statistically significant as displayed in Table 15 and Table 16 showing the ceiling line effect size after permutation. These tables underline that after permutation only innovation culture and organizational structure were statistically significant necessary conditions for effectiveness and efficiency.

Table 15: Permutation Results Effectiveness

Ceiling line effect size overview after permutation	Original effect size	95.0%	Permutation p value
LV scores - Innovation Culture	0,290	0,103	0,000
LV scores - Structure	0,232	0,145	0,000
LV scores - VUCA	0,013	0,074	0,990
LV scores - VUCA x Innovation Culture	0,013	0,039	0,914
LV scores - VUCA x Structure	0,012	0,046	0,968

Source: Own representation

When focusing on the success factor of efficiency Table 16 supports the same assumption since only innovation culture and organizational structure were significant success factors.

Table 16: Permutation Results Efficiency

Ceiling line effect size overview after permutation	Original effect size	95.0%	Permutation p value
LV scores - Innovation Culture	0,225	0,114	0,000
LV scores - Structure	0,245	0,159	0,000
LV scores - VUCA	0,010	0,076	0,981
LV scores - VUCA x Innovation Culture	0,011	0,041	0,877
LV scores - VUCA x Structure	0,011	0,048	0,949

Source: Own representation

The Interpretation of these results will be presented in chapter 5.

4.5.2.3 Application of NCA on Core Constructs

Next to the endogenous (output) variables in a second step the core constructs organizational structure and innovation culture were analyzed. Studying those constructs enables the researcher to further dive into detail since within this analysis the *must-have* factors for the success factors from the previous chapter are examined.

As previously outlined both core constructs embody the idea auf a continuum of development within a process of development within an organization. Organizational structures can be conceptualized as a continuum ranging from mechanistic to organic frameworks (Cruz & Camps, 2003; Olden, 2012; Rapert & Wren, 1998). Innovation culture can be conceptualized as a continuum between open-minded and closed innovation cultures, reflecting varying levels of internal and external collaboration (Herzog & Leker, 2010). As demonstrated by the continuum ranging from mechanistic to organic organizational structure, the performance axis established by IPMA can function as a foundation for the establishment of performance levels. Organizational structures exhibiting 33 % performance are considered mechanistic, while those demonstrating 33 % to 66 % performance are deemed ambidextrous. Structures demonstrating performance levels exceeding 66 % can be considered organic. As a consequence, it is possible to derive the essential characteristics of an organic organizational structure from the bottleneck tables of NCA.

The scatter plots of the success factors for both organizational structure (see Figure 18, Figure 19 and Figure 20) and innovation culture (see Figure 21 and Figure 22) can be found below.

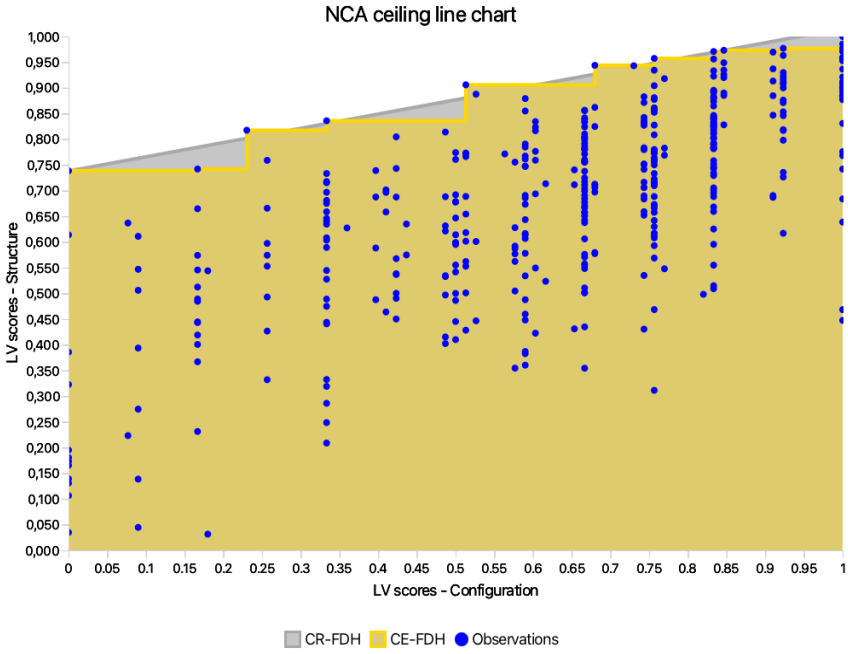


Figure 18: Scatter Plots Organizational Structure: Success Factor Configuration

Source: Own representation

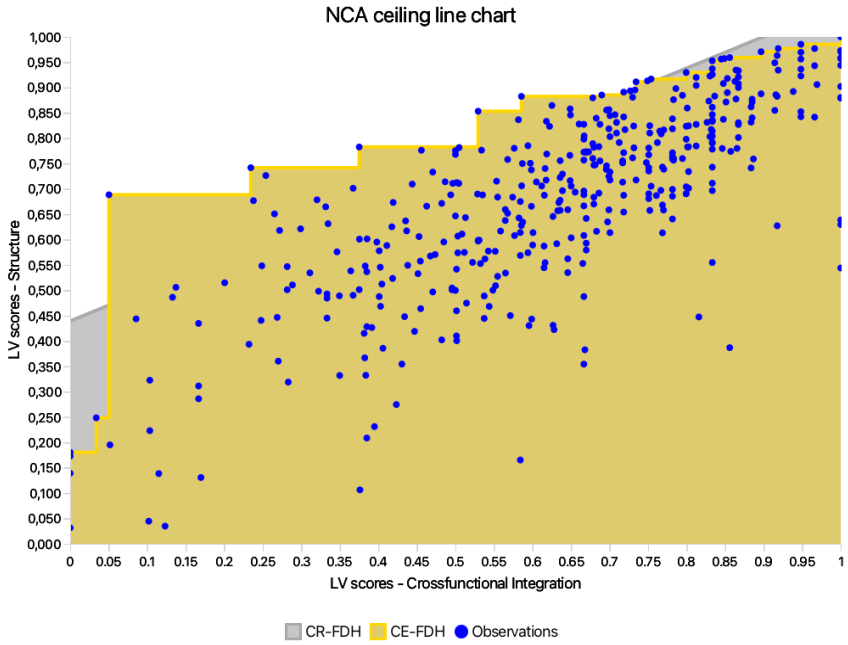


Figure 19: Scatter plots Organizational Structure: Success Factor Cross-functional Integration

Source: Own representation

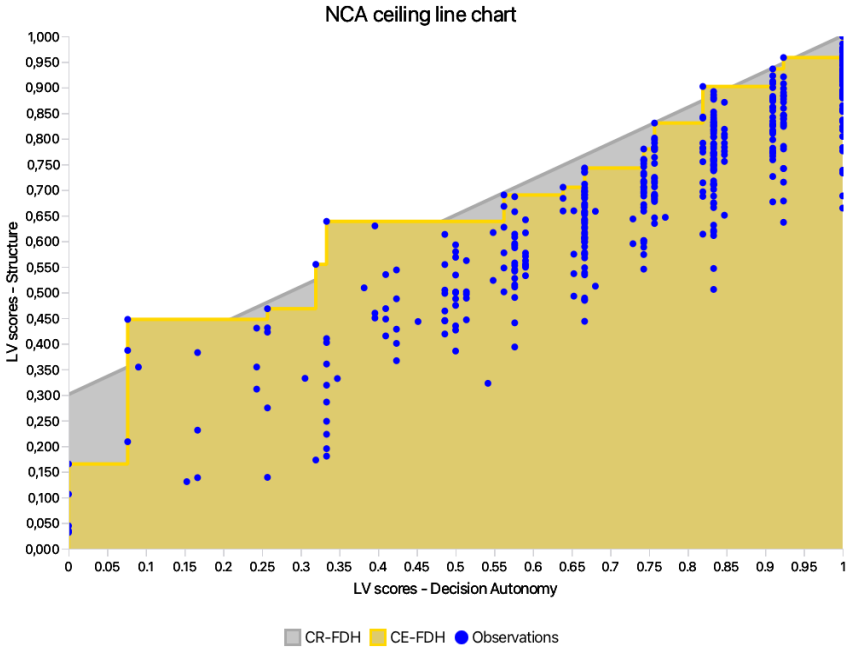


Figure 20: Scatter Plots Organizational Structure: Success Factor Decision Autonomy

Source: Own representation

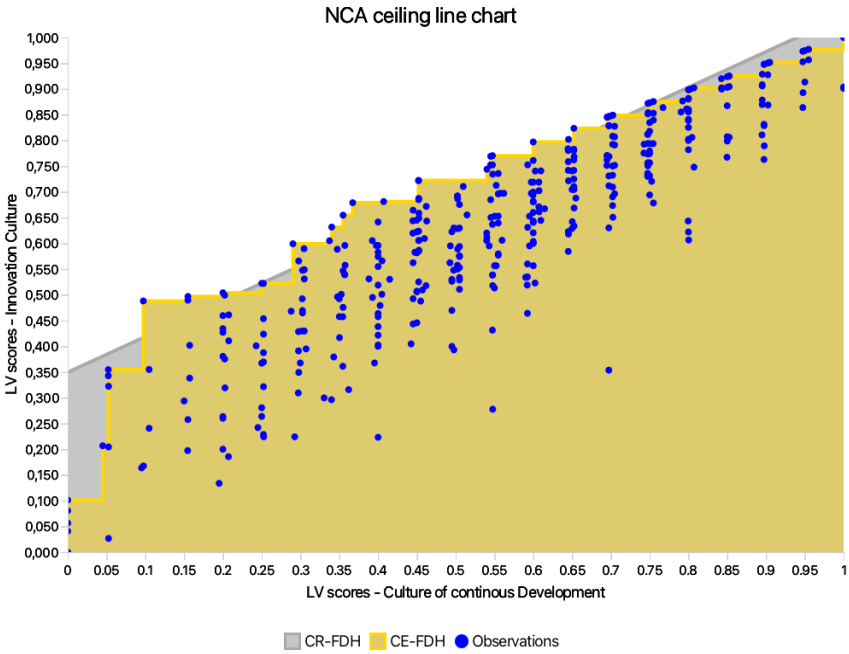


Figure 21: Scatter Plot Innovation Culture: Success Factor Culture of Continuous Development

Source: Own representation

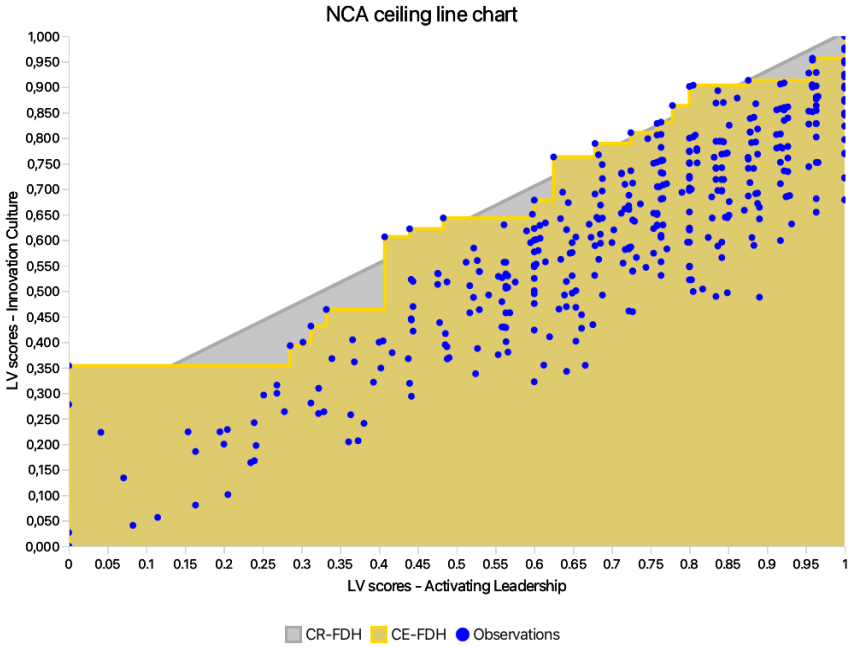


Figure 22: Scatter Plot Innovation Culture: Success Factor Culture of Activating Leadership

Source: Own representation

The NCA results shown within the scatter plots can also be discovered in the respective bottleneck Table 17 and Table 18.

Table 17: Bottleneck Table Organizational Structure

Bottleneck tables - CE-FDH	LV scores - Structure	LV scores - Configuration	LV scores - Crossfunctional Integration	LV scores - Decision Autonomy
0,00%	0,000	NN	NN	NN
10,00%	0,100	NN	NN	NN
20,00%	0,200	NN	0,034	0,076
30,00%	0,300	NN	0,050	0,076
40,00%	0,400	NN	0,050	0,076
50,00%	0,500	NN	0,050	0,319
60,00%	0,600	NN	0,050	0,333
70,00%	0,700	NN	0,234	0,639
80,00%	0,800	0,230	0,529	0,757
90,00%	0,900	0,513	0,734	0,819
100,00%	1,000	1,000	1,000	1,000

Source: Own representation

Aiming to proactively implement an organic organizational structure (approx. 66 % performance in IPMA equals 66 % of CE-FDH in bottleneck table) as depicted in Table 17

there is a specific set and configuration of success factors necessary to ensure an organic character of an organizational structure. For an organic organizational structure on 70 % a level of 23,4 percentiles of cross-functional integration 63,9 percentiles of decision autonomy are necessary. Reaching at least 80 % of the continuum of organizational structure (organic characteristic) 23 percentiles of a decentralized configuration, 52,9 percentiles of cross-functional integration and 75,7 percentiles of a decentralized decision autonomy are necessary.

Table 18: Bottleneck Table Innovation Culture

Bottleneck tables - CE-FDH	LV scores - Innovation Culture	LV scores - Culture of continous Development	LV scores - Activating Leadership
0,00%	0,000	NN	NN
10,00%	0,100	NN	NN
20,00%	0,200	0,045	NN
30,00%	0,300	0,052	NN
40,00%	0,400	0,097	0,312
50,00%	0,500	0,200	0,407
60,00%	0,600	0,337	0,407
70,00%	0,700	0,452	0,625
80,00%	0,800	0,645	0,724
90,00%	0,900	0,807	0,800
100,00%	1,000	1,000	1,000

Source: Own representation

Following in Table 18 there was a specific set and configuration of success factors necessary to ensure 80 % of innovation culture which equals an open-minded innovation culture. For this level of innovation culture equaling an open-minded innovation culture 64,5 percentiles of a culture of continuous development and 72,4 percentiles of activating leadership were necessary. As shown in Table 19 these three success factors configuration, cross functional integration and decision autonomy were considered significant based on permutation.

Table 19: Permutation Results Organizational Structure

Ceiling line effect size overview after permutation	Original effect size	95.0%	Permutation p value
LV scores - Configuration	0,136	0,041	0,000
LV scores - Crossfunctional Integration	0,205	0,054	0,000
LV scores - Decision Autonomy	0,364	0,067	0,000

Source: Own representation

When focusing on the success factor of innovation culture Table 20 underlined that both success factors culture of continuous development and activating leadership were statistically significant.

Table 20: Permutation Results Innovation Culture

Ceiling line effect size overview	Original effect size	95.0%	Permutation p value
LV scores - Culture of Continuous Development	0,311	0,042	0,000
LV scores - Activating Leadership	0,382	0,072	0,000

Source: Own representation

4.5.2.4 Combined Results of NCA and PLS-SEM

A combined result presentation of NCA and PLS-SEM (see Table 21) suggests important indications for further research and can help creating deductions from the study data for the practical implementation.

Table 21: Combined Results of NCA and PLS-SEM for Endogenous Variables Effectiveness and Efficiency

Construct	Effectiveness		Efficiency	
	Total Effects (PLS-SEM)	CE-FDH effect sizes (NCA)	Total Effects (PLS-SEM)	CE-FDH effect sizes (NCA)
Innovation Culture	0,501***	0,290***	0,528***	0,225***
Organizational Structure	0,397***	0,232***	0,265***	0,245***
VUCA	-0,433***	0,013	-0,452***	0,010

p<0,1; p<0,05*; p<0,01**; p<0,001***

Source: Own representation

This aggregated overview of both PLS-SEM and NCA results is based on data originating from multiple analyses. On the one hand the total effects from PLS-SEM including the significance of these effects can be seen. On the other hand, the CE-FDH effect sizes from NCA can be seen. These effect sizes are also displayed including level of significance.

Overall, three endogenous variables are reviewed within Table 21 focusing on the latent output variables effectiveness and efficiency.

Effectiveness: The construct innovation culture is a significant predictor for the target construct effectiveness. The construct showed a high effect of 0,501*** and was a necessary

condition for the target construct with a medium necessity effect size of 0,290***. Adding the information from the bottleneck Table 13 to enable an organization of reaching 80 % of effectiveness a minimum of 56 percentiles of innovation culture must be reached. Likewise, the construct organizational structure is a significant predictor of the target construct effectiveness. The construct showed a medium effect of 0,397*** and is also a highly significant necessary condition for the target construct with an effect of 0,232***. According to the bottleneck Table 13 for reaching 80 % of effectiveness next to the above mentioned 56 percentiles of innovation culture also 67,9 percentiles of organizational structure were necessary. Taking into consideration the construct of VUCA with a highly negative total effect size of -0,433*** it is also influencing the target construct effectiveness. However, it is vital to note that VUCA is not a necessary condition for the target construct "effectiveness".

Efficiency: The construct innovation culture is a significant predictor of the target construct efficiency. The construct showed a high effect of 0,528*** and was a necessary condition for the target construct with a medium necessity effect size of 0,225***. Adding the information from the bottleneck Table 14 to enable an organization of reaching 80 % of efficiency a minimum of 40,1 percentiles of innovation culture had to be reached. Likewise, the construct organizational structure is a significant predictor of the target construct efficiency. The construct showed a medium effect of 0,265*** and was also a highly significant necessary condition for the target construct with 0,245***. According to the bottleneck Table 14 for reaching 80 % of efficiency next to the above mentioned 40,1 percentiles of innovation culture also 66,8 percentiles of organizational structure are necessary. Taking into consideration the construct of VUCA with a highly negative total effect size of -0,452*** it was also influencing the target construct efficiency. However, it is vital to note that VUCA is no necessary condition for the target construct since permutation is not significant.

4.6 Hypotheses Testing

As depicted in Table 22 the results of hypothesis testing are referenced with a significance level of $\alpha = 0,05$. In total 15 hypotheses were tested. 12 of those hypotheses can be supported based on the data set at hand and three hypotheses cannot be supported.

The structural equation modeling results demonstrated strong empirical support for the proposed direct and mediating relationships between organic organizational structure, open-minded innovation culture and organizational effectiveness and efficiency.

An organic organizational structure showed a statistically highly significant positive effect on both effectiveness (β = 0,398) and efficiency (β = 0,265). Similarly, an open-minded innovation culture showed a strong positive effect on effectiveness (β = 0,486) and efficiency (β = 0,526). Both effects were highly statistically significant.

Furthermore, a mediation analysis confirmed that an open-minded innovation culture was statistically highly significant mediating the relationship to effectiveness (β = 0,285) and efficiency (β = 0,309). This finding is based on the specific indirect effect of innovation culture mediating the relationship between organizational structure and effectiveness is β = 0,295. The specific indirect effect of innovation culture mediating the relationship between organizational structure and efficiency is β = 0,333.

While the environmental dynamics of VUCA did not moderate the relationship between an organizational structure and effectiveness (β = 0,077, but not statistically significant) VUCA was statistically significant moderating the relationship between organizational structure and efficiency (β = 0,127). This moderation effect was also noticed when focusing innovation culture. While the environmental dynamics of VUCA did not moderate the relationship between an innovation culture and effectiveness (β = -0,024, and not statistically significant) VUCA was statistically significant moderating the relationship between innovation culture and efficiency (β = -0,147). It needs to be underlined that the moderation effect of VUCA for the relationship of organizational structure and efficiency was positive while the moderation effect between innovation culture and efficiency was negative.

The Necessary Condition Analyses confirmed that both organizational structure and innovation culture were necessary conditions for the output variables of effectiveness and efficiency. An organic organizational structure was a necessary condition for effectiveness (d = 0,232) and for efficiency (d = 0,245). Further to that an open-minded innovation culture was a necessary condition for effectiveness (d = 0,290) and for efficiency (d = 0,225). All effects of the Necessary Condition Analysis based on the permutation were statistically highly significant.

The interpretation and conclusions of these results will be shared in chapter 5.

Table 22: Hypothesis Testing

Category	Hypotheses		ß-coefficient	p-value	Result
Direct Effect	H1a	Organic Org. Struc. -> (+) Effectiveness	0,398	0,000	H1a can be supported
	H1b	Organic Org. Struc. -> (+) Efficiency	0,265	0,000	H1b can be supported
	H2a	Open Inn. Cult. -> (+) Effectiveness	0,486	0,000	H2a can be supported
	H2b	Open Inn. Cult. -> (+) Efficiency	0,526	0,000	H2b can be supported
Mediating Effect	H3a	Org. Struc. -> Inn. Cult. -> Effectiveness	0,285	0,000	H3a can be supported
	H3b	Org. Struc. -> Inn. Cult. -> Efficiency	0,309	0,000	H3b can be supported
Moderation Effect	H4a	VUCA x Struc. -> Effectiveness	0,077	0,116	H4a cannot be supported
	H4b	VUCA x Struc. -> Efficiency	0,127	0,031	H4b can be supported
	H4c	VUCA x Inn. Cult. -> Effectiveness	-0,024	0,614	H4c cannot be supported
	H4d	VUCA x Inn. Cult. -> Efficiency	-0,147	0,016	H4d can be supported
	H4e	VUCA x Org. Struc. -> Inn. Cult.	0,020	0,429	H14e cannot be supported
NCA	H5a	Organic Org. Struc. (NCA) -> (+) Effectiveness	0,232	0,000	H5a can be supported
	H5b	Organic Org. Struc. (NCA) -> (+) Efficiency	0,245	0,000	H5b can be supported
	H5c	Open Inn. Cult. (NCA) -> (+) Effectiveeness	0,290	0,000	H5c can be supported
	H5d	Open Inn. Cult. (NCA) -> (+) Efficiency	0,225	0,000	H5d can be supported

Source: Own representation

5 DISCUSSION

5.1 Interpretation of Findings

5.1.1 Target Construct: Effectiveness

The analysis of organizational effectiveness, defined in this study by the indicators of flexibility, goal alignment and organizational resilience (see Figure 2), was revealed to be a primary outcome of the model. The PLS-SEM model demonstrated substantial explanatory power for this construct, achieving an R^2adj of 0,625 (see Table 6). This indicates that 62,5 % of the variance in organizational effectiveness is explained by the model's predictors, namely organizational structure, innovation culture and the VUCA environment functioning as a moderator. The robustness of the model for effectiveness is confirmed by its predictive power and effect-size metrics. The Stone-Geisser criterion for effectiveness is $Q^2 = 0,496$ (see Table 8), indicating a medium-to-high forecast accuracy (Hair et al., 2024). The PLSpredict analysis (see Table 9) showed the model had a medium predictive power for the manifest variables, confirming its generalizability. The effect size f^2 analysis (see Table 7) provides a clear picture of what drives this explanatory power: Innovation culture has a medium effect on the explained variance of effectiveness ($f^2 = 0,208$), while the direct effects of VUCA ($f^2 = ,0111$) and organizational structure ($f^2 = 0,014$) are small to non-existent. This f^2 result strongly suggests that innovation culture is the most significant direct driver of effectiveness and that the influence of structure is likely channeled through innovation culture (see Table 7).

The results of hypothesis testing (see Table 22) confirm this observation. An open-minded innovation culture was found to be the strongest positive determinant of effectiveness (H2a: Total Effect $\beta = 0,486$, $p = 0,000$). This aligns with the literature, which posits that activating leadership, which is a lower order construct of innovation culture enhances performance by fostering motivation and aligning personal values with organizational goals (Hurduzeu, 2025; Lin et al., 2022). Furthermore, continuous development as an additional lower order construct of the open-minded innovation culture supports this finding, as studies like those from Chakraborty et al. (2025) and Hasyim & Bakri (2023) directly linked organizational learning and continuous development initiatives to long-term organizational effectiveness and resilience.

An organic organizational structure also demonstrated a significant positive total effect on effectiveness (H1a: Total Effect $\beta = 0,398$, $p = 0,000$). This finding supports literature that

links the components of an organic structure such as decentralized decision autonomy to improved strategic responsiveness, enhanced organizational learning and greater adaptability (Argyris & Schön, 1978; Grant, 1996; Menon et al., 1996).

Further to that the mediation analysis provides a critical clarification of the relationship between organizational structure and effectiveness. As hypothesized (H3a: β = 0,285, p = 0,000), innovation culture was confirmed as a highly significant partial mediator between organizational structure and effectiveness. While the direct path from structure to effectiveness remained significant with medium to low effect (β = 0,113, p = 0,036, see Table 10), the majority of structure's positive influence is channeled indirectly through its role in fostering an open-minded innovation culture. This result provides strong empirical backing for the conceptual models proposed by Dewi et al. (2025), Iranmanesh et al. (2021) and Zeb et al. (2021), which all argue that culture serves as the vital mechanism translating structural flexibility into corporate performance outcomes.

A surprising and important finding was the lack of a moderating effect from the VUCA environment on effectiveness. H4a (moderation on the structure-effectiveness path, p = 0,166), H4c (moderation on the culture-effectiveness path, p = 0,614) and H4e (moderation on the structure-innovation culture path, p = 0,429) cannot be supported by the data (see Table 22). These results contrast with literature (e.g., (Ahmed et al., 2022; Tuhai, 2024). Their literature findings suggest environmental dynamism would be a critical moderator to corporate performance (effectiveness and efficiency). However, these effects do only apply if no agile management methods are applied (Ahmed et al., 2022). Accordingly, the data from the studies mentioned above suggest that the internal configuration of structure and culture has a stable, direct relationship with effectiveness when agile methods are applied, regardless of the level of external turbulence. Therefore, the negative impact of VUCA on effectiveness is best understood as a direct negative antecedent (Total Effect = -0,435, see Table 12) rather than a conditional moderator.

Finally, the Necessary Condition Analysis (NCA) provided additional insights. As hypothesized, both an organic organizational structure (H5a: d = 0,232, p = 0,000) and an open-minded innovation culture (H5c: d = 0,290, p = 0,000) were confirmed as statistically significant necessary conditions for achieving high effectiveness. The bottleneck analysis (see Table 13) quantifies this by achieving a 80 % level of effectiveness, an organization must have an innovation culture score of at least the 56th percentile and an organizational structure score of at least the 67,9th percentile. This finding strongly reinforces the claims

of classic contingency and innovation literature (e.g., Burns & Stalker, 1961; Damanpour, 1991; Ramezan, 2011) that organicity and innovation are not just helpful, but are fundamental prerequisites for effectiveness (i.e., exploration and adaptability) in dynamic contexts. The permutation test (see Table 15) also confirmed that VUCA is not a necessary condition (p = 0,140), reinforcing the study's proactive thesis that internal alignment and not the external environment is the key bottleneck for success in a dynamic environment.

5.1.2 Target Construct: Efficiency

The analysis of the target construct organizational efficiency, defined in this study by competitiveness, new product development (NPD) performance and team performance yielded significant and nuanced findings. The PLS-SEM model achieved a moderate explanatory power for this construct, with an R^2 adj of 0,459 (see Table 6). Beyond the model's in-sample explanatory power (R^2) its robustness is further confirmed by the effect size (f^2) and predictive power (Q^2). The f^2 analysis (see Table 7) is showing that an open-minded innovation culture has the largest effect on the explained variance of efficiency (f^2 = 0,183) while an organic organizational structure (f^2 = 0,002) and VUCA (f^2 = 0,062) has no effect. This reinforces the finding that the influence of organizational structure is almost entirely indirect and that it is innovation culture that acts as the primary driver. Furthermore, the model demonstrates solid predictive relevance. The Stone-Geisser criterion for efficiency is Q^2 = 0,350 (see Table 8), which indicates a medium forecast accuracy according to the guidelines of Hair et al. (2024). This is supported by the overall model's medium predictive power (as detailed in Table 9) confirming that the model's findings for efficiency are not just explanatory but are generalizable to out-of-sample data.

The results from the hypothesis testing (see Table 22) further reveal that efficiency is strongly and positively driven by both an open-minded innovation culture (H2b: Total effect β = 0,526, p = 0,000) and an organic organizational structure (H1b: Total effect β = 0,265, p = 0,000). Conversely the external VUCA environment exerts moderate but significant positive and negative effects on efficiency. This finding applies to VUCA moderating the relationship between organizational structure towards efficiency (H4b: Total effect β = 0,127, p = 0,031) and between innovation culture towards efficiency (H4d: Total effect β = -0,147, p = 0,016). It is interesting to note that different directions of the effects are evident for organizational structure and innovation culture. While a fluid and organic organizational structure has a moderate positive effect towards efficiency an open-minded innovation culture has a moderate negative effect on efficiency.

The study's finding that an open-minded innovation culture is the strongest positive determinant of efficiency (H2b) provides robust support for the literature. This effect is driven by its two lower-order constructs. Activating leadership which is a component of innovation culture enhances efficiency. That finding aligns with studies by Garad et al. (2022) and Hurduzeu (2025). They found that transformational leadership inspires employees to higher performance levels, which naturally translates into higher levels of internal efficiency. Further to that a culture of continuous development which is a lower order construct of innovation culture directly supports the findings of Jerab (2024), who linked continuous improvement processes to enhanced organizational efficiency and competitiveness.

This strong positive finding also provides an important contrast to other literature such as Li et al. (2024) and Stanisławski (2022) who warned that open-minded innovation can sometimes create significant coordination costs, process duplications and inefficient structuring particularly in large organizations which reduces efficiency. The strong positive path found in this study suggests that, for the organizations sampled, the benefits of innovation (e.g., process improvements from continuous development) significantly outweigh these potential coordination costs. This may be explained by the strong, simultaneous presence of an organic organizational structure, which provides the flexible coordination needed to prevent the inefficiencies that Li et al. (2024) and Stanisławski (2022) identified.

The role of organizational structure in driving efficiency was found to be highly complex and primarily indirect. The direct path from an organic organizational structure to efficiency was not statistically significant and showed a low negative effect (β = -0,044, p = 0,451, see Table 10). This result challenges the premise of a direct link found in studies like Carillo & Kopelman (1991), who associated structural variables directly with operating efficiency. However, the total effect of an organic structure on efficiency was positive and significant (H1b: Total Effect β = 0,265, p = 0,000, see Table 22). This is explained by the highly significant indirect effect, where innovation culture fully mediates the relationship (H3b: β = 0,309, p = 0,000, see Table 22). This finding is critical because an organic organizational structure does not boost efficiency on its own. Rather, its primary contribution to efficiency is the role as an enabler of an open-minded innovation culture, which in turn drives efficiency gains. This provides strong empirical validation for the conceptual arguments of Dewi et al. (2025) and Iranmanesh et al. (2021) regarding the central mediating function of

an innovative culture. This finding suggests that structural transformations in accordance with the findings from Bavyko et al. (2022) only improve efficiency if they successfully foster a culture of innovation.

The moderating effects of VUCA on efficiency were particularly revealing, highlighting a key tension in proactive strategy. First, VUCA was found to significantly weaken the positive relationship between innovation culture and efficiency (H4d: $\beta = -0{,}147$, $p = 0{,}016$, see Table 22). This suggests that as environmental dynamics (volatility, uncertainty, complexity and ambiguity) increases, the process of innovation becomes more difficult, costly and harder to manage, diminishing its positive impact on efficiency. Secondly, in contrast VUCA strengthened the relationship between an organic organizational structure and efficiency (H4b: $\beta = 0{,}127$, $p = 0{,}031$, see Table 22). This finding strongly supports the premise of this dissertation and aligns with literature from Mezhevov et al. (2022) and Mijušković & Todorović (2020), who argued that organizations must adopt flexible structures to enhance efficiency amidst turbulence. It implies that in a turbulent environment, the flexibility, reduced bureaucracy and streamlined decision-making of an organic structure as noted by Williamson (1983) become even more critical for maintaining efficiency than in a stable environment.

Finally, the Necessary Condition Analysis (NCA) shifted the perspective from *should-have* drivers to *must-have* prerequisites, yielding one of the study's at hand most significant contributions. Both an open-minded innovation culture (H5d: $d = 0{,}225$, $p = 0{,}000$) and an organic organizational structure (H5b: $d = 0{,}245$, $p = 0{,}000$) were confirmed as statistically significant necessary conditions for high efficiency (see Table 22). The bottleneck analysis (see Table 14) quantifies this, indicating that to achieve an 80 % level of efficiency, an organization must have a minimum culture score of 40,1 percentile and a minimum structure score of 66,8 percentile.

The above-mentioned findings challenge and update traditional contingency theory. Seminal works by Burns & Stalker (1961) and subsequent studies on ambidexterity (e.g., Raisch & Birkinshaw, 2008) and bureaucracy (e.g., Adler & Borys, 1996 and Siggelkow & Rivkin, 2005) consistently associated mechanistic structures with efficiency based on the assumption of exploitation. In contrast the results of this study suggest that in a modern, VUCA-dominated context, this assumption is no longer valid. High efficiency is no longer achievable through rigid standardization. Instead, the new bottleneck is a minimum threshold of organicity (flexibility in configuration, a high level of cross-functional

integration and a decentralized decision autonomy). As demonstrated in the permutation results (see Table 16), a VUCA environment itself was not a necessary condition, thereby substantiating the dissertation's proactive perspective: An organic organizational structure and an open-minded innovation culture are foundational for enhanced organizational efficiency, rather than the external environment.

5.2 Recommendations based on Importance Performance Map

The Importance-Performance Map Analysis (IPMA) presented in chapter 4.4.3 provides a critical diagnostic tool for managerial action. By plotting the total importance which describes the total effect or leverage of a predictor construct on the target construct against its performance which describes its current average score in the sample from 0 - 100, the IPMA matrix (see exemplary Figure 10) identifies clear priorities for resource allocation.

The following recommendations are derived from analyzing the position of the lower-order constructs in the IPMA quadrants for the target outcomes of efficiency (see Figure 11) and effectiveness (see Figure 12).

Top Priority: Concentrate Here

The most urgent managerial priority identified in this study is culture of continuous development. For both effectiveness (Importance = 0,368) and efficiency (Importance = 0,388), this construct can be clearly assigned to the “Concentrate here” quadrant (Q4). The construct has one of the highest total effects on both performance metrics, but it simultaneously has the lowest performance score in the entire model (Performance ≈ 56 %).

This significant gap between high importance and low performance represents an opportunity for improvement. Management should prioritize and allocate resources such as training, budget and strategic focus to fostering this capability. This includes implementing and rewarding processes for organizational learning, systematic feedback loops (e.g., Kaizen or PDCA cycles) and cultivating a mindset where experimentation and incremental improvements are valued and seen as part of daily work as outlined by Jerab (2024) and Sihombing et al. (2025).

Key Strengths: Keep up the Good Work

The analysis further identifies two organizational strengths. Decision autonomy and activating leadership are consistently located in the "Keep up the Good Work" quadrant (Q1) for both effectiveness and efficiency. Decision autonomy (Performance ≈ 73 %) is the most

important driver for effectiveness (Importance = 0,407) and a key driver for efficiency (Importance = 0,336). Further to that activating leadership (Performance ≈ 71 %) is a high-impact driver for both effectiveness (Importance = 0,345) and efficiency (Importance = 0,364).

Both constructs are high-performing and high-leverage assets. The managerial priority for both decision autonomy and activating leadership is protection and retention. Management must actively ensure that these strengths are not eroded by avoiding the recentralization of decision-making during a crisis. Furthermore, these strengths should be leveraged. Since activating leadership is performing well, these leaders should be tasked with championing the improvement of the culture of continuous development as they have demonstrated their effectiveness in motivating employees (Dvir et al., 2002; Kauffeld et al., 2004).

Lower Priority & Nuanced Role: Low Priority

The constructs configuration (Performance ≈ 63 % / Importance = 0,163) and cross-functional integration (Performance ≈ 63 % / Importance = 0,206) consistently fall into the "Low Priority" quadrant (Q3). They demonstrate both low total importance (leverage) and relatively low performance.

This finding suggests that large-scale, costly investment projects aimed with a focus at improving standardization protocols or cross-functional team structures may yield a poor return on investment, as they have low leverage on the ultimate performance outcomes. Resources would be more efficiently spent on the Q4 priority.

Integrating the results from NCA this "low priority" status must be interpreted with caution and balanced against the NCA findings (Chapter 4.5.2). The NCA (see Table 17) revealed that to achieve an 80 % organic structure, a minimum threshold of cross-functional integration (52,9 percentile) and configuration (23 percentile) is a necessary prerequisite. Therefore, these factors should be treated rather as hygiene factors than low priority. Management must ensure they meet the minimum necessary bottleneck level of those constructs to avoid failure, but they should not be the focus of resource-intensive initiatives aimed at driving new performance gains.

Low Priority & High Performance: Possible Overkill

It is an important finding that for both efficiency (see Figure 11) and effectiveness (see Figure 12), no predictor constructs fall into the "Possible Overkill" quadrant (Q2). This

quadrant is designed to identify areas where performance is high (indicating high resource consumption) but importance for the target outcome is low (low strategic leverage).

The absence of any items in this quadrant is a positive outcome. It suggests that, based on the sample data, organizations are not currently misallocating significant resources or wasting effort on structural or cultural activities that have a low impact on performance. For the data set at hand no corrective action is required for this quadrant.

Finally, next to the target constructs effectiveness and efficiency the IPMA also provides a blueprint for how to strategically configure the core constructs of organizational structure and innovation culture.

The IPMA for innovation culture (see Figure 13) shows how it is built by the components of organizational structure. The result of the analysis is underlining that decision autonomy is the single most important driver (Importance = 0,485) and is already a high-performing strength (Performance ≈ 73 %). Configuration and cross-functional Integration in contrast are in the "Low Priority" quadrant (Q3). This provides a powerful and actionable insight since the most effective structural lever managers can pull to foster an open-minded innovation culture is to grant, protect and expand decentralized decision-making power. This highlights a powerful causal chain. Empowering employees with decision autonomy is the most critical structural action management can take to foster an open-minded innovation culture, which in turn is the most powerful driver of both effectiveness and efficiency. This aligns with Grant (1996), who argued that autonomy taps into distributed organizational knowledge, which is the heart of innovation.

5.3 Answers to the Research Questions

The main objective of this dissertation was to identify how organizations can proactively balance their organizational structure and innovation culture to sustain or enhance effectiveness and efficiency of an organization in a dynamic environment. Based on the results at hand the objectives of this study were formulated in eight research questions covering one main question mentioned above and seven subordinated research questions that can be clearly answered by a set of *must-have* and *should-have* factors. A detailed overview on how the research questions and hypotheses align can be found in Table 23.

Table 23: Alignment Hypothesis Testing and Research Questions

Category		Hypotheses	ß-coefficient	p-value	Result	Detailed Result based on Hypothese Testing for Research Question	Connected Research Question	Connected Research Question
Direct Effect	H1a	Organic Org. Struc. -> (+) Effectiveness	0,398	0,000	H1a can be supported	Organic organizational structures are positively associated with effectiveness.	1.1 + 1.3	- To what extent does organizational structure and innovation culture I3influence corporate performance under VUCA conditions? - Which structural and cultural characteristics exert the strongest impact on key performance indicators such as efficiency and effectiveness?
	H1b	Organic Org. Struc. -> (+) Efficiency	0,265	0,000	H1b can be supported	Organic structures are positively associated with efficiency	1.1 + 1.3	
	H2a	Open Inn. Cult. -> (+) Effectiveness	0,486	0,000	H2a can be supported	An open innovation culture is positively associated with effectiveness.	1.1 + 1.3	
	H2b	Open Inn. Cult. -> (+) Efficiency	0,526	0,000	H2b can be supported	Organic structures are positively associated with efficiency.	1.1 + 1.3	
Mediating Effect	H3a	Org. Struc. -> Inn. Cult. -> Effectiveness	0,285	0,000	H3a can be supported	Innovation culture mediates the relationship between organizational structure and effectiveness.	1.4	- How does innovation culture mediate the relationship between organizational structure and performance in dynamic and uncertain environments?
	H3b	Org. Struc. -> Inn. Cult. -> Efficiency	0,309	0,000	H3b can be supported	Innovation culture mediates the relationship between organizational structure and efficiency.	1.4	
Moderation Effect	H4a	VUCA x Struc. -> Effectiveness	0,077	0,116	H4a cannot be supported	VUCA moderates the relationship between organizational structure and effectiveness.	1.2	- How does VUCA moderate the effects of organizational structure and innovation culture on corporate performance?
	H4b	VUCA x Struc. -> Efficiency	0,127	0,031	H4b can be supported	VUCA moderates the relationship between organizational structure and efficiency.	1.2	
	H4c	VUCA x Inn. Cult. -> Effectiveness	-0,024	0,614	H4c cannot be supported	VUCA moderates the relationship between innovation culture and effectiveness.	1.2	
	H4d	VUCA x Inn. Cult. -> Efficiency	-0,147	0,016	H4d can be supported	VUCA moderates the relationship between innovation culture and efficiency.	1.2	
	H4e	VUCA x Org. Struc. -> Inn. Cult.	0,020	0,429	H14e cannot be supported	VUCA moderates the relationship between organizational structures and innovation culture.	1.2	
NCA	H5a	Organic Org. Struc. (NCA) -> (+) Effectiveness	0,232	0,000	H5a can be supported	An organic organizational structure is a necessary condition for enhanced organizational effectiveness.	1.5 + 1.6 + 1.7	- What are the necessary conditions for a balanced relationship between organizational structural and cultural characteristics that enable proactive adaptation to VUCA and thus ensure high corporate performance? - What are critical bottlenecks (must-have factors) to ensure a balance of structure and culture which is most resistant to VUCA? - Which critical success factors are pivotal for organizational performance and how can their impact be optimally leveraged through targeted actions?
	H5b	Organic Org. Struc. (NCA) -> (+) Efficiency	0,245	0,000	H5b can be supported	An organic organizational structure is a necessary condition for enhanced organizational efficiency.	1.5 + 1.6 + 1.7	
	H5c	Open Inn. Cult. (NCA) -> (+) Effectiveeness	0,290	0,000	H5c can be supported	An open innovation culture is a necessary condition for enhanced organizational effectiveness.	1.5 + 1.6 + 1.7	
	H5d	Open Inn. Cult. (NCA) -> (+) Efficiency	0,225	0,000	H5d can be supported	An open innovation culture is a necessary condition for enhanced organizational efficiency.	1.5 + 1.6 + 1.7	

Source: Own representation

An organic organizational structure and an open-minded innovation culture are necessary conditions for an enhanced corporate performance in a dynamic environment. An organic organizational structure is mostly supported by a decentralized decision autonomy followed by a cross functional integration of teams and a configuration which serves a balanced level of standardizations and formalizations. An open-minded innovation culture is mostly supported by a culture of activating leadership and continuous development. Accordingly, it is required to build an organic organization structure and support an open-minded innovation culture to proactively prepare for the unforeseen dynamics of today's environment so that effectiveness and efficiency can be enhanced. Further to this leading research question seven subordinated research questions were reviewed.

The first subordinated research question was asking for the impact that organizational structure and innovation culture have on the corporate performance under VUCA conditions. Considering the effect size f^2 innovation culture has the highest effect size on effectiveness and efficiency. The organizational structure in turn is having the largest effect on innovation culture. The effect of VUCA towards effectiveness and efficiency is minor while a medium effect of VUCA towards innovation culture should be considered.

Taking the moderator VUCA under review another subordinated research questions was asking how or in other words in which direction VUCA moderates the relationship between organizational structure and innovation culture towards corporate performance. Focusing on the statistically significant total effects VUCA does only have smaller effects on the relationship of innovation culture towards efficiency and organizational structure towards efficiency. The moderating effect of VUCA between organizational structure and efficiency is medium sized and positive which means that a higher configuration of environmental dynamics has a positive effect on the relationship between organizational structure and efficiency. This result seems unusual since higher environmental dynamics like uncertainty and volatility usually decrease efficiency. However, according to the research hypothesis efficiency can be increased under dynamic environmental conditions due to reduced bureaucracy and a streamlined decision process (Williamson, 1983) within an organic organizational structure. The moderating effect of VUCA between innovation culture and efficiency is small sized and negative which is against the initial hypothesis that a well-balanced set of an organic organizational structure and an open-minded innovation culture enhance effectiveness and efficiency.

There are no statistically significant effects moderating the relationship between organizational structure and innovation culture towards corporate performance.

Considering the structural and cultural characteristics that exert the strongest impact on key performance indicators like effectiveness and efficiency the total effects underline that innovation culture has a much stronger effect towards effectiveness and efficiency than organizational structure. However, the fact that an organic structure also has a large effect towards innovation culture needs to be mentioned.

Furthermore, a subordinated research question was asking how or in other words in which direction innovation culture mediates the relationship between organizational structure and innovation culture within a dynamic environment. Both mediating effects from organizational structure via the mediating variable innovation culture towards effectiveness and efficiency are statistically significant. The specific indirect effect size towards efficiency is slightly larger than the specific indirect effect size towards effectiveness.

Three additional subordinated research questions were focusing on the necessary condition analysis. For a balanced relationship between organizational structure and innovation culture the following characteristics are necessary to enable a proactive adoption of VUCA and in consequence ensure a higher corporate performance. For an organic organizational structure, a decentralized decision autonomy has the highest relevance followed by a cross functional integration of teams and a configuration balancing standardization and formalization (see Table 7). For an open-minded innovation culture an activating leadership style is required and a culture of continuous development supports the openness of the innovation culture. Those factors can also be interpreted as critical bottlenecks (*must-have* factors) to ensure a balance of structure and culture which is most resistant to VUCA. All this critical success factors can potentially be adjusted within organizations to enhance productivity. However, it needs to be highlighted that structural changes impacting the configuration, decision autonomy and the level of cross-function integration of teams require senior management attention. A process of restructuring of organizations requires involvement of stakeholders at various levels is crucial to ensure that these structural changes are not only accepted but also effectively implemented. The integration of employees in the decision-making process has been demonstrated to cultivate a perception of ownership, thereby enhancing the adaptability of the organization in volatile environments. Moreover, as organizations navigate this restructuring, they must remain vigilant about the emerging dynamics of innovation and collaboration, particularly considering the increasing reliance on technology

and data-driven decision-making. This shift necessitates a careful balance between decentralized autonomy and the need for cohesive strategic alignment, which has been shown to improve overall organizational performance and innovation capacity (Stanikzai & Mittal, 2025).

In contrast an adjustment towards an open-minded innovation culture can also introduce challenges that necessitate a reevaluation of existing practices. As organizations embrace open-minded innovation, they often encounter cultural mismatches that can hinder collaboration and impede the successful implementation of innovative processes. Therefore, a comprehensive cultural change within an organization often constitutes a long process of change and adjustment which cannot be forced top-down but rather needs to organically grow.

6 NEW SCIENTIFIC RESULTS

6.1 Study's Contribution

The primary objective of this research is to shift the academic and managerial discourse from a reactive posture towards environmental turbulence to a proactive way of facing the dynamics of today. This is achieved by developing and empirically validating an integrated model that explains how organizations can proactively configure their internal organizational structure and innovation culture to sustain and enhance corporate effectiveness and efficiency (performance) when faced with the persistent challenges of the dynamics of a volatile, uncertain, complex and ambiguous (VUCA) environment.

The motivation for this study originated from a research gap in the existing strategic management literature. While research on the VUCA phenomenon has grown, the dominant focus has been on developing reactive coping mechanisms designed to mitigate the immediate consequences of disruptive events. This approach has framed organizations as shock absorbers and reveals that a relevant research gap exists regarding empirical evidence on the systematic and proactive interplay between organizational structure and innovation culture as a combined lever for performance. While some studies have examined these constructs in isolation, there was a lack of a holistic and integrated model that simultaneously tested their direct, mediating and moderated effects on both effectiveness and efficiency within a turbulent environment using PLS-SEM and NCA.

A significant contribution of this dissertation lies in its novel methodological design. The research gap was addressed by moving beyond traditional, single-logic analyses and instead combining two powerful quantitative methods:

- Partial Least Squares Structural Equation Modeling (PLS-SEM): This approach allowed the study to test the complex interaction of relationships in the research model, identifying the *should-have* factors. It provided a sufficiency logic revealing which factors (e.g., innovation culture) act as the strongest drivers for enhancing performance (effectiveness and efficiency).
- Necessary Condition Analysis (NCA): This was a critical addition to PLS-SEM that provided a necessity logic. NCA identifies the *must-have* factors or critical bottlenecks that represent the minimum thresholds of a construct (e.g., a certain level

of configurations for an open-minded innovation culture) that must be in place for a desired outcome (e.g., enhanced effectiveness) to even be possible.

By integrating PLS-SEM and NCA, this study delivers a far more complete and actionable set of results than either method could alone. It not only identifies what managers should invest in to drive performance but also what they must have in place to avoid failure. This dual-logic approach is a novel methodological contribution to the study of organizational design and strategic management in dynamic contexts.

Next to a methodological contribution this study also contributes to several key theoretical approaches.

Classic contingency theory-based approaches posit that organizational effectiveness and efficiency depend on the fit between structure and environment. The study at hand extends this theory in two ways. It firstly empirically confirms that a more organic structure is the appropriate fit for a VUCA environment and secondly it moves beyond structure alone by integrating innovation culture as a mediating factor and demonstrating that the fit must be an alignment of culture and structure.

Furthermore, a major theoretical contribution is the direct challenge to the classic organizational theory (Burns & Stalker, 1961) that associates mechanistic structures with high level of efficiency. The NCA results from this study demonstrate that in a modern, turbulent context, a minimum threshold of organicity (specified by an open configuration, decentralized decision autonomy and cross-functional integration) is a necessary condition for high efficiency. This suggests that the old model of achieving efficiency through rigid bureaucracy is no longer viable in a VUCA world. Flexibility has become a prerequisite for efficiency and not just an alternative to efficiency.

Finally, the study delivers several novel empirical findings with direct practical implications. The PLS-SEM results confirmed that an open-minded innovation culture is the single strongest direct driver of both effectiveness and efficiency. Additionally, it was confirmed as a powerful mediator, explaining how an organic structure achieves its positive performance impact. The primary value of an organic structure is its ability to foster an open-minded innovation culture, which in turn drives performance.

For the first time in this context, the NCA results quantified the specific, non-negotiable thresholds required for enhanced corporate performance. This balancing is not merely a theoretical concept but can be defined by the specific, tangible actions and perceptions

measured in this study. Achieving the necessary 56th percentile of an open-minded innovation culture is not an abstract goal, but it is a direct function of its two core components. The *must-have* level is primarily built upon:

- Activating Leadership: To reach this threshold, supervisors must demonstrate they are interested in employee suggestions for improvement (Item AL01_02, Loading: 0,813), actively involve employees in solving problems (Item AL01_03, Loading: 0,804) and support them when they make suggestions (Item AL01_01, Loading: 0,796).
- Continuous Development: The threshold requires a culture where teams are not just reflecting but are actively generating (Item CD01_06, Loading: 0,789) and trying out new ideas (Item CD01_10, Loading: 0,785).

Therefore, balancing for a *must-have* innovation culture means managers must actively solicit, involve and support employee ideas, while the organization must have established routines for generating and testing new concepts.

Similarly, achieving the 67,9th percentile in organic structure, which is a bottleneck for both effectiveness and efficiency is defined by its high-loading items:

- Decision Autonomy: The entire foundation of the organizational structure is based on superiors keeping open communication with employees (Item DM01_07, Loading: 0,850) and providing employees the opportunity to suggest improvements (Item DM01_06, Loading: 0,787).
- Cross-functional Integration: The structure is then supported by the free flow of informal communication, where employees from different areas can be called freely when needed (Item CN01_04, Loading: 0,667) and informal discussions between them are common (Item CN01_03, Loading: 0,679).

Balancing for an organic threshold, therefore, means prioritizing open, bottom-up communication from superiors (autonomy) and enabling informal, horizontal communication between teams (integration). This approach offers a nuanced perspective, providing empirical evidence that supports the theoretical contribution that organicity defined here as open communication and employee empowerment is a prerequisite for efficiency.

Additionally, the model demonstrated that VUCA is not just a simple moderator that applies a negative effect on corporate performance due to unforeseen dynamics. Instead, it acts as a

significant direct negative antecedent to performance. Furthermore, it has complex moderating effects, such as strengthening the positive relationship between an organic structure and efficiency, while weakening the path from innovation culture to efficiency. This complex result highlights the internal tensions managers must balance.

By using an Importance-Performance Map Analysis (IPMA), the study translates the complex findings into a clear strategic blueprint. The most urgent priority for managers identified from the data is to pay attention to the Quadrant Q4 "concentrate here" construct for fostering a culture of continuous development, which had the highest performance gap (high importance, low performance). Because the entire construct is in the low-performance quadrant, all its component items (MV) are underperforming. The most critical levers are the items that most strongly define the construct (i.e., those with the highest outer loadings).

A manager seeking to fix this high-importance, low-performance gap should therefore concentrate on implementing processes for:

- Reflecting on Success: Systematically analyzing "what is going well and should be further developed" (Item CD01_04, Loading: 0,797).
- Idea Generation: Actively encouraging teams to "generate many new ideas" (Item CD01_06, Loading: 0,789).
- Experimentation: Creating a culture that is "always trying out new ideas" (Item CD01_10, Loading: 0,785).
- Learning from Failures: Implementing routines to "reflect on what is not going well and could be improved" (Item CD01_02, Loading: 0,736).

These four specific behaviors with high impact are the most effective levers for managers to pull to address the strategic weakness identified in the IPMA.

6.2 Summary of New Scientific Results

In summary, this dissertation yields the following new scientific results as illustrated in Table 24. Central to this work is the dual-logic approach, a methodological innovation that synthesizes Partial Least Squares Structural Equation Modeling (PLS-SEM) with Necessary Condition Analysis (NCA) to simultaneously identify sufficient performance drivers and non-negotiable minimum thresholds in this field of science. This dual perspective facilitates a critical re-evaluation of Contingency Theory, demonstrating that *Structure-Environment-Fit* in dynamic contexts is not a direct correlation but is fundamentally mediated by an open-minded innovation culture. Furthermore, the findings of this dissertation empirically revise

the classic *Mechanistic-for-Efficiency* paradigm, establishing that a baseline level of organic structure is a strict necessity for high efficiency in contemporary markets. Beyond identifying innovation culture as the primary antecedent of organizational effectiveness, this study for the first time provides granular, quantified benchmarks for performance, revealing that achieving 80 % effectiveness requires surpassing the 56th percentile in innovation culture and the 67.9th percentile in organic structure. By further elucidating the complex, dual-moderating role of VUCA, which strengthens the impact of organic structures while attenuating cultural drivers and applying Importance-Performance Map Analysis (IPMA), this research for a first time delivers an actionable strategic blueprint that prioritizes continuous development as the most urgent catalyst for long-term corporate resilience.

Table 24: New Scientific Results

Category	New Scientific Result	Description & Key Findings
Methodological Innovation	The Dual-Logic Approach	The study pioneers a novel methodology by combining Partial Least Squares Structural Equation Modeling (PLS-SEM) and Necessary Condition Analysis (NCA) for this field of research. This allows managers to simultaneously identify sufficient *should-have* performance drivers and non-negotiable *must-have* minimum thresholds to avoid failure.
Theoretical Contribution	Updating Contingency Theory	The research extends classic contingency theory by confirming that an organic structure is the appropriate fit for a dynamic VUCA environment. Furthermore, it proves that "Structure-Environment-Fit" is not achieved by structure alone, but relies on innovation culture acting as the critical mediating factor.
Theoretical Contribution	Overturning the "Mechanistic-for-Efficiency" Model	The study directly challenges the classic organizational assumption (Burns & Stalker, 1961) that rigid, mechanistic structures drive efficiency. The NCA results empirically prove that in a modern dynamic world, a minimum threshold of an organic structure (flexibility, cross-functional integration, decision autonomy) is a strict necessity for high efficiency.
Empirical Discovery	Culture as the Ultimate Driver & Structural Enabler	PLS-SEM reveals that an open-minded innovation culture is the single strongest direct driver of both organizational effectiveness and efficiency. An organic structure's primary value lies in its role as a partial mediator, enabling this innovative culture to flourish.
Empirical Discovery	Quantified Performance Bottlenecks	[Exemplary for Effectiveness] For the first time in this context, the study quantifies exact, non-negotiable thresholds. To achieve 80% effectiveness, an organization must secure at least the 56th percentile in innovation culture (via activating leadership and continuous development) and the 67.9th percentile in organic structure (via decision autonomy and cross-functional integration).
Empirical Discovery	The Complex, Dual-Moderating Role of VUCA	VUCA is proven to be a direct negative antecedent to corporate performance rather than just a simple moderator. However, it exerts a dual-moderating effect on efficiency: Environmental turbulence actually strengthens the positive relationship between an organic structure and efficiency, while simultaneously weakening the positive relationship between innovation culture and efficiency.
Practical Contribution	Actionable Strategic Blueprint (IPMA)	Using Importance-Performance Map Analysis (IPMA), the study identifies a *culture of continuous development* as the most urgent managerial priority (high importance, low current performance) and outlines exact behaviors for intervention: Reflecting on success, encouraging idea generation, fostering experimentation and learning from failures.

Source: Own representation

7 CONCLUSION

7.1 Study's Limitations

The execution of scientific research is invariably subject to certain limitations. In the pursuit of scientific transparency, it is imperative to delineate the limitations inherent in research endeavors. This approach is pivotal in ensuring the optimal impact of research findings during their implementation.

The entire research model is based on primarily literature research to create the research model at hand (see Figure 2). To ensure a high-quality literature research pre-studies with systematic literature reviews have been performed (e.g. Weiß, 2024; Weiß, 2025). For the selection of the most relevant scientific papers keywords were defined to ensure an objective and clear approach. With the help of block building method (Guba, 2008; Tranfield et al., 2003) the research questions focusing on the impact of a dynamic environment to the mutual interplay of organizational structure and organizational culture towards the performance factors effectiveness and efficiency were divided in relevant blocks of terms. The utilization of these terms was driven by the necessity to optimize the congruence between the research and the extant literature. The application of this method can be subject to a certain degree of subjectivity, as the choice of terms has not been challenged by a non-involved researcher.

In addition to the aforementioned points, it is imperative to note that the research was focused on papers that have undergone the process of peer-review and have a maximum publication age of 10 years. The implementation of these regulations was driven by the objective of enhancing the scientific standards and the quality of research conducted. However, it is important to note that research papers which have been published prior to the timeframe utilized for the systematic literature research may not have been identified. Furthermore, in certain contexts deviations from this standard had to be made to cover all relevant findings in literature which are older than the defined decade.

Next to the above-mentioned limitations the dynamics of the environment are a very broad term which complicates the specification and distinguishment from other approaches. The term VUCA on the one hand is a very holistic approach which can be readily addressed. Nevertheless, a comprehensive literature review should encompass non-holistic approaches, such as simple dynamics due to external effects or concrete effects, including the pandemic of Covid-19 or certain political events.

When quantitative research is the focus, additional limitations must be considered. A total of 428 participants took part in the survey. The minimum required number of participants was 153, a figure which was successfully attained. However, it needs to be acknowledged that the number of participants could have been further increased to enhance validity and significance of the sample (Faul et al., 2009).

Further to that the participants are predominantly from German-speaking countries. Despite the fact that the survey has also been shared in English language to decrease the risk of a potential cultural bias based on language only three participants have answered the survey in English language, which is the rational why neither a Common Method Bias (CMB) nor Measurement Invariance of Composite Models (MICOM) has been performed. Referring to the data's characteristics the assumption that the results may primarily apply for organizations reflecting a German work culture can be formulated.

The methodology of SEM also entails smaller limitations which should be transparently shared. The research model is based on latent variables which are challenging to measure due to the inability for direct measurement. For example, the latent variable of innovation culture needs to be operationalized by items to enable the researcher to measure the characteristics of a latent construct. This operationalization has been based on existing scales with high reputation. However, using those existing scales still does not ensure that all relevant characteristics of a latent construct have been considered. Further to that a potential risk of measuring perceptions of the participants exists. Their perception might have been influenced by expectations of the individuum or the society. Additionally, the scales were originally published in English language. For the survey the items were translated into German language which could potentially imply certain translation issues for the intended understanding of the items.

Connected to the latent variables it is hard to estimate the model fit of SEM towards the reality. All indicators which can be used for assuring the best possible fit are accurate within the research at hand (e.g. Q^2 LV and Q^2 MV). This, however, does not guarantee that the model is perfectly accurate since alternative models could explain the data equally well.

The data set under consideration demonstrates a high quality in terms of both sample characteristics (see Chapter 4.1) and structural model (see Chapter 4.4). The reliability and validity based on Cronbach's Alpha and AVE, VIF etc. is on a good level. Additionally, discriminant validity (HTMT) is highly satisfactory like it is with the level of determination R^2. Further to that certain items were not dropped due to their lower loadings / weights since

they represent an essential conceptual facet of the structural equation model (see Annex 3 and Annex 4; Item AG01_05 -> Effectiveness with loading of 0,367).

Furthermore, data for both the NCA and IPMA had to be normalized. This normalization is imperative, as the scales utilized in the survey were implemented with their original scaling to enhance the study's validity. It is important to note that this additional step, which is performed manually, does adjust the data set. Consequently, this can result in a reduction in the comparability of the SEM and NCA/IPMA analyses.

In a final step it should be mentioned that during this dissertation causal relationship between the constructs are mentioned. It is relevant to clarify that due to the nature of this cross-sectional study no casualization can be identified but rather a correlation based on the evident dataset at hand.

7.2 Directions for Future Research

The dissertation seeks to address the pressing challenge of enhancing organizational performance through proactive structural and cultural adaptations in response to increasing environmental dynamics like volatility, uncertainty, complexity and ambiguity (VUCA). A comprehensive review of existing literature reveals a prevailing focus on reactive coping strategies. However, there is a clear empirical and theoretical gap concerning proactive configurations of organizational structure and innovation culture that can systematically buffer the negative effects of VUCA while enhancing performance outcomes.

This research proposes a multidimensional research model grounded in established theories of organizational design, innovation culture and strategic management, with the aim of addressing the identified gap. The use of Structural Equation Modelling (SEM) including advanced techniques such as Importance-Performance Map Analysis (IPMA) and Necessary Condition Analysis (NCA) allows a nuanced examination of direct, indirect, mediating and moderating effects across key constructs.

The current outlook is founded on the empirical validation of the model, utilizing a cross-sectoral survey of organizations. This survey targeted a sample size sufficiently large to permit robust statistical inference but could potentially be enlarged with a higher sample size covering multiple regions worldwide to increase international validity.

The dissertation pays particular attention to the identification of combinations of organizational structure and innovation culture that exhibit the highest levels of resilience to VUCA dynamics and yields the greatest impact on effectiveness and efficiency metrics.

Based on the research model those latent constructs could be operationalized with additional scales and items to enlarge the scope of the research. Further to those potentials for adjustment of the study a diversification of the research questions should be considered. The findings of the research indicate that the implementation of an organistic organizational structure and an open-minded innovation culture has the potential to enhance organizational performance. It is imperative that this adaptability is integrated into the organizational strategy, ensuring its seamless implementation in the daily operations of management. Consequently, the transition to praxis must be methodically planned to capitalize on the scientific outcomes of this research.

Taking into account the scientifically significant negative impacts of the moderator VUCA towards the overall corporate performance resilience of an organization can be interpreted as an indicator for enhanced performance. The development of a scientific model that could be used to predict the necessary degree of resilience in relation to a certain level of environmental dynamics (VUCA) could ensure the applicability of the model to managers.

In the context of rapidly evolving technologies such as artificial intelligence, which promises to enhance performance, it is imperative for organizations to demonstrate agility in their responses. This agility to proactively adopt operations and ensure rapid changes to be implemented will help accelerate performance and is a vital factor when implementing the key takeaways of this study. As previously stated, the implementation of adaptability into organizational strategy is contingent upon the utilization of resilience as an indicator for prediction and the employment of agility for the purpose of rapid responses to technological developments. This will establish a foundation for both scholarly advancement and managerial application by operationalizing the proactive approach of this dissertation to address the threats posed by a dynamic environment.

8 SUMMARY OF THE RESULTS

This dissertation develops and empirically validates a proactive model for enhancing corporate performance defined by effectiveness and efficiency amidst today's increasingly dynamic environments. It addresses a critical research gap by shifting focus from reactive coping mechanisms to the proactive interplay between organizational structure and innovation culture.

A significant methodological contribution is the novel, dual-logic approach combining PLS-SEM and NCA. The analysis is based on quantitative data from a validated survey instrument, which relies on established academic scales. This design simultaneously identifies *should-have* performance drivers and *must-have* success prerequisites. Balancing these drivers and prerequisites in an appropriate way should enable a lasting organizational effectiveness and efficiency in turbulent environments. The PLS-SEM findings reveal an open-minded innovation culture characterized by activating leadership and continuous development is the strongest direct driver of both effectiveness and efficiency. The positive impact of an organic organizational structure defined by decentralized decision autonomy, cross-functional integration and a flexible configuration is largely mediated through its crucial role in fostering this innovative culture.

The study's most significant theoretical contribution comes from the NCA results, which updates classic contingency theory. Contrary to traditional models that link mechanistic structures to efficiency, this analysis suggests that a minimum threshold of an organic organizational structure is a necessary condition and a critical bottleneck for achieving high effectiveness and efficiency in a modern, turbulent context. The NCA also confirms that minimum levels of both an organic structure and an open-minded innovation culture are non-negotiable prerequisites for high effectiveness. In summary, proactive balancing requires a high-level, simultaneous mix of both organic structure and open-minded innovation culture to achieve high effectiveness, while high efficiency is primarily bottlenecked by first achieving a minimum necessary threshold of the organic structure itself. Practically, the research provides a clear managerial blueprint. It identifies that to achieve high performance an organic structure and open-minded innovation culture are *must-have* foundations. The Importance-Performance Map Analysis (IPMA) further identifies based on the data set at hand that a culture of continuous development as the highest-priority construct for managerial intervention, due to its high strategic importance and low current performance.

ATTACHMENTS

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Annexes

Annex 1: Survey Instrument

Thank you for your willingness to participate in this survey!

What it is about:

In the contemporary business landscape, organisations are confronted with the challenges posed by a rapidly evolving environment, characterised by perpetual uncertainty. The objective of this study is to formulate a sustainable recommendation on the optimal organisational structure and innovation culture required to ensure long-term business success.

How long does the survey take?

As part of the study, all statements are evaluated based on the principle of agreement. The logic of the scales remains consistent throughout with deviating options for your answers. You will assess the degree of your agreement with various statements.
The survey can be completed in approx. 12 minutes.

No personal data is collected. The survey is completely **anonymous**.

PS: Users of **SurveyCircle.com** receive points for their participation, which they can use to recruit study participants for free.

10.13147/SOE.2026.13

Allgemeine Informationen | General Information

1. I acknowledge that no personal data will be used and would like to participate in this survey. SD19

Please confirm your willingness to participate below.

[Please choose]

2. What is your gender? SD01

- ◯ Female
- ◯ Male
- ◯ Diverse

3. How old are you? SD02

I am years old.

4. Are you currently employed? SD13

- ◯ Yes, I am employed.
- ◯ No, I am unemployed.
- ◯ No, I am unemployed for less than six months.
- ◯ No, I am retired.

5. What is your profession? SD14

- ◯ Industry
- ◯ Services Sector
- ◯ Commerce
- ◯ Skilled trades / Craftsmanship
- ◯ Other:

6. How long have you been working for your current employer? SD03

[Please choose]

10.13147/SOE.2026.13

Organisationsstruktur | Organizational Structure

7. Please evaluate the following statements in the context of your daily work.

CI01

Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
Within our organization cross-functional work teams are extensively utilized for managing day-to-day operations.						
○	○	○	○	○	○	○
Within our organization, employees are encouraged to work together with colleagues from other functional areas.						
○	○	○	○	○	○	○
Managers in our organization are strongly encouraged to share information and provide input to other functional areas.						
○	○	○	○	○	○	○
Within our organization, employees from different functional areas are strongly encouraged to share resources.						
○	○	○	○	○	○	○
Managers across our organization work together in (informal) teams.						
○	○	○	○	○	○	○

SF01

10.13147/SOE.2026.13

8. Please evaluate the following statements in the context of your daily work.

Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
For any situation that may arise, there are written procedures available to deal with the matter.	○	○	○	○	○	○	○
Rules and procedures play central role in the organization.	○	○	○	○	○	○	○
Employees' work is registered in forms.	○	○	○	○	○	○	○
There are periodic checks on whether employees comply with rules and procedures.	○	○	○	○	○	○	○
There are job descriptions written for all positions.	○	○	○	○	○	○	○

CN01

9. Please evaluate the following statements in the context of your daily work.

Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
It is easy to speak with any person, independently of his/her position.	○	○	○	○	○	○	○
Usually informal discussions arise between employees from different areas.	○	○	○	○	○	○	○
Employees from different areas can be called freely when they are needed.	○	○	○	○	○	○	○
Employees of an area are always available to those in other areas.	○	○	○	○	○	○	○

DM01

10. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
Few actions are implemented without a supervisor approving of the decision.	○	○	○	○	○	○	○
Even issues of little significance need consultation with a supervisor for a final decisions to be made.	○	○	○	○	○	○	○
Employees must ask their supervisors before doing anything.	○	○	○	○	○	○	○
Employees in this job are allowed to make many decisions.	○	○	○	○	○	○	○
Employees in this job are often asked by their supervisor to participate in decisions.	○	○	○	○	○	○	○
Employees are provided the opportunity to suggest improvements in the way things are done.	○	○	○	○	○	○	○
Superiors keep open communication with employees in this job.	○	○	○	○	○	○	○

Page 04

VUCA

What does VUCA mean?

VUCA describes a dynamic and uncertain environment characterized by **volatility (strong fluctuations), uncertainty (difficult predictability), complexity (multifaceted interconnections) and ambiguity (ambiguous information)**, making decision-making more challenging and requiring flexible strategies.

VO01

11. Please assess which conditions apply to innovation projects in your company.

	Does not apply at all	Rather does not apply	Rather applies	Fully applies
Simple in planning (straightforward/sequential execution)	○	○	○	○
Resource needs are known and accessible	○	○	○	○
Adequate timeframe with good slack in schedule	○	○	○	○
Solid contracts throughout project duration	○	○	○	○
Known, well defined objectives	○	○	○	○

12. Please assess which conditions apply to innovation projects in your company.

UN01

	Does not apply at all	Rather does not apply	Rather applies	Fully applies
Uses few and proven technology components	○	○	○	○
Stakeholders are few, with few time zones / cultural differences	○	○	○	○
Information is easy to obtain	○	○	○	○
Scope is well defined and approved	○	○	○	○
Risk management is well defined	○	○	○	○

CO01

13. Please assess which conditions apply to innovation projects in your company.

	Does not apply at all	Rather does not apply	Rather applies	Fully applies
Few and simple regulatory or political environments	○	○	○	○
Few subcontractors, organizational departments, and cultural differences	○	○	○	○
Few interfaces with other technologies, projects or operations	○	○	○	○
Has been done many times before	○	○	○	○
Clear governance, straightforward decision-making	○	○	○	○

14. Please assess which conditions apply to innovation projects in your company.

AM01

	Does not apply at all	Rather does not apply	Rather applies	Fully applies
Deliverables are well defined, no “unkowns unkowns”	○	○	○	○
Connections between tasks are clear	○	○	○	○
Risk factors are well known and documented	○	○	○	○
No “hidden agenda”	○	○	○	○
All stakeholders and their relationships are recognized	○	○	○	○

10.13147/SOE.2026.13

15. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Somewhat agree	Mostly agree	Strongly agree
My supervisor supports me when I have a suggestion for improvement.	○	○	○	○	○	○
My supervisor is interested in my suggestions for improvement.	○	○	○	○	○	○
Our supervisor involves employees in solving problems.	○	○	○	○	○	○
Our supervisor encourages us to make suggestions for improvement.	○	○	○	○	○	○
My supervisor makes many suggestions for improvement themselves.	○	○	○	○	○	○
Those who decide on the evaluation of a suggestion are sufficiently qualified and competent.	○	○	○	○	○	○

CR01

16. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Somewhat agree	Mostly agree	Strongly agree
My colleagues and I constantly think about improvements.	○	○	○	○	○	○
We reflect on what is not going well and could be improved.	○	○	○	○	○	○
We generate many new ideas.	○	○	○	○	○	○
We reflect on what is going well and should be further developed.	○	○	○	○	○	○
It is important that every employee makes suggestions for improvement.	○	○	○	○	○	○

CD01

17. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Somewhat agree	Mostly agree	Strongly agree
This organization is always moving toward the development of new answers.	○	○	○	○	○	○
This organization can be described as flexible and continually adapting to change.	○	○	○	○	○	○
In this organization, we sometimes reexamine our most basic assumptions.	○	○	○	○	○	○
People in this organization are always searching for fresh, new ways of looking at problems.	○	○	○	○	○	○
Members of this organization realize that in dealing with new problems and tasks, frustration is inevitable; therefore, it is handled constructively.	○	○	○	○	○	○
This organization is open and responsive to change.	○	○	○	○	○	○
This place seems to be more concerned with the status quo than with change.	○	○	○	○	○	○
Once this organization develops a solution to a particular problem, that solution becomes a permanent one.	○	○	○	○	○	○
There is little room for change here.	○	○	○	○	○	○
We're always trying out new ideas.	○	○	○	○	○	○

10.13147/SOE.2026.13

Effektivität | Effectiveness

18. Please evaluate the following statements in the context of your daily work.

PE01

Significantly lower	Much lower	Lower	Neither higher nor lower	Higher	Much higher	Significantly higher
Compared to your competitors, indicate your position on the following dimensions: Market share						
○	○	○	○	○	○	○
Compared to your competitors, indicate your position on the following dimensions: Sales growth						
○	○	○	○	○	○	○

19. Please evaluate the following statements in the context of your daily work.

TP01

Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
Our team effectively used its resources.						
○	○	○	○	○	○	○
Our team was within the proposed budget.						
○	○	○	○	○	○	○
Our team was within the proposed time-schedule.						
○	○	○	○	○	○	○
Our team was able to meet its goals.						
○	○	○	○	○	○	○
Our team was able to respond quickly to problems.						
○	○	○	○	○	○	○

PD01

10.13147/SOE.2026.13

20. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
We bring new and innovative products more often to market than other firms.	○	○	○	○	○	○	○
In our market we are known for our innovative products.	○	○	○	○	○	○	○
Our new products differ substantially from their precursors.	○	○	○	○	○	○	○
The percentage of new and innovative products in the product portfolio is significantly higher in comparison to our competitors.	○	○	○	○	○	○	○
The percentage of sales generated through new and innovative products is significantly higher in comparison to our competitors.	○	○	○	○	○	○	○

AG01

10.13147/SOE.2026.13

21. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
Our organization rapidly reacts to emerging opportunities in markets.	○	○	○	○	○	○	○
Our organization rapidly reacts to emerging opportunities in customer needs.	○	○	○	○	○	○	○
Our organization rapidly reacts to emerging environmental opportunities (e.g., new regulations, artificial intelligence).	○	○	○	○	○	○	○
Our organization supports business experimentation despite uncertain returns.	○	○	○	○	○	○	○
Our organization seeks high-risk projects with chances of high return.	○	○	○	○	○	○	○
Our organization commits resources to radical changes that can potentially transform markets and competition.	○	○	○	○	○	○	○
Our organization anticipates new business opportunities.	○	○	○	○	○	○	○
Our organization seeks new business opportunities.	○	○	○	○	○	○	○
Our organization seeks novel approaches to future market needs.	○	○	○	○	○	○	○

TG01

22. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Somewhat disagree	Undecided	Mostly agree	Strongly agree
I feel that the team I am working in is target-orientated structured.	○	○	○	○	○
I feel that the overall organization is working target-orientated.	○	○	○	○	○
My daily actions taken lead to the desired and essential effects.	○	○	○	○	○
I think that our daily work meets the stakeholder´s requirements.	○	○	○	○	○

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Effizienz | Efficiency

OG01

23. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Somewhat disagree	Undecided	Mostly agree	Strongly agree
Our profits have been generally above the industry average.	○	○	○	○	○
Our return on assets have been generally above industry average.	○	○	○	○	○
Our inventory turnover ratio has been generally higher than industry average.	○	○	○	○	○

AD01

24. Please evaluate the following statements in the context of your daily work.

	Strongly disagree	Mostly disagree	Somewhat disagree	Undecided	Somewhat agree	Mostly agree	Strongly agree
Our organization adapts existing business models.	○	○	○	○	○	○	○
Our organization adapts the existing business process.	○	○	○	○	○	○	○
Our organization quickly adopts best practices used by others.	○	○	○	○	○	○	○

25. Please evaluate the following statements in the context of your daily work. OE01

	Strongly disagree	Mostly disagree	Somewhat disagree	Somewhat agree	Mostly agree	Strongly agree
People in this organization can take on any challenge.	○	○	○	○	○	○
This organization can beat our competition.	○	○	○	○	○	○
This organization is far more innovative than most organizations.	○	○	○	○	○	○
In this organization, we coordinate our efforts to complete difficult projects.	○	○	○	○	○	○
People in this organization can work together to accomplish a goal.	○	○	○	○	○	○
People in this organization can mobilize efforts to accomplish difficult and complex goals.	○	○	○	○	○	○
In this organization, everyone works together very effectively.	○	○	○	○	○	○

This organization can meet customer requirements because the employees are extremely competent.	○	○	○	○	○	○
People here have a sense of purpose.	○	○	○	○	○	○
This organization has a strong vision of the future.	○	○	○	○	○	○
This organization is confident about its future.	○	○	○	○	○	○
This company will double in size in the next 10 years.	○	○	○	○	○	○
During an economic downturn, this organization will come out strong.	○	○	○	○	○	○
This organization is likely to fall apart in a few years.	○	○	○	○	○	○
This organization has no hope of surviving more than a year or two.	○	○	○	○	○	○
I would be surprised if this organization exists in 5 years.	○	○	○	○	○	○
Because this organization is likely to fail, I would never recommend that a friend work here.	○	○	○	○	○	○

Last Page

Thank you for your support!

Your responses help to generate new scientific insights.

This survey is now complete.

For any questions concerning this survey please do not hesitate to contact the author: mike.weiss@fom-net.de

Annex 2: Item Coding

Section AD: Adaptability

[AD01] Scale (fully labeled)
Adaptability
"Please evaluate the following statements in the context of your daily work."

AD01_01 Our organization adapts existing business models.
AD01_02 Our organization adapts the existing business process.
AD01_03 Our organization quickly adopts best practices used by others.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section AG: Agility

[AG01] Scale (fully labeled)
Agility
"Please evaluate the following statements in the context of your daily work."

AG01_01 Our organization rapidly reacts to emerging opportunities in markets.
AG01_02 Our organization rapidly reacts to emerging opportunities in customer needs.
AG01_03 Our organization rapidly reacts to emerging environmental opportunities (e.g., new regulations, artificial intelligence).
AG01_04 Our organization supports business experimentation despite uncertain returns.
AG01_05 Our organization seeks high-risk projects with chances of high return.
AG01_06 Our organization commits resources to radical changes that can potentially transform markets and competition.
AG01_07 Our organization anticipates new business opportunities.
AG01_08 Our organization seeks new business opportunities.
AG01_09 Our organization seeks novel approaches to future market needs.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
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AG01_09 Our organization seeks novel approaches to future market needs.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section CD: Continuous Development

[CD01] Scale (fully labeled)
Continuous Development
"Please evaluate the following statements in the context of your daily work."

CD01_01 This organization is always moving toward the development of new answers.
CD01_02 This organization can be described as flexible and continually adapting to change.
CD01_03 In this organization, we sometimes reexamine our most basic assumptions.
CD01_04 People in this organization are always searching for fresh, new ways of looking at problems.
CD01_05 Members of this organization realize that in dealing with new problems and tasks, frustration is inevitable; therefore, it is handled constructively.
CD01_06 This organization is open and responsive to change.
CD01_07 This place seems to be more concerned with the status quo than with change.
CD01_08 Once this organization develops a solution to a particular problem, that solution becomes a permanent one.
CD01_09 There is little room for change here.
CD01_10 We're always trying out new ideas.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Somewhat agree
5 = Mostly agree
6 = Strongly agree
-9 = Not answered

Section CI: Cross-functional Integration

[CI01] Scale (fully labeled)
Cross-functional Integration 1
"Please evaluate the following statements in the context of your daily work."

CI01_01 Within our organization cross-functional work teams are extensively utilized for managing day-to-day operations.
CI01_02 Within our organization, employees are encouraged to work together with colleagues from other functional areas.
CI01_03 Managers in our organization are strongly encouraged to share information and provide input to other functional areas.
CI01_04 Within our organization, employees from different functional areas are strongly encouraged to share resources.
CI01_05 Managers across our organization work together in (informal) teams.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section CN: Configuration

[CN01] Scale (fully labeled)
Configuration
"Please evaluate the following statements in the context of your daily work."

CN01_01 It is easy to speak with any person, independently of his/her position.
CN01_02 Usually informal discussions arise between employees from different areas.
CN01_03 Employees from different areas can be called freely when they are needed.
CN01_04 Employees of an area are always available to those in other areas.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section CO: Complexity

[CO01] Scale (fully labeled)
Complexity
"Please assess which conditions apply to innovation projects in your company."

CO01_01 Few and simple regulatory or political environments
CO01_02 Few subcontractors, organizational departments, and cultural differences
CO01_03 Few interfaces with other technologies, projects or operations
CO01_04 Has been done many times before
CO01_05 Clear governance, straightforward decision-making

1 = Does not apply at all
2 = Rather does not apply
3 = Rather applies
4 = Fully applies
-9 = Not answered

Section CR: Continuous Reflection

[CR01] Scale (fully labeled)
Continuous Reflection
"Please evaluate the following statements in the context of your daily work."

CR01_01 My colleagues and I constantly think about improvements.
CR01_02 We reflect on what is not going well and could be improved.
CR01_03 We generate many new ideas.
CR01_04 We reflect on what is going well and should be further developed.
CR01_05 It is important that every employee makes suggestions for improvement.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Somewhat agree
5 = Mostly agree
6 = Strongly agree
-9 = Not answered

Section DM: Decision-Making

[DM01] Scale (fully labeled)
Decision-Making
"Please evaluate the following statements in the context of your daily work."

DM01_01 Few actions are implemented without a supervisor approving of the decision.
DM01_02 Even issues of little significance need consultation with a supervisor for a final decisions to be made.
DM01_03 Employees must ask their supervisors before doing anything.
DM01_04 Employees in this job are allowed to make many decisions.
DM01_05 Employees in this job are often asked by their supervisor to participate in decisions.
DM01_06 Employees are provided the opportunity to suggest improvements in the way things are done.
DM01_07 Superiors keep open communication with employees in this job.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section OE: Organizational Efficacy Scale (Leistungswirksamkeit)

[OE01] Scale (fully labeled)
Organizational Efficacy Scale (Leistungswirksamkeit)
"Please evaluate the following statements in the context of your daily work."

OE01_01 People in this organization can take on any challenge.
OE01_02 This organization can beat our competition.
OE01_03 This organization is far more innovative than most organizations.
OE01_04 In this organization, we coordinate our efforts to complete difficult projects.
OE01_05 People in this organization can work together to accomplish a goal.
OE01_06 People in this organization can mobilize efforts to accomplish difficult and complex goals.
OE01_07 In this organization, everyone works together very effectively.
OE01_08 This organization can meet customer requirements because the employees are extremely competent.
OE01_09 People here have a sense of purpose.
OE01_10 This organization has a strong vision of the future.
OE01_11 This organization is confident about its future.
OE01_12 This company will double in size in the next 10 years.
OE01_13 During an economic downturn, this organization will come out strong.
OE01_14 This organization is likely to fall apart in a few years.
OE01_15 This organization has no hope of surviving more than a year or two.
OE01_16 I would be surprised if this organization exists in 5 years.
OE01_17 Because this organization is likely to fail, I would never recommend that a friend work here.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Somewhat agree
5 = Mostly agree
6 = Strongly agree
-9 = Not answered

Section OG: Comparative Organizational Performance

[OG01] Scale (fully labeled)
Comparative Organizational Performance
"Please evaluate the following statements in the context of your daily work."

OG01_01 Our profits have been generally above the industry average.
OG01_02 Our return on assets have been generally above industry average.
OG01_03 Our inventory turnover ratio has been generally higher than industry average.

1 = Strongly disagree
2 = Somewhat disagree
3 = Undecided
4 = Mostly agree
5 = Strongly agree
-9 = Not answered

Section PD: New Product Development Performance

[PD01] Scale (fully labeled)
New Product Development Performance
"Please evaluate the following statements in the context of your daily work."

PD01_01 We bring new and innovative products more often to market than other firms.
PD01_02 In our market we are known for our innovative products.
PD01_03 Our new products differ substantially from their precursors.
PD01_04 The percentage of new and innovative products in the product portfolio is significantly higher in comparison to our competitors.
PD01_05 The percentage of sales generated through new and innovative products is significantly higher in comparison to our competitors.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section PE: Performance

[PE01] Scale (fully labeled)
Performance
"Please evaluate the following statements in the context of your daily work."

PE01_01 Compared to your competitors, indicate your position on the following dimensions: Market share
PE01_02 Compared to your competitors, indicate your position on the following dimensions: Sales growth

1 = Significantly lower
2 = Much lower
3 = Lower
4 = Neither higher nor lower
5 = Higher
6 = Much higher
7 = Significantly higher
-9 = Not answered

Section SF: Standardization/Formalization

[SF01] Scale (fully labeled)
Standardization/Formalization
"Please evaluate the following statements in the context of your daily work."

SF01_01 For any situation that may arise, there are written procedures available to deal with the matter.
SF01_02 Rules and procedures play central role in the organization.
SF01_03 Employees' work is registered in forms.
SF01_04 There are periodic checks on whether employees comply with rules and procedures.
SF01_05 There are job descriptions written for all positions.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section TG: Target-Orientation

[TG01] Scale (fully labeled)
Target-Orientation
"Please evaluate the following statements in the context of your daily work."

TG01_01 I feel that the team I am working in is target-orientated structured.
TG01_02 I feel that the overall organization is working target-orientated.
TG01_03 My daily actions taken lead to the desired and essential effects.
TG01_04 I think that our daily work meets the stakeholder´s requirements.

1 = Strongly disagree
2 = Somewhat disagree
3 = Undecided
4 = Mostly agree
5 = Strongly agree
-9 = Not answered

Section TP: Team-Performance

[TP01] Scale (fully labeled)
Team-Performance
"Please evaluate the following statements in the context of your daily work."

TP01_01 Our team effectively used its resources.
TP01_02 Our team was within the proposed budget.
TP01_03 Our team was within the proposed time-schedule.
TP01_04 Our team was able to meet its goals.
TP01_05 Our team was able to respond quickly to problems.

1 = Strongly disagree
2 = Mostly disagree
3 = Somewhat disagree
4 = Undecided
5 = Somewhat agree
6 = Mostly agree
7 = Strongly agree
-9 = Not answered

Section UN: Uncertainty

[UN01] Scale (fully labeled)
Uncertainty
"Please assess which conditions apply to innovation projects in your company."

UN01_01 Uses few and proven technology components
UN01_02 Stakeholders are few, with few time zones / cultural differences
UN01_03 Information is easy to obtain
UN01_04 Scope is well defined and approved
UN01_05 Risk management is well defined

1 = Does not apply at all
2 = Rather does not apply
3 = Rather applies
4 = Fully applies
-9 = Not answered

Section VO: Volatility

[VO01] Scale (fully labeled)
Volatility
"Please assess which conditions apply to innovation projects in your company."

VO01_01 Simple in planning (straightforward/sequential execution)
VO01_02 Resource needs are known and accessible
VO01_03 Adequate timeframe with good slack in schedule
VO01_04 Solid contracts throughout project duration
VO01_05 Known, well defined objectives

1 = Does not apply at all
2 = Rather does not apply
3 = Rather applies
4 = Fully applies
-9 = Not answered

Annex 3: Outer Loadings (Item-Indicator Reliability)

Outer Loadings	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
AD01_01 -> Effectiveness	0,707	0,696	0,042	16,855	0,000
AD01_03 -> Effectiveness	0,706	0,695	0,042	16,922	0,000
AG01_02 -> Effectiveness	0,692	0,682	0,045	15,358	0,000
AG01_03 -> Effectiveness	0,685	0,674	0,043	15,795	0,000
AG01_04 -> Effectiveness	0,646	0,634	0,045	14,272	0,000
AG01_05 -> Effectiveness	0,367	0,362	0,060	6,088	0,000
AG01_06 -> Effectiveness	0,614	0,605	0,045	13,547	0,000
AG01_07 -> Effectiveness	0,658	0,647	0,043	15,287	0,000
AG01_08 -> Effectiveness	0,558	0,548	0,052	10,706	0,000
AG01_09 -> Effectiveness	0,680	0,669	0,044	15,588	0,000
AL01_01 <- Innovation Culture	0,796	0,796	0,024	33,863	0,000
AL01_02 <- Innovation Culture	0,805	0,805	0,022	37,415	0,000
AL01_03 <- Innovation Culture	0,813	0,813	0,019	42,583	0,000
AL01_04 <- Innovation Culture	0,804	0,804	0,021	38,093	0,000
AL01_06 <- Innovation Culture	0,752	0,753	0,023	32,916	0,000
AM01_01_rc <- VUCA	0,735	0,733	0,034	21,474	0,000
AM01_02_rc <- VUCA	0,772	0,771	0,022	34,861	0,000
AM01_03_rc <- VUCA	0,710	0,709	0,033	21,763	0,000
AM01_04_rc <- VUCA	0,654	0,654	0,036	18,059	0,000
AM01_05_rc <- VUCA	0,744	0,744	0,024	31,616	0,000
CD01_02 <- Innovation Culture	0,736	0,735	0,025	29,312	0,000
CD01_04 <- Innovation Culture	0,797	0,797	0,018	43,634	0,000
CD01_06 <- Innovation Culture	0,789	0,789	0,019	40,750	0,000
CD01_10 <- Innovation Culture	0,785	0,784	0,021	37,090	0,000
CI01_03 -> Structure	0,679	0,674	0,049	13,814	0,000
CI01_05 -> Structure	0,625	0,619	0,056	11,158	0,000
CN01_03 -> Structure	0,667	0,661	0,051	13,102	0,000
CN01_04 -> Structure	0,636	0,631	0,052	12,175	0,000
CO01_05_rc <- VUCA	0,713	0,713	0,028	25,044	0,000
DM01_06 -> Structure	0,787	0,784	0,035	22,505	0,000
DM01_07 -> Structure	0,850	0,846	0,031	27,057	0,000
OE01_01 -> Effectiveness	0,738	0,726	0,043	17,277	0,000
OE01_02 -> Effectiveness	0,722	0,711	0,041	17,549	0,000
OE01_04 -> Effectiveness	0,813	0,801	0,036	22,686	0,000
OE01_05 -> Effectiveness	0,750	0,738	0,042	17,787	0,000
OE01_06 -> Effectiveness	0,795	0,783	0,036	21,797	0,000
OE01_07 -> Effectiveness	0,839	0,826	0,026	32,833	0,000
OE01_08 -> Effectiveness	0,653	0,644	0,045	14,649	0,000
OE01_09 -> Effectiveness	0,719	0,708	0,038	18,903	0,000
OE01_11 -> Effectiveness	0,694	0,683	0,045	15,464	0,000
OG01_02 <- Efficiency	0,630	0,629	0,041	15,553	0,000
OG01_03 <- Efficiency	0,626	0,624	0,042	15,034	0,000
PD01_01 <- Efficiency	0,823	0,822	0,020	41,740	0,000
PD01_02 <- Efficiency	0,820	0,819	0,020	41,438	0,000
PD01_03 <- Efficiency	0,791	0,790	0,023	34,981	0,000
TG01_02 <- Efficiency	0,697	0,697	0,027	25,764	0,000
TP01_05 <- Efficiency	0,680	0,680	0,027	24,918	0,000
UN01_03_rc <- VUCA	0,642	0,641	0,036	17,859	0,000
UN01_04_rc <- VUCA	0,760	0,759	0,022	34,740	0,000
UN01_05_rc <- VUCA	0,717	0,716	0,028	25,788	0,000
VO01_02_rc <- VUCA	0,678	0,678	0,032	21,453	0,000
VO01_04_rc <- VUCA	0,637	0,637	0,034	18,506	0,000
VO01_05_rc <- VUCA	0,756	0,756	0,023	33,361	0,000

Source: Own representation

Annex 4: Outer Weights (Item-Indicator Reliability)

Outer Weights	Effectiveness	Efficiency	Innovation Culture	Structure	VUCA
AD01_01	0,073				
AD01_03	0,033				
AG01_02	0,088				
AG01_03	0,055				
AG01_04	0,089				
AG01_05	-0,125				
AG01_06	0,140				
AG01_07	0,085				
AG01_08	-0,110				
AG01_09	0,129				
AL01_01			0,135		
AL01_02			0,135		
AL01_03			0,135		
AL01_04			0,126		
AL01_06			0,145		
AM01_01_rc					0,100
AM01_02_rc					0,123
AM01_03_rc					0,107
AM01_04_rc					0,100
AM01_05_rc					0,146
CD01_02			0,144		
CD01_04			0,150		
CD01_06			0,161		
CD01_10			0,142		
CI01_03				0,171	
CI01_05				0,191	
CN01_03				0,161	
CN01_04				0,129	
CO01_05_rc					0,122
DM01_06				0,232	
DM01_07				0,461	
OE01_01	0,074				
OE01_02	0,088				
OE01_04	0,116				
OE01_05	0,056				
OE01_06	0,122				
OE01_07	0,218				
OE01_08	-0,078				
OE01_09	0,156				
OE01_11	0,074				
OG01_02		0,148			
OG01_03		0,142			
PD01_01		0,189			
PD01_02		0,192			
PD01_03		0,178			
TG01_02		0,276			
TP01_05		0,252			
UN01_03_rc					0,112
UN01_04_rc					0,124
UN01_05_rc					0,112
VO01_02_rc					0,125
VO01_04_rc					0,100
VO01_05_rc					0,132

Source: Own representation

10.13147/SOE.2026.13

APPENDIX

Declaration on Identity

I, undersigned Mike Weiß, declare that the printed and electronic versions of the doctoral dissertation and thesis booklet are identical in all respects.

Schwerte, 04.03.2026

Mike Weiß

Legal Declaration

I, the undersigned Mike Weiß by signing this declaration declare that *Proactive Balancing Strategies of Organizational Structure and Innovation Culture to Increase Corporate Performance* my PhD dissertation was my own work; during the dissertation I complied with the Act LXXVI of 1999 on the rules of copyright and the rules of the doctoral dissertation prescribed by the Doctoral School, especially regarding references and citations.[1]

Furthermore, I declare that I did not mislead the supervisor(s) or the program leader with the dissertation.

By signing this declaration, I acknowledge that if it can be proved that the dissertation is not self-made or the author of a copyright infringement is related to the dissertation, the University of Sopron is entitled to refuse the acceptance of the dissertation.

I further declare that I am not in the process of obtaining a doctoral degree in the same discipline, that I am not in the process of having my doctoral degree revoked, and that I have not had a previously awarded doctoral degree revoked within 5 years.

Refusing to accept a dissertation does not affect any other (civil, legal, criminal) consequences of copyright infringement.

Schwerte, 04.03.2026

Mike Weiß

[1] LXXVI. TV. 1999 Section 34 (1) Any person may quote the details of the work, to the extent justified by the nature and purpose of the receiving work and in the original, by the name of the source and the author designated there.

Article 36 (1) Details of public lectures and other similar works, as well as political speeches, may be freely used for information purposes, within the scope justified by the purpose. For such use, the source, along with the author's name, should be indicated, unless this is impossible.

10.13147/SOE.2026.13

ACKNOWLEDGEMENTS

Writing a dissertation marks a significant milestone in my research career. The success of such a project is only possible with the support and guidance of inspiring people supporting me.

I would like to express my gratitude to my supervisors Prof. Dr. István Bartók and Prof. Dr. Joachim Hafkesbrink. The countless number of discussions and consultation we had are much appreciated and played a vital role during the progress of my scientific work.

I would also like to express my sincere thanks to the entire team of Sopron University, especially Prof. Dr. Csilla Obádovics, Head of István Széchenyi István Széchenyi Economic and Management Doctoral School, as well as to the staff of FOM University für Oekonomie & Management for their support.

I would like to extend my heartfelt thanks to all friends, companions and supporters who have accompanied me on this journey. My deepest gratitude goes to my parents, friends and fellow students who have supported me throughout the entire journey of this dissertation.

Especially I would like to thank the most important person in my life, Berit, for the support during my endless hours of work in early mornings, late nights and weekends throughout the last years. Your support has been the most relevant part of the journey. I am more than grateful having you standing next to me with all your support, patience and love.