Master in Business Administration Thesis

Exploring Innovation-Driven Leadership

An Empirical Study in the Aerospace and Defense Industry

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The author(s) declare(s) that they have completed the thesis work independently. All external sources are cited and listed under the References section. The thesis work has not been submitted in the same or similar form to any other institution(s) as part of another examination or degree.

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Abstract

Background: The Aerospace and Defense industry requires continuous innovation and adaptation. Ambidextrous leadership, which balances exploration and exploitation, plays a crucial role in driving innovative work behavior. Understanding this relationship is important for navigating industry complexities and staying competitive in rapidly changing market conditions.

Purpose: The purpose of this study is to explore the influence of ambidextrous leadership on aerospace and defense firms' innovation at the individual level. It also deepens the understanding of conditions to improve innovation by examining the moderating role of collaborative climate.

Methodology: This study uses a quantitative research design, specifically structural equation modeling (SEM). Data was collected through a survey questionnaire, with eighty-one valid responses from professionals in the industry.

Results and analysis: The study found that open leadership behavior was positively related to innovative work behavior. This means that leaders who show open leadership behaviors, such as being supportive and collaborative, have a greater impact on inspiring and encouraging innovative thinking and behavior among their employees. However, the study did not find a significant relationship between closed leadership behavior and innovative work behavior. This is surprising, as closed leadership behaviors, such as being directive and controlling, have been shown to be positively related to innovation in other studies. One explanation for this finding is that the aerospace and defense industry is a highly regulated industry with strict safety standards. In this context, leaders may be more focused on ensuring that existing products and processes are safe and dependable, rather than encouraging employees to take risks and experiment with innovative ideas.

The study also found that collaborative climate was positively related to innovative work behavior. This means a work environment that supports collaboration and teamwork can foster innovation by encouraging employees to share ideas and work together to solve problems. However, the study did not find that a collaborative climate moderated the relationship between open leadership behavior and innovative work behavior. This suggests open leadership behavior positively impacts innovative work behavior regardless of the level of collaborative climate in the workplace.

Recommendations for future research: Future research should address the limitations of this study by employing larger samples, objective measures, and exploring additional moderating variables such as organizational size and innovative climate. Longitudinal studies are needed to understand the sustained impact of open leadership behaviors and collaborative climates on innovative work behavior over time. By doing so, we can enhance our understanding of leadership's role in promoting innovation and develop practical recommendations for organizations across diverse industries and contexts.

Keywords: innovation-driven leadership, organizational innovation, ambidextrous leadership, open leader behavior, closed leader behavior, innovative work behavior, collaborative climate.

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Daniel and Jose

Table of contents

List of Tables

List of Figures

List of abbreviations

A&D	Aerospace & Defense
AL	Ambidextrous leadership
AVE	Average variance extracted value
B.Sc.	Bachelor of Science
CL	Closing leader
CB-SEM	Covariance-based structural equation modelling
CC	Collaborative climate
CR	Composite reliability
DV	Discriminant validity
f^2	Effect of size
FL	Factor load
HTMT	Heterotrait-monotrait ratio
IWB	Innovative work behavior
M.Sc.	Master of Science
OL	Open leader
Ph.D.	Doctor of Philosophy
PLS-SEM	Partial least squared structural equation modelling
R^2	Coefficient of determination
VIF	Variance inflation factor
Q^2	Predictive relevance

1. Introduction

This introductory chapter presents the concept of an innovation-driven leadership style, ambidextrous leadership, and why this is could be particularly suited in the aerospace and defense industry. A research gap in the field is identified and presented, followed by the purpose of this study, which leads to the research question and purpose of this study.

1.1. Background

The aerospace and defense industry operates in a complex and dynamic environment (Gélain, 2021), requiring organizations to continuously innovate and adapt to technological advancements, regulatory changes, and global competition (Mallory, Brenner, Kulish, Rein, & Cathalan, 2022). In this context, ambidextrous leadership, and its impact on fostering innovative work behavior have emerged as critical factors for organizational success (Klonek, Gerpott, & Parker, 2020). Ambidextrous leadership refers to the ability of leaders to effectively balance and integrate exploratory and exploitative behaviors within their teams and organizations (Hafeez, et al., 2019). It enables the simultaneous pursuit of innovation and efficiency, allowing companies to thrive in turbulent and competitive markets.

The aerospace and defense industry plays a key role in national security and economic growth (Gélain, 2021). Organizations in this industry face challenges, including long development cycles, high development costs, and complex supply chains (Brukardt, Conway, Horah, & Sachs, 2023). Innovation is paramount for their survival and growth. By continuously improving products and processes, organizations can meet evolving customer needs, adapt to changing technological landscapes, and remain at the forefront of industry advancements (Mallory, Brenner, Kulish, Rein, & Cathalan, 2022).

Therefore, effective leadership plays a pivotal role in driving innovation within organizations (Gilley, Dixon, & Gilley, 2008) and (Agbor, 2008). Ambidextrous leadership provides a framework for balancing exploration and exploitation, allowing leaders to encourage creativity, risk-taking, and experimentation while also promoting efficiency and operational excellence (Klonek, Gerpott, & Parker, 2020). However, despite the increasing recognition of ambidextrous leadership's importance, empirical research specifically examining its influence on innovative work behavior within the aerospace and defense industry is still limited. For example, Klonek et al. (2020) empirically study the interplay of ambidextrous management in the aerospace industry, but they do not dive into its implications on innovative work behavior.

Understanding the relationship between ambidextrous leadership and innovative work behavior in this industry is critical for the following reasons. Firstly, innovation in the aerospace and defense sector involves significant technical complexities, stringent safety standards, and compliance requirements (Mallory, Brenner, Kulish, Rein, & Cathalan, 2022). Exploring how ambidextrous leadership practices affect innovative work behavior within this context can help organizations navigate these challenges and foster a culture that supports and sustains innovation.

Secondly, the aerospace and defense industry are characterized by a high competitivity and rapidly changing market conditions (Mallory, Brenner, Kulish, Rein, & Cathalan, 2022). Innovation is essential for organizations to differentiate themselves, develop innovative technologies, and secure lucrative contracts (Caliari, Ribeiro, Pietrobelli, & Vezzani, 2023). By examining the relationship between ambidextrous leadership and innovative work behavior, this study can provide insights into how organizations can foster a culture of innovation and effectively leverage their resources and capabilities to gain a competitive advantage.

1.2. Research gap

The literature review in Chapter 2, revealed that there is a scarcity of empirical studies in the field of ambidextrous leadership and its impact on innovativeness. This is specifically true at the individual level. Despite the increasing recognition of the importance of ambidextrous leadership in driving innovations, there are currently few quantitative studies, leaving a significant void in understanding the practical implications of this leadership approach.

Interestingly, only one study exploring ambidextrous leadership within the aerospace and defense industry was found. This study, however, opted for a qualitative approach and thus fails to connect the gap between the theoretical framework of ambidextrous leadership and the aerospace defense sector through a quantitative analysis. Thus, there is a lack of quantitative studies specially focused on ambidextrous leadership within the aerospace and defense industry. This gap is a critical research gap to consider since these industries are known for being complex and producing innovative solutions. This presents an opportunity to explore the effects of ambidextrous leadership on organizational outcomes, such as innovation.

Based on the above, it is evident that there is a need for comprehensive empirical studies that delve into ambidextrous leadership at both the individual level and within industry-specific contexts, such as aerospace and defense. Closing these gaps in the literature will not only contribute to a deeper understanding of ambidextrous leadership's effectiveness but will also provide actionable insights for organizations in this industry seeking to enhance their innovation capabilities.

1.3. Purpose and Research Questions

This study aims to empirically examine the relationship between ambidextrous leadership and innovative work behavior within the aerospace and defense industry. By investigating this relationship, the study looks to contribute to both theoretical and practical understanding by shedding light on the role of ambidextrous leadership in fostering innovation within a challenging industry context. The overarching purpose of this research is to supply evidence-based insights and recommendations to industry leaders and managers to promote ambidextrous leadership practices and enhance innovative work behavior.

Through a quantitative approach, this thesis explores the influence of ambidextrous leadership on innovative work behavior, moderated through the lens of collaborative climate. In "Creativity, Inc." Catmull (2014) emphasizes the importance of fostering a collaborative climate to encourage innovation and creativity within a company. He believes that creative ideas are not the result of isolated individuals, but rather appear through the collective effort of teams working together. The findings will offer practical implications for organizations in the aerospace and defense industry looking to cultivate a culture of innovation and maximize their innovation potential.

To fulfill the purpose described above, the following research question has been formulated:

How does collaborative climate moderate the relationship between ambidextrous leadership style and employees' innovative work behavior in the aerospace and defense industry?

The research question acts as a pilar for this study and is thus used as a guide to satisfy the purpose of this study. Since this study explores the topic of ambidextrous leadership through a quantitative approach, the research question was further broken down into seven hypotheses. The hypotheses intended for empirical testing are presented below. These hypotheses outline the examination of the connection between variables influencing innovative work behavior, and when this behavior is impacted by a moderating variable.

- **H1:** Closing leader behavior is positively related to employees' innovative work behavior.
- **H2:** Opening leader behavior is positively related to employees' innovative work behavior.
- **H3:** Ambidextrous leadership (the interaction between opening and closing leadership behaviors) is positively related to employees' innovative work behavior.
- **H4:** Collaborative climate moderates the positive relationship between closing leader behavior and innovative work behavior.
- **H5:** Collaborative climate moderates the positive relationship between open leader behavior and innovative work behavior.
- **H6:** Collaborative climate moderates the positive relationship between ambidextrous leadership and innovative work behavior.
- **H7:** Collaborative climate is positively related to innovative work behavior.

1.4. Delimitations

This thesis work focuses on the application of ambidextrous leadership within the aerospace and defense industry, aiming to investigate its impact on various aspects, particularly in the context of innovation. The study extends beyond the confines of a single country to encompass data collection across countries. This multi-country approach is chosen to ensure an adequately large and diverse sample size, providing a more robust foundation for drawing meaningful conclusions.

While the investigation revolves around ambidextrous leadership, it is important to acknowledge that there are various leadership styles and approaches that can influence organizational outcomes. This thesis specifically emphasizes ambidextrous leadership due to its significance in balancing exploration and exploitation, a critical aspect in the innovative landscape of the aerospace and defense sector.

The examination of the moderating variable will be limited to the influence of collaborative climate. Collaborative climate is a critical factor in understanding how organizational environments either enhance or hinder the effectiveness of ambidextrous leadership in fostering innovation. This singular focus on a moderating variable, while intentional, recognizes that there could be other relevant factors that interact with ambidextrous leadership, yet this study specifically aims to analyze the role of collaborative climate.

Furthermore, it is important to note that while this thesis endeavors to shed light on the interplay between ambidextrous leadership, collaborative climate, and innovation in the aerospace and defense industry, it may not encompass all the intricacies and factors at play within this complex and dynamic sector. The study will provide valuable insights, but the results should be interpreted within the context of the stated delimitations, keeping in mind the broader landscape of the aerospace and defense industry and the potential influence of other unexplored variables.

By acknowledging and clearly defining these delimitations, this thesis work strives to contribute to a deeper understanding of the specific interactions between ambidextrous leadership, collaborative climate, and innovation within the diverse context of the aerospace and defense industry across various countries.

1.5. Thesis structure

Figure 1 presents the structure of this thesis which follows a logical progression, where the topic is introduced in its first chapter, and current research gaps in the field are highlighted. Furthermore, the purpose of the study is presented, along with the research questions and delimitations.

In chapter 2, a comprehensive literature review that explores key concepts such as innovation, ambidexterity, ambidextrous leadership, and leadership theories is presented. This leads to the development of a theoretical framework that establishes the baseline and hypothesis for the research, which is presented in Chapter 3. The methodology section (Chapter 4) outlines the research design, model, measures, data analysis techniques, and ethical considerations.

In Chapter 5, the thesis then moves on to present the results and analysis of the research, which includes descriptive statistics, measurement models, structural models, and hypothesis testing. This analysis is followed by a discussion section in chapter 6 where the implications of the findings are explored. This discussion includes insights into the relationship between innovative work behavior and ambidextrous leadership, with a focus on the moderating role of collaborative climate. In this chapter, the thesis also addresses the limitations of the research and suggests future directions for further investigation. Finally, a reference list is provided to acknowledge the sources used throughout the thesis, and an appendix section is included for supplementary materials.

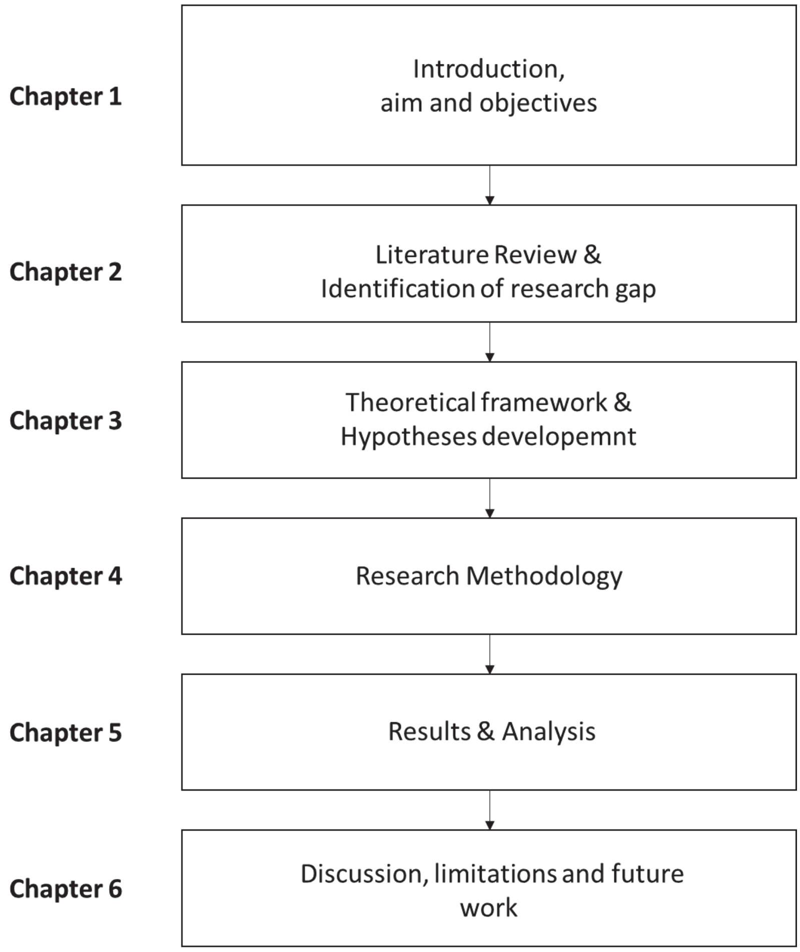

Figure 1. Schematic outline of this study.

2. Literature Review[1]

This section provides an overview of the existing literature on innovation, ambidexterity, leadership, and collaborative climate. It explores the concept of innovation as a process and discusses the theoretical foundation for understanding ambidexterity as a leadership challenge. The section also introduces the model of ambidextrous leadership, which involves flexible switching between opening and closing leadership behaviors. Additionally, it presents an overview of the collaborative climate and its relationship with innovation and leadership challenges around them. The main goal of this section is to build a framework for examining the role of ambidextrous leadership in innovative collaborative teams.

2.1. Introduction

Garvin's article on Organization and management (1998) introduces the tension between organizations objective to have well-managed work processes and how managers can improve them through measurement, stability, and continuous monitoring. While keeping in mind that operationalization and incremental innovation are crucial for firms with high tech content. Requiring managers to allow experimentation, outside-of-the-box thinking and innovation. This duality is described by March (1991) as Exploration and Exploitation. We will dive deeper into these concepts and the relations between innovation, leadership, and collaborative environment throughout this section.

Researchers have examined the role of ambidextrous leadership in promoting innovation within various industries. For instance, Klonek et al. (2020) conducted an empirical study on the interplay of ambidextrous management in the aerospace industry. Their findings highlighted the importance of balancing exploratory and exploitative behaviors in achieving innovative outcomes. However, their study did not specifically delve into the implications of ambidextrous leadership on innovative work behavior through collaborative climate.

Other studies have explored the relationship between leadership and innovation in different contexts. Gilley et al. (2008) conducted a meta-analysis examining the link between leadership behaviors and innovation outcomes. They found that transformational leadership, characterized by inspiring and motivating followers, was positively related to innovation. Similarly, Agbor (2008) conducted a study in the manufacturing sector and found that supportive leadership, which fosters employee autonomy and involvement, positively influenced innovation. We want to study in an analogous way if ambidextrous leadership would have a similar result empirically.

While earlier research has supplied valuable insights on the relationship between leadership and innovation, there is a scarcity of empirical studies specifically investigating the impact of ambidextrous leadership on innovative work behavior within the aerospace and defense industry moderated by collaborative climate. This industry presents unique challenges, such as complex technical requirements, stringent safety standards, and high competition. Therefore, understanding the specific dynamics and implications of ambidextrous leadership in fostering innovation within this context is crucial.

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[1] To gain a comprehensive understanding of the existing knowledge related to ambidextrous leadership and innovative work behavior, a thorough literature review was conducted. The search was conducted using multiple databases provided by Blekinge Institute of Technology, through the online library, those databases, include ScienceDirect, Springer, JSTOR, and Google Scholar, using keywords such as "ambidextrous leadership," "innovative work behavior," "aerospace industry," and "collaborative climate." The selected articles were chosen based on their relevance to the research topic and their contribution to the understanding of ambidextrous leadership and innovative work behavior.

2.2. Innovation and the Concept of Exploration and Exploitation

In recent decades, innovation has become a prominent topic in academic research. The Global Innovation Index 2022, published by Cornell University, INSEAD, and the World Intellectual Property Organization (2022), found that there has been a significant increase in academic research on innovation in recent years. The report found that the number of academic papers published on innovation has increased by over 50% since 2010. Innovation has been defined more than once in the past. One influential perspective, proposed by Joseph Schumpeter (Carayannis, 2013), describes innovation as "creative destruction," emphasizing its critical role in driving economic change. Another viewpoint focuses on qualitatively different outcomes, considering innovation as any new idea, practice, or object that is qualitatively different from existing forms (Carayannis, 2013). Furthermore, innovation can be seen as a process of putting inventive ideas into practice, matching problem-solving needs with relevant solutions. Creativity itself is not enough, innovation requires the implementation of the ideas (King & Anderson, 2002). The sources of innovation can come from within or outside the organization, such as unexpected occurrences, process needs, market changes, or shifts in customer feeling (Carayannis, 2013).

It is important to differentiate innovation from creativity. Creativity is defined by Amabile and Pratt (2015) as the ability to generate new ideas or concepts, or to make new things or put existing things together in new ways. It is a mental process that produces something new and original. Whereas innovation is the application of innovative ideas or concepts to create something new and useful. It is the process of translating ideas into new products, services, or processes. Creativity and innovation are therefore closely related concepts, but they are not identical. Creativity is the first step in innovation, but it is not enough. Innovation also requires the ability to take risks, to persevere in the face of obstacles, and to market and sell new products or services (Amabile & Pratt, 2015; King & Anderson, 2002).

2.2.1. Exploration and Exploitation

Measurement and validation of innovative work behavior (IWB) of individual employees for organizational success is still in evolution (Jong & Hartog, 2010; de Jong & Den Hartog, 2008). De Jong et al. (2010; 2008) derive four dimensions from data acquired through empirical surveys. Opportunity exploration, idea generation, championing, and application. Which are extracted from the different steps in the process of innovation. That process is further simplified into two different activities: idea generation (exploration) and idea implementation (exploitation) (March, 1991). Exploration focuses on investing in new knowledge and market opportunities, leading to radical innovation and entering new product markets and technologies. It entails variance, experimentation, and risk-taking. Exploitation, on the other hand, involves refining and extending existing competencies, technologies, and paradigms to produce predictable returns. It is associated with incremental innovation and the improvement of existing products and services) (March, 1991). Table 1 shows a more in-depth analysis of the differences between both approaches. Both exploration and exploitation are necessary for successful innovation, as they contribute to the continuous development and use of unique ideas and capabilities. The balance between exploration and exploitation is critical for organizational survival and success (March, 1991). Table 1 presents the characteristics of exploration and exploitation associated with the innovation process.

It is essential to note that these two activities require different corporate structures, processes, strategies, capabilities, and cultures to pursue (He & Wong, 2004) Exploitation is typically associated with routinization, stable markets, technologies, and bureaucracy, while exploration is associated with path-breaking, improvisation, chaos, disruption and emerging markets and technologies (He & Wong, 2004) The returns from these two activities are also associated with operating in different periods. Exploitation is associated with more predictable and safe returns that are closer in time (He & Wong, 2004), but not necessarily sustainable in the long term (Kassotaki, 2022). On the other hand, explorative firms are more likely to generate more significant variation in their performance, experiencing larger returns and failures. March (1991) describes exploitation as being effective in the short-term but self-destructive in the longer time horizon.

Table 1. Comparative table of concepts between Exploration and Exploitation (March, 1991)

Exploration	Exploitation
Focuses on innovative ideas and opportunities	Focuses on existing knowledge and resources
Goal is to discover new things and create new knowledge	Goal is to improve existing products, processes, and services
Involves higher risk	Involves lower risk
May have higher rewards	May have lower rewards
Typically takes a longer time to achieve results	Typically takes a shorter time to achieve results
Requires a more open, creative, and risk-taking culture	Requires a more closed, focused, and risk-averse culture
Benefits from visionary, inspiring, and empowering leadership	Benefits from pragmatic, meticulous, and controlling leadership
Requires a diverse, talented, and creative workforce	Requires an experienced, skilled, and dependable workforce
Uses a more experimental, exploratory, and discovery-oriented process	Uses a more refined, implementation-oriented, and scaling-oriented process
Uses tools such as brainstorming, ideation, and prototyping	Uses tools such as testing, analysis, and optimization
Measures success by the number of innovative ideas generated, new knowledge created, and new markets explored	Measures success by revenue growth, market share, and customer satisfaction

2.3. Defining Ambidexterity and Ambidextrous Organization

The term ambidexterity originates from the human ability to use both hands with equal skill, and comes from the Latin words ambi-, meaning "both," and dexter, meaning "right" or "favorable." Thus, ambidexterity means "both right" or "both favorable." The term was first used in English in the 1530s (Grose, 1971). But it was not until Duncan (1976) that the concept was introduced in an organizational context.

Duncan (1976) describes an ambidextrous organization as a dual structure that companies can employ to effectively navigate actions that demand capabilities and time horizons. Tushman and O’Reilly (1996) defined ambidextrous organization as “the ability of an organization to both explore and exploit” and identified this ability as crucial for a firm's long-term survival. A firm that only focuses on exploitative activities might achieve stable and predictable returns in the short term, but there is a risk of not being able to sustain the returns in the long term. This is due to the risk of falling into a competence trap, where the firm is unable to adapt to any change in the market. Firms must therefore strive for the best balance between exploration and exploitation to keep competitiveness in both the short and long term (Kassotaki, 2022; He & Wong, 2004; March 1991). However, engaging in exploitative and explorative activities simultaneously is challenging, as it demands making resource-allocation decisions of already limited resources. Thus, the integration of both exploration and exploitation activities within an organization is often dismissed due to the inherent complexities associated with managing this paradox (Schindler, 2015). Tushman and O’Reilly (1996) therefore argued that managers in such organization will need to combat the paradox of being able to partly operate in periods of stability and incremental innovation, but also periodically destroy current, successful organizations, to reconstruct a new and better organization that is better suited for both the upcoming competition and any new technology. The authors further argued that a firm that has ambidexterity and can effectively engage in both exploration and exploitation activities concurrently is expected to reach higher levels of performance compared to firms that prioritize one activity over the other.

Consequently, ambidextrous organizations display alignment and adaptability, effectively addressing current business demands while staying open to changes in the environment (Junni, Sarala, Taras, & Tarba, 2013). Researchers have over the years tried to resolve the paradox of exploration and exploitation, by conducting research in the context of organizational learning, technological innovation, organizational adaption, strategic management, and organizational design (Kassotaki, Review of Organizational Ambidexterity Research, 2022). Ambidexterity is crucial for organizational learning, as it enables the exploitation of existing competencies and the exploration of new opportunities (March, 1991). However, the notion of ambidexterity is not solely related to the balance between exploration and exploitation. It can also involve a balance between incremental and radical innovations, continuity, and change, and organic versus mechanical organizational structures (Kafetzopoulos, 2022). Ambidexterity can be approached in diverse ways. For example, structural ambidexterity involves using separate teams or organizational units for exploration and exploitation activities, or, sequential ambidexterity implies a temporal pattern, with periods of incremental change occasionally punctuated by revolutionary change (O'Reilly & Tushman, 2013). However, when this concept is discussed with reference to innovation, ambidexterity is considered the interaction between exploitation and exploration (Rosing, Frese, & Bausch, Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership, 2011).

2.3.1. Types of Ambidexterity

The debate over the ambidexterity hypothesis suggests that effectively balancing radical innovation (exploration) and incremental refinement (exploitation) leads to better long-term firm performance (Smith, Lewis, Jarzabkowski, & Langley, 2019; Duncan, 1976; O'Reilly & Tushman, 2013). The challenge lies in the paradoxical relationship between exploration and exploitation. Simultaneously pursuing both creates tensions within organizations that are hard to reconcile, yet they are also mutually complementary forces that coexist over time. The goal is not to eliminate this contradiction but to manage it through an ongoing process of coping with and working through this learning paradox (Smith, Lewis, Jarzabkowski, & Langley, 2019). Scholarly attention has led to three main approaches: structural ambidexterity (separating exploration and exploitation activities), contextual ambidexterity (creating a behavioral context for balancing the two), and sequential ambidexterity (alternating between exploration and exploitation architectures) (Smith, Lewis, Jarzabkowski, & Langley, 2019; O'Reilly & Tushman, 2013).

Structural Ambidexterity: This approach involves creating separate units for exploration and exploitation, focusing on differentiation and integration. Exploration units develop new skills while exploitative units leverage existing capabilities. The structural separation allows both activities to coexist and synergize, though it might lead to isolation and lack of coordination (Duncan, 1976; Smith, Lewis, Jarzabkowski, & Langley, 2019).

Contextual Ambidexterity: Here, organizational tensions are harmonized within a single unit. Managers design a behavioral context where employees allocate time to both exploration and exploitation. While it avoids structural complexity, it can stress employees with conflicting tasks (Gibson & Birkinshaw, 2004; Smith, Lewis, Jarzabkowski, & Langley, 2019).

Sequential Ambidexterity: This approach involves alternating between periods of exploration and exploitation, responding to changing environmental demands. Organizations shift between these orientations to maintain balance. However, it can be disruptive and incur transition costs (O'Reilly & Tushman, 2013; Smith, Lewis, Jarzabkowski, & Langley, 2019).

However, critics argue that ambidexterity literature often presents static accounts. From a paradox perspective, managing exploration-exploitation tensions requires continuous efforts (Smith, Lewis, Jarzabkowski, & Langley, 2019). Smith et al. (2019) propose three stages of managing these tensions: initiation (identifying the paradox and planning), contextualization (designing structures and processes), and implementation (dealing with the paradox daily).

Initiation Stage: Organizations identify the need to balance exploration and exploitation. This can be triggered externally by industry shifts or internally by interdisciplinary teams recognizing opportunities (Smith, Lewis, Jarzabkowski, & Langley, 2019).

Contextualization Stage: Organizational designs are established to support the chosen ambidexterity approach. In the structural pathway, senior executives create formal structures; in the contextual pathway, front-line managers design informal contexts; in the sequential pathway, the organization undergoes structural shifts (Smith, Lewis, Jarzabkowski, & Langley, 2019).

Implementation Stage: Day-to-day coordination becomes crucial to ensure both activities work together. In structural ambidexterity, senior executives and managers coordinate activities. In contextual ambidexterity, diverse knowledge flows and social connectedness are emphasized. In sequential ambidexterity, role conflicts and common identity play a role (Smith, Lewis, Jarzabkowski, & Langley, 2019).

The focus shifts from a static approach to a process-oriented one, aligning with current paradox thinking. The key insight is that different paths to managing this paradox create path dependency. Initial framing of the paradox influences contextualization choices, which, in turn, impacts the implementation process. This can lead to either developing capabilities over time or reinforcing processes that limit flexibility. Smith et al. (2019) suggest balancing path-dependent and pathbreaking approaches. Shifting between pathways is possible and may be necessary for effective paradox management, demanding organizations to break path dependency when needed.

2.4. Introduction to Leadership – Concept and Theories

Leadership is a complex and dynamic field that has been extensively explored through various theoretical perspectives (Dubrin, 2016). The word “leader” can be traced back as early as the 1300s, while the term leadership appeared in the late 1700s (King A. S., 1990). Nevertheless, scientific research on the topic did not start until the 20^{th} century and has been extensively researched since then (Bass, 1960; King, 1990). Leadership was initially considered a personality trait, where the research focused on emulating the personalities and behaviors of great historical figures who have become effective leaders (King A. S., 1990). As research progressed, more variables affected leadership, evolving into the contingency era.

The Contingency era marked a significant advancement in leadership theory by recognizing that effective leadership is not confined to one-dimensional approaches but depends on numerous factors such as behavior, personality, influence, and the situation (King A. S., 1990). Leadership styles in this era aimed to find situational variables that dictate the most suitable leadership approach. Notable theories of this era include Fiedler's Contingency Theory (Fiedler, 1964), the Path-Goal Theory (Evans, 1970), and the Normative Theory (Vroom & Yetton, 1973; Vroom & Jago, 1978). Although only two eras have been mentioned so far, King (1990) categorized the evolution of leadership theory and suggested that leadership could be divided into ten different eras, which reflects the immense interest and progress that have been made to understand this field of research.

Nowadays, the study of leadership extends beyond just the leader and includes considerations of followers, peers, supervisors, work environment, culture, and a wide range of individuals, forming a complex system of variables (Kassotaki, 2019; Avolio et al., 2009; Rogan & Mors, 2014). As a result, leadership is no longer seen as solely an individual trait but is described in various models involving relationships, shared dynamics, global perspectives, strategic approaches, and intricate social interactions (Avolio et al., 2009). However, one can prioritize certain key characteristics of successful leadership. Effective leaders have fundamental qualities shared by all leaders, alongside specific traits and behaviors that are unique to their individual personalities and styles (Blake & Mouton, 1964).

Leadership in the context of innovation differs from leadership in other organizational contexts due to the distinct characteristics manifested by the innovation process (Gerlach et al., 2020). According to Gerlach et al. (2020) innovation performance is the observable successful implementation of a creative idea. This highlights the intricate nature of the innovation process. On one hand, creativity entails engaging in divergent thinking, challenging established rules and assumptions, and gaining knowledge (Andriopoulos and Lewis, 2009). However, implementation needs a focus on practicality and efficiently completing a product within the designated time (Miron-Spektor et al., 2011).

2.4.1. Defining and Understanding Ambidextrous Leadership

The concept of ambidextrous leadership has received significant attention in leadership studies over the last years (Kassotaki, Explaining Ambidextrous leadership in the Aerospace and Defense Organizations, 2019a), and can be traced back to strategic-level organization learning (Schindler, 2015). For example, Vera and Crossan (2004) were early in proposing that a combination of leadership styles, transformational and transactional leadership, is needed for fostering organizational learning in a strategic leadership context. Jansen et al. (2009) were first to link transformational and transactional behaviors of strategic leaders, to explorative and exploitative innovations. In fact, studies conducted over the years have proposed that transformational and transformational leadership styles are linked to ambidextrous leadership (Kassotaki, 2019a; Rosing et al., 2011). This is in line with the proposal from Bass (1985) who suggested that all leaders exhibit characteristics of both transformational and transactional leadership styles, and leaders often tend to prioritize one leadership style over the other, but the most effective leaders are those who demonstrate a combination of both transformational and transactional behaviors.

More specifically, studies have highlighted the strong association between transformational leadership and creativity and innovation (e.g., Jansen et al., 2008; Rosing et al., 2011). Transformational leaders can inspire and motivate employees to generate creative ideas and implement them in innovative products. By transforming followers' attitudes, beliefs, and values, they motivate them to achieve outstanding performance (Rosing & Zacher, 2017). Concurrently, transformational leaders inspire and motivate their colleagues by setting elevated expectations, employing symbolic communication, and conveying significant purposes in a straightforward manner (Bass & Avolio, 1993). Transactional leadership, however, is commonly associated with exploiting existing knowledge (Rosing et al., 2011). Transactional leaders emphasize task completion within specified timelines, requiring employees to adhere to strict rules to attain predetermined product goals. They clarify goals, reward successful goal achievement, and intervene only when necessary. Unlike transformational leadership. transactional leaders typically do not foster experimentation, risk-taking, or tolerance for mistakes, and therefore, their impact on creativity and innovation is limited (Rosing et al., 2011). These leaders primarily provide contingent rewards and engage in active management by exception, aiming to enhance efficiency and improve performance in existing routines (Vera & Crossan, 2004).

Rosing et al. (2011) argued that while transformational and transactional leadership styles are positively associated with innovation, these two styles are considered too broad in scope. In fact, the authors argue that these two styles encompass a wide range of behaviors that can both promote or hinder innovation (Rosing et al., 2011; Kassotaki, 2019b). Instead, Rosing et al. (2011) expanded the theoretical framework established by Bledow et al. (2009) and developed the ambidextrous leadership model which suggests that an effective leader is one that can support their subordinates in engaging in both exploration and exploitation activities that particularly match the requirements that teams and individual phases during the innovation process (Rosing et al., 2011). According to Rosing et al. (2011), an ambidextrous leader is characterized by its ability to exhibit open behaviors to encourage exploration and close behaviors to facilitate exploitation and the balance between these two activities leads to enhanced innovation, as illustrated in Figure 2.

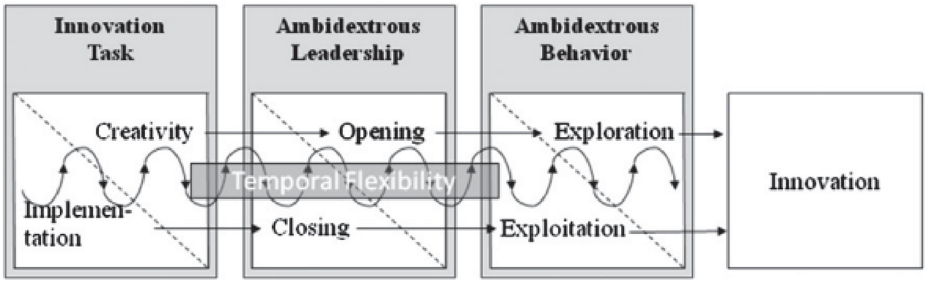

Figure 2 Conceptual illustration of the ambidextrous leadership model proposed by Rosing et al. (2011). Source: Rosing et al. (2011)

There is a consensus among researchers that ambidextrous leadership encompasses a multifaceted array of behaviors characterized by both cognitive and behavioral complexity (Rosing et al., 2011; Kassotaki, 2019a). Thus, an effective (ambidextrous) leader should be able to seamlessly switch between these two behaviors based on the situational demands of the tasks at hand (Rosing et al., 2011). By successfully integrating these contradictory approaches, leaders can create an environment that promotes innovation and organizational adaptability ((Kassotaki, Review of Organizational Ambidexterity Research, 2022). Table 2 presents examples provided by Rosing et al. (2011) that illustrate how transformational leadership behaviors and transactional leadership behaviors can be both opening and closing behaviors.

Opening leader behaviors encompass fostering creativity, encouraging risk-taking, promoting experimentation, and supporting idea generation. On the other hand, closing behaviors involve structure, maintaining efficiency, setting goals, and ensuring the implementation of ideas ((Rosing, Frese, & Bausch, Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership, 2011). The key challenge lies in balancing these two sets of behaviors. Ambidextrous leaders must navigate the tension between exploration and exploitation, allowing for both creative thinking and efficient execution. Table 2 presents examples provided by Rosing et al. (2011) that illustrate how transformational leadership behaviors and transactional leadership behaviors can be both opening and closing behaviors.

Table 2. Examples of transformational and transactional leadership behaviors and how they translate to open and close leadership behaviors. Adapted from Rosing et al. (2011).

	Open leadership behaviors	**Closing leadership behaviors**
Transformational leadership	• Inspiration: Transformational leaders inspire and motivate their team members by providing a compelling vision of the future. They communicate a sense of purpose that goes beyond individual tasks. • Encouraging Divergent Thinking: Open transformational leaders actively seek out and value a wide range of perspectives and ideas. They create an environment where team members feel comfortable	• Reinforcing Current Practices: Instead of encouraging innovation and change, closed transformational leaders might emphasize adhering to existing practices. Their vision might motivate confirmatory behavior, where team members are expected to conform to established norms. • Incremental Changes: Instead of fostering radical change, closed transformational leaders might focus on incremental improvements to current processes. They might be

	sharing unconventional thoughts and solutions. • Transparency and Honesty: Open transformational leaders practice transparent communication. They openly share information about the organization's direction, challenges, and decisions, fostering trust among team members.	cautious about deviating too far from what is already in place. • Less Tolerance for Deviation: Closed leaders might be less open to deviations from established norms, as they value conscientious behavior that follows predetermined paths.
Transactional leadership	• Encouraging Risk-Taking: Open transactional leaders promote a culture where team members are encouraged to take calculated risks and try out novel approaches, even within established processes. • Learning-Oriented Approach: Open transactional leaders see errors as valuable learning experiences. They encourage open discussions about mistakes to identify root causes and develop strategies for improvement. • Adaptive Goal Setting: Open transactional leaders set goals that encourage exploration and experimentation alongside existing processes. They recognize the value of exploring new avenues for growth.	• Strict Performance Metrics: Leaders with closed behavior might set clear and specific performance metrics focused solely on efficiency and productivity. Rewards are tied directly to meeting these predefined metrics. • Punishment for Errors: Closed transactional leaders might lean towards punishing errors, which could create an environment where team members are hesitant to take calculated risks or innovate due to fear of negative consequences. • Setting and monitoring exploitation goals

2.4.2. Criticism of Ambidextrous Leadership Theory

Since the introduction of the concept of ambidextrous leadership theory by Rosing et al. (2011), studies have been conducted on the field over the years. However, the validity of conclusions that can be drawn from the different studies, have been criticized by different scholars. For example, Kafetzopoulos (2021) conducted a large literature review on the topic and found five major flaws in the published research.

Firstly, the author found that the published research typically focusses on specific countries or sectors which restricts the generalizability of the results. Besides, most studies collect data primarily from leaders or followers which raises concerns about common method bias and self-report bias. However, it should be noted that the approach of using subjective self-assessment methods is not limited to ambidextrous leadership research and has been criticized for other studies as well (e.g., Anderson et al., 2014; Potočnik and Anderson, 2012). The second flawed area recognized by Kafetzopoulos (2021) is that the existing measurement scales for ambidextrous leadership lack specificity about the sequencing and rationale behind opening and closing behaviors. Third, the lack of control or even consideration of important variables (e.g., employees' behavior or employees' characteristics) that can function as mediating and moderating factors. Fourth, Kafetzopoulos (2021) found that the sample size of the empirical research is small which limits the statistical conclusions that can be drawn. And fifth, the current literature primarily examines the influence of ambidextrous leadership on followers' behavior and firm performance, without considering the impact of different leadership styles and other factors that might affect innovation and followers' behavior.

Klonek et al. (2020) have also highlighted the definitions of opening and closing leader behaviors lack conceptual clarity. The authors argue that since the definitions are primarily based on their ability to promote exploration and exploitation, this leads to a focus on the outcomes rather than the specific behaviors (Rosing & Zacher, 2023).

2.4.3. Earlier Empirical Research on Ambidextrous Leadership in the Context of Innovation

Since Rosing et al. (2011) introduced their ambidextrous leadership model, empirical studies have been published. This section aims to present the most relevant studies within the topic of ambidextrous leadership within the context of innovation to provide the reader with the status of the topic with regards to research. Since ambidexterity theory of leadership was defined for innovation, it is interesting for this thesis' scope.

The first empirical study reported on ambidextrous leadership for innovation was conducted by Zacher & Rosing (2017) who aimed to assess the ambidexterity theory of leadership empirically and quantitatively for innovation, proposed by Rosing et al. (2011), which suggests that a complex leadership approach is necessary to match the complexity of the innovation process. In the study, the authors used data from thirty-three architectural and interior design firms and provided initial support for the ambidexterity theory. It found that employees' ratings of opening leadership behavior positively predicted team innovation, as rated by team leaders. On the other hand, closing leadership behavior did not show a significant main effect. Importantly, the highest levels of team innovation were seen when both opening and closing leadership behaviors were high, while lower levels were seen when only one behavior was high or when both were low. These results remained consistent even after controlling team leaders' ratings of general team success and employees' ratings of transformational leadership behaviors. Zacher & Rosing (2017) suggests that the findings show that team leaders need to show both opening and closing behaviors to foster prominent levels of team innovation. Also, they indicate leadership behaviors beyond transformational leadership that significantly predict team innovation. Therefore, research on innovation should move beyond studying single, broad, and stable antecedents, considering the complex and sometimes contradictory requirements of innovation processes.

Zacher & Wilden (2014) further extended the initial research from Zacher & Rosing (2017) at the team level, by studying the relationship between ambidextrous leadership and self-reported innovative performance of the individual. The researchers saw that employees reported the highest levels of daily innovative performance when both opening and closing behaviors were high. This finding supports the notion that leaders should engage in contrasting but complementary behaviors to effectively foster employee innovation.

Rogan & Mors (2014) identified that there was scarce research on individual-level ambidexterity and proposed two key challenges that might explain the phenomenon: First, although researchers acknowledge that individual behaviors play a crucial role in promoting ambidexterity, it is challenging to observe and study the specific processes that enable organizations to develop ambidexterity at the individual level. And second, the author argues that research on ambidextrous leadership has focused on understanding the cognitive processes required to balance exploration and exploitation. However, it should be mentioned that in recent years, particularly in the last couple of years, an increased number of studies have been focusing on ambidexterity at the individual level (e.g., Oluwafemi et al., 2020;. Usman et al., 2020; Akinci et al, 2022, Gerlach et al., 2020).

Gerlach et al. (2020) conducted a study with the aim to explore the relationship between opening and closing leader behaviors and innovation performance while also examining traditional leadership styles such as transformational, transactional, and instrumentational leadership, as well as leader-member exchange. The findings show that weekly fluctuations in opening and closing leader behaviors have a stronger impact on innovation performance than general, stable behaviors observed between individuals. Surprisingly, the study did not find the expected relationship between the interplay of opening and closing leader behaviors and innovative performance based on weekly fluctuations, contrary to theoretical arguments and earlier empirical evidence reported by (Zacher & Wilden (2014) and Zacher & Rosing (2015). The authors suggest that the lack of alignment between leader behaviors and situational requirements may explain this unexpected result. Changing leader behaviors within a week does not provide an advantage for innovation performance, due to mixed signals when behaviors are not aligned with the situation's requirements.

Furthermore, the study reveals a positive relationship between instrumental leadership and innovation performance at the between-person level, even after controlling other traditional leadership styles. This finding supports the idea that instrumental leadership plays a strategic role in the innovation process, particularly in terms of finding opportunities, securing resources, and forming strategic alliances within the organization.

Until now, all the research presented on this topic has been in western countries. Usman et al. (2020) addresses this issue by exploring the direct relationship between ambidextrous leadership and innovative work behavior in a non-Western culture (Pakistan). The study examines workplace thriving as a mediator between ambidextrous leadership and innovative work behavior, addressing the need to explore the underlying processes of ambidextrous leadership and the complex mechanisms driving innovative work behavior. The findings reveal that ambidextrous leadership is positively associated with both workplace thriving and innovative work behavior, supporting prior research. Workplace thriving partially mediates the relationship between ambidextrous leadership and innovative work behavior. These results emphasize the positive impact of ambidextrous leadership on employees' resource availability, vitality, and learning, leading to enhanced innovative work behavior. The study also suggests that organizations should invest in developing ambidextrous leadership qualities among supervisors to foster an environment that encourages innovative behaviors. Additionally, creating a supportive culture that promotes workplace thriving and innovative work behavior is essential for c innovation within organizations.

Akinci et al. (2022) conducted a similar study in Turkey where they aimed to fill the gap in literature by examining individual innovativeness and its drivers in a multinational military and public environment. The authors reported that the results based on social exchange theory propose that opening leader behavior promotes innovative work behavior. Additionally, the interplay of opening and closing behaviors also encourages innovative work behavior. However, similarly to the findings reported by Gerlach et al. (2020), the direct relationship between closing leadership and innovative behavior was non-significant. Akinci et al. (2022) theorized that the lack of relationship between close leadership and innovative behavior was due to work in a military setting that prioritizes alignment and efficiency over innovation.

Only one study covering ambidextrous leadership in the aerospace and defense industry was found and was published by Kassotaki (2019a). Kassotaki (2019a) conducted a qualitative study aimed to establish a link between the micro-level behaviors of ambidextrous leaders and the macro-level environment within the aerospace and defense organizations. The author argued that there was a significant gap in the current knowledge with respect to the specific insights into the behaviors and leadership styles that facilitate ambidexterity at the micro-level. Additionally, the author pointed out that the understanding of how organizational and environmental constraints impact ambidextrous leadership at the macro-level is limited. The study found that both transformational and transactional leadership styles are present at the senior management level. However, transactional leadership tends to prevail over transformational leadership at the top management level, aligning with the notion that certain organizations are more ambidextrous than others, as originally stated by Birkinshaw & Gupta (2013). The study suggests that the tendency of top management to lean towards transactional leadership is in part due to the strictly structured organizations with low to medium dynamism environments often found in the aerospace and defense industry. This leads to managers prioritizing exploitative activities, goals setting, and coordination while underemphasizing explorative activities, innovation, and subordinate motivation.

2.5. Reflections from Literature

The literature review revealed significant findings, trends, and gaps in the current existing research on the topic.

One key finding is that opening and closing leader behaviors play a crucial role in fostering innovation at the individual team and individual levels. However, there seems to be scarcity of research on individual-level ambidexterity, which presents a challenge in understanding the specific processes that enable organizations to develop ambidexterity at the individual level (Rogan & Mors, 2014). The literature further suggests that there is a positive relationship between ambidextrous leadership and innovative work behavior, supported by studies conducted in both Western and non-Western cultures.

A notable gap identified in the literature is the limited research on ambidextrous leadership in specific industries, such as the aerospace and defense sector. This highlights the need for further investigation into the behaviors and leadership styles that facilitate ambidexterity at the micro-level and the impact of organizational and environmental constraints on ambidextrous leadership at the macro-level.

3. Theoretical Framework

This chapter describes the theoretical framework adopted for this study based on the concept of ambidextrous leadership. As mentioned previously, ambidextrous leadership refers to the ability of leaders to effectively balance and integrate exploratory and exploitative behaviors within their teams and organizations. It involves encouraging creativity, risk-taking, and experimentation while also promoting efficiency and operational excellence (Rosing, 2011).

Based on the theory and empirical results presented in the literature review, the following gaps were identified in the topic of ambidextrous leadership:

- Overall, few empirical studies have been performed on ambidextrous leadership and its effect on innovativeness, particularly at the individual level.
- Only one (qualitative) study was found where ambidextrous leadership was studied particularly in the aerospace and defense industry.
- No quantitative studies were found investigating ambidextrous leadership in the aerospace and defense industry.

Therefore, the aim of this thesis work is to extend the scarce knowledge on ambidextrous leadership in the aerospace and defense industry by exploring the open and closing leader behaviors and its effect on innovative work behavior at the individual level quantitively. Additionally, since leadership is a complex concept that is not only affected by behavioral aspects of the leader but also affected by moderating factors (Kassotaki, 2019a), this thesis will explore the moderating effect of collaborative climate between ambidextrous leadership and innovative work behavior. In other words, this thesis work aims to answer the following research question:

How does collaborative climate moderate the relationship between ambidextrous leadership style and employees' innovative work behavior in the aerospace and defense industry?

This section presents the theoretical framework adopted for this thesis work based on the literature's findings. Subsequently, a conceptual framework will be presented, visualizing the framework that will function as a foundation for this thesis work. To answer the research question formulated above, the theory will be discussed briefly, and hypotheses will be formulated and presented.

3.1. Baseline Framework & Hypothesis Development

This thesis work will adapt the framework proposed by Akinci et al. (2022). The reason for this is that the study conducted by the authors is conducted in a similar organization (military organization) to the one we have in mind for this thesis work, namely aerospace & defense. Thus, we use the study from Akinci et al. (2022) as a primary baseline where it is of interest to evaluate ambidextrous leadership and its effect on innovative work behavior. A conceptual framework for this is presented in Figure 3, illustrating the research model proposed for this thesis work. It should be noted that the moderating effect of collaborative climate will be adopted for our model, instead of innovative climate used by Akinci et al. (2022) for their study. The reason behind the selection of collaborative climate is based on the suggestion by Kafetzopoulos (2021), who reviewed the available research on ambidextrous leadership, and suggested that the exploration of moderators would increase the understanding of this type of leadership and suggested collaborative climate to be an interesting variable to explore.

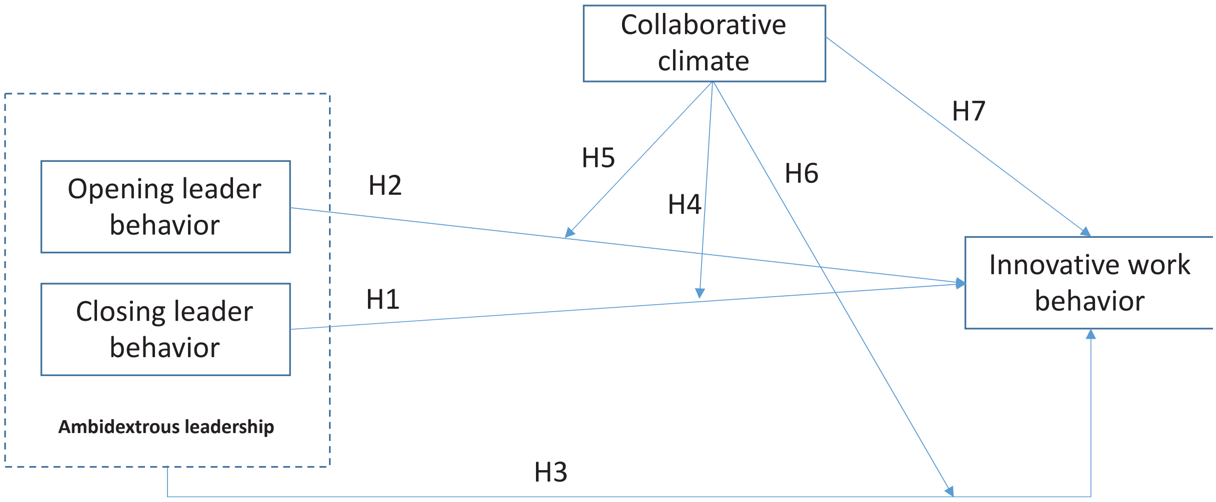

Figure 3 Proposed Conceptual Framework

3.1.1. The Relation between Innovative Work Behavior and Ambidextrous Leadership

Innovative work behavior is defined as the development, adoption, and implementation of original ideas, which can be broken down into three main components (Akinci et al., 2022). Firstly, idea generation focuses on the creation of novel solutions to identified problems. Secondly, idea promotion refers to the ability to gain support in the organization to execute the suggested ideas. And lastly, idea implementation which is to transform these innovative ideas into practical solutions and execute them in practice. The role of leadership at workplace was identified as a key agent of change in the organization's innovative work behavior (de Jong & Den Hartog, 2008; Javed, Abdullah, Zaffar, ul Haque, & Rubab, 2019), which according to Javed et al. (2019) and Prieto et al. (2014) is fundamentally motivated by the leadership role of psychologically empowering their employees throughout the innovation lifecycle. One prominent theoretical concept within ambidextrous leadership is the concept of open and closed leadership behaviors and according to theory, combining these two behaviors can lead to fostering both explorative and exploitative efforts in their subordinates. Closing leader behavior focuses on goal monitoring, control, and operational efficiency (Rosing et al., 2011). Similar studies (e.g., Zacher & Wilden, 2014) show that this leadership behavior can contribute to individual innovation by providing clear incentives and a contingent reward system (Akinci et al., 2022). We therefore suggest that:

H1: *Closing leader behavior is positively related to employees' innovative work behavior.*

Open leadership behavior encompasses practices that stimulate creativity, empower employees to make autonomous decisions, and drive innovation (Rosing et al., 2011). This approach encourages followers to think beyond conventional boundaries, disrupt established routines, and challenge the existing norms (Kassotaki, 2019a; Rosing, 2011; Akinci et al., 2022), all of which are pivotal in cultivating a culture of innovation (Akinci et al., 2022). Consequently, we propose the following hypothesis:

H2: *Opening leader behavior is positively related to employees' innovative work behavior.*

According to the core assumption of ambidexterity theory, the interaction between opening and closing behaviors serves as a predictor of employee innovative performance (Rosing, 2011). This assumption posits that the highest levels of innovative performance occur when both opening and closing behaviors are high. In other words, when leaders effectively balance and exhibit both behaviors, it creates an environment that fosters employee innovation and leads to enhanced performance (Rosing & Zacher., 2014). The following hypothesis is therefore suggested:

H3: *Ambidextrous leadership (the interaction between opening and closing leadership behaviors) is positively related to employees' innovative work behavior.*

3.1.2. The Moderating Role of Collaborative Climate

A collaborative climate refers to a work setting or organizational culture where individuals and teams actively engage in cooperative and coordinated efforts to achieve common goals. It is characterized by open communication, shared decision-making, mutual respect, and a strong emphasis on teamwork and collaboration (Barker Scott & Manning, 2022). This collaborative work culture has benefits, as highlighted by academic research (Anderson, 1995; Owen et al, 2008).

One of the key advantages of a collaborative climate is its positive impact on knowledge sharing and learning. When individuals work in an environment that encourages collaboration, they are more likely to freely share their expertise, insights, and ideas with others (Hsieh & Kuotsai , 2016). This knowledge exchange facilitates the generation of new and innovative solutions to problems, as diverse perspectives and experiences are pooled together (Barker Scott & Manning, 2022). Additionally, a collaborative climate promotes creativity by creating a space where employees feel safe to take risks, explore innovative ideas, and experiment with different approaches (Barker Scott & Manning, 2022).

Moreover, a collaborative work culture enhances problem-solving capabilities and improves decision-making processes. In a collaborative climate, individuals have access to a broader range of information and resources, as they can tap into the collective expertise of their colleagues (Hsieh & Kuotsai , 2016). This enables teams to make more informed decisions and find effective solutions to complex problems (Barker Scott & Manning, 2022). Additionally, the open communication and shared decision-making characteristic of a collaborative climate reduce hierarchical barriers and facilitate a more inclusive and participative decision-making process (Barker Scott & Manning, 2022).

Anderson (1995) discusses the impact of collaborative relationships on the aerospace industry and highlights their potential for fostering innovation. Collaboration allows firms to explore new research, technology, and market opportunities by leveraging the expertise and resources of external partners (Anderson M. , 1995). Large globally oriented corporations are particularly likely to benefit from collaboration due to their greater access to resources and ability to establish connections with research institutions and firms in various locations (Anderson M. , 1995).

Owen et al. (2008) present a comprehensive framework for collaborative innovation, which emphasizes alignment, boundaries, and commitment. The framework suggests that alignment involves synchronizing the strategic vision and innovation goals throughout the organization, both vertically and horizontally. Vertical alignment ensures that innovation objectives are integrated into the overall organizational strategy, while horizontal alignment breaks down barriers to collaboration and adjusts job functions to support innovation (Owen , Goldwasser, Choate, & Blitz, 2008). Boundaries, as addressed in the framework, focus on managing partnerships by emphasizing partner selection, appropriate structures, and governance. Technological integration and collaborative tools play a crucial role in supporting successful collaboration (Owen , Goldwasser, Choate, & Blitz, 2008). Finally, commitment involves ongoing dedication to fostering a collaborative culture through leadership, performance management, and continuous learning (Owen , Goldwasser, Choate, & Blitz, 2008). This framework provides valuable insights into how organizations can promote collaboration, strategic direction, and innovation.

Nguyen et al. (2021) and Afsar et al. (2014) have studied the moderating effect of collaborative culture on transformational leadership and innovation relationship. Their results suggest that transformational leadership has a stronger impact on radical innovation than on incremental innovation. Additionally, the study supports the idea that knowledge management capability plays a mediating role between transformational leadership and various aspects of innovation capability. Notably, the influence of knowledge management capability on specific aspects of innovation capability varies and is contingent upon the level of collaborative culture within an organization. Their study is the closest we could find to the work we are trying to do.

However, in the context of ambidextrous leadership, the relationship between a collaborative climate and innovative work behavior has not been explored in academic literature, to the best of our knowledge. Therefore, we propose four hypotheses to investigate this relationship. Firstly, we propose that a collaborative climate moderates the positive relationship between closing leader behavior and innovative work behavior. Closing leader behavior refers to leaders who focus on refining and executing existing processes and strategies (Rosing, Frese, & Bausch, Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership, 2011). A collaborative climate may enhance the effectiveness of closing leaders by providing them with access to diverse perspectives and resources, facilitating the implementation of innovative improvements to existing processes.

H4: *Collaborative climate moderates the positive relationship between closing leader behavior and innovative work behavior.*

Secondly, we propose that a collaborative climate moderates the positive relationship between open leader behavior and innovative work behavior. Open leader behavior refers to leaders who encourage exploration, experimentation, and the generation of innovative ideas (Rosing, Frese, & Bausch, Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership, 2011). In a collaborative climate, open leaders may be able to harness the collective creativity and knowledge of their teams, leading to a higher level of innovative work behavior.

H5: *Collaborative climate moderates the positive relationship between open leader behavior and innovative work behavior.*

Thirdly, we propose that a collaborative climate moderates the positive relationship between ambidextrous leadership and innovative work behavior. Ambidextrous leadership refers to leaders who can balance and integrate both exploratory and exploitative activities within their teams (Luu, Dinh, & Qian, 2019). A collaborative climate may provide the necessary support and resources for ambidextrous leaders to effectively manage the tension between exploration and exploitation, thereby promoting innovative work behavior.

H6: *Collaborative climate moderates the positive relationship between ambidextrous leadership and innovative work behavior.*

Lastly, we propose that a collaborative climate itself is positively related to innovative work behavior. The collaborative nature of the work environment, characterized by open communication, shared decision-making, and teamwork, creates a conducive atmosphere for generating and implementing innovative ideas.

H7: *Collaborative climate is positively related to innovative work behavior.*

By investigating the moderating role of collaborative climate, we aim to deepen our understanding of how the organizational climate influences innovative work behavior and the effectiveness of different leadership styles in fostering innovation.

4. Research Methodology

This chapter presents the methodology opted for this study. It builds upon the literature review and theoretical framework presented in the two previous chapters. This chapter outlines the strategies, techniques, and tools employed to address the research question and objectives of this study. The following sections will guide the reader through the research design, data collection, survey design, sample size determination, measurement approaches, data analysis, the conceptual research model, demographic characteristics of respondents, reliability and validity of this study, and ethical considerations.

4.1. Research Design

To address the main research question and its corresponding hypotheses, this study employs a quantitative research design. According to Ghauri et al. (2019), quantitative research methods are valuable in business and social studies as they enable the researcher to quantify variables, establish statistical associations, and evaluate hypotheses. In this study, the aim is to investigate the relationship between Ambidextrous leadership and innovative work behavior and understand how that relationship is moderated by a collaborative culture within organizations operating the aerospace and defense industry. The choice of a quantitative research design allows for the rigorous examination of these relationships and the statistical analysis of data to derive meaningful insights (Ghauri, Gronhaug, & Strange, 2020). Thus, a statistical model that was able to explain the relationships between the different variables within the scope of this study needed to be constructed.

Traditionally, first-generation statistical techniques, such as multi-linear regression, have been widely used for quantitative research design and data analysis (Hair, Hult, Ringle, & Sarstedt, 2014). However, these methods have inherent limitations. One of the main limitations is their assumption that the research model should possess a straightforward structure, with all variables directly observable. This assumption may not always be feasible, especially when the study is explorative like it is the case of this study. For this reason, scholars and researchers have been turning to second-generation statistical techniques to overcome the limitations of first-generation techniques (Hair, Hult, Ringle, & Sarstedt, 2014).

Structural equation modeling (SEM), which is a second-generation technique, offers the ability to incorporate unobservable variables that are measured indirectly through indicator variables (Ghauri et al., 2020; Hair et al., 2017). This flexibility is particularly valuable when dealing with variables (constructs) that cannot be directly observed or measured. Furthermore, SEM enables researchers to account for measurement errors in observed variables, enhancing the accuracy and reliability of the analysis. By considering both the latent constructs and their observable indicators, SEM provides a comprehensive framework for investigating complex relationships and capturing the nuances of the research model (Hair, Hult, Ringle, & Sarstedt, 2014).

There are two types of SEM techniques, namely covariance-based SEM (CB-SEM), and partial-least squares SEM (PLS-SEM). According to Hair et al (2014), PLS-SEM is the preferred method for exploratory studies to confirm established theories. There are numerous published research exploring the relationship between ambidextrous leadership and innovative work behavior (Usman et al., 2020; Hafeez et al., 2019; Haider et al., 2023; Jabeen, Zahur, & Jalalzai, 2023). However, there is no, to the best of the authors' knowledge, research on the relationship between ambidextrous leadership, innovative work behavior, under moderation of collaborative climate. Thus, the nature of this study is considered exploratory since the relations between the variables within the scope of this study are not known, and the PLS-SEM method was thus considered the most suited method for this study. Furthermore, considering the short amount of time available for data collection (due to the nature of the thesis), there was a risk of not having a sample size big enough for CB-SEM. Besides, research has shown that PLS-SEM is more robust for analyzing complex research models and small sample sizes when compared to CB-SEM (Ghauri, Gronhaug, & Strange, 2020; Hair, Hult, Ringle, & Sarstedt, 2017).

PLS-SEM is a path model and it comprises two main components: the structural model and the measurement model. In the structural model, constructs are used to represent indirectly measured variables. These constructs depict the relationships between different variables and are connected by paths (arrows) to visualize the interconnections. On the other hand, the measurement model consists of the structural model along with the indicators for each construct. Indicators are variables that are directly measured and reflect the manifest representation of the constructs. Specifically, in the data collection process, each indicator corresponds to a specific question in the questionnaire, establishing a direct one-to-one mapping. These modeling components collectively form the foundation of PLS-SEM, enabling the evaluation of relationships between constructs and their measured indicators in a comprehensive manner (Hair, Hult, Ringle, & Sarstedt, 2014).

4.2. Data Collection

Primary data was collected in this study by developing a survey that contained a total of forty questions (also referred to as items). The survey was developed in alignment with the theoretical background and already existing and tested questionnaires were adopted for the survey. This approach is recommended by Harkness et al (2003) and re-using relevant questions from existing questionnaires in survey design offers several benefits; It saves time by leveraging previous work, enhances comparability across studies, improves measurement quality through established validity and reliability, and enables researchers to build on existing knowledge and theories (Harkness, van de Vijver, Johnson, & Mohler, 2003).

To ensure a robust sample for the study, a targeted recruitment strategy was employed to engage professionals in the aerospace and defense industry. The survey was administered electronically, with participants contacted via email and LinkedIn to solicit their participation. Prior to accessing the web-based questionnaire, respondents received a detailed explanation regarding the research objectives and the significance of their contribution. The survey itself was hosted on the widely used and dependable "Google Forms" platform (Google Forms, 2023), which helped establish credibility and fostered a sense of familiarity among respondents. To increase the number of responses, a follow-up email was sent to participants about a week after the first contact. This friendly reminder was intended to motivate those who might have forgotten or postponed their participation. By using this follow-up approach, we aimed to minimize the potential impact of not receiving responses from individuals, which could have led to biased results. This helped the study by enabling it to obtain a more diverse and representative sample, leading to more reliable and meaningful findings for the study. A summary of the demographic data is presented in Table 6. Furthermore, it is important to acknowledge its inherent limitations. One of the primary constraints we encountered was the small sample size used in our survey. This modest sample size, while carefully selected and rigorously analyzed, may introduce certain biases, and limit the generalizability of our findings.

The data collected in this study employed a 5-point Likert scale to capture responses from participants. Likert scales, developed by psychologist Rensis Likert in 1932, are widely used psychometric response scales for assessing individuals' sentiments towards statements or questions (Preedy & Watson, 2010). The 5-point Likert scale, chosen for its widespread adoption, consists of five response options ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). This scale size strikes a balance between capturing nuanced responses and maintaining respondents' engagement.

4.3. Survey Design

The survey design for this study encompassed five distinct subsections, each serving a specific purpose in gathering the necessary data. This section in the report provides an overview of the survey design, including the introduction, screening process, sections content, data collection, and language considerations.

The first section of the survey aimed to provide a concise introduction to the study and inform participants about the ethical considerations underpinning the research. Additionally, this section included a screening step to ensure that respondents were working in the aerospace and defense industry, which aligns with the scope of this study. Participants who responded affirmatively proceeded to the second section, while those who responded negatively were thanked for their contribution but were not permitted to continue with the survey.

The second section focused on gathering demographic information from the respondents. This included data related to age, tenure, academic degree, work position, and geographic location. The purpose of this section was to establish a comprehensive understanding of the participant characteristics and provide context for the subsequent analyses.

The third section of the survey consisted of questions specifically tailored to capture the two dimensions of ambidextrous leadership, namely open leader behavior and closed leader behavior. By eliciting responses in these areas, the study aimed to investigate the influence of ambidextrous leadership on the variables of interest.

In the fourth section, participants were presented with questions designed to assess their innovative work behavior. This section aimed to gather data on the participants' individual tendencies and actions related to innovation within their respective roles.

The fifth and concluding section of the survey focused on examining collaborative culture. Through targeted questions, the study sought to explore the extent to which collaborative practices were present within the participants' work environments.

To collect the data, the survey was implemented using Google Forms, and the raw data was downloaded as an Excel file and subsequently saved as a .csv file. Following data collection, a thorough screening process was conducted to identify and remove incomplete or erroneous responses, ensuring the maximum accuracy and reliability of the data used for analysis.

The survey and all communications were administered in English, the most widely used language in academics. As stated by Ozdemir (2013), English stands out as the global lingua franca, ensuring broad accessibility to a diverse range of respondents.

4.4. Sample Size

An important consideration in quantitative studies is determining the minimum sample size required for data collection. In the context of PLS-SEM, which does not assume any underlying data distribution, it is well-suited for analyzing small sample sizes and complex models, unlike other SEM techniques such as CB-SEM (Hair, Hult, Ringle, & Sarstedt, 2014)

Hair, Hult et al. (2014) propose a rule of thumb, known as the "10-times" rule, for determining the minimum sample size in PLS-SEM models. This rule suggests that the minimum sample size should be at least ten times the largest number of structural paths directed at a specific construct within the structural model. In this study, the largest number of structural paths toward a construct is seven, consisting of three direct paths and four moderated paths toward the innovation construct. Therefore, the anticipated minimum sample size is expected to be seventy participants. In this study, eighty-one valid responses were obtained (as presented in §4.8), indicating that the sample size obtain for this study is sufficient. Nonetheless, we acknowledge the limitations of the small sample size used. Which may introduce certain biases and limit the generalizability of our findings.

4.5. The Structural Equation Model

Based on the literature review presented in §2, a research model was constructed for the aim of this study, which is to understand the relationship between Ambidextrous leadership and Innovative Work Behavior and understand how that relationship is moderated by a collaborative culture within organizations operating the aerospace and defense industry. Figure 4 presents the conceptual statistical research model constructed for this study and consists of one dependent variable, and three independent variables.

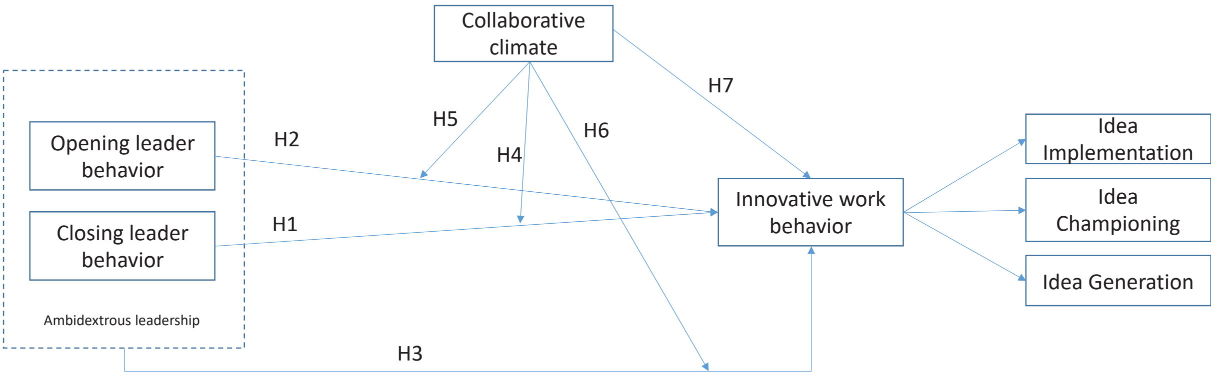

Figure 4. Conceptual statistical research model.

The model was constructed to be reflective, where the latent construct causes the observed indicators to measure it. In this model, the indicators are seen as reflective of the latent construct, meaning that any changes or variations in the construct will be reflected in the observed indicators. The indicators are interchangeable and are expected to vary due to their shared relationship with the latent construct. Unlike formative measurement models where the latent construct is formed by its indicators. In other words, the indicators are seen as causing or forming the latent construct. Changes or variations in the construct are determined by changes in the indicators (Hair, Hult, Ringle, & Sarstedt, 2014).

4.6. Measures

Dependent variable – **Innovative work behavior** construct scale adopted from Janssen (2000) was applied. The scale utilized in this study consists of three dimensions: idea generation, idea championing, and idea implementation, with a total of eight items. An example item from the scale is "*I search out new working methods or techniques*". The reliability of the scale was assessed using Cronbach's alpha, resulting in a value of 0.907. This indicates a high level of internal consistency for the scale as a whole. This construct is divided into two dimensions, open leader behavior, and closed leader behavior, where open leader behavior had 7 items and closed leader behavior had 6 items.

Independent variables – **Ambidextrous leadership** is defined in this thesis as the interaction between **open leader behavior** and **closed leader behavior**. These two constructs were measured by adopting a construct scale from Rosing et al. (2011). A sample item for open leadership is "My leader motivates me to take risks" and one for closed leadership is "*My leader monitors and controls goal attainment*". The Cronbach alpha were 0.882 and 0.725 respectively. The measurement of **Collaborative climate** in this study utilized the Collaborative Climate Survey (CCS), which was originally developed by Sveiby and Simons (2002). This measurement tool was designed to assess whether collaboration is more effective than competition in generating value. The construct has 19 items and Cronbach's alpha value of 0.941. A sample item is "*Sharing knowledge is encouraged by the department in action and not only in words*".

Table 3 provides an overview of the constructs and corresponding indicators used in this study. A total of 3 constructs and 40 indicators have been identified to measure the variables of interest. To facilitate their integration into the measurement model, each indicator has been assigned a unique code. These codes will be referenced in relation to the PLS-SEM model throughout this thesis report, ensuring clarity and consistency in the analysis and interpretation of the data.

Table 3. Summary of the statistical model constructs, indicators, and codes.

Construct	Codes	Indicator	Source
Open leader behavior	[OL1]	Freedom and risk-taking	Adopted from Rosing, Frese, & Bausch (2011)
	[OL2]		
	[OL3]		
	[OL4]		
	[OL5]		
	[OL6]	Error learning	
	[OL7]		
Closed leader behavior	[CL1]	Goal attainment	
	[CL2]	Routines	
	[CL3]	Corrective actions	
	[CL4]	Adherence to rules	
	[CL5]	Uniform task accomplishments	
	[CL6]	Stick to plans	
Innovative work behavior	[IG1]	Idea generation	Adopted from Janssen (2000)
	[IG2]		
	[IG3]		
	[IC1]	Idea championing	
	[IC2]		
	[IImp1]		

	[IImp2]	Idea implementation	
	[IImp3]		
Collaborative climate	[CC1]	Organizational culture	Adapted from Sveiby & Simons (2002)
	[CC2]	Knowledge sharing	
	[CC3]	Open communication	
	[CC4]	Open communication	
	[CC5]	Innovative solutions	
	[CC6]	Immediate supervisor	
	[CC7]	Information sharing	
	[CC8]	Open communication	
	[CC9]	Knowledge sharing	
	[CC10]	Knowledge sharing	
	[CC11]	Employee Attitude	
	[CC12]	Collaboration	
	[CC13]	Information sharing	
	[CC14]	Knowledge sharing	
	[CC15]	Openness	
	[CC16]	Work group support	
	[CC17]	Openness	
	[CC18]	Openness	
	[CC19]	Information sharing	

Figure 5 presents the implemented PLS-SEM model in SmartPLS 4 software (Ringle, Wende, & Wende, 2022) which was used to carry out the analysis. The path model reveals the constructs (or latent variables) as blue circles. The paths are represented by the black arrows, and visualize the relationship between the different constructs. Lastly, the indicators are represented in yellow rectangles.

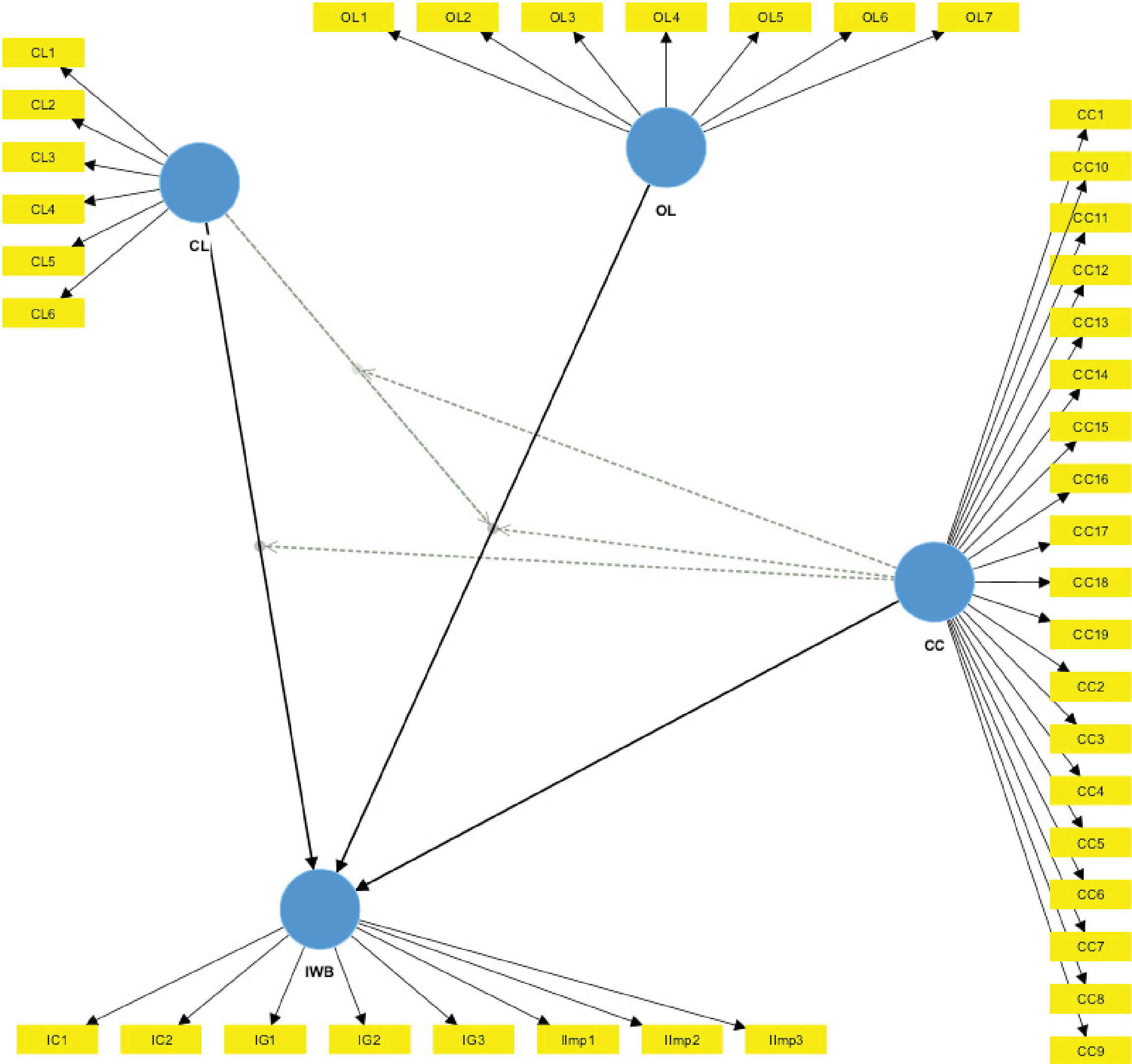

Figure 5. The implemented PLS-SEM reflective model with its corresponding constructs and indicators.

4.7. Data Analysis

The data analysis for this study was conducted on SmartPLS 4 software (version 4.0.9.3) (Ringle, Wende, & Wende, 2022) with a student license for PLS-SEM path modeling and for evaluating the descriptive statistics of the data.

The initial stage of the analysis involved assessing and evaluating the descriptive statistics of the collected data. This included analyzing the data characteristics in terms of central tendency, dispersion (expressed through the mean and standard deviation), and a normality test, thus giving a good overview of the collected data. Although PLS-SEM can accommodate non-normally distributed data, it is crucial to take the data distribution into account (Basbeth & Ibrahim, 2018). If the data deviates from normality, employing bootstrapping to estimate standard errors may lead to increased errors, potentially diminishing the significance of identified relationships. Consequently, it is advisable to consider the data distribution in PLS-SEM to uphold the accuracy and reliability of the results.

To evaluate the validity and reliability of the reflective measurement model, the internal consistency, convergent validity, and discriminant validity were assessed. In reflective measurement models, reliability indicates the extent to which the measurement items consistently and reliably capture the underlying construct. High reliability ensures that the measurement instrument produces consistent results and reduces measurement errors, thus increasing confidence in the obtained data. Validity, on the other hand, refers to the extent to which the measurement accurately measures the construct it intends to measure. In reflective measurement models, validity demonstrates that the measurement items effectively capture the theoretical meaning of the construct. Validity ensures that the measurement instrument measures what it claims to measure and provides meaningful and accurate results (Hair, Hult, Ringle, & Sarstedt, 2014) Reliability and validity are crucial because they directly influence the credibility and trustworthiness of the findings and conclusions drawn from the data. Without reliable and valid measurements, the results of the analysis may be unreliable, misleading, or lack generalizability. Therefore, establishing the reliability and validity of the reflective measurement models is essential to ensure the robustness and integrity of the research outcomes (Hair, Sarstedt, Ringle, & Gudergan, 2018). The internal consistency was evaluated by calculating the Cronbach's Alpha (CA) and Composite Reliability (CR) values of the measurement model. To establish the convergent validity of the measurement model, the average variance extracted value (AVE) is calculated. Lastly, it is required to determine whether the constructs in the model are distinct and do not overlap in terms of their measurement, hence determining the Discriminant Validity (DV) of the model. There are typically three standard techniques to establish DV. According to Hair, Hult, et al., (2014), the preferred method to use is the heterotrait-monotrait ratio (HTMT). The two other methods, Fornell-Larcker criterion and cross-loadings analysis are considered inferior methods to use (Henseler, Ringle, & Sarstedt, 2015; Hair, Hult, Ringle, & Sarstedt, 2014). The criteria for establishing the reliability and validity of the reflective measurement model are presented in Table 4.

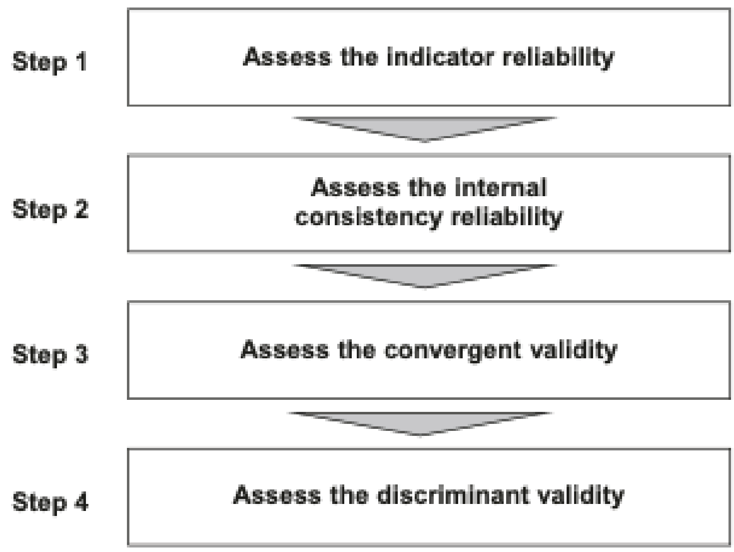

Figure 6. Assessment strategy of measurement model suggested by (Hair, Hult, Ringle, & Sarstedt, 2014). (Source: Hair Jr et al., 2021)

Subsequently, the PLS-SEM structural model is assessed to determine its suitability for hypothesis testing through the evaluation of collinearity, predictive accuracy (including capability and relevance), and overall model fit. Collinearity requires to be assessed before conducting hypothesis testing is essential to avoid introducing biases into the results (Hair, Hult, Ringle, & Sarstedt, 2014). Issues of collinearity arise when the independent constructs (variables) display high correlation, indicating their ability to predict each other. A way to quantify collinearity in the structural model is by calculating the

Variance Inflation Factor (VIF). VIF quantifies the extent to which the variance of the estimated regression coefficients is increased due to the presence of high correlation between the predictor variables.

A high VIF indicates a strong correlation between predictor variables, suggesting the presence of multicollinearity. Multicollinearity can lead to unreliable and unstable estimates of the regression coefficients, making it difficult to interpret the individual effects of the predictors on the dependent variable (Hair, Hult, Ringle, & Sarstedt, 2014). The VIF is calculated for each predictor variable in the model, and a general guideline is that VIF values above 5 indicate a problematic level of multicollinearity. In such cases, the literature advises addressing the multicollinearity issue by either removing one or more correlated predictors, combining them into composite variables, or employing other techniques to mitigate the impact of multicollinearity (Hair, Hult, Ringle, & Sarstedt, 2014; Hair, Sarstedt, Ringle, & Gudergan, 2018).

The model's explanatory power refers to the ability of a structural model to accurately predict or explain the variance in the dependent constructs based on the independent constructs or predictors in the model. It indicates how well the model can capture and account for the relationships and influences among the variables (Hair, Hult, Ringle, & Sarstedt, 2014). The coefficient of determination (R^2) measures the proportion of the variance in the dependent construct that is explained by the independent constructs in the model. It ranges from 0 to 1, where a higher R^2 indicates a stronger predictive capability (Basbeth & Ibrahim, 2018). On the other hand, the effect of size, or f^2 measures the change in ^{R2} when an omitted exogenous latent variable is included or excluded from the model. However, the predictive relevance of the structural model cannot be assessed with SmartPS software due to limitations caused by the license. The same goes for the model fit. Table 5 presents all the criteria for establishing that there are no issues with collinearity, predictive accuracy, and overall model fit.

Once it was established that the structural model did not have any issues with collinearity, and predictive accuracy, hypothesis testing was performed. The testing was conducted with a two-tailed test with a 5% significance level.

Table 4. Evaluation criteria of reflective measurement models. The criteria were extracted from (Hair, Hult, Ringle, & Sarstedt, 2014)

Reflective measurement models		**Acceptable criteria**
Internal consistency reliability	Cornbach's Alpha	>.7
	Composite reliability	>.7
Convergent validity	Outer loadings	>.7[2]
	Average variance extracted (AVE)	>.5
Discriminant validity	Heterotrait-monotrait ratio (HTMT)	< .85 (conservative) < .9 (less conservative)

[2] Note that according to Hair, Hult et al., (2014) indicators with outer loadings between 0.4-0.7, should be considered for removal when the removal of the indicator yields in an increase in the composite relibility such that the suggested threshold value (0.5) is surpassed. Indicator with poor outer loadings (< 0.4) should always be removed from the construct.

Table 5. Evaluation criteria of structural models. The criteria were extracted from (Hair, Hult, Ringle, & Sarstedt, 2014)

Structural model		Acceptable criteria
Collinearity	VIF	<5
Coefficient of Determination	R^2	Substantial = 0.75 Moderate = 0.5 Weak = 0.25
Effect size	f^2	Large = 0.35 Medium = 0.15 Small = 0.02
Predictive relevance	Q^2	>0

4.8. Demographics of Respondents

A total of 257 professionals were invited to participate in the study. Out of those, eighty-four responses were initially collected, yielding a response rate of 32.7 percent. After carefully going through the data, only eighty-one responses were considered valid to go forward with the analysis. Most respondents (84%) indicated that they work in the Aerospace and Defense (A&D) industry, while none reported not working in this industry. This suggests a high representation of individuals from the A&D sector in the sample.

Among the eighty-one participants who responded, 77.2 percent were male, while the remaining 22.8 percent were female, and no respondent identified as non-binary. This indicates that male respondents accounted for more than two-thirds of the total participant pool. Figure 7 presents a visual distribution of the respondent's gender.

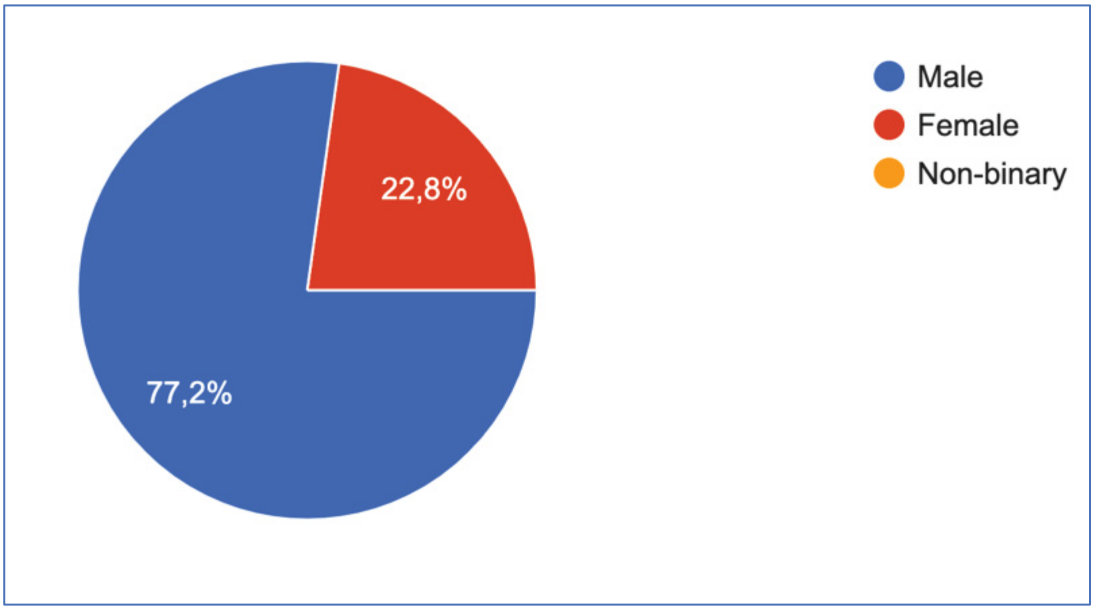

Figure 7. Gender distribution of the participant pool.

The respondents were distributed across different age groups, as presented in Figure 8. The largest age group was evenly split between individuals under thirty and those aged between 30-39, each accounting for 27.7% of the sample. The remaining age groups (40-49 and 50 or older) accounted for 19.3% and 25.3% of the sample, respectively.

The dynamics within the industry are truly fascinating, as it is teeming with a vibrant blend of young, highly qualified individuals. This influx of youthful talent not only underscores the potential for innovation but also signals a promising integration of fresh perspectives drawn from universities. Their energy and drive to usher in innovative ideas can undoubtedly reshape industry practices (Etzkowitz & Zhou, 2017).

At the same time, we should not overlook the invaluable contribution of the seasoned professionals who have crossed the 50-year-old threshold. With their wealth of experience and a deep-rooted understanding of how things have evolved over time, they bring an unparalleled perspective to the table. Their knowledge of established practices and the historical context in which they emerged is a wellspring of wisdom that can guide and anchor the industry's journey forward (Etzkowitz & Zhou, 2017).

The distribution of respondents across various age groups, as depicted in Figure 8, highlights this diversity. It is interesting to note that the largest age group is strikingly divided between those under thirty and individuals aged between 30 and 39, each constituting 27.7% of the sample. This distribution accentuates the influx of both budding talent and mid-career professionals. The remaining segments, representing the 40-49 and 50+ age groups, account for 19.3% and 25.3% of the sample respectively, indicating a healthy mix of experience and maturity in the industry's workforce. This balance between youthful vigor and seasoned wisdom is undoubtedly a driving force behind the industry's potential for both innovation and stability.

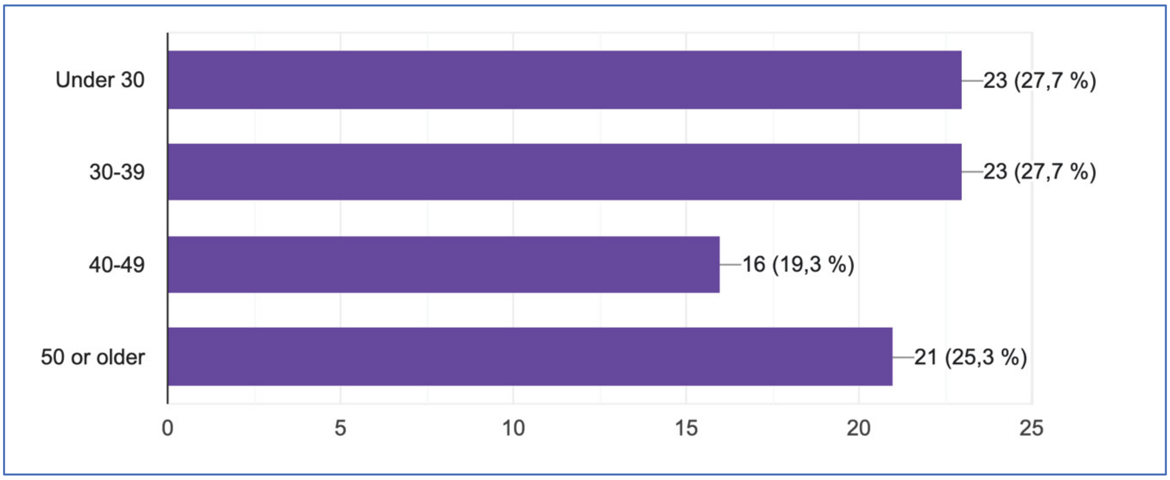

Figure 8. The survey respondents age distribution.

The analysis of participant roles reveals important insights about the composition of the sample population. The fact that a substantial proportion (79.8%) of respondents identified themselves as individual contributors highlights the prevalence of non-managerial positions within the surveyed group. This distribution of roles provides an opportunity to gauge the impact of ambidextrous management on employees at various levels of the organizational hierarchy. The preponderance of non-managerial roles in the sample highlights the significance of considering these perspectives when evaluating the effectiveness of ambidextrous leadership. These individuals experience the effects of their leaders' behavior, such as the ability to inspire, support growth, and foster a sense of shared purpose. Their opinions can shed light on how well ambidextrous management practices are resonating throughout the organization and influencing employees' attitudes, motivation, and job satisfaction. While middle management positions make up a smaller percentage of the participants (19%), their viewpoints are also pivotal. Middle managers often serve as conduits between senior leadership and front-line employees. Their insights can offer a bridge between the ambidextrous leadership strategies implemented by senior leaders and their impact on day-to-day operations and the overall work environment. Furthermore, the representation of senior-level management or higher positions in the sample (3.6%) provides an additional layer of understanding. These leaders play a direct role in shaping the organizational culture, strategic decisions, and the implementation of management practices. Their perceptions of leadership effectiveness can reflect the alignment between the intended leadership philosophy and its actual execution throughout the organization.

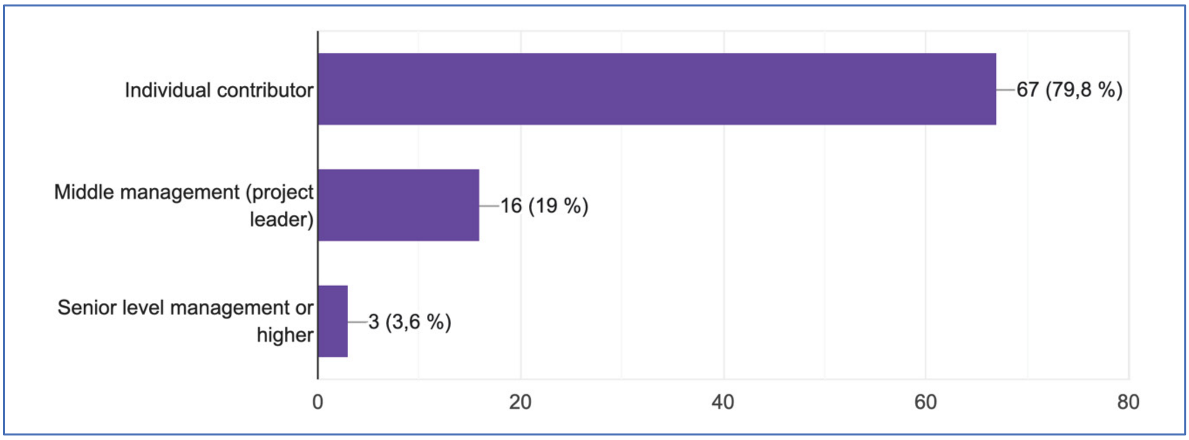

Figure 9. The survey respondents work position.

The distribution of participants' tenure and experience levels within the sample provides an interesting lens through which to examine the potential for ambidextrous management to influence innovation. The analysis reveals that a considerable proportion (38.6%) of participants have limited work experience, with five years or less. These individuals, often early in their careers, can contribute to the exploration phase of ambidextrous management. Their fresh perspectives, unencumbered by long-held habits, can infuse new energy into the innovation process. They are more likely to challenge the status quo, question assumptions, and generate out-of-the-box ideas that can invigorate the organization's approach to problem-solving. Conversely, the respondents with greater experience (19.3% ranging from 6-10 years, 15.7% 11-20 years, and 26.5% 21 years or more) possess valuable insights and lessons learned from their time within the organization. These seasoned employees can play a pivotal role in the exploitation phase of ambidextrous management. Their familiarity with existing processes, industry trends, and historical context enables them to refine and optimize innovative ideas. They can provide guidance on how to effectively integrate new concepts into the organizational fabric, ensuring that innovation aligns with the organization's goals and strategies. The blend of diverse experience levels in the sample presents an opportunity for cross-pollination of ideas, enhancing the innovation process. The interactions between individuals with varying backgrounds and perspectives foster a dynamic exchange of insights. The less experienced employees can benefit from the wisdom of their more seasoned colleagues, while the latter can gain fresh viewpoints that challenge conventional thinking. This collaborative environment, facilitated by ambidextrous management principles, nurtures a culture of continuous learning and innovation.

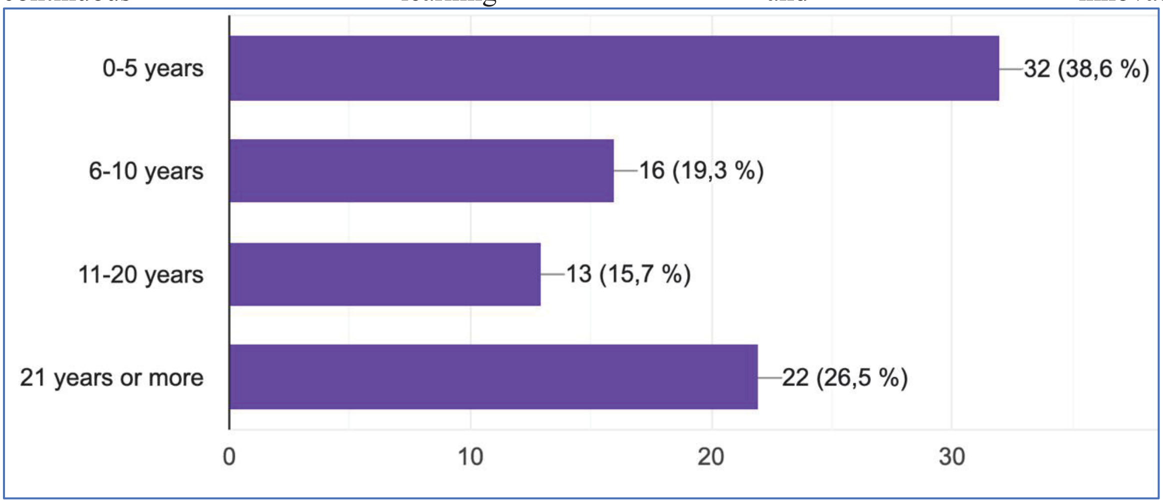

Figure 10. The survey respondents' tenure in the aerospace and defense industry.

The distribution of respondents' educational backgrounds reveals a diverse range of qualifications. Among the participants, 3.7 percent graduated from high school, while 1.2 percent held an associate degree. Most respondents, constituting 63.4 percent, possessed a Master of Science (M.Sc.) degree. Additionally, 13.4% held a Bachelor of Science (B.Sc.) degree, and 18.3% had attained a Doctor of Philosophy (Ph.D.) qualification. The results thus show that the advanced education level of the surveyed population, since approximately 80 percent of the total sample population had acquired a higher education degree, namely master's and Doctoral degrees.

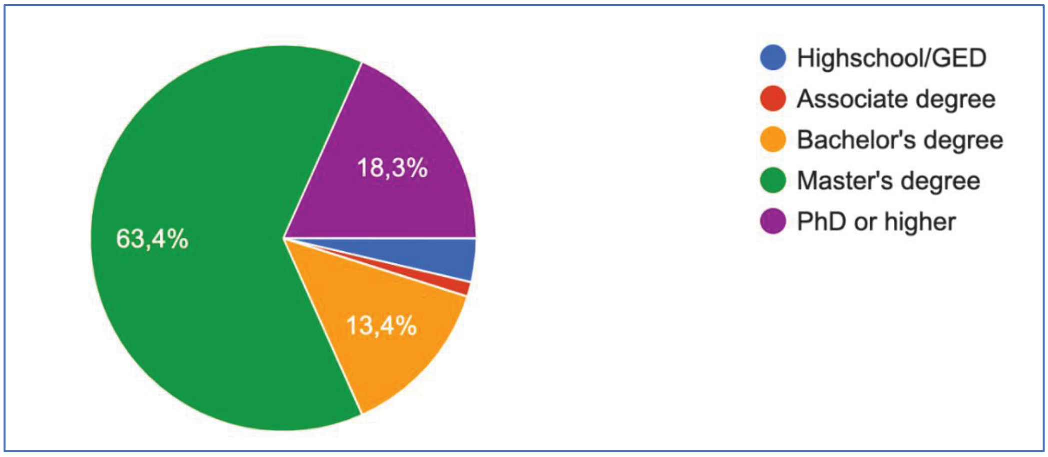

Figure 11. The survey respondents' level of education.

Most respondents were in Europe (76.5%), followed by North America (22.2%), and a small representation from the Asia-Pacific region (1.2%). This suggests a geographic concentration of participants in Europe, while the sample includes limited representation from other regions.

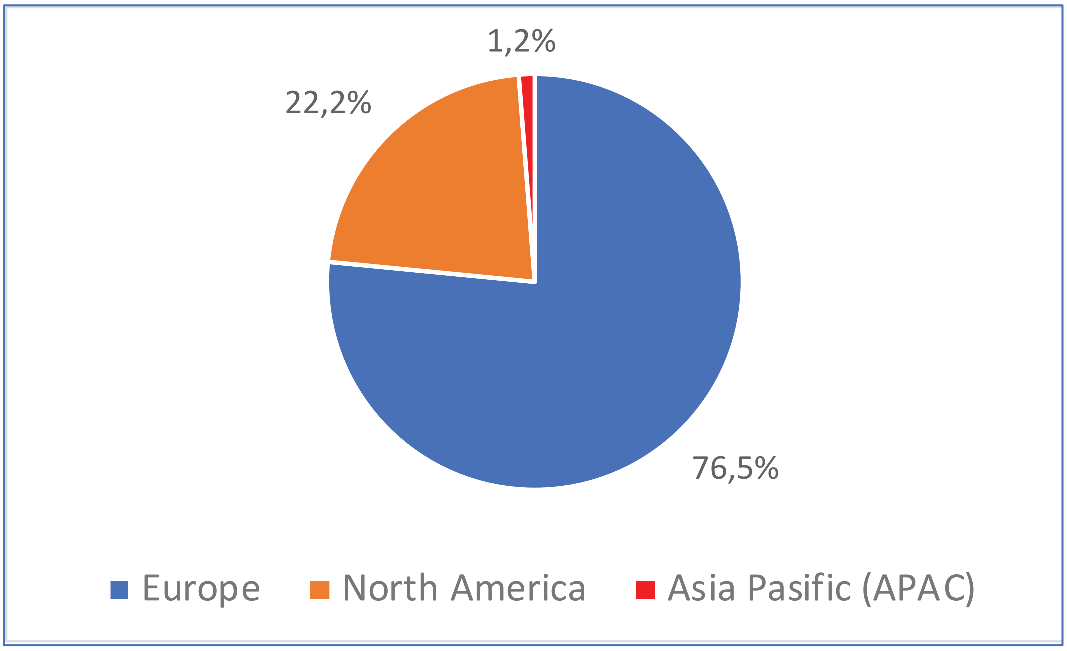

Figure 12. The survey respondents' geographical location.

Table 6. Sample demographics characteristics (n=81).

Control variables	Description	Frequency	Percentage
Working in A&D?	Yes	84	100
	No	0	
Gender	Male	61	77.2
	Female	18	22.8
	Non-binary	0	0
Age group	Under 30	23	27.7
	30-39	23	27.7
	40-49	16	19.3
	50 or older	21	25.3
Education level	Highschool/GED	3	3.7
	Associate degree	1	1.2
	Bachelor's degree	11	13.4
	Master’s degree	52	63.4
	PhD or higher	15	18.3
Position	Individual contributor	67	79.8
	Middle management (project leader)	16	19
	Senior level management or higher	3	3.6
Tenure (years)	0-5	32	38.6
	6-10	16	19.3
	11-20	13	15.7
	21 or more	22	26.5
Location	Europe	62	76.5
	North America	18	22.2
	Asia-Pacific (APAC)	1	1.2

4.9. Reliability, Validity & Generalizability

The reliability of a study indicates the extent to which it remains unbiased and consistent in its measurements over varying periods of time and across different variables (Ghauri, Gronhaug, & Strange, 2020). This study's reliability is supported by crucial factors. Firstly, using a well-established study by Akinci et al. (2022), as a base and applying minor adjustments to align with this thesis topic adds credibility to our research. Additionally, relying on primary data collected from eighty-one white-collar employees from various parts of the world, primarily from the Western Hemisphere, strengthens the trustworthiness of our findings. Furthermore, the questionnaire used in our study was created from previously tested questions used in other research, which reinforces the reliability since these questions had been proven and validated in previous studies. Lastly, the internal consistency reliability of the research model is established by calculating the composite reliability in SmartPLS. This metric confirms the stability and consistency of our measurements. Additionally, the fact that all numerical values fall within acceptable ranges assures an adequate level of reliability in our study, further confirming the consistency of our research.

The validity is, as described in section 4.7, assessed in this study by calculating the average variance constructed (AVE), with SmartPLS. The findings indicate robust validity, as all numerical values fall within the acceptable threshold, affirming the congruence of the constructs for this study. Furthermore, the discriminant validity was established by employing the Heterotrait-Monotrait (HTMT) ratio to estimate the true correlations between constructs. In this context, the observed correlations have been deemed valid, implying a strong level of construct discrimination, and thereby reinforcing the internal validity of the research.

External validity, the capacity to extend the research findings beyond the sample and setting, can be argued to have been satisfied to a degree. The inclusion of participants from diverse geographical backgrounds enhances the potential generalizability of the study's findings to white-collar employees from various Western countries. The choice to conduct the survey and all communications in English, a widely employed language in academic discourse, supports the study's external validity, facilitating its applicability to an international audience. Thus, considering the diverse participant pool and the use of a globally recognized language contribute to the potential for broad generalizability, emphasizing the study's relevance and applicability beyond its immediate scope in the aerospace and defense industry. The remaining generalization of the study can be attributed to identifying industries with similar constraints, regulations, and innovation as the aerospace industry. Those industries could include Fintech, Healthcare and Medical devices, Transportation and Energy. All these industries have constant scrutiny by authorities and quality regulations and require innovation to differentiate themselves from the competition.

4.10. Ethical Considerations

In adherence to research ethics (Ghauri, Gronhaug, & Strange, 2020), survey participants were informed on the purpose of the study, why a survey was required, and how their responses were being handled and stored.

We conducted the survey with the intention of gathering valuable insights and contributing to academic knowledge in the field. We emphasized and assured the participants' anonymity, not collecting personal data, such as names or email addresses. We implemented measures to ensure that individual responses could not be traced back to any specific participant. Furthermore, the data collected during the survey was securely stored and treated with strict confidentiality throughout the research process. Participants' trust and privacy were highly valued, and the participants were guaranteed that the collected data would not be shared or sold to any third parties. The data obtained from the survey would be solely utilized for the purpose of the thesis and would not be employed for any other undisclosed purposes. Prior informed consent was sought from participants, who were explicitly informed about the purpose of the study and the intended use of the collected data. By voluntarily submitting their responses, participants indicated their consent for the processing of their data for the specific purpose of the thesis.

5. Results and Analysis

This chapter presents the experimental results and related discussion. The first section presents the distribution of the data in terms of normality. The second section presents the reliability and validity of the statistical model by constructing a measurement model. The third section shows the structural model and the accuracy and quality of the PLS-SEM model parameters. Lastly, the fourth and last section evaluates the hypotheses formulated in Chapter 3.

5.1. Descriptive Statistics

As mentioned previously, PLS-SEM is a statistical method that can manage data that is not normally distributed. However, it is still important to consider the distribution of the data when using PLS-SEM (Basbeth & Ibrahim, 2018). If the data deviates significantly from a normal distribution, using bootstrapping to estimate standard errors may result in larger errors. This can weaken the significance of the relationships found in the analysis. Therefore, it is recommended to consider the data distribution when using PLS-SEM to ensure the accuracy and dependability of the results.

A way to measure data deviation from normality is to analyze the skewness and kurtosis of the data (Basbeth & Ibrahim, 2018). Table 7 presents the mean, median, standard deviation, excess kurtosis, and skewness values of the set of variables used in this study. Skewness measures the asymmetry of the data distribution, while excess kurtosis quantifies the degree of spikiness or flatness compared to a normal distribution (Ghauri, Gronhaug, & Strange, 2020).

Table 7. Descriptive statistics

Indicators	Mean	Median	Standard deviation	Excess kurtosis	Skewness
OL1	4.073	4.000	0.934	1.282	-1.063
OL2	4.061	4.000	0.942	0.493	-0.927
OL3	3.500	3.000	1.051	-0.429	-0.225
OL4	4.280	4.000	0.901	3.099	-1.611
OL5	4.341	5.000	0.830	3.347	-1.634
OL6	4.085	4.000	0.872	1.045	-0.955
OL7	3.902	4.000	0.945	-0.088	-0.596
CL1	3.573	4.000	1.024	-0.487	-0.305
CL2	3.305	3.000	1.090	-0.370	-0.349
CL3	3.561	4.000	1.127	-0.311	-0.571
CL4	3.378	3.000	0.983	-0.165	-0.201
CL5	3.268	3.000	0.963	-0.217	-0.151
CL6	3.585	4.000	0.883	-0.095	-0.265
IG1	4.183	4.000	0.665	0.334	-0.482
IG2	4.049	4.000	0.810	1.617	-0.932
IG3	4.110	4.000	0.796	2.195	-1.088
IC1	4.098	4.000	0.878	1.008	-0.965
IC2	3.598	4.000	1.034	-0.185	-0.469
IImp1	3.707	4.000	0.876	0.928	-0.713
IImp2	3.622	4.000	0.919	-0.249	-0.320
IImp3	3.927	4.000	0.823	0.884	-0.663
CC1	4.171	4.000	0.985	0.623	-1.132
CC2	4.268	4.000	0.827	0.701	-1.070
CC3	4.085	4.000	1.026	0.449	-1.001
CC4	4.122	4.000	0.955	1.177	-1.106
CC5	4.110	4.000	0.975	0.828	-1.028
CC6	4.110	4.000	1.012	0.249	-1.016
CC7	3.939	4.000	1.063	0.037	-0.869
CC8	4.293	4.000	0.819	0.379	-1.003
CC9	3.927	4.000	0.997	0.348	-0.827
CC10	4.220	5.000	0.976	0.734	-1.181
CC11	4.305	5.000	0.920	0.219	-1.130
CC12	3.805	4.000	1.142	-1.047	-0.458
CC13	4.256	4.000	0.838	0.506	-1.026
CC14	3.976	4.000	0.987	-0.931	-0.492
CC15	4.537	5.000	0.684	0.098	-1.182
CC16	3.902	4.000	0.892	-0.362	-0.540
CC17	4.000	4.000	0.897	-0.591	-0.516
CC18	4.098	4.000	0.878	-0.454	-0.635
CC19	3.768	4.000	0.901	-0.742	-0.232

While analyzing the skewness values, we observe that most variables exhibit negative skewness. This suggests that the distribution of these variables is skewed towards the left, with a longer tail on the left side of the distribution. Variables such as OL1, OL2, OL4, OL5, OL6, IImp1, IImp3, CC2, CC7, and CC18 display negative skewness. Examining the excess kurtosis values, variables deviate from the normal distribution in terms of kurtosis. Variables such as OL4, OL5, IG3, IC1, IC2, CC1, CC2, CC9, CC10, CC11, CC12, CC14, and CC15 have positive excess kurtosis, indicating a more peaked or leptokurtic distribution compared to a normal distribution. On the other hand, variables like OL3, CC3, and CC19 exhibit negative excess kurtosis, suggesting a flatter or platykurtic distribution.

A general guideline to determine whether the data is normally distributed is that the skewness and kurtosis values should be between -1 and +1 (Basbeth & Ibrahim, 2018). For the data presented in Table 7, 7 indicators have skewness and/or kurtosis values outside of that interval, namely OL1, OL4, OL5, IG2, IG3, CC12, and CC15. However, the complete data set has average skewness and kurtosis values of -0.77 and 0.40, respectively.

5.2. Measurement Model (Outer Model) Evaluation

To assess the validity and reliability of the selected indicators, a measurement model was constructed using SmartPLS 4 software (version 4.0.9.3) (Ringle, Wende, & Wende, 2022) with a student license. The measurement model is presented in Table 8 and was constructed to validate the indicator reliability, internal consistency reliability, convergent validity, and discriminant validity of the constructs.

5.2.1. Indicator Reliability Testing

Indicator reliability relates to the assessment of the suitability and capability of items (referred to as indicators) created to measure a specific construct. An indicator is deemed to have met the indicator reliability criteria if its factor loading exceeds the threshold of 0.5 (Hair et al., 2014). The evaluation of indicator reliability involves scrutinizing factor loadings, which involves estimating the relationships between reflective latent variables and their corresponding indicators (Hair, Hult, Ringle, & Sarstedt, 2018).

According to Hair et al., (2014), the recommended threshold value to obtain acceptable indicator reliability is to have a factor loading higher than 0.708. Furthermore, factor loadings with low loadings, below 0.4, should always be automatically eliminated to prevent any potential distortion of results during the estimation stage of the structural model (Hair, Hult, Ringle, & Sarstedt, 2014). Items with a factor loading between 0.4 and 0.708 were removed only if the removal of these items lead to an increase in internal consistency reliability or convergent validity.

Table 8 presents the factor loadings between the items and their respective construct for all items except five. These 5 items are not included in the table since they did not meet the necessary criteria for indicator reliability (<0.4) and were consequently excluded from the subsequent analysis per the recommendation by Hair, Hult, Ringle, & Sarstedt (2014). The removed items were CL2, CL5, CC10, CC16, and CC19. When excluding these items, the factor loadings of the remaining individual items range from 0.532 to 0.859, which satisfies the indicator reliability criteria.

5.2.2. Internal Consistency Reliability Testing

Internal consistency reliability assesses how different indicators measuring the same construct are associated with each other (Hair et al., 2021). To check this type of reliability, the composite reliability (CR) and Cronbach's alpha values for each construct with its corresponding indicators were evaluated.

In this study, all values for CR and Cronbach’s alpha were above the threshold value of 0.7, indicating an elevated level of reliability, as presented in Table 8.

5.2.3. Convergent Validity Testing

Convergent validity relates to the extent the items converge to represent the underlying construct. Researchers frequently employ the Average Variance Extracted (AVE) metric to affirm the presence of convergent validity (Hair et al., 2014).

Accordingly, the assessment of the model's convergent validity was conducted using the AVE, which is advised to surpass a threshold of 0.50, as suggested by Hair et al. (2014). The results in Table 8 indicate that all the constructs of this study have AVE values above 0.50, thus satisfying the convergence validity criteria. The AVE values of the constructs ranged between 0.531 to 0.606, confirming that all the constructs have the highest level of convergent validity.

Table 8. Indicator Reliability, Internal Consistency, and Convergent Validity.

Construct	Item	FL	CronAlpha	CR		AVE
				Rho_A	Rho_B	
			0.882	0.918	0.906	0.586
Open Leader behavior	OL1	0.859				
	OL2	0.816				
	OL3	0.755				
	OL4	0.857				
	OL5	0.837				
	OL6	0.564				
	OL7	0.611				
			0.725	0.768	0.819	0.536
Closed Leader behavior	CL1	0.820				
	CL3	0.765				
	CL4	0.597				
	CL6	0.751				
			0.941	0.950	0.947	0.531
Collaborative climate	CC1	0.758				
	CC2	0.842				
	CC3	0.820				
	CC4	0.724				
	CC5	0.807				
	CC6	0.648				
	CC7	0.746				
	CC8	0.786				
	CC9	0.744				
	CC11	0.774				
	CC12	0.614				
	CC13	0.786				
	CC14	0.744				
	CC15	0.802				
	CC17	0.532				
	CC18	0.650				
			0.907	0.917	0.925	0.606
Innovative work behavior	IG1	0.737				
	IG2	0.869				
	IG3	0.738				
	IC1	0.785				
	IC2	0.834				
	IImp1	0.822				
	IImp2	0.754				
	IImp3	0.671				

5.2.4. Discriminant Validity Testing

Discriminant validity testing is performed to ensure that a construct has the strongest relationships with its own indicator, and not with other constructs. In other words, it validates the uncorrelation between two constructs that are not supposed to be correlated and thus ensuring no interference in the model between constructs.

The discriminant validity for all constructs in the model was tested using the heterotrait-monotrait (HTMT) ratio, which is the preferred method according to literature (Hair, Hult, Ringle, & Sarstedt, 2014). The two standard approaches for assessing the discriminant validity in variance-based SEM, Fornell-Larcker criterion and the assessment of cross-loadings, were initially considered but disregarded due to their low sensitivity, and thus their ability to detect a lack of discriminant validity was considered low (Henseler, Ringle, & Sarstedt, 2015).

The HTMT ratio between two constructs should be below the threshold value 0.90 if discriminant validity is supported between said constructs. Table 9 presents the HTMT results for all variables in the model. The results show that all values are below the threshold value of 0.90, and thus the discriminant validity of the constructs has been established (Hair, Hult, Ringle, & Sarstedt, 2014).

Table 9. HTMT matrix with results for testing discriminant validity.

	1.	2.	3.	4.	5.	6.	7.
1. CC							
2. CL	0.512						
3. IWB	0.391	0.291					
4. OL	0.814	0.487	0.432				
5. CC x CL	0.336	0.301	0.077	0.222			
6. CC x CL x OL	0.379	0.601	0.165	0.344	0.770		
7. CC x OL	0.557	0.172	0.073	0.589	0.413	0.424	
8. CL x OL	0.189	0.239	0.082	0.218	0.863	0.785	0.380

5.3. Structural Model

The evaluation of the structural model, model quality, and research hypotheses was conducted using the SmartPLS 4 program. Additionally, an assessment of the model's out-of-sample performance was performed as a robust check. It should be noted that traditional significance testing is not suitable for PLS (Partial Least Squares) analysis due to its non-parametric nature and lack of assumptions about normal distribution. Instead, the significance of the parameter estimates in PLS is obtained through bootstrapping. In accordance with the recommendation by Hair et al. (2014), all significance tests in this study are based on 5000 bootstrap samples, and the structural model is shown in Figure 13

To assess if there are collinearity problems with the model, a variance inflation factor (VIF) analysis was performed. The reason for the importance of this assessment is that in SEM analysis, the relationships between latent variables and indicators are estimated based on a covariance or correlation matrix. Collinearity among the indicators can lead to inflated standard errors, making it difficult to decide the true significance and magnitude of the estimated relationships. This can result in misleading or ambiguous interpretations of the model (Hair, Hult, Ringle, & Sarstedt, 2014) .Table 10 presents the VIF values for each latent variable in this model.

Table 10. Collinearity of the latent variables.

	Innovative work behavior
Collaborative climate	3.307
Closed leader behavior	1.857
Open leader behavior	3.377

Based on the VIF values presented in Table 10, the latent variable CC has a relative moderate level of collinearity with the other variables in the analysis. CL had the lowest VIF value. Suggesting a low level of collinearity in comparison with the other variables. Lastly, OL has the highest VIF value of 3.375. However, all VID values are below the recommended threshold level of five (Hair, Hult, Ringle, & Sarstedt, 2014), suggesting that no collinearity exists between the latent variables in the construct.

From Table 11, the endogenous variable of interest, "innovative work behavior," proves an R-squared value of 29.5%. This shows that approximately 29.5% of the variance in innovative work behavior can be explained by the exogenous variables included in the model. The R-squared value serves as a measure of the level of predictiveness or the extent to which the exogenous variables collectively account for the observed variation in the endogenous variable (Hair, Hult, Ringle, & Sarstedt, 2014). According to Hair et al (2014), the value of R square is 0.75 (substantial), 0.50 (moderate), and 0.25 (weak). This suggests that the obtained R-squared value falls in the level of predictiveness “weak “, showing that the included exogenous variables explain a portion of the variability in innovative work behavior, and the rest is explained by other variables not included in the research model.

Table 11. R-square values

Path	R square	R square adjusted
Innovative work behavior	0.295	0.228

Further analysis of the data reveals the effects of size f^2 on the relationship between the endogenous variables (collaborative climate, closed leader behavior, open leader behavior) and the exogenous variable (innovative work behavior). The effect size f2 is a measure used in SEM to quantify the impact of a moderating variable on the relationship between independent and dependent variables (Hair, Hult, Ringle, & Sarstedt, 2014). It is the proportion of variance in the dependent variable that can be attributed to the moderating variable beyond the effects of the independent variables. The values of f2 can range from 0 to positive infinity and a small effect size is typically considered to be around 0.02, a medium effect size around 0.15, and a large effect size around 0.35 (Hair, Hult, Ringle, & Sarstedt, 2014). These thresholds supply a general guideline for interpreting the magnitude of the moderating effect. By examining the f2 values, the size of the moderating effect can be assessed, and understand how it strengthens or weakens the relationship between the variables of interest.

The results show that the effect of size f2 on collaborative climate and innovative work behavior is 0.033. This shows a small positive impact of collaborative climate on innovative work behavior. However, the effect size is small, suggesting that collaborative climate may have a limited influence on promoting innovative work behavior. For closed leader behavior, the effect of size f2 on innovative work behavior is 0.002. This value shows a small positive impact of closed leader behavior on innovative work behavior. The effect size is minimal, suggesting that closed leader behavior may have a negligible influence on promoting innovative work behavior. Lastly, for open leader behavior, the effect of size f2 on innovative work behavior is 0.082. This value shows a moderately positive impact of open leader behavior on innovative work behavior. The effect size is larger compared to the other variables, suggesting that open leader behavior may have a more major influence on promoting innovative work behavior.

Table 12. Effect of size f^2

Path		Effect of size f^2
Endogenous variable	**Exogenous variable**	
Collaborative climate	Innovative work behavior	0.033
Closed leader behavior	Innovative work behavior	0.002
Open leader behavior	Innovative work behavior	0.082

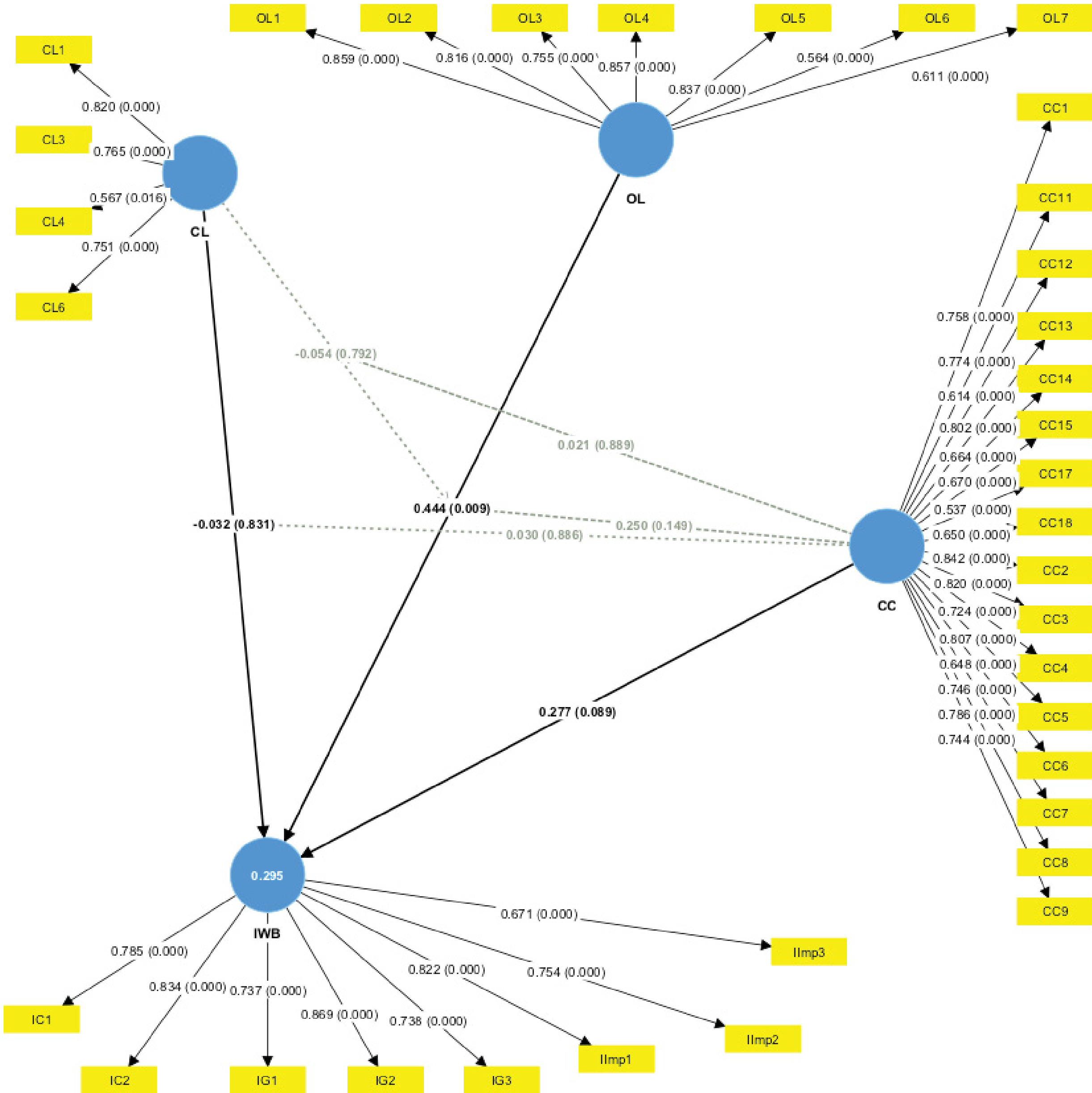

Figure 13. The structural model. Outer model: Factor loadings (P-values), Constructs: R^2-value, inner model: Patch coefficients (P-values).

5.4. Hypothesis testing

Table 13 supplies the standardized path coefficients β and their corresponding significance levels for each endogenous construct. The path coefficient values should be between –1 and +1, where values closer to –1 indicate a strong negative relationship between the constructs, and close to +1 indicates strong positive relationship (Hair, Hult, Ringle, & Sarstedt, 2014). The path between closed leader behavior and innovative work behavior did not show a significant effect (β = -0.032, p = 0.831), indicating that closed leader behavior does not significantly influence innovative work behavior in the context studied, thus rejecting the first hypothesis H1. On the other hand, the path from open leader behavior to innovative work behavior yielded a significant positive effect (β = 0.444, p = 0.009), suggesting that open leader behavior significantly promotes innovative work behavior. Thus, the second hypothesis H2 is supported.

The interaction effect of ambidextrous leadership (OL x CL) on innovative work behavior was found to be statistically non-significant (β = -0.054, p = 0.792), implying that the joint influence of open and closed leader behavior does not significantly affect innovative work behavior. Similarly, the interaction effect between collaborative climate and closed leader behavior (Collaborative Climate x Closed leader behavior) did not yield a significant effect on innovative work behavior (β = 0.03, p = 0.886), showing that the combined influence of collaborative climate and closed leader behavior is not statistically significant. The same goes for the interaction effect between collaborative climate and open leader behavior (β = 0.250, p = 0.149). Furthermore, the interaction effect between ambidextrous leadership and collaborative climate (Ambidextrous leadership x Collaborative climate) did not show a significant effect on innovative work behavior (β = 0.21, p = 0.889), showing that the joint impact of ambidextrous leadership and collaborative climate is not statistically significant. As a result, the hypotheses H3, H4, and H5 are rejected. Lastly, the path from collaborative climate to innovative work behavior proved a significant positive effect (β = 0.277, p = 0.089), although the p-value is slightly above the conventional threshold of .05. Nevertheless, it falls within the range of significance at p < 0.1, suggesting that collaborative climate may have a meaningful influence on promoting innovative work behavior, albeit at a weaker level of significance.

Table 13. Summary of hypothesis testing results.

Hypothesis	Path	β	T statistics	P value	Decision
H1	Closed leader behavior → Innovative work behavior	-0.032	0.214	0.831	Not supported
H2	Open leader behavior → Innovative work behavior	0.444*	2.621	0.009	Supported
H3	Ambidextrous leadership (OL x CL) → Innovative work behavior	-0.054	0.263	0.792	Not supported
H4	Collaborative Climate x Closed leader behavior → Innovative work behavior	0.030	0.144	0.886	Not supported
H5	Collaborative climate x Open leader behavior→ Innovative work behavior	0.250	1.444	0.149	Not supported
H6	Ambidextrous leadership x Collaborative climate→ Innovative work behavior	0.21	0.140	0.889	Not supported
H7	Collaborative climate → Innovative work behavior	0.277**	1.700	0.089	Supported

* Significant at p < .01

** Significant at p < .1

6. Discussion

The aim of this study was to investigate and explore the relationship between ambidextrous leadership, collaborative climate, and innovative work behavior in the aerospace and defense industry. Ambidextrous leadership refers to the ability of leaders to balance and integrate open leadership (exploration) and closed leadership (exploitation) behaviors (Rosing, Frese, & Bausch, Explaining the heterogeneity of the leadership-innovation relationship: Ambidextrous leadership, 2011). Collaborative climate reflects the extent to which employees perceive their work environment as supportive of collaboration, knowledge sharing, and teamwork (Barker Scott & Manning, 2022). Innovative work behavior encompasses the generation, development, and implementation of novel ideas and approaches within the organization.

With that goal in mind, we embarked to the task of responding to the research question: How does collaborative climate moderate the relationship between ambidextrous leadership style and employees' innovative work behavior in the aerospace and defense industry? And we postulated the following hypotheses along the way:

- H1: Closing leader behavior is positively related to employees' innovative work behavior.
- H2: Opening leader behavior is positively related to employees' innovative work behavior.
- H3: Ambidextrous leadership (the interaction between opening and closing leadership behaviors) is positively related to employees' innovative work behavior.
- H4: Collaborative climate moderates the positive relationship between closing leader behavior and innovative work behavior.
- H5: Collaborative climate moderates the positive relationship between open leader behavior and innovative work behavior.
- H6: Collaborative climate moderates the positive relationship between ambidextrous leadership and innovative work behavior.
- H7: Collaborative climate is positively related to innovative work behavior.

The findings from this study reveal a positive relationship between **open leadership behavior** and **innovative work behavior**. This is in line with earlier studies (Akinci et al, 2022; Zacher & Rosing, 2015; Gerlach et al, 2020) and confirm that white-collar employees in the aerospace and defense industry are more innovative when they perceive their leaders to have an open leadership behavior. However, the direct individual relationship between **closed leadership behavior** and innovative work behavior was not found to be significant. Gerlach et al. (2020) reported in their study that closed leadership behavior had positive effect on innovation, while studies from Zacher & Rosing (2015), and Akinci et al (2022), could not correlate closed leadership behavior with innovation. Akinci et al (2022) proposed that one potential explanation for the absence of support between closed leadership behavior and innovation could be attributed to the inherent characteristics of work conducted within a military environment. In such settings, leaders tend to prioritize alignment, efficiency, and obedience-based performance indicators, rather than fostering innovative ideas and actions. In other words, finding the industry as the reason to the discrepancy with contemporary studies. Thus, there seem to be contradictory findings in the published literature about this type of relationship. Moreover, similar contradictions have been found for **ambidextrous leadership** since the postulated interaction between open leadership behavior and closed leadership behavior did not show a significant effect on innovative work behavior for this study. This finding is surprising as this contradicts both theoretical arguments (Rosing et al., 2011), and earlier empirical evidence on this topic (Akinci et al, 2022; Zacher & Rosing, 2015; Kassotaki, 2019a). On the other hand, Gerlach et al (2020) also reported a non-significant relationship between the interaction of open and closed leadership behavior and innovative work behavior, while Haider et al (2023) reported that ambidextrous leadership had a negative effect on innovative work behavior.

This study is, to the best of the authors' knowledge, the first-time ambidextrous leadership is evaluated empirically in an aerospace and defense setting. It is therefore worth considering that the studies above were all performed in different industries and countries, and they featured survey participants who occupied distinct positions. This could be a potential reason there are inconsistencies in the reported results since leadership is a complex phenomenon. The existing research on leadership has shown that it is a multilevel concept (Gooty et al., 2012), and is not only considered an individual characteristic (Kassotaki, 2019b). Thus, the balance between opening and closing leadership behavior is intricate, influenced not only by leader-related factors but also molded by significant moderators including corporate, industry, and country-specific characteristics (Kassotaki, 2019a). This was also reflected in the model as the level of predictiveness of the research model used in this study was considered weak, and a substantial portion of the variability in innovative work behavior was explained by other variables not included in the research model. Since there is no empirical data exploring ambidextrous leadership and its effect on innovativeness in the aerospace and defense industry available to compare with the results from this study, it is possible that white-collar employees in this industry only showed to have positive to innovativeness when open leadership is perceived.

The current study also examined the moderating role of **collaborative climate** on the relationship between ambidextrous leadership and innovativeness. The findings showed that the moderating effect of collaborative climate was not significant for any of the configurations, meaning that all the hypotheses including collaborative climate as a moderator were rejected. This implies that for the configuration were there was a significant effect on innovativeness without moderation (open leadership behavior -> innovativeness), the impact is large enough and the extra support of collaborative climate is not a prerequisite or facilitator for it. On the other hand, collaborative climate did not improve the innovativeness where the direct relationships were non-significant. However, the direct individual relationship between collaborative climate and innovative work behavior was a positive effect, this aligns with the studies by Anderson (1995). Bain et al. (2001) discovered through an empirical study, that research collaborative climates are more propense to innovativeness than development teams. This aligns with both our findings on the relation between **collaborative climate** and innovation, and **open leadership behavior** and innovation, which fosters learning, research and experimentation (Rosing, Frese, & Bausch, 2011). Even though this study could not prove that collaborative climate has a moderating role to improve innovativeness, it shows that it individually has a direct relationship with innovative behavior, Nguyen et al. (2021) have discovered positive results for Transformational Leadership relation with innovation moderated by collaborative culture. This, even though non conclusive, strongly suggests that there might be other leadership styles that better foster collaborative environments and hence innovation, than ambidextrous leadership. Results show that it is important for companies to create a collaborative climate in their organization to improve innovativeness among their white-collar employees, however, we acknowledge that other variables non considered in our study could have created a bias that remains to be explored by other studies proposing more variables to either strengthen the causality we observed, or explain a different source of it.

6.1. Implications

This study supplies theoretical, managerial, and organizational implications. With respect to theoretical implications, the study contributes to the existing literature by examining the relationship between ambidextrous leadership and innovative work behavior in a specific industry context, which has not been explored empirically before. This study was able to extract valuable results, which show that the interaction between open and closed leadership behaviors, as conceptualized by ambidextrous leadership, did not have a significant effect on innovative work behavior. Thus, these findings challenge earlier theoretical arguments and empirical evidence that have supported the positive impact of ambidextrous leadership on innovation.

Furthermore, the study highlights the role of industry-specific characteristics in influencing the relationship between leadership behaviors and innovative work behavior. The contradictory findings about the impact of closed leadership behavior on innovation may be attributed to the inherent characteristics of work conducted in the aerospace and defense industry. Leaders in such settings often prioritize alignment, efficiency, and obedience-based performance indicators, which may hinder the fostering of innovative ideas and actions. This suggests that the relationship between leadership behaviors and innovation is contingent upon industry-specific factors and cannot be generalized across different industries.

And lastly, the study underscores the importance of considering leadership as a complex, multilevel concept. Leadership is not solely an individual characteristic but is also influenced by various contextual factors, including corporate, industry, and country-specific characteristics. The balance between open and closed leadership behaviors is intricate and shaped by these contextual factors. Therefore, future research should consider the interplay between individual and contextual factors to gain a comprehensive understanding of leadership and its impact on innovative work behavior.

With respect to managerial and organizational implications, the study highlights the significance of open leadership behavior in driving innovation. Leaders who show open leadership behaviors, characterized by being supportive and collaborative, have a greater impact on inspiring and encouraging innovative thinking among their employees. Therefore, managers should focus on developing open leadership behaviors, such as promoting idea generation, supplying resources and support, and nurturing a culture of collaboration. Raisch (2008) suggested that organizations which are characterized by standardization, centralization, and hierarchy, the prioritization of efficient exploitation of existing capabilities may hinder the essential drivers of innovation and flexibility necessary for the exploration of new capabilities. In other words, the more rigid an organization is, the more senior managers resort to the use of exploitative activities such as goal settings, and coordination, rather than explorative activities (Kassotaki, 2019a). According to Kassotaki (2019a), organizations in the aerospace and defense industry are highly structured and run in low to medium dynamic environments. This means that leaders in these types of organizations tend to prefer to put more emphasis on exploitative activities than on explorative activities. Considering the results obtained in this study, the selection of exploitative activities would have a contra-productive effect in innovativeness of white-collar employees. It is therefore important for companies in this sector to allow and encourage leaders to explore open leadership as this seems to improve the innovativeness of their subordinates.

The study also underscores the importance of setting up a collaborative climate within organizations. A collaborative climate refers to a work environment that fosters collaboration, knowledge sharing, and teamwork. The study found a positive direct relationship between a collaborative climate and innovative work behavior. This suggests that organizations should concentrate on creating an atmosphere that encourages collaboration and eases the exchange of ideas and knowledge among employees. Managers can achieve this by implementing practices such as team-building activities, cross-functional projects, and open communication channels (Thamhain, 2006).

Furthermore, even though the study did not find significant moderating effects of collaborative climate on the relationship between leadership behaviors and innovative work behavior, it still highlights the need for organizations to prioritize the development of a collaborative climate. Although the collaborative climate may not directly enhance the impact of leadership behaviors on innovation, it independently contributes to fostering innovative behavior. Therefore, managers should invest in creating a collaborative climate to enhance overall innovativeness within their organizations.

In the context of the highly regulated aerospace industry, it is crucial to acknowledge the notable distinctions that exist between working within the defense sector and operating in more openly oriented industries, such as advertising or other commercial domains. The stringent constraints imposed by the aerospace industry create a unique dynamic that differentiates it from sectors where openness is not only welcomed but is also implemented quite differently. In the aerospace and defense sector, managers must navigate a landscape that requires a delicate balance between security concerns and the fostering of innovation. This emphasizes the imperative for leaders to concentrate their efforts on nurturing open leadership behaviors and cultivating a collaborative climate among their white-collar employees. By actively fostering an environment that values transparency, communication, and idea-sharing, organizations can establish the conditions that promote innovative work behavior. This strategic approach paves the way for the creation, refinement, and successful implementation of novel ideas and approaches. Such an initiative-taking stance enhances the organization's capacity to not only adapt but also flourish in the dynamic and ever-evolving landscape of the aerospace industry.

6.2. Limitations and Future Research Directions

This study contributes to existing leadership literature in the context of aerospace and defense settings, but it is not without limitations.

Firstly, the period for conducting this study was restricted, which presented a notable challenge for defining the study, preparing the approach, and receiving complete questionnaires. This was particularly clear in collecting enough data to achieve a sample size with high confidence. This study tried to mitigate this by encouraging any white-collar employee working in the industry to take part in the study, regardless of location (Rogan & Mors, 2014). Despite this, the sample size was still low. The small sample size could affect the reliability and validity of the results and could explain why the results from this study are not entirely in line with the ambidextrous leadership theory proposed by Rosing et al (2011). It is therefore recommended to conduct a similar study with a larger collecting period, enabling the opportunity to increase the sample size and confidence in the results.

Secondly, one notable limitation is the omission of certain potential variables that could influence both the dependent and independent variables simultaneously. Factors such as individual personality traits, organizational culture nuances, and external environmental factors were not comprehensively explored in this research but have been explored by other studies as important factors for innovation (Prieto & Perez-Santana, 2014; Leong & Rasli, 2014). These unexamined variables may play a significant role in shaping innovative work behavior and its association with open and closed leader behaviors and collaborative climates. Future research endeavors should consider these variables to provide a more holistic understanding of the complex dynamics at play in fostering innovation within organizations.

Furthermore, this study used a subjective self-assessment method to capture the survey participants' innovative work behavior. Scholars have at times criticized this approach (Anderson et al., 2014; Potočnik and Anderson, 2012) due to potential biases based on individual beliefs and potential issues with the accuracy of the construct being measured. It is therefore recommended to consider employing more objective assessments of innovative work behavior, such as peer-rate, supervisor-rate, or expert-rate data (Kung et al., 2020).

Lastly, this study explored the role of collaborative climate as a moderator. The results showed that it did not have a significant effect on innovative work behavior when ambidextrous leadership was applied. To extend the knowledge on ambidextrous leadership, it is recommended to implement other moderating variables such as organizational size or innovative climate.

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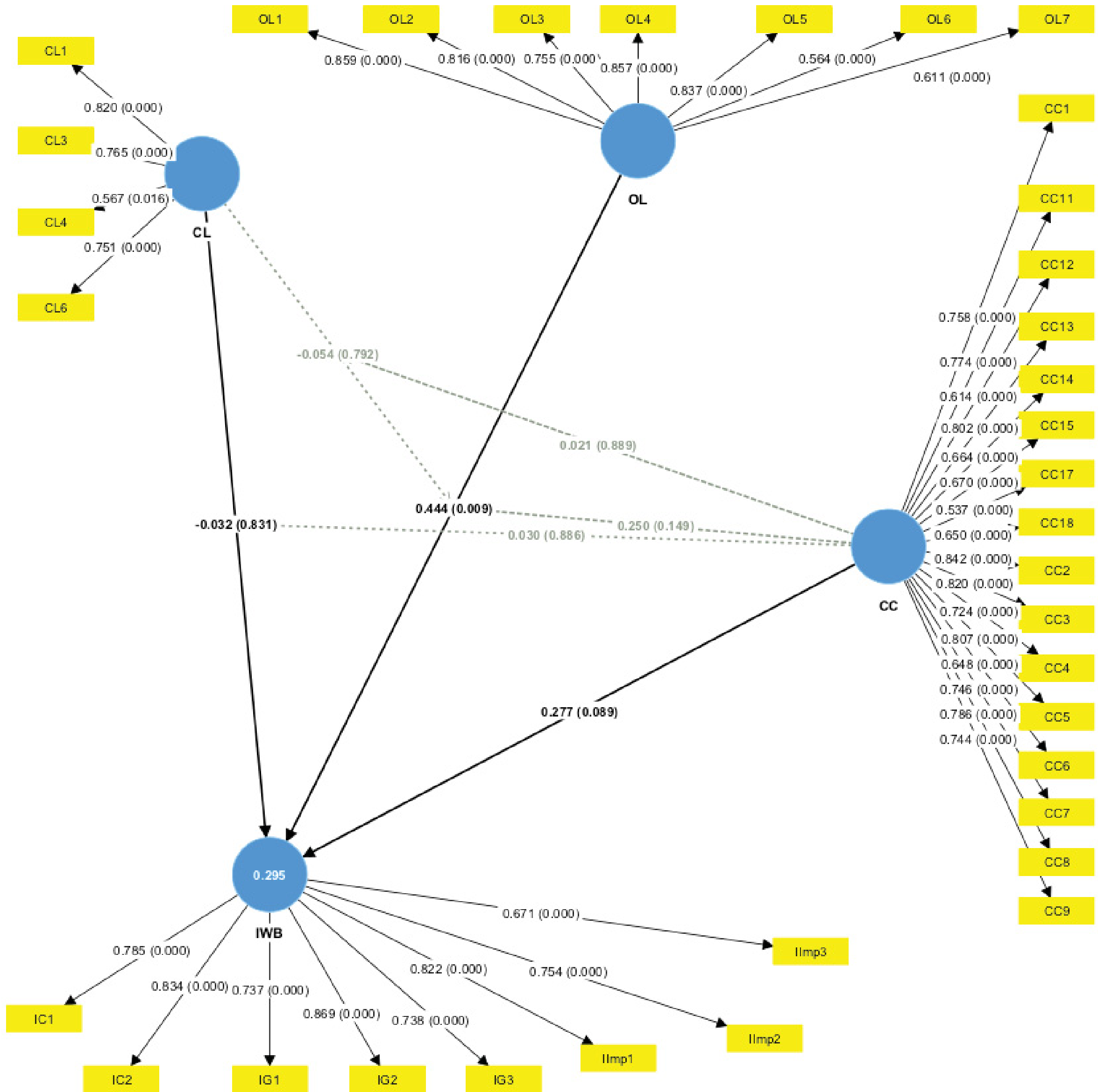
Appendix I – Structural Model



Appendix 2 – Outer loadings

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
CC1 <- CC	0.758	0.75	0.082	9.185	0
CC11 <- CC	0.774	0.757	0.083	9.357	0
CC12 <- CC	0.614	0.591	0.111	5.513	0
CC13 <- CC	0.802	0.79	0.074	10.789	0
CC14 <- CC	0.664	0.664	0.086	7.766	0
CC15 <- CC	0.67	0.656	0.108	6.177	0
CC17 <- CC	0.537	0.531	0.103	5.211	0
CC18 <- CC	0.65	0.647	0.083	7.859	0
CC2 <- CC	0.842	0.828	0.065	12.86	0
CC3 <- CC	0.82	0.808	0.064	12.747	0
CC4 <- CC	0.724	0.702	0.085	8.466	0
CC5 <- CC	0.807	0.799	0.064	12.668	0
CC6 <- CC	0.648	0.625	0.107	6.026	0
CC7 <- CC	0.746	0.733	0.082	9.041	0
CC8 <- CC	0.786	0.775	0.063	12.416	0
CC9 <- CC	0.744	0.722	0.093	8.007	0
CL1 <- CL	0.82	0.77	0.158	5.182	0
CL3 <- CL	0.765	0.703	0.18	4.251	0
CL4 <- CL	0.567	0.505	0.235	2.414	0.016
CL6 <- CL	0.751	0.704	0.177	4.236	0
IC1 <- IWB	0.785	0.775	0.059	13.401	0
IC2 <- IWB	0.834	0.833	0.045	18.532	0
IG1 <- IWB	0.737	0.731	0.059	12.405	0

IG2 <- IWB	0.869	0.862	0.034	25.318	0
IG3 <- IWB	0.738	0.739	0.056	13.086	0
IImp1 <- IWB	0.822	0.82	0.05	16.31	0
IImp2 <- IWB	0.754	0.753	0.056	13.404	0
IImp3 <- IWB	0.671	0.667	0.073	9.178	0
OL1 <- OL	0.859	0.847	0.052	16.613	0
OL2 <- OL	0.816	0.803	0.067	12.17	0
OL3 <- OL	0.755	0.741	0.086	8.767	0
OL4 <- OL	0.857	0.843	0.062	13.77	0
OL5 <- OL	0.837	0.827	0.065	12.894	0
OL6 <- OL	0.564	0.55	0.128	4.403	0
OL7 <- OL	0.611	0.598	0.099	6.196	0
CC x CL x OL -> CC x CL x OL	1	1	0	n/a	n/a
CC x CL -> CC x CL	1	1	0	n/a	n/a
CC x OL -> CC x OL	1	1	0	n/a	n/a
CL x OL -> CL x OL	1	1	0	n/a	n/a

Appendix 3 – Construct validity & Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
CC	0.941	0.95	0.947	0.531
CL	0.725	0.768	0.819	0.536
IWB	0.907	0.917	0.925	0.606
OL	0.882	0.918	0.906	0.586

Appendix 4 – Discriminant Validity

Fornell-Larcker criterion

	CC	CL	IWB	OL
CC	0.729			
CL	0.448	0.732		
IWB	0.397	0.258	0.779	
OL	0.779	0.419	0.415	0.765

Cross loadings

	CC	CL	IWB	OL	CC x OL	CL x OL	CC x CL	CC x CL x OL
CC1	0.757	0.29	0.337	0.475	-0.374	-0.195	-0.304	0.278
CC11	0.774	0.468	0.228	0.637	-0.448	-0.181	-0.278	0.287
CC12	0.615	0.309	0.075	0.335	-0.318	-0.108	-0.193	0.259
CC13	0.802	0.417	0.345	0.644	-0.479	-0.017	-0.227	0.209
CC14	0.665	0.432	0.34	0.557	-0.299	-0.042	-0.098	0.218
CC15	0.67	0.288	0.118	0.486	-0.403	-0.118	-0.295	0.251
CC17	0.537	0.206	0.228	0.313	-0.146	-0.108	-0.171	0.195
CC18	0.65	0.162	0.285	0.433	-0.181	-0.068	-0.086	0.145
CC2	0.842	0.365	0.3	0.591	-0.429	-0.246	-0.328	0.363
CC3	0.82	0.349	0.338	0.644	-0.523	-0.187	-0.321	0.36
CC4	0.723	0.222	0.229	0.609	-0.468	0.001	-0.096	0.123
CC5	0.806	0.332	0.397	0.782	-0.52	-0.195	-0.274	0.339
CC6	0.648	0.314	0.149	0.532	-0.428	-0.164	-0.233	0.311
CC7	0.745	0.424	0.322	0.57	-0.392	-0.243	-0.378	0.394
CC8	0.786	0.344	0.256	0.65	-0.422	-0.101	-0.228	0.208
CC9	0.744	0.276	0.298	0.602	-0.452	-0.157	-0.277	0.337
CL1	0.429	0.821	0.245	0.357	-0.115	-0.142	-0.218	0.439
CL3	0.386	0.764	0.158	0.431	-0.249	-0.094	-0.101	0.298
CL4	0.158	0.565	0.08	0.118	-0.036	-0.171	-0.224	0.398
CL6	0.27	0.752	0.211	0.263	-0.033	-0.194	-0.215	0.379
IC1	0.344	0.142	0.782	0.4	-0.078	-0.041	0.005	0.102
IC2	0.337	0.295	0.836	0.342	-0.008	-0.05	-0.029	0.096
IG1	0.27	0.115	0.733	0.348	-0.021	-0.068	-0.097	0.16
IG2	0.386	0.209	0.868	0.363	-0.078	-0.066	-0.104	0.159
IG3	0.272	0.229	0.74	0.276	0.024	-0.118	-0.149	0.167
IImp1	0.352	0.244	0.825	0.319	-0.026	-0.059	-0.04	0.109
IImp2	0.257	0.208	0.756	0.272	0.079	0.047	-0.012	0.1

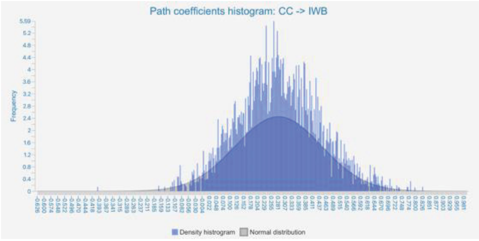
IImp3	0.208	0.146	0.671	0.233	0.121	0.034	0.022	0.082
OL1	0.663	0.312	0.358	0.859	-0.528	-0.198	-0.215	0.317
OL2	0.609	0.349	0.317	0.816	-0.453	-0.153	-0.106	0.338
OL3	0.516	0.414	0.303	0.756	-0.379	-0.026	-0.048	0.257
OL4	0.725	0.374	0.335	0.857	-0.608	-0.273	-0.315	0.394
OL5	0.722	0.42	0.439	0.837	-0.588	-0.24	-0.251	0.306
OL6	0.434	0.025	0.138	0.564	-0.211	0.17	0.103	-0.059
OL7	0.391	0.152	0.199	0.611	-0.199	0.038	0.078	0.062
CC x OL	-0.542	-0.147	-0.009	-0.593	1	0.38	0.413	-0.424
CL x OL	-0.186	-0.198	-0.056	-0.178	0.38	1	0.863	-0.785
CC x CL x OL	0.369	0.507	0.156	0.345	-0.424	-0.785	-0.77	1
CC x CL	-0.326	-0.252	-0.066	-0.189	0.413	0.863	1	-0.77

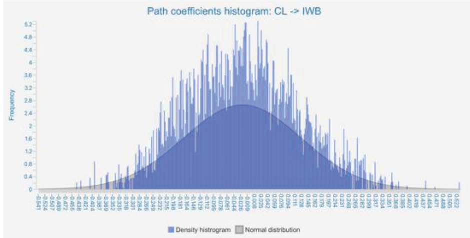
Appendix 5 – Path coefficients

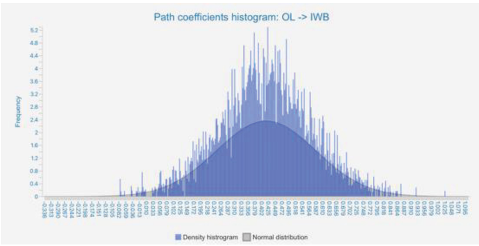
	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
CC -> IWB	0.277	0.282	0.163	1.7	0.089
CL -> IWB	-0.032	-0.023	0.15	0.214	0.831
OL -> IWB	0.444	0.417	0.169	2.621	0.009
CC x OL -> IWB	0.25	0.153	0.173	1.444	0.149
CL x OL -> IWB	-0.054	-0.042	0.204	0.263	0.792
CC x CL -> IWB	0.03	0.067	0.212	0.144	0.886
CC x CL x OL -> IWB	0.021	0.074	0.15	0.14	0.889

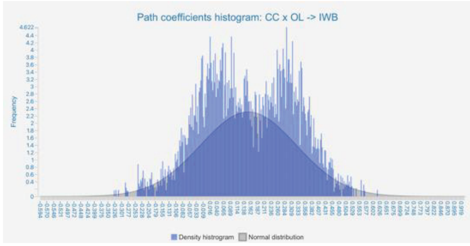
Confidence intervals

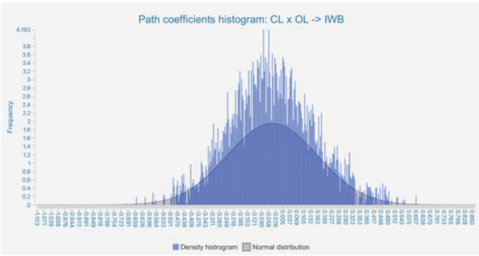
	Original sample (O)	Sample mean (M)	2.50%	97.50%
CC -> IWB	0.277	0.282	-0.021	0.615
CL -> IWB	-0.032	-0.023	-0.3	0.279
OL -> IWB	0.444	0.417	0.077	0.76
CC x OL -> IWB	0.25	0.153	-0.18	0.456
CL x OL -> IWB	-0.054	-0.042	-0.44	0.392
CC x CL -> IWB	0.03	0.067	-0.366	0.47
CC x CL x OL -> IWB	0.021	0.074	-0.155	0.387

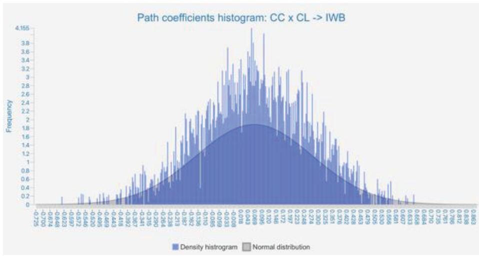

Path coefficients histogram: CC -> IWB
Frequency
Density histogram
Normal distribution

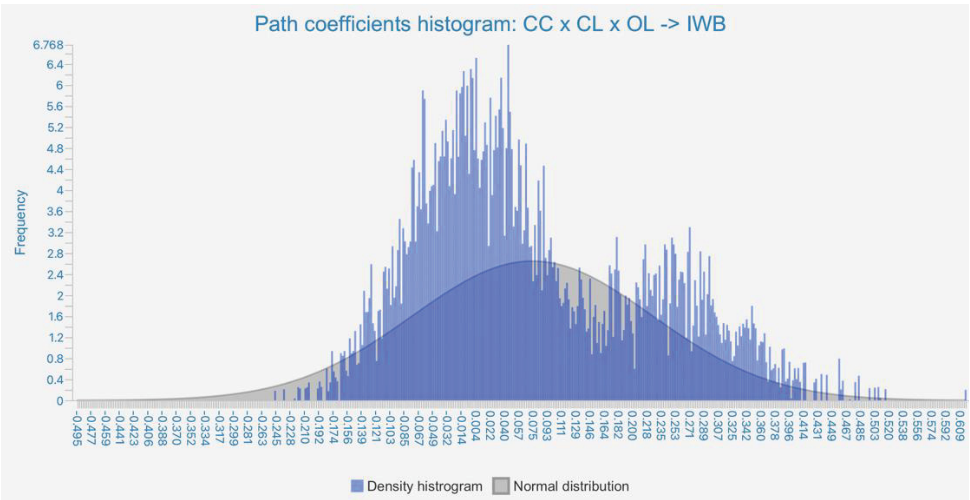

Path coefficients histogram: CL -> IWB
Frequency
Density histogram
Normal distribution


Path coefficients histogram: OL -> IWB
Frequency
Density histogram
Normal distribution


Path coefficients histogram: CC x OL -> IWB
Frequency
Density histogram
Normal distribution


Path coefficients histogram: CL x OL -> IWB
Frequency
Density histogram
Normal distribution


Path coefficients histogram: CC x CL -> IWB
Frequency
Density histogram
Normal distribution


Path coefficients histogram: CC x CL x OL -> IWB
Frequency
Density histrogram
Normal distribution

Appendix 6 – Questionnaire

Ambidextrous leadership and innovative work behavior - Survey MBA thesis 2023

We are currently conducting research for our Masters' thesis on the MBA program at Blekinge Institute of Technology, Sweden. Our study aims to investigate the relationship between ambidextrous leadership style and innovative work behavior among white-collar employees in the aerospace and defense industry, moderated by a collaborative climate.

To achieve our research goals, we are inviting you to participate in a survey that will take approximately 5-10 minutes to complete. Please note that the survey is 100% anonymous and will not collect any personal data, such as names or email addresses, and no responses can be traced back to any respondents. Any data collected from this survey will be securely stored until the completion of the thesis.

We value your trust and privacy, and assure you that we will not share or sell your data with any third parties. The data collected in this study will only be used for the purpose of this thesis, and will not be used for any other purposes. By submitting your responses, you consent to the processing of the data for the purpose of the thesis.

Thank you for taking the time to participate in our study. If you have any questions related to the survey or our research, please do not hesitate to contact us.

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Questionnaire			Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Ambidextrous leadership	Open leader	My leader allows different ways of accomplishing a task					
		My Leader encourages experimentation with different ideas					
		My leader motivates me to take risks					
		My leader gives possibilities for independent thinking and acting					
		My leader gives room for own ideas					
		My leader allows errors					
		My leader encourages error learning					
	Closed leader	My leader monitors and controls goal attainment					
		My leader establishes routines					
		My leader takes corrective actions					
		My leader controls adherence to rules					
		My leader pays attention to uniform task accomplishment					
		My leader sticks to plans					
Collaborative climate		Sharing knowledge is encouraged by the department in action and not only in words					
		We are continuously encouraged to bring new knowledge into the department					
		We are encouraged to say what we think even if it means disagreeing with people we report to.					
		Open communication is characteristic of the department as a whole					
		My immediate supervisor encourages me to come up with innovative solutions to work-related problems					
		My immediate supervisor organizes regular meeting to share information					
		My immediate supervisor keeps me informed					
		My immediate supervisor encourages open communication in my working group					
		My immediate supervisor encourages- by action and not only by words- sharing of knowledge					
		I learn a lot from other staff in this department					
		In my department, informatiuon sharing has increased my knowledge					
		Most of my expertise has developed as a result of working together with colleagues in this department					
		Sharing information translates to deeper knowledge in this department					
		Combining the knowledge amongst staff has resulted in many new ideas and solutions for the department					
		There is much I could learn from my colleagues					
		There are people who prefer to work on their own					
		We often share work experiences informally in our unit/section					
		We help each other to learn the skills we need					
		We keep all team members up to date with current events and work trends					
Innovative work behavior	Idea Generation	I search out new working methods or techniques					
		I generate original solutions for problems					
		I find new approaches to execute tasks					
	Idea Championing	I promote and champions ideas to others					
		I Investigate and secure funds needed to implement new ideas					
	Idea Implementation	I transform innovative ideas into usefull applications					
		I introduce innovative ideas into the work environment in a systemic way					
		I evaluate the utility of innovative ideas					