THE IMPACT OF HUMAN-CENTRIC ORGANIZATION, SUSTAINABILITY AWARENESS, AND LEAN-CONTINUOUS IMPROVEMENT ON ORGANIZATIONAL RESILIENCE: THE MEDIATING ROLE OF DYNAMIC OPERATIONAL AGILITY AT THE MULTINATIONAL PHARMACEUTICAL INDUSTRY IN INDONESIA

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MASTER OF BUSINESS ADMINISTRATION

IPMI INSTITUTE,

JAKARTA

2026

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A THESIS

Submitted in partial fulfillment of the requirements for the degree of Master of Business Administration

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We hereby declare that this Thesis is the student's own work, has been read and presented to the Institut IPMI Board of Examiners, and has been accepted as part of the requirements needed to obtain a Master of Business Administration Degree and has been found to be satisfactory.

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This Thesis is a presentation of my original research work. Wherever contributions of others are involved, every effort is made to indicate this clearly, with due reference to the literature, and acknowledgment of collaborative research and discussions. This work is being submitted in partial fulfillment of the requirements for the Master of Business Administration degree and has not previously been accepted in substance for any degree, and is not being concurrently submitted in candidature for any degree.

Jakarta, 03 August 2026

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ACKNOWLEDGMENT

Alhamdulillahi Rabbil ‘Alamin, all praise and gratitude belong to Allah SWT, the Most Gracious and Most Merciful, for His endless blessings, mercy, guidance, and wisdom throughout my life and this academic journey.

To my beloved wife, Faradila Wijayadi, and to my beloved children, Zivanka Zoya T and Kaivandra Zeva N, words will never be sufficient to express my gratitude. Thank you for being my greatest source of inspiration and motivation. Every smile, laugh, and precious moment we shared reminded me why I embarked on this journey. There were many occasions when my studies required me to spend less time with you than I wished, and for that I am deeply grateful for your understanding. My sincere hope is that one day this achievement will serve as an example that with faith, perseverance, discipline, and continuous learning, no dream is beyond reach.

I would like to express my sincere appreciation to Dr. Ir. Amelia Naim Indrajaya, MBA, for her invaluable guidance, constructive feedback, patience, and continuous support throughout the completion of this research. My gratitude also extends to IPMI Institute, its faculty members, and academic staff for providing an exceptional learning environment that challenged me to think critically, lead strategically, and continuously develop both personally and professionally.

My heartfelt gratitude also goes to Bayer Indonesia, Cimanggis Plant, particularly the leadership team (COLLECT), colleagues, and employees of the entire site who provided an inspiring environment for learning, innovation, continuous improvement, sustainability, and professional growth. The experiences, challenges, and opportunities throughout my career have significantly contributed to the development of the ideas and insights reflected in this research. I also extend my sincere thanks to all respondents who generously participated in this study and shared their valuable perspectives, making this research possible. The study itself is based on the context of the pharmaceutical manufacturing environment at the Cimanggis plant and the contributions of its employees.

I would also like to express my sincere appreciation to Ms. Priscilla Silvan Prarizta for her trust, leadership, encouragement, and support for continuous learning and professional development. Her encouragement to challenge limits, embrace growth opportunities, and pursue excellence has been a meaningful part of my MBA journey.

Finally, I extend my gratitude to my lecturers, mentors, classmates, colleagues, friends, and everyone who has contributed directly or indirectly to this accomplishment. This thesis represents more than the completion of an academic requirement; it reflects a journey of faith, learning, perseverance, leadership, and personal growth. I pray that this work may provide meaningful contributions to both academic knowledge and the advancement of organizational excellence within the pharmaceutical industry.

ABSTRACT

The pharmaceutical manufacturing sector is increasingly vulnerable to rapid technological shifts, global supply chain unpredictability, and evolving regulatory standards. To maintain long-term competitiveness and operational continuity, these pressures necessitate a robust framework for organizational resilience. This research investigated how Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean-Continuous Improvement (LCI) influence Organizational Resilience (OR), specifically examining the mediating role of Dynamic Operational Agility (DOA). The research was grounded in the Resource-Based View (RBV) and the Dynamic Capabilities View (DCV), integrated into a proposed Pharmaceutical Excellence Framework (PEF) tailored to the BANI (Brittle, Anxious, Nonlinear, Incomprehensible) environment.

To achieve this, the research addressed one primary research question and five supporting questions through a quantitative, cross-sectional design. Data were collected from 175 experienced employees at the multinational pharmaceutical Cimanggis plant using stratified sampling and analyzed via Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 4. The empirical results demonstrated that the model collectively explained 67.7% of the variance in Organizational Resilience. While Sustainability Awareness and Lean-Continuous Improvement exhibited significant direct impacts on resilience, the direct relationship between Human-Centric Organization and resilience was not significant. However, the study confirmed that Dynamic Operational Agility significantly mediates the individual relationships for all three variables. Most importantly, the results validated the integrated mediation effect, proving that the collective impact of HCO, SA, and LCI on resilience is significantly channeled through the firm's agile capabilities.

The Importance-Performance Map Analysis (IPMA) further identified Sustainability Awareness and Dynamic Operational Agility as the highest strategic priorities for improvement. These findings suggest that building resilience requires a "Dual-Track Strategy" that balances operational stability through LCI with the cultivation of adaptive, human-centric, and sustainability-oriented capabilities. This study provides leaders with an evidence-based model to guide strategic resource allocation, emphasizing that while operational agility is the primary engine of resilience, it must be fueled by a foundation of human-centric practices and a deep awareness of sustainability

Keywords**:** *organizational resilience, dynamic operational agility, human-centric organization, sustainability awareness, lean continuous improvement, BANI framework*

CHAPTER I

INTRODUCTION

1.1. Background

The pharmaceutical manufacturing industry is characterized by a core dichotomy in the modern business environment: the simultaneous need for extraordinary stability and extreme agility. On the one hand, the industry is subject to strict regulations (Good Manufacturing Practices) that demand consistent quality, predictability, and process control. The conditions outlined by the VUCA framework (Volatile, Uncertain, Complex, Ambiguous) have been surpassed by the current business environment, which Cascio (2020) refers to as a "BANI world," which is defined by brittleness, anxiety, nonlinearity, and incomprehensibility. The BANI paradigm reflects the experiential and systemic aspects of contemporary disruptions at a human level, in contrast to VUCA, which focuses on external environmental variables. (Cascio J. , 2025). In a Brittle world, systems that appear robust can shatter without warning, as demonstrated by the COVID-19 pandemic, which exposed the fragility of global pharmaceutical supply chains optimized for efficiency rather than resilience. (List, 2024) The Anxiety dimension reflects the pervasive uncertainty faced by organizations and employees who must make critical decisions amid incomplete information and rapidly shifting regulatory landscapes. Nonlinearity describes the disproportionate relationship between cause and effect, where small disruptions can cascade into systemic failures, a phenomenon particularly relevant in pharmaceutical manufacturing, where a single quality deviation can trigger plant-wide shutdowns and global supply shortages. Finally, Incomprehensibility captures the difficulty of understanding the interconnected dynamics that drive outcomes in complex, highly regulated industries.

The BANI framework significantly impacts organizations' conception and development of resilience. It is becoming evident that embracing flexibility, adaptation, and, most importantly, resilience is the proper response to a brittle

environment (Cascio J. J., 2025). This perspective is consistent with the Resource-Based View (RBV) and the Dynamic Capabilities View (DCV) employed in this research. Organizations need to possess valuable resources and the dynamic ability to reorganize them in reaction to BANI circumstances (Syamsir, 2025). Companies operating in BANI environments in the pharmaceutical manufacturing sector need to implement agile transformation strategies that incorporate adaptive leadership, continuous improvement, and greater organizational agility to remain resilient and competitive (Vishwakarma.S.S., 2024). Similarly, it demonstrates empirically that healthcare organizations operating under BANI conditions achieve higher resilience when they invest in staff competencies and governance quality, findings that resonate with the human-centric organizational practices examined in this study (Borshch, 2025). These insights underscore the urgency for pharmaceutical manufacturers such as Multinational Pharmaceutical Company in Indonesia to move beyond traditional efficiency-driven approaches and develop integrated resilience capabilities that can withstand brittleness, navigate anxiety, adapt to nonlinearity, and make sense of the incomprehensibility that defines the current operating environment.

Organizational resilience has become a vital strategic asset for maintaining long-term sustainability and competitiveness amid rapid technological progress, global competition, and growing environmental uncertainty. Organizational resilience refers to the ability to foresee, prepare for, react to, and adjust to both incremental shifts and sudden interruptions, allowing for continuous performance in changing surroundings (Fathi, 2021). The pharmaceutical manufacturing sector, which operates under stringent regulatory requirements, high R&D costs, intricate global supply chains, and rising societal expectations for ethical and sustainable practices, particularly needs this capability.

The production of pharmaceuticals in Indonesia is strategically important to both public health and the country's economic growth. The industry faces several obstacles, including shifting regulations, unstable supply chains, technological advancements, and heightened competition from global firms. The urgent need for robust organizational structures and flexible operational capabilities was

highlighted by the COVID-19 pandemic, which also revealed weaknesses in pharmaceutical supply chains, workforce management, and production systems (Ivanov, 2020). As a result, identifying the key organizational factors that improve resilience has become a top managerial and research priority.

Indonesia's pharmaceutical business has steadily expanded during the last five years. Despite the slow drop in post-pandemic demand, the sector's share of the country's GDP grew from roughly USD 2.580 million in 2019 to USD 3.590 million in 2022 (business-indonesia.org, 2023). Due to consistent domestic demand and encouraging government measures, Indonesia's pharmaceutical business is predicted to increase by an estimated USD 11 billion in 2025. Additionally, market volume is expected to reach USD 4.56 billion by 2029, with a compound annual growth rate (CAGR) of 4.77% from 2025 to 2029 (insiders, Asian, 2025) (statista, 2024).

Figure 1.1. The Pharmaceutical Market Trend in Indonesia

Source : (statista, 2024)

According to recent research, a Human-Centric Organization is an essential component of organizational resilience. Human-centric organizations promote engagement and learning-oriented practices by emphasizing psychological safety, well-being, inclusivity, employee empowerment, and participatory decision-making (Albrecht, 2015) (Joana R. C. Kuntz, 2016). These methods improve workers' ability to adapt, solve problems proactively, and be creative, thereby

strengthening organizational resilience. (Lengnick-Hall, 2011) argue that fostering adaptable skills, social capital, and learning capacities, and strategic Human Resources Management practices based on human-centered values, greatly enhance resilience. Nevertheless, empirical studies examining this connection in emerging economy settings, especially in the pharmaceutical industry, remain limited.

Simultaneously, modern organizations now consider sustainability awareness to be a critical strategic orientation. The triple bottom line framework is a common way to conceptualize sustainability awareness, encompassing organizational knowledge and a commitment to social responsibility, environmental protection, and ethical governance. (Elkington, 1997). Organizations with strong sustainability awareness tend to adopt long-term strategic perspectives, invest in resource efficiency, and foster innovation, thereby enhancing their adaptability and resilience. (Saunila M. U., 2018). In the pharmaceutical sector, sustainability initiatives are increasingly linked to regulatory compliance, ethical production, waste management, and corporate reputation. Nevertheless, empirical research has been limited in its exploration of how sustainability awareness contributes to the development of resilience through dynamic Operational agility.

Lean continuous improvement is a critical operational mechanism for translating human-centric values and a sustainability orientation into tangible resilience outcomes. Lean continuous improvement focuses on systematic process optimization, waste elimination, quality enhancement, and employee involvement through practices such as Kaizen, Total Quality Management, and Lean Manufacturing (Imai, 2012). Empirical research indicates that continuous improvement practices significantly contribute to organizational adaptability, responsiveness, and recovery capability (Saunila M. U., 2018). Demonstrated that continuous improvement initiatives enhance organizational performance and sustainability by fostering learning-oriented cultures and process innovation. Similarly, found that continuous improvement positively influences organizational resilience by strengthening operational stability, crisis responsiveness, and adaptive capacity. Moreover, Dubey (2017) highlighted that lean-based improvement

practices enhance supply chain agility and resilience, enabling firms to manage uncertainties more effectively.

Organizational resilience has become a vital strategic asset for maintaining long-term sustainability and competitiveness amid rapid technological progress, global competition, and growing environmental uncertainty. Organizational resilience refers to the ability to anticipate, prepare for, respond to, and adapt to both incremental shifts and sudden disruptions, enabling continuous performance in changing environments.

Therefore, this research focuses on the Cimanggis plant of a leading multinational pharmaceutical corporation in Indonesia, a significant manufacturing site. The plant operates at the intersection of demanding quality standards (Good Manufacturing Practices) and the relentless pursuit of operational efficiency. This study proposes and quantitatively tests an integrated model to understand how the Cimanggis plant can enhance its resilience. This framework posits that a combination of a Human-Centric Organization (HCO), heightened Sustainability Awareness (SA), and a culture of Lean/Continuous Improvement (LCI) is a foundational pillar. However, it suggests that while these pillars provide a foundation, their full impact on resilience may require dynamic operational agility (DOA), which then acts as the direct mechanism for enhancing Organizational Resilience (OR).

1.2. Previous Studies and Research Gap

The following table summarizes key empirical studies that inform the PEF, highlighting their variables, methodologies, and findings, and underscoring the gap that this research aims to fill.

Table 1.1 List of Previous Studies

Author (s) & Year	Independent Variable(s)	Mediator/Moderator	Dependent Variable(s)	Methodology	Key Finding & Relevance to PEF
Tetteh et al. (2024).	Top Mgmt. Commitment, Employee Involvement	-	Lean 4.0 Implementation	Quantitative Survey	Supports the link between HCO dimensions and advanced operational practices (LCI).
(Mariani, 2025)	ESG Practices	Organizational Agility	Project Performance	Quantitative Survey	offering concrete evidence of agility's mediating role in the ESG-performance relationship.
(AlDmour, 2025)	Lean Six Sigma	Green Manufacturing	Operational Performance	Quantitative Survey	Shows the interplay between LCI and SA, suggesting they are complementary resources.
(Fathi, 2021)	Strategic Foresight	-	Organizational Resilience	Quantitative Survey	Establishes a validated scale for OR and links it to proactive, forward-looking capabilities.
(Omoush, 2021)	Strategic Agility	-	Competitive Advantage	Quantitative Survey	Demonstrates the direct positive impact of agility on firm-level outcomes.
(Avey, 2009)	-	-	Psychological Ownership	Conceptual/Measurement	Provides the foundational theory and validated scales for the Psychological Ownership construct in HCO.

This comprehensive review of the literature reveals two critical gaps that the present study aims to address. First, there is a theoretical integration gap. While individual studies have linked pairs of constructs (e.g., ESG and agility, or leadership and lean), no research has proposed and tested a comprehensive, integrated model that simultaneously examines the interplay of HCO, SA, and LCI as foundational resources, with DOA as the mediating mechanism, and OR as the

outcome. Additionally, there exists a contextual gap. There is a lack of thorough empirical research on the factors influencing organizational resilience within the specific, high-stakes environment of the Indonesian pharmaceutical manufacturing sector. This research tackles both gaps by evaluating a new, combined framework in a significantly pertinent yet underexplored empirical context.

1.3. Problem Identification

The pharmaceutical industry is particularly susceptible to BANI conditions. The brittleness of pharmaceutical supply chains was starkly revealed during the COVID-19 pandemic, when just-in-time manufacturing and lean inventory systems designed for efficiency proved inadequate amid unprecedented surges in demand and raw material shortages (List, 2024). The anxiety dimension manifests in the constant regulatory pressure from agencies such as BPOM *(Badan Pengawasan Obat dan Makanan)*, where non-compliance can result in production halts and market withdrawal. Nonlinearity is evident in how minor disruptions, such as a single equipment failure or a deviation in environmental monitoring, can cascade through interconnected production systems, leading to batch losses totaling millions of dollars and months of supply delays. Strategic decision-making becomes more challenging due to the complexities of emerging issues, including the adoption of Industry 4.0 technologies and the evolving biosimilar landscape. The classic components of the Pharmaceutical Excellence Framework—Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI)—need to be reassessed in this BANI environment as strategic assets that, when enhanced via Dynamic Operational Agility (DOA), can create the organizational resilience necessary to prosper amid disorder
of chaos (Cascio J. J., 2025) (Vishwakarma.S.S., 2024).

The production of pharmaceuticals requires rigorous adherence to safety, quality, and regulatory compliance standards while also maximizing efficiency and reducing waste, goals that often conflict (Alifiya, 2025). Although empirical evidence indicates that implementation challenges relate to cultural readiness, managerial commitment, and integration with broader organizational goals, lean and continuous improvement methodologies, such as Lean Six Sigma, have

demonstrated the potential to increase efficiency and reduce operational inefficiencies in manufacturing contexts (Adiawaty, 2025); (Alifiya, 2025).

Furthermore, although sustainability awareness, encompassing environmental, social, and governance issues, is increasingly recognized as a strategic necessity in the pharmaceutical industry, it has not always been incorporated into integrated management systems that balance social, environmental, and quality performance. (Erwin, 2024). A human-centric organizational perspective is critical because employees are central agents in continuous improvement and resilience processes. However, limited studies have examined how human-centric leadership, workforce engagement, and sustainability awareness collectively shape lean practices to build resilience in Indonesian pharmaceutical manufacturing.

Although the academic literature thoroughly explores the individual advantages of human-centric practices, sustainability, and lean manufacturing, a notable research gap remains regarding how these factors interact to enhance organizational resilience, particularly in pharmaceutical manufacturing. Many studies investigate these factors separately, leading to a disjointed understanding of the routes to resilience. Research has confirmed the beneficial effect of psychological ownership on work results (Avey, 2009). The role of green manufacturing in improving performance (AlDmour, 2025). However, few have integrated these concepts into a single, comprehensive model.

More crucially, our understanding of how these essential resources are transformed into resilience is significantly inadequate. This research indicates that a key mediating factor is Dynamic Operational Agility (DOA), defined as the ability to sense, respond, learn, and adjust operational processes. A comprehensive model assessing the direct impacts of these determinants on resilience, along with their indirect effects mediated by DOA, has not been analyzed in existing literature. The primary concern this research seeks to tackle is the absence of an empirically supported, cohesive framework that clarifies the complex, multi-pathway connections among Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean/Continuous Improvement (LCI), Dynamic Operational Agility (DOA),

and Organizational Resilience (OR), specifically in the realm of pharmaceutical manufacturing.

1.4. Research Questions

To tackle the recognized issue, this research is directed by a main research question and five supplementary sub-questions:

1.4.1. Primary Research Question:

How Human-Centric Organization, Sustainability Awareness, and Lean/Continuous Improvement collectively influence Organizational Resilience. What is the mediating role of Dynamic Operational Agility in these relationships at the Multinational Pharmaceutical Company in Indonesia, specifically at the Cimanggis plant?

1.4.2. Supporting Research Questions:

a) To what extent does a Human-Centric Organization directly influence the Organizational Resilience of the firm?
b) What is the direct impact of Sustainability Awareness on building Organizational Resilience in a manufacturing context?
c) How does Lean-Continuous Improvement directly contribute to the enhancement of Organizational Resilience?
d) What is the mediating role of Dynamic Operational Agility in the relationships between Human-Centric Organization, Sustainability Awareness, and Lean-Continuous Improvement with Organizational Resilience?
e) How can an integrated Pharmaceutical Excellence Framework (PEF) be developed to explain the synergistic impact of these organizational capabilities on resilience in a BANI environment?

The primary objective of this research is to analyze how Human-Centric Organization, Sustainability Awareness, and Lean-Continuous Improvement collectively influence Organizational Resilience, and to evaluate the integrated mediating role of Dynamic Operational Agility in these relationships at the Multinational Pharmaceutical Cimanggis plant. Supporting objectives are as follows:

a) To examine the direct effect of a Human-Centric Organization on the Organizational Resilience of the firm. This relationship in a pharmaceutical manufacturing context.
b) To investigate the direct impact of Sustainability Awareness on building Organizational Resilience in a manufacturing context. Its contribution to the firm's adaptive capacity.
c) To evaluate how Lean-Continuous Improvement directly contributes to the enhancement of Organizational Resilience and its role in maintaining operational stability.
d) To assess the mediating role of Dynamic Operational Agility in the relationships between Human-Centric Organization, Sustainability Awareness, Lean-Continuous Improvement, and Organizational Resilience.
e) To develop and validate an integrated Pharmaceutical Excellence Framework (PEF) that explains how these organizational capabilities synergistically drive resilience in a BANI environment.

1.5. Significance of the study

This research is expected to make significant contributions to both the theory and practice of pharmaceutical manufacturing, organizational management, and sustainability.

1.5.1. Theoretical contribution

It extends existing literature on organizational resilience by examining the integration of human-centric practices, sustainability awareness, and lean continuous improvement. This area remains underexplored in the Indonesian pharmaceutical context. By focusing on the interplay between these three

dimensions, the study addresses a critical gap in understanding how employee engagement, environmental and social responsibility, and process efficiency collectively enhance organizational adaptability and robustness. (Lengnick-Hall, 2011) (Elkington, 1997).

1.5.2. Managerial contribution

The research offers practical insights for managers in the pharmaceutical industry. Findings from this study can inform the development of holistic management strategies that align lean operational practices with sustainability goals while fostering a human-centric culture. This integrated approach is expected to improve operational efficiency, employee satisfaction, and organizational flexibility, thereby strengthening the industry's ability to respond to disruptions such as supply chain shocks, regulatory changes, and public health emergencies (Ivanov, 2020).

It extends to the study's contribution to sustainable development initiatives within the manufacturing industry by highlighting the importance of embedding sustainability awareness into core operational and human resource practices. By demonstrating how environmental, social, and governance practices can be synergistically implemented alongside lean and human-centric strategies, the study provides a roadmap for creating resilient and socially responsible pharmaceutical organizations.

1.5.3. Contextual contribution

This research will also make a valuable contextual contribution by providing much-needed empirical data on the drivers of organizational resilience within the under-researched Indonesian pharmaceutical manufacturing sector. By conducting the study at a leading multinational pharmaceutical company in Indonesia, the findings will offer insights into how global best practices in lean, sustainability, and human-centric management are operationalized within the unique cultural, regulatory, and economic landscape of an emerging market. This provides a more nuanced understanding that can inform both local and international firms operating in similar contexts.

1.6. Novelty

This research provides multiple important contributions to the current knowledge base by tackling essential deficiencies in the literature. The table below presents an in-depth comparison, examining the variables investigated in essential references alongside the extensive framework suggested in this study.

Table 1.2 List of Research Aspects

Research Aspect	Identified Gap	Contribution of This Study
Human-Centric Organization	Studies focus on employee engagement and adaptive capacity in general contexts; limited research in pharmaceutical manufacturing in Indonesia (Lengnick-Hall, 2011)	Examines how human-centric practices influence employee engagement and organizational resilience, specifically in Indonesian pharmaceutical manufacturing.
Sustainability Awareness	Sustainability practices are often studied separately from operational excellence; integration with lean and human-centric strategies is rarely addressed (Elkington, 1997)	Integrates sustainability awareness with lean and human-centric approaches, providing a holistic perspective on resilient pharmaceutical operations.
Lean Continuous Improvement	Lean initiatives studied extensively for efficiency gains; cultural and contextual challenges in Indonesia are underexplored (Bortolotti, 2015)	Investigates how lean continuous improvement can be synergized with human-centric and sustainability practices for enhanced resilience.
Organizational Resilience	Prior research examines resilience drivers individually; lack of integrated frameworks in emerging market contexts (Ivanov, 2020)	Proposes an integrated framework linking human-centric practices, sustainability awareness, and lean continuous improvement to strengthen organizational resilience in the Indonesian pharmaceutical sector.
Contextual Novelty	Most studies have been conducted in developed countries; empirical evidence from Indonesia is limited.	Provides context-specific insights from Indonesian pharmaceutical manufacturers, addressing cultural, regulatory, and operational challenges unique to emerging markets.

By integrating a unique combination of variables, introducing a more specific mediating construct (DOA), and grounding the research in a highly relevant but understudied context, this thesis provides a significant and novel contribution to both theory and practice. It offers a clear, evidence-based roadmap for building resilient pharmaceutical manufacturing operations in a volatile world.

1.7. Scope of the Study

This research focuses on the internal organizational drivers of resilience within the multinational pharmaceutical manufacturing context in Indonesia, specifically at a multinational pharmaceutical company in Cimanggis. For the purposes of this research, Organizational Resilience is defined as the firm's adaptive capacity to anticipate, respond to, and recover from operational disruptions while maintaining performance standards. It is important to note the following boundaries of the scope:

- Operational and Cultural Focus: The study emphasizes operational agility, human-centric practices, and sustainability orientation as the primary drivers of resilience.
- Exclusion of Financial Metrics: While financial resilience (e.g., liquidity, capital structure stability) is a critical dimension of overall firm sustainability, it is outside the scope of this empirical investigation. This study relies on perceptual data from employees to measure resilience outcomes rather than objective financial indicators.
- Geographic and Sectoral Focus: The findings are specific to the pharmaceutical manufacturing sector in Indonesia and may have limited generalizability to other industries or geographic regions.

1.8. Research Structure

Chapter 1: Introduction

Indonesia's strategically important pharmaceutical manufacturing sector is under growing strain from supply chain disruptions, international competitiveness,

and regulatory compliance. Improving organizational resilience is essential to ensuring long-term operations while preserving effectiveness and quality. This study examines the combination of lean continuous improvement, sustainability awareness, and human-centric organizational practices as drivers of resilience. The research highlights deficiencies in the existing understanding of the combined effects of these factors. To enhance the research's relevance and its theoretical and practical contributions in emerging market settings, the research questions, objectives, importance, and novelty are outlined.

Chapter 2: Literature Review

This chapter examines the key concepts and theories underpinning the study. Employee empowerment, involvement, and flexibility are essential elements of a people-focused organization. Sustainability awareness encompasses environmental, social, and governance practices in manufacturing. Efficiency, waste minimization, and operational excellence are the primary objectives of lean continuous improvement. Organizational resilience refers to the ability to anticipate, manage, and bounce back from disruptions while maintaining critical functions. The existing literature suggests that these methods are not completely unified, particularly in Indonesian pharmaceutical production. To enhance resilience, the chapter concludes by pointing out research gaps and stressing the necessity for an all-encompassing framework that combines lean, sustainable, and human-centered methods

Chapter 3: Research methodology

Describes the PLS-SEM analytic plan, data gathering techniques, sampling method, and quantitative study design.

Chapter 4: Data Analysis

The chapter offers the empirical basis for theoretical and practical insights by demonstrating how integrated management approaches enhance organizational agility, employee involvement, and operational effectiveness

Chapter 5: Conclusion & Recommendation

The study concludes that incorporating lean continuous improvement, sustainability awareness, and human-centric approaches significantly enhances organizational resilience in Indonesian pharmaceutical production. Presents the data analysis's findings, discusses their consequences, admits its limitations, and offers suggestions for further study and use.

CHAPTER II

LITERATURE REVIEW

2.1.Theoretical Foundation

This section establishes the theoretical underpinnings of the Pharmaceutical Excellence Framework (PEF). The framework is based on four complementary theoretical lenses, each of which sheds light on a distinct aspect of the phenomenon being studied. The integration of these theories provides a thorough, multi-level explanation of how Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI) collaborate to create Organizational Resilience (OR) through the mediating mechanism of Dynamic Operational Agility (DOA).

Resource-Based View (RBV) Theory

The Resource-Based View (RBV), a key concept in strategic management, illustrates how firms create and maintain a competitive edge. A firm's competitive edge comes from its internal resources and capabilities rather than from its standing in the external market. Under the VRIN framework, a resource should have four essential characteristics to provide a sustainable competitive edge: it must be Valuable (allowing the business to exploit opportunities or mitigate threats), Rare (not easily accessible to rivals), Imperfectly Imitable (challenging for rivals to copy), and Non-substitutable (no comparable alternatives are available) (Barney J. , 1991).

RBV offers the theoretical rationale for considering HCO, SA, and LCI as strategic resources within the PEF. Resources that are valuable, uncommon, and challenging to replicate include a deeply ingrained human-centric culture, a sincere dedication to sustainability, and an advanced capacity for continuous improvement. They are difficult for rivals to imitate because they are ingrained in the company's social fabric and developed over time through path-dependent processes. These three resources together form a special and valuable bundle for the Bayer Indonesia

Cimanggis plant, which can serve as the basis for developing resilience. However, RBV's static nature is a major drawback. Simultaneously, it clarifies which resources hold value, yet it lacks depth in illustrating how companies generate, utilize, and restructure these resources in reaction to an evolving environment. The Dynamic Capabilities Perspective tackles this limitation.

The Dynamic Capabilities View

The Dynamic Capabilities View (DCV) enhances the RBV by shifting the emphasis from resources to the methods by which companies develop, integrate, and modify their resource pool to respond to swiftly evolving conditions. The DCV contends that in fluctuating markets, merely having valuable resources is insufficient; companies must also be able to adjust and modify those resources. Elaborated on the idea by pinpointing three main groups of dynamic capabilities: sensing, seizing, and transforming. (Teece.D.J., 1997).

The DCV serves as the main theoretical foundation for the mediating variable in the PEF: Dynamic Operational Agility (DOA). DOA is envisioned as a dynamic capability that enables the Cimanggis plant to detect shifts in its operational landscape, capitalize on opportunities, and adjust operations for sustainable adaptation. This research asserts that DOA serves as the process by which the static resources recognized by RBV (HCO, SA, LCI) are converted into the dynamic result of Organizational Resilience.

2.1.2. Upper Echelons Theory (UET)

The characteristics of a company's top management team might somewhat predict organizational outcomes, according to Hambrick's (1984) Upper Echelons Theory (UET). The theory holds that executives use their cognitive bases, values, and perceptions as filters to interpret the strategic environment and make decisions. UET provides a theoretical foundation for the "Top Management Commitment" facet of the HCO construct in the PEF. Whether to promote sustainability, encourage continuous development, or invest in a human-centric culture is fundamentally a strategic choice made by the company's leadership. The radical

transformation of Bayer AG under CEO Bill Anderson is a striking illustration of UET in action (Groysberg, 2025).

2.1.3. Positive Organizational Behavior (POB)

UET focuses on the macro-level impact of leaders; Positive Organizational Behavior (POB) provides the micro-foundations for understanding employee-level contributions to organizational success. The study and application of positively oriented human resource strengths and psychological capacities that can be measured, developed, and effectively managed for performance improvement in today's workplace" is the definition of POB. Grasping the Psychological Ownership component of HCO requires understanding this idea. (Luthans, 2022). By fostering a sense of effectiveness, ownership, and belonging among employees, the organization unlocks positive psychological capacities that result in proactive behaviors, improved engagement, and greater readiness to contribute to agility and continuous improvement efforts. POB illustrates why individual employees' attitudes and behaviors are crucial to a resilient organization.

2.1.4. Synthesis of Theoretical Lenses

These four theories are not mutually exclusive; they are complementary and operate at different levels of analysis, providing a comprehensive explanatory framework for the PEF. The following table summarizes their integrated roles:

Table 2.1 Theoretical Lens in the PEF

Theoretical Lens	Level of Analysis	Core Question Answered	Role in the PEF
Resource-Based View (RBV)	Firm	What resources provide a competitive advantage?	Justifies HCO, SA, and LCI as valuable, rare, and inimitable strategic resources.
Dynamic Capabilities View (DCV)	Process	How does the firm adapt to change?	Explains the role of DOA as the mechanism that reconfigures resources to achieve resilience.
Upper Echelons Theory (UET)	Top Management	Who drives the strategic direction and culture?	Explains the critical role of top management commitment in establishing a Human-Centric Organization.

Theoretical Lens	Level of Analysis	Core Question Answered	Role in the PEF
Positive Organizational Behavior (POB)	Individual	Why do employees contribute to success?	Explains the importance of Psychological Ownership in fostering proactive, engaged employee behavior.

2.2. Independent Variable

2.2.1. Integrating Human-Centric Organization (HCO)

People are at the center of a human-centric organization's operations, strategy, and culture. It acknowledges workers as the main drivers of innovation, value creation, and resilience rather than merely as resources. Two important aspects of HCO are used in this study: psychological ownership and top.

- **Top Management Commitment:** As argued by UET, the visible, unwavering support of senior leadership is the most critical factor in any significant organizational transformation (Hambrick, 1984). This includes allocating resources, modeling desired behaviors, and consistently communicating the strategic importance of a people-first culture. The radical transformation at Bayer AG, under the banner of “Dynamic Shared Ownership,” exemplifies this, where the CEO and executive team are dismantling bureaucracy and empowering self-managed teams. (Groysberg, 2025).
- **Psychological Ownership:** This is the perception among workers that the company (or a portion of it) is "theirs" (AlDmour, 2025). It is a mindset that encourages a strong feeling of accountability, stewardship, and active participation. Employees are more willing to go above and beyond their official job definitions, contribute to ongoing development, and exhibit the discretionary effort necessary for true agility when they have a sense of ownership (Avey, 2009).

2.2.2. Sustainability Awareness

Sustainability awareness is a multifaceted concept that includes behavioral commitment to sustainable development principles, normative orientation, and

cognitive comprehension. The idea is closely related to the United Nations' 2015 2030 Agenda for Sustainable Development, which outlines 17 Sustainable Development Goals (SDGs) as a comprehensive framework for tackling social injustice, economic instability, and environmental degradation worldwide. According to this concept, sustainability awareness includes internalizing ethical duty and intergenerational equality, as well as awareness of sustainability concerns.

Recent academic discourse conceptualizes sustainability awareness as a precursor to sustainable behavior and transformative societal change. It is embedded in systems thinking, critical reflection, and anticipatory competence, enabling individuals and institutions to recognize the interconnectedness of ecological, social, and economic systems (Wiek, 2016). Furthermore, sustainability awareness is strongly associated with Education for Sustainable Development (ESD), which promotes values-driven learning processes that foster agency, responsibility, and participatory engagement (UNESCO, 2017). Empirical studies indicate that higher levels of sustainability awareness significantly correlate with pro-environmental attitudes, responsible consumption patterns, and support for sustainability-oriented policies (Bamberg, 2018).

Sustainability Awareness in the pharmaceutical context transcends mere compliance and represents a strategic orientation toward long-term value creation by integrating Environmental, Social, and Governance (ESG) principles into the core business. (Hoang, 2018). This study focuses on two dimensions:

- **ESG Integration**: This involves methodically integrating ESG factors into all organizational decision-making processes, including capital investments, product development, and supply chain management. Strong ESG performance is strongly correlated with higher financial performance, lower risk, and improved corporate reputation, according to research (Sun, 2023).
- **Green Manufacturing**: This is the use of manufacturing methods that reduce adverse effects on the environment, preserve energy and natural resources, and are secure for workers, communities, and customers. This includes methods such as reducing solvent waste, increasing energy efficiency, and creating

more sustainable product life cycles in the pharmaceutical sector. (AlDmour, 2025).

2.2.3. Lean Continuous Improvement

Lean/Continuous Improvement is a methodical strategy that uses incremental, continuous process improvements to identify and eliminate waste (muda). High-performing manufacturing companies are firmly rooted in this operational excellence mindset (Jones, 2003). The two dimensions explored are:

- **Lean Six Sigma:** This methodology is data-driven and rigorous, combining the defect-reduction and process-variation-control tools of Six Sigma with the waste-elimination principles of Lean. It is an effective instrument for raising quality, cutting expenses, and guaranteeing regulatory compliance in the pharmaceutical sector (AlDmour, 2025).
- **Kaizen Culture:** Kaizen, a Japanese term meaning change for the better, refers to a culture where all employees are actively engaged in identifying and implementing improvements in their own work areas. It is a bottom-up approach that empowers employees and fosters a mindset of perpetual improvement, which is a critical antecedent to organizational agility (Imai, 2012).

2.3. Dependent Variable: Organizational Resilience

Organizational Resilience (OR) is the study's ultimate dependent variable. It is the firm’s ability to absorb stress, recover critical functionality, and thrive in altered circumstances after a disruption (Teece.D.J., 1997). A resilient organization does not simply bounce back to its original state; it bounces forward, having learned and adapted from the experience. This study operationalizes OR through three core capacities:

- **Adaptive Capacity:** The ability to make incremental adjustments to processes and strategies in response to gradual environmental changes. It is about flexibility and the capacity for continuous evolution.

- **Absorptive Capacity:** The ability to withstand and absorb the impact of a sudden shock or disruption without catastrophic failure. This involves having redundancies, buffers, and robust systems in place.
- **Restorative Capacity:** The ability to rapidly recover and restore core operational functions after a disruption has occurred. This includes having business continuity plans, disaster recovery protocols, and the ability to mobilize resources for recovery quickly.

2.3.1. Mediating: Dynamic Operational Agility (DOA)

In the PEF, the primary mediating construct is Dynamic Operational Agility (DOA). It symbolizes the company's dynamic capacity to manage and adapt its operational procedures effectively and efficiently in response to shifting customer demands and environmental turbulence. (Tallon P. P., 2011). It is not just about speed; it is also about quickly and intelligently rearranging resources. Based on the research of several academics on organizational and operational agility (Swafford, 2008). This study conceptualizes DOA through four separate but connected dimensions:

- **Sensing Agility:** The ability of the organization to rapidly detect, interpret, and act upon signals of change from both the internal and external environments. This includes monitoring market trends, competitor moves, technological shifts, and internal process performance.
- **Responding Agility:** The capacity to quickly develop and deploy responses to the sensed changes. In a manufacturing context, this involves the ability to rapidly change production schedules, modify product specifications, or re-route supply chains.
- **Learning Agility:** The ability to learn from experience, both successes and failures, and to institutionalize that learning to improve future responses. This involves robust feedback loops, post-action reviews, and a culture that encourages experimentation and knowledge sharing.
- **Reconfiguration Agility:** The most advanced dimension, this refers to the ability to fundamentally re-engineer and transform core operational processes,

structures, and resource allocations to capitalize on new opportunities or mitigate emerging threats. This is the essence of a dynamic capability in action.

2.4. Hypothesis Development

Based on the theoretical foundations and the literature reviewed, this study proposes six hypotheses to test the relationships within the Pharmaceutical Excellence Framework (PEF).

2.4.1. Direct Effects on Organizational Resilience

H_1: *Human-Centric Organization (HCO) has a positive direct effect on Organizational Resilience (OR).*

A culture that values its people, fosters psychological ownership, and is championed by committed leaders creates a workforce that is more engaged, proactive, and willing to contribute discretionary effort during a crisis. This human capital is a critical resource that enhances all three capacities of resilience: employees are more adaptive to change, more willing to absorb extra workload during a disruption, and more motivated to contribute to a swift restoration of operations (Avey, 2009).

H_2: *Sustainability Awareness (SA) has a positive direct effect on Organizational Resilience (OR).*

Firms with a strong sustainability orientation tend to have more robust risk management systems, more diversified and ethical supply chains, and a stronger reputation among stakeholders (Hoang, 2018). These factors act as buffers during a crisis. Green manufacturing practices often lead to more efficient resource use, which can provide a cushion during supply shocks, thus enhancing absorptive and restorative capacity. Moreover, sustainability awareness promotes innovation and continuous learning, which are critical mechanisms for building organizational resilience in dynamic and uncertain environments (Saunila M. U., 2018).

H_3: *Lean/Continuous Improvement (LCI) has a positive direct effect on Organizational Resilience (OR).*

A mature, lean culture creates streamlined, transparent, and well-understood processes. This process discipline makes it easier to identify and respond to

deviations during a crisis. A culture of Kaizen empowers employees to solve problems at the local level, fostering a decentralized, rapid-response capability that is a hallmark of resilient organizations (Imai, 2012).

Organizational resilience refers to an organization's capacity to anticipate, prepare for, respond to, and recover from disruptions while maintaining operational continuity and performance (Duchek.S, 2020). Lean continuous improvement contributes to resilience by embedding continuous learning, process standardization, and systematic problem-solving into daily operations, enabling organizations to detect early signs of disruption and respond effectively (Rahi, 2019) . Furthermore, continuous improvement enhances operational flexibility and cross-functional collaboration, which facilitates rapid adaptation during crises and environmental turbulence (Dubey, 2017).

Empirical studies demonstrate that organizations implementing lean continuous improvement practices exhibit superior resilience outcomes, including faster recovery, improved crisis responsiveness, and enhanced operational stability (Saunila M. U., 2018) (Rahi, 2019). By continuously refining processes and strengthening learning mechanisms, lean practices build robust operational systems capable of withstanding and adapting to unexpected shocks. Therefore, lean continuous improvement is hypothesized to have a significant positive effect on organizational resilience, particularly in highly regulated and complex manufacturing environments such as the pharmaceutical industry.

2.4.2. The Mediating Role of Dynamic Operational Agility (DOA)

While the direct effects are important, the central argument of this thesis is that the primary pathway by which the foundational pillars influence resilience is through building agility.

H_4: *Dynamic Operational Agility (DOA) mediates the relationship between Human-Centric Organization (HCO) and Organizational Resilience (OR).*

Human-Centric Organization (HCOB) emphasizes employee empowerment, psychological safety, participatory decision-making, and continuous learning, fostering a flexible and adaptive organizational climate. Such

an environment enables organizations to rapidly sense environmental changes, respond effectively, and reconfigure operational processes, thereby enhancing dynamic operational agility (Albrecht, 2015) (Kuntz, 2016). Employees who feel psychologically safe and empowered are more likely to engage in proactive problem-solving and knowledge sharing, which are critical for building operational agility in dynamic environments (Tallon P. P., 2019).

Dynamic operational agility, in turn, plays a crucial role in strengthening organizational resilience by enabling firms to anticipate disruptions, absorb shocks, and recover swiftly from crises. Agile organizations demonstrate superior capabilities in resource reallocation, rapid decision-making, and operational flexibility, which significantly improve their ability to cope with environmental turbulence and uncertainty (Ivanov, 2020) (Duchek.S, 2020). Empirical evidence suggests that operational agility serves as a critical mechanism through which human-centered management practices translate into enhanced resilience outcomes (Liu, 2019).

Therefore, dynamic operational agility is proposed to mediate the relationship between Human-Centric Organization and organizational resilience, whereby human-centric practices foster agility-enhancing capabilities that ultimately strengthen resilience. This mediating mechanism underscores the importance of aligning human-centered management systems with agile operational structures to build robust organizational resilience in highly dynamic and uncertain business environments.

H_5: *Dynamic Operational Agility (DOA) mediates the relationship between Sustainability Awareness (SA) and Organizational Resilience (OR).*

Sustainability awareness reflects an organization's commitment to environmental stewardship, social responsibility, and ethical governance, which collectively shape strategic priorities and operational practices. Organizations with high sustainability awareness tend to adopt proactive risk management, resource efficiency, and stakeholder-oriented strategies, fostering dynamic operational agility (Ortiz-de-Mandojana, 2016) (Saunila M. U., 2018). By embedding sustainability principles into operational processes, firms enhance their ability to

sense environmental changes, rapidly adjust operational configurations, and respond effectively to emerging risks and uncertainties (Tallon P. P., 2019).

Dynamic operational agility, in turn, significantly contributes to organizational resilience by enabling organizations to anticipate disruptions, maintain operational continuity, and recover swiftly from unexpected shocks. Agile organizations demonstrate superior adaptability, flexibility, and resource reconfiguration capabilities, which are essential for sustaining performance under turbulent conditions. (Duchek.S, 2020) (Ivanov, 2020). Empirical studies suggest that sustainability-driven firms exhibit higher resilience levels, largely due to their agile operational structures and long-term strategic orientation (Ortiz-de-Mandojana, 2016) (Liu, 2019).

Therefore, dynamic operational agility is posited to mediate the relationship between sustainability awareness and organizational resilience. This mediating mechanism underscores that sustainability awareness alone may not directly translate into resilience unless it is operationalized through agile processes and adaptive operational capabilities. Integrating sustainability values with dynamic operational agility enables organizations to transform long-term sustainability commitments into tangible resilience outcomes.

H6: Dynamic Operational Agility (DOA) mediates the relationship between Lean/Continuous Improvement (LCI) and Organizational Resilience (OR).

Continuous improvement is a systematic organizational approach that enhances operational efficiency, process quality, and organizational learning through ongoing incremental changes. Practices such as lean management, Kaizen, and total quality management foster a culture of continuous learning, problem-solving, and employee involvement, which are fundamental for developing dynamic operational agility (Saunila M. U., 2018) (Rahi, 2019). By continuously refining processes and eliminating inefficiencies, organizations strengthen their ability to rapidly sense operational disruptions, respond effectively to environmental changes, and reconfigure resources in real time, thereby enhancing operational agility (Dubey, 2017) (Tallon P. P., 2019)

Dynamic operational agility turns plays a pivotal role in reinforcing organizational resilience by enabling organizations to anticipate uncertainties, absorb operational shocks, and recover swiftly from unexpected disruptions. Agile organizations demonstrate superior flexibility, adaptability, and responsiveness, which are essential capabilities for maintaining operational continuity under turbulent conditions (Duchek.S, 2020) (Ivanov, 2020). Empirical evidence suggests that organizations characterized by high operational agility exhibit improved resilience, particularly in dynamic manufacturing environments (Liu, 2019).

Lean principles create a stable and efficient operational baseline. This stability is the necessary platform for building agility. A Kaizen culture (LCI) directly fosters Sensing and Learning Agility by empowering employees to identify and act on opportunities for improvement. This operational agility is the mechanism that translates the efficiency gains of lean into the adaptive capacity required for resilience (Swafford, 2008).

2.4.3. The Integrated Mediation Effect of the Pharmaceutical Excellence Framework (PEF)

While Hypotheses H4, H5, and H6 posit the individual mediating roles of Dynamic Operational Agility (DOA) for each predictor, the central thesis of the Pharmaceutical Excellence Framework (PEF) is that these pillars, Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI) do not operate in isolation. The framework's conceptual power lies in its synergistic and simultaneous contribution to building a resilient organization. The resource-based view (RBV) and dynamic capability view (DCV) suggest that competitive advantage arises not from a single resource, but from the complex interplay of multiple, mutually reinforcing capabilities that are difficult for competitors to imitate (Barney J. , 1991) (Teece.D.J., 1997).

Therefore, the PEF is proposed as an integrated system where the combined strategic thrust of fostering a human-centric culture, embedding sustainability, and driving continuous improvement collectively enhances the firm's dynamic operational agility. This enhanced agility, in turn, is the core mechanism through

which the entire framework influences organizational resilience. Testing the predictors individually only provides a partial view; a test of the total indirect effect of the integrated model is required to validate the framework as a holistic system. This leads to the final, overarching hypothesis:

H7: *The integrated effect of Human-Centric Organization, Sustainability Awareness, and Lean/Continuous Improvement on Organizational Resilience is significantly mediated by Dynamic Operational Agility*.

2.5. Research Framework

This study suggests the following approach for this analysis based on the theoretical underpinnings and the examined literature:

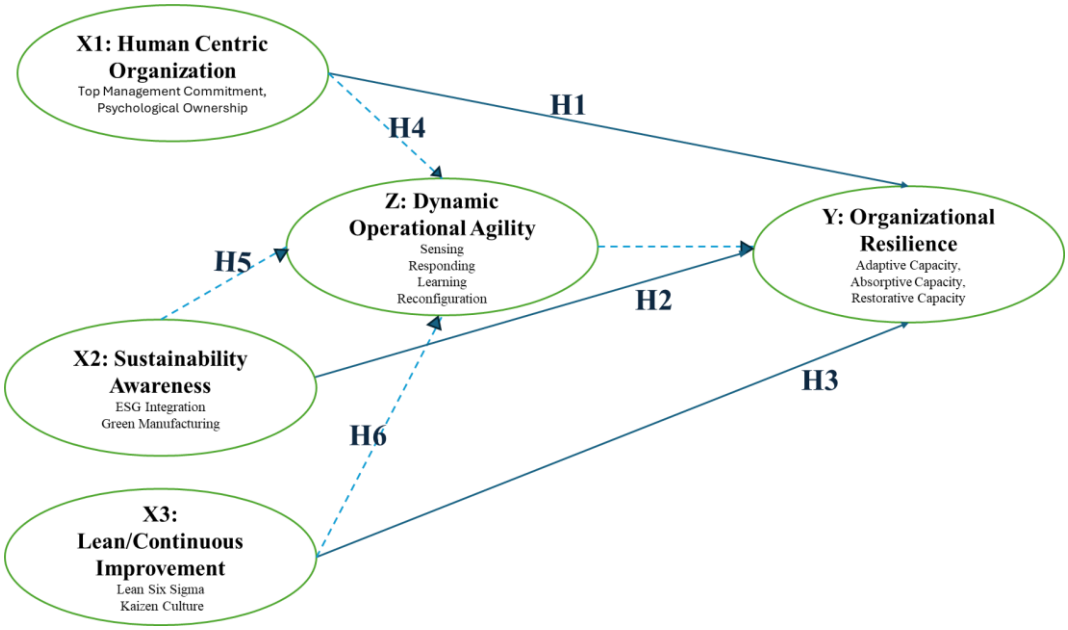

Figure 2.1. Research Framework

CHAPTER III

RESEARCH METHODOLOGY

3.1.Introduction

This research utilizes a post-positivist philosophical approach. Post-positivism recognizes that although an objective reality exists, our capacity to understand it is flawed and shaped by the constraints of our approaches and prejudices. This philosophy aligns well with this research as it endorses the application of quantitative, empirical techniques to evaluate a theoretical model, while also acknowledging that the results indicate a likely, rather than a definitive, truth. It promotes a thorough, analytical approach to hypothesis testing, which is fundamental to this research. The structure for this research is outlined as follows:

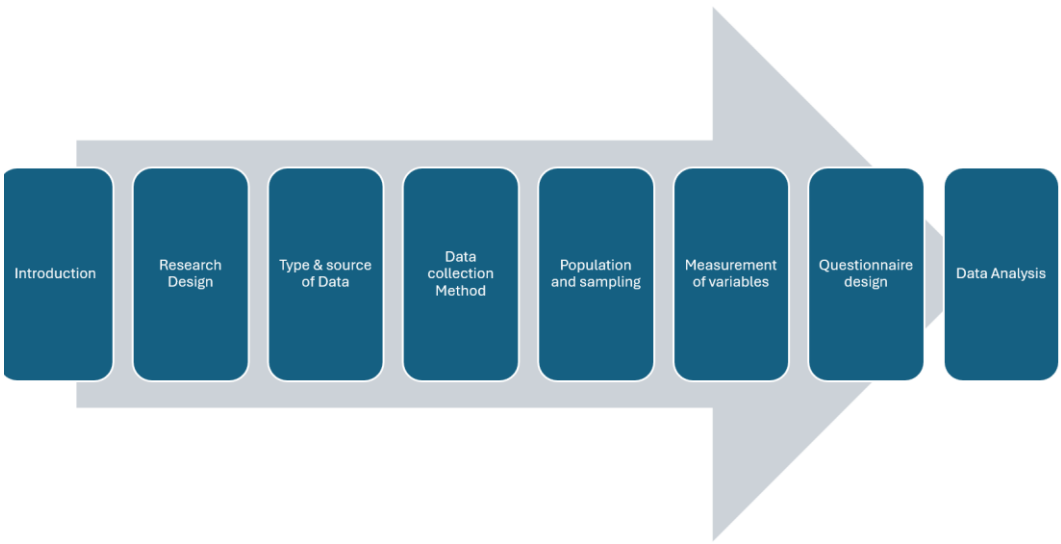

Figure 3.1. Flowchart of Research Methodology

3.2. Research Design

This research uses a quantitative, explanatory approach to examine how human-centered organizational practices, sustainability awareness, and lean continuous improvement enhance organizational resilience in pharmaceutical

manufacturing companies in Indonesia. The research framework is based on the Resource-Based View (RBV), which suggests that distinctive organizational resources and capabilities—whether tangible or intangible—can lead to lasting (Barney J. B., 2019). In this context, human-centric practices, sustainability awareness, and lean continuous improvement are conceptualized as strategic resources that enhance adaptive capacity and resilience.

The research adopts a cross-sectional survey method to gather empirical information from managers, supervisors, and employees within a multinational pharmaceutical firm in Indonesia. Stratified random sampling was implemented to guarantee that respondents accurately represent the functional areas of production, quality assurance, supply chain, and operations management. Data was collected through a structured questionnaire containing validated scales modified from earlier research: human-centered organization (Top Management Commitment, Psychological Ownership) (Avey, 2009) (Tetteh, 2024), sustainability awareness (ESG integration and Green manufacturing) (Mariani, 2025) (AlDmour, 2025) , lean continuous improvement (Lean Six Sigma and Kaizen culture) (AlDmour, 2025) (Imai, 2012) , and organizational resilience (absorptive, adaptive, and restorative capabilities) (Fathi, 2021). All items will be measured using a five-point Likert scale ranging from strongly disagree to agree strongly.

Data analysis used Structural Equation Modeling (SEM) to examine the proposed relationships among the independent variables (human-centric organization, sustainability awareness, lean continuous improvement) and the dependent variable (organizational resilience). Construct validity was evaluated through Measurement Model Assessment, and reliability was determined using Cronbach's alpha and composite reliability. Ethical factors, such as informed consent, anonymity, and voluntary involvement, were rigorously maintained during the research process

This study combines RBV theory with empirical data from the Indonesian pharmaceutical industry to develop a robust framework for understanding how strategic human, structural, and process resources enhance organizational resilience, delivering practical insights for managers and policymakers seeking to

improve operational performance, adaptability, and long-term sustainability. Information was gathered at a specific point in time. This design is suitable and practical for an MBA thesis, as it captures the connections between the variables without the limitations of time and resources inherent in a longitudinal study (Cross-sectional). The main objective of the study is to clarify the causal links among the independent, mediating, and dependent variables. The research aims to clarify the mechanisms and reasons by which the predictors impact organizational resilience, particularly by examining the mediating role of DOA (Explanatory).

3.3. Type and Source of Data

This research uses primary quantitative data as the primary source of information to empirically investigate the combination of human-centric organizational practices, sustainability awareness, and lean continuous improvement to enhance organizational resilience in the Multinational Pharmaceutical Industry in Indonesia. Primary data is gathered directly from participants to guarantee precision, relevance, and contextual specificity concerning the research variables. The selection of primary data aligns with the study's aim of understanding perceptions, practices, and behavioral trends at both the individual and organizational levels, which are crucial for assessing intangible factors such as organizational resilience and human-centric practices.

The target respondents include managers, supervisors, and operational employees across production, quality assurance, supply chain, and operational departments. To ensure representative data, stratified random sampling is used, dividing the population into strata by functional roles and organizational levels. This approach mitigates selection bias and ensures that the perspectives of different hierarchical levels and departments are adequately captured. This systematic data collection method ensures the reliability, validity, and comprehensiveness of the dataset, providing robust empirical evidence to understand the mechanisms by which human, structural, and process-oriented resources contribute to organizational resilience at that subject company.

Table 3.1 Measurement of Variables

Data Type	Source of Data	Purpose / Use in Study	Collection Method	Measurement
Primary Data	Employees in pharmaceutical manufacturing firms (managers, supervisors, operational staff) in the subject pharma industry	To measure perceptions, behaviors, and practices related to human-centric organization, sustainability awareness, lean continuous improvement, and organizational resilience	Structured questionnaire survey	5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree)
Construct 1: Human-Centric Organization	Same as above	To assess commitment management and employee well-being as central drivers of organizational success	Questionnaire items adapted from (Avey, 2009) (Tetteh, 2024)	5-point Likert scale
Construct 2: Sustainability Awareness	Same as above	To evaluate ESG integration into its strategy and embrace sustainable manufacturing practices	Questionnaire items adapted from (Mariani, 2025) (AlDmour, 2025)	5-point Likert scale
Construct 3: Lean Continuous Improvement	Same as above	To examine Kaizen practices, waste reduction, and process optimization	Questionnaire items adapted from (AlDmour, 2025) (Imai, 2012)	5-point Likert scale
Construct 4: Organizational Resilience	Same as above	To assess absorptive, adaptive, and restorative capacities	Questionnaire items adapted from (Fathi, 2021)	5-point Likert scale
Construct 5: **Dynamic Operational Agility (DOA)**	Same as above	To evaluate the company's ability to detect alterations in the market landscape and to react swiftly and efficiently by adjusting	Questionnaire items adapted from (Tallon P. P., 2019)	5-point Likert scale

Data Type	Source of Data	Purpose / Use in Study	Collection Method	Measurement
		its operational competencies		

3.4. Population and Sampling

The study's population comprises workers at the Multinational Pharmaceutical Company's Cimanggis Plant, including managerial, supervisory, and operational personnel across various functional areas, such as production, quality assurance, supply chain, and process management. This group is chosen because these employees have firsthand experience and understanding of organizational procedures, people-focused practices, sustainability efforts, and lean ongoing improvement activities, all of which are essential for enhancing organizational resilience. By targeting multiple hierarchical levels, the study ensures a comprehensive understanding of organizational practices from both decision-making and operational perspectives.

To obtain adequate statistical power for PLS-SEM analysis, a minimum sample size must be met. According to the "10 times rule," a widely used guideline in PLS-SEM, the minimum sample size must be 10 times the number of paths leading to the most intricate construct in the model (Hair J. F., 2022). In the PEF, the most intricate concept is Organizational Resilience, which has four incoming pathways (from HCO, SA, LCI, and DOA). Consequently, the smallest sample size would be 40. To achieve increased statistical power and reliable results, this study aimed to recruit a sample of 175 participants. The increased sample size yielded more reliable parameter estimates and greater confidence in the results. Cochran’s formula for large populations is used to determine the target sample size, ensuring adequate statistical power for structural equation modeling (SEM) analyses. Furthermore, the research accounts for non-response and incomplete information by including a 10–15% margin in the original sample distribution. The criteria for eligible respondents are: (1) employed at a Multinational Pharmaceutical Company

in Indonesia ; (2) actively engaged in operational or managerial roles pertaining to production, quality, or process enhancement; and (3) ready to give informed consent to partake in the research.

Through precise identification of the population and stratified random sampling, this research ensures that the collected data accurately represent the diversity of roles and viewpoints within Indonesian pharmaceutical manufacturing companies. This method improves the trustworthiness and accuracy of the results concerning the connections between human-centered organization, sustainability consciousness, lean ongoing enhancement, and organizational resilience

The unit of analysis for this research is the individual employee within the organization. While the study's overarching goal is to understand the resilience of PT Bayer Indonesia as an organizational entity, the data were collected from 175 experienced professionals across various departments and hierarchical levels. Their individual perceptions and assessments of the organization's practices and capabilities serve as the empirical basis for the organizational-level conclusions drawn in this study. This approach is consistent with strategic management research that explores organizational phenomena through the collective insights of its workforce

3.5. Measurement of Variable

This research aims to measure variables to understand the connections between human-centered organization, sustainability consciousness, lean continuous advancement, and organizational resilience in pharmaceutical manufacturing companies in Indonesia. The constructs are operationalized through structured questionnaires derived from validated instruments used in prior research. Every item is assessed using a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree), enabling participants to express the level of agreement or strength of opinion regarding each statement. The Likert scale offers a consistent and dependable approach for measuring attitudes, perceptions, and behavioral tendencies, enabling statistical analysis of the relationships between variables

The study includes three independent variables (predictors): (1) human-centric organization (Top Management Commitment, Psychological Ownership) (Avey, 2009) (Tetteh, 2024), (2) sustainability awareness (ESG integration and Green manufacturing) (Mariani, 2025) (AlDmour, 2025) , (3) lean continuous improvement (Lean Six Sigma and Kaizen culture) (AlDmour, 2025) (Imai, 2012). The dependent variable is Organizational Resilience (OR), defined as the organization's capacity to anticipate, absorb, adapt, and recover from disruptions while maintaining operational continuity. Measurement items capture the organization's adaptive, absorptive, and restorative capacities. Additionally, the study examines mediating effects, specifically testing whether the implementation of lean continuous improvement mediates the relationship between human-centric organization and sustainability awareness, and between sustainability awareness and organizational resilience. Mediation analysis enables the study to identify indirect effects and to explore whether lean continuous improvement serves as a mechanism through which organizational resources and practices enhance resilience.

Every construct is subjected to reliability and validity assessments, incorporating measures such as Cronbach's alpha, composite reliability, and Measurement Model Evaluation, which help ensure the precision and stability of measurement. This method establishes a solid basis for Structural Equation Modeling (SEM), allowing for the empirical evaluation of direct and mediated relations between variables

Table 3.2 Variable Operationalization Table

Variable	Definition	Indicators	Measurement Scale	References
Human-Centric Organization (X_1)	A management philosophy that prioritizes employee well-being, engagement, and empowerment as central drivers of organizational success.	1. Our top management provides visible leadership in creating a people-focused culture. 2. Senior leaders consistently communicate the importance of employee well-being. 3. Management allocates sufficient resources to support employee development and work-life balance. 4. I feel a strong sense of ownership over my work and its outcomes. 5. I feel that this organization is our organization. 6. I am willing to go above and beyond to contribute to the success of this company.	Likert Scale (1–5)	(Tetteh, 2024) (Avey, 2009)
Sustainability Awareness (X_2)	The extent to which the organization integrates environmental, social, and governance (ESG) principles into its strategy and embraces sustainable manufacturing practices.	1. Our company actively considers environmental and social impacts in its business decisions 2. We have clear, well-defined sustainability goals and targets. 3. Sustainability performance is regularly reported and communicated to stakeholders. 4. We actively seek to reduce waste and emissions in our production processes. 5. Our plant prioritizes the use of energy-efficient technologies and practices. 6. We are committed to minimizing the environmental footprint of our products.	Likert Scale (1–5)	(Mariani, 2025) (AlDmour, 2025)

Variable	Definition	Indicators	Measurement Scale	References
Continuous Improvement (X_3)	A systematic approach to identifying and eliminating waste through continuous improvement, empowering employees to enhance processes and create value.	1. We consistently use Lean Six Sigma principles to improve our operational processes. 2. Data-driven problem-solving (e.g., DMAIC/A3/QCC) is a standard practice in our plant. 3. We focus on reducing process variation and defects to enhance quality. 4. All employees are encouraged to identify and suggest improvements in their work areas. 5. We have a culture that supports small, incremental improvements continuously. 6. Management empowers teams to implement their own improvement ideas.	Likert Scale (1–5)	(AlDmour, 2025) (Imai, 2012)
Dynamic Operational Agility (DOA) (M)	The firm's capacity to sense changes in the business environment and to respond promptly and effectively by reconfiguring its operational capabilities.	1. We are quick to detect shifts in market demand and customer preferences. 2. Our plant can rapidly adjust production schedules to meet unexpected orders. 3. We effectively learn from past disruptions to improve our response strategies. 4. We can quickly reallocate resources (e.g., people, equipment) to address operational challenges.	Likert Scale (1–5)	(Tallon P. P., 2019)

Variable	Definition	Indicators	Measurement Scale	References
Organizational Resilience (Y)	The ability of an organization to anticipate, prepare for, respond to, and adapt to incremental change and sudden disruptions in order to survive and prosper.	1. Our organization is effective at modifying its processes to cope with unforeseen challenges. 2. We can absorb the impact of a disruption while maintaining core operations. 3. Our plant has a demonstrated ability to recover quickly from operational setbacks. 4. We have robust systems in place to bounce back from disruptions.	Likert Scale (1–5)	(Fathi, 2021)

3.6. Questionnaire Design

The survey for this research aims to put into practice the ideas of human-centered organization, sustainability consciousness, lean ongoing improvement, and organizational resilience within Indonesian pharmaceutical manufacturing companies. The tool is designed to ensure clarity, validity, and reliability, enabling the collection of high-quality empirical data. Each item is assessed using a five-point Likert scale, from 1 (strongly disagree) to 5 (strongly agree), enabling participants to indicate the degree of their agreement with every statement. The Likert scale is selected for its straightforwardness, reliability, and suitability for quantitative assessment. Before large-scale deployment, the questionnaire is pilot-tested with a small group of employees to assess the clarity, relevance, and reliability of its items. Input from the pilot test is used to improve phrasing and organization, ensuring that participants can understand and answer each question correctly. The completed questionnaire is subsequently provided in both electronic and printed formats, based on accessibility, to gather feedback from various functional levels and departments. This thoughtfully crafted questionnaire serves as a strong instrument for evaluating the study variables, facilitating subsequent

Structural Equation Modeling (SEM) analysis to examine the relationships among human-centric organization, sustainability awareness, lean continuous improvement, and organizational resilience.

3.7. Data Analysis

3.7.1. Data Preparation

Prior to analysis, the gathered data underwent a structured preparation procedure to ensure precision, thoroughness, and reliability. At first, responses were evaluated for absent data, conflicting answers, and outliers, and these problems were resolved using standard statistical methods, including imputation or case exclusion when required. Data coding was conducted to convert quantitative responses into numerical values suitable for statistical analysis. The dataset was then examined for normality, linearity, and multicollinearity to satisfy the prerequisites of Structural Equation Modeling (SEM). This thorough preparation process ensures that the dataset is robust and appropriate for credible, dependable hypothesis testing.

3.7.2. Respondent Profile

The study's respondents comprised 175 employees from a pharmaceutical manufacturing firm in Indonesia (Multinational Pharmaceutical Company, Cimanggis plant), selected through stratified random sampling to ensure representation across hierarchical levels and departments. The sample was functional distribution covered production (40%), quality (25%), supply chain and project (20%), and Engineering and Supporting (15%). This distribution enables a comprehensive understanding of organizational practices and perceptions, ensuring that the findings regarding human-centric organization, sustainability awareness, lean continuous improvement, and organizational resilience reflect diverse perspectives within the firms.

3.7.3. Descriptive Analysis

Descriptive analysis serves as the first stage in Partial Least Squares Structural Equation Modeling (SEM-PLS), summarizing the features of the gathered data and offering insights into the distribution, central tendency, and variability of the research variables. This study calculated descriptive statistics, such as mean, standard deviation, minimum, and maximum values, for the constructs of human-centric organization, sustainability awareness, lean continuous improvement, and organizational resilience. These metrics offer an initial insight into respondents' views and the strength of consensus on Likert-scale questions.

Descriptive analysis in SEM-PLS also helps identify potential anomalies, such as outliers or skewed distributions, which may affect the reliability and validity of subsequent modeling. Data normality is assessed to determine whether non-normality may influence PLS estimation, although SEM-PLS is robust against moderate non-normality (Hair J. F., 2022). Additionally, descriptive statistics help evaluate the measurement model, ensuring that each indicator exhibits sufficient variance to contribute meaningfully to its latent construct.

3.7.4. Inferential Analysis

Inferential analysis in Partial Least Squares Structural Equation Modeling (SEM-PLS) is used to examine the hypothesized relationships among constructs and to test their significance, strength, and direction. Unlike descriptive statistics, which summarize data characteristics, inferential analysis enables researchers to draw conclusions about the population from which the sample is drawn and to assess the causal relationships between latent variables (Hair J. F., 2022). In this study, SEM-PLS is used to investigate the impact of human-centric organization, sustainability awareness, and lean continuous improvement on organizational resilience, as well as the potential mediating effect of lean continuous improvement.

Inferential analysis in SEM-PLS also includes model fit evaluation, such as Standardized Root Mean Square Residual (SRMR), to assess the adequacy of the model in representing the observed data. Collectively, these inferential procedures

provide rigorous statistical evidence to confirm whether human-centric organization, sustainability awareness, and lean continuous improvement significantly influence organizational resilience in Indonesian pharmaceutical manufacturing firms. The analysis also identifies the relative contribution of each predictor and the mediating mechanisms, offering valuable insights for managerial decision-making and strategic interventions.

3.7.5. Outer Model

The outer model, also known as the measurement model, defines the relationships between latent constructs and their observed indicators. The outer model evaluates how well the indicators represent the underlying latent variable, ensuring the validity and reliability of measurement before testing structural relationships (Hair J. F., 2022). This research analyzes four latent constructs within the outer model: Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean Continuous Improvement (LCI), and Organizational Resilience (OR). All constructs are reflective, indicating that the indicators are presumed to be expressions of the underlying latent variable. The evaluation of the outer model includes three main assessments: convergent validity, internal consistency reliability, and discriminant validity.

A well-validated outer model ensures that latent constructs are measured accurately, providing a strong basis for evaluating structural relationships in the inner model. This guarantees that later path analysis, hypothesis evaluation, and mediation examination are dependable and significant for comprehending the effects of HCO, SA, and LCI on organizational resilience within pharmaceutical manufacturing companies

a. Internal Consistency

Internal consistency is a critical aspect of the measurement model in SEM-PLS, reflecting the extent to which the indicators of a latent construct consistently measure the same underlying concept (Hair J. F., 2022). In this study, internal consistency ensures that constructs such as Human-Centric Organization (HCO),

Sustainability Awareness (SA), Lean Continuous Improvement (LCI), and Organizational Resilience (OR) are measured reliably, enabling accurate interpretation of the relationships in the structural model.

Two primary metrics are employed to assess internal consistency: Cronbach's alpha (α) and composite reliability (CR). Cronbach's alpha measures the average inter-item correlation; values above 0.70 are considered acceptable, indicating sufficient consistency among indicators. Composite reliability, preferred in SEM-PLS, accounts for differing indicator loadings, providing a more precise estimate of construct reliability. A CR value above 0.70 demonstrates that the construct consistently captures the variance of its indicators.

High internal consistency is essential to ensure that latent constructs are measured reliably across respondents and contexts. It also enhances the validity of subsequent analyses, including confirmatory factor analysis, hypothesis testing, and mediation evaluation. By confirming the internal consistency of all constructs, this study ensures that the observed relationships among HCO, SA, LCI, and OR accurately reflect organizational dynamics within Indonesian pharmaceutical manufacturing firms.

b. Convergent Validity

Convergent validity is a critical component of the measurement model in SEM-PLS, assessing the extent to which indicators of a latent construct are highly correlated and measure the same underlying concept (Hair J. F., 2022). In this study, convergent validity ensures that constructs such as Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean Continuous Improvement (LCI), and Organizational Resilience (OR) accurately reflect the theoretical dimensions they are intended to capture.

Convergent validity is evaluated using factor loadings and Average Variance Extracted (AVE). Indicators with loadings exceeding 0.70 and AVE greater than 0.50 are deemed valid, suggesting that a significant portion of the variance is accounted for by the latent construct. Reliability of internal consistency

is assessed using Cronbach's alpha and composite reliability, with values over 0.70 considered acceptable.

Establishing convergent validity is essential for reliable hypothesis testing and structural modeling. It ensures that the latent variables in the model are accurately operationalized, thereby supporting the integrity of the structural model analysis. By confirming convergent validity, this study provides confidence that the observed relationships among HCO, SA, LCI, and OR reflect true organizational dynamics in pharmaceutical manufacturing firms in Indonesia.

c. Determinant Validity (Discriminant Validity)

Determinant validity, commonly referred to as discriminant validity, is a fundamental criterion in SEM-PLS that assesses whether a construct is truly distinct from other constructs in the model (Hair J. F., 2022). In this study, discriminant validity ensures that Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean Continuous Improvement (LCI), and Organizational Resilience (OR) measure separate and conceptually independent phenomena, preventing overlap and redundancy in the measurement model.

Discriminant validity is assessed with the Heterotrait-Monotrait (HTMT) ratio, which measures the resemblance between constructs. HTMT values below 0.90 indicate that the constructs are adequately distinct, whereas higher values may indicate possible multicollinearity or overlap in measurement. Establishing discriminant validity is essential as it verifies that the latent variables represent distinct elements of organizational processes, instead of indicating a common factor

In addition to HTMT, traditional methods such as comparing the square root of the Average Variance Extracted (AVE) with inter-construct correlations can also support discriminant validity. Ensuring that each construct demonstrates adequate discriminant validity strengthens the reliability and interpretability of the structural model, enabling meaningful hypothesis testing and causal inference. In this study, confirming determinant validity ensures that the relationships among HCO, SA,

LCI, and OR reflect authentic organizational dynamics, rather than measurement artifacts, in Indonesian pharmaceutical manufacturing firms.

d. Formative Measurement Models

In Partial Least Squares Structural Equation Modeling (SEM-PLS), formative measurement models represent constructs in which indicators *cause* the latent variable rather than merely reflect it. Unlike reflective constructs, in which indicators are assumed to share common variance, formative constructs comprise multiple dimensions or indicators that collectively define the latent variable (Hair et al., 2019). Changes in one indicator can directly affect the latent construct, but indicators need not correlate strongly with one another.

In the context of this study, formative measurement models may be applied to Lean Continuous Improvement (LCI) or Sustainability Awareness (SA) if the constructs are conceptualized as being formed by distinct practices or dimensions. For example, LCI can be formed by separate indicators such as Kaizen implementation, process standardization, and waste reduction, each contributing uniquely to the construct. Similarly, SA may comprise environmental, social, and economic dimensions, with each indicator independently shaping the overall construct.

Formative measurement models require careful evaluation because traditional reliability metrics, such as Cronbach's alpha, are not appropriate. Instead, indicator weights and their statistical significance are assessed using bootstrapping procedures. Indicators with non-significant weights may be candidates for removal if theoretically justified.

Overall, formative measurement models provide a nuanced representation of multidimensional constructs in which indicators define the construct rather than merely reflect it. In this study, applying formative measurement models allows researchers to accurately capture the complexity of LCI and SA, ensuring that all relevant dimensions contribute to the development of organizational resilience in pharmaceutical manufacturing firms in Indonesia. Proper specification and

validation of formative constructs are essential to produce meaningful and actionable insights from SEM-PLS analysis.

3.7.6. Inner Model

a. Inner Model (Structural Model)

The inner model, also referred to as the structural model, in SEM-PLS represents the hypothesized relationships between latent constructs and evaluates the strength and significance of these causal paths (Hair J. F., 2022). In this study, the inner model examines how Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean Continuous Improvement (LCI) influence Organizational Resilience (OR) in Indonesian pharmaceutical manufacturing firms. Additionally, it assesses the mediating role of LCI in the transmission of HCO- and SA-induced effects on OR.

The assessment of the internal model includes multiple essential elements. Path coefficients (β) assess the strength and direction of relationships among constructs, and bootstrapping is utilized to evaluate their statistical significance, producing t-values and p-values for hypothesis testing. The coefficient of determination (R^2) reflects the fraction of variability in the dependent variable accounted for by the independent variables, offering insight into the model's ability to explain. Effect size (f^2) is computed to assess the significant influence of each predictor on the endogenous construct, while predictive relevance (Q^2) is evaluated via the blindfolding method to measure the model’s forecasting precision.

By analyzing the inner model, researchers can test direct, indirect, and total effects, including mediation mechanisms, to understand how organizational practices and awareness contribute to resilience. A well-specified and validated inner model ensures that the theoretical framework accurately represents organizational dynamics, supporting managerial insights and evidence-based recommendations for enhancing resilience through human-centric practices, sustainability awareness, and continuous improvement initiatives.

b. Collinearity

Collinearity refers to the extent to which two or more predictor indicators are highly correlated, potentially distorting the estimation of path coefficients in SEM-PLS (Hair J. F., 2022) . In the context of this study, collinearity is particularly relevant for constructs such as Lean Continuous Improvement (LCI) and Sustainability Awareness (SA), which may consist of multiple indicators forming formative or reflective measures.

Collinearity is evaluated by calculating the Variance Inflation Factor (VIF) for each variable. VIF values under 5 are deemed acceptable, signifying low multicollinearity and confirming that each indicator offers distinct information to the construct. Elevated collinearity can increase standard errors, diminish statistical significance, and undermine the trustworthiness of parameter estimates. Through the assessment and management of collinearity, the research guarantees that both the measurement and structural models yield valid, interpretable, and reliable outcomes. This phase enhances the validity of findings about the effects of human-centered organization, sustainability awareness, and lean continuous improvement on organizational resilience in Indonesia's pharmaceutical manufacturing.

c. Path Coefficient

In SEM-PLS, path coefficients (β) indicate the strength and direction of associations among latent constructs in the structural (inner) model. They measure how alterations in an independent variable affect a dependent variable while accounting for other predictors in the model. Path coefficients range from -1 to +1, where positive values indicate a direct correlation and negative values indicate an inverse correlation (Hair J. F., 2022).

This research estimates path coefficients to assess the impacts of Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean Continuous Improvement (LCI) on Organizational Resilience (OR). Furthermore, the mediating function of LCI is analyzed by assessing both direct and indirect impacts. The bootstrapping method with 5,000 resamples is used to assess the statistical

significance of path coefficients, generating t-values and p-values to evaluate whether the proposed relationships are supported.

d. Coefficient of Determination (R^2)

The coefficient of determination (R^2) in SEM-PLS measures the portion of variance in an endogenous (dependent) construct that is accounted for by its exogenous (independent) constructs. R^2 assesses the explanatory power of the structural model and indicates the effectiveness of the independent variables in predicting the dependent variable. R^2 values vary from 0 to 1, where larger values indicate a greater ability to explain (Hair J. F., 2019).

In this research, R^2 is computed for Organizational Resilience (OR), which is affected by Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean Continuous Improvement (LCI). For instance, an R^2 value of 0.62 indicates that 62% of the variability in OR is explained by these predictors, indicating considerable explanatory power. The interpretation of R^2 can be categorized as weak (0.25), moderate (0.50), or substantial (0.75) according to standards for social science studies. R^2 is supported by additional metrics, such as effect size (f^2) and predictive relevance (Q^2), to provide a comprehensive evaluation of model effectiveness. A strong R^2, along with meaningful path coefficients, indicates that the model effectively captures the connections between HCO, SA, LCI, and OR. Assessing R^2 enables researchers and managers to gauge how much organizational strategies and efforts contribute to improving resilience in Indonesian pharmaceutical manufacturing companies. The coefficient of determination (R^2) in SEM-PLS quantifies the proportion of variance in an endogenous (dependent) construct explained by its exogenous (independent) constructs. R^2 measures the explanatory power of the structural model and indicates how well the independent variables predict the dependent variable. Values of R^2 range from 0 to 1, with higher values signifying stronger explanatory capability (Hair J. F., 2019).

e. Effect Size (f^2)

In SEM-PLS, effect size (f^2) assesses the significant influence of an independent variable on an endogenous (dependent) construct in the structural model. In contrast to path coefficients, which reflect the strength and direction of relationships, f^2 measures the extent to which an independent variable affects the R^2 value of the dependent construct. It offers a way to gauge practical importance in addition to statistical importance (Hair J. F., 2019).

Cohen's criteria categorize f^2 values as small (0.02), medium (0.15), and large (0.35), reflecting the contribution of each predictor in accounting for the variance in the dependent variable. In this research, f^2 is utilized to evaluate the individual impacts of Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean Continuous Improvement (LCI) on Organizational Resilience (OR). For example, an f^2 of 0.18 for HCO → OR suggests a medium effect, indicating that human-focused practices significantly enhance organizational resilience. Assessing f^2 in conjunction with R^2 and path coefficients offers a deeper insight into the strength and practical significance of each predictor in boosting resilience among Indonesian pharmaceutical manufacturing companies. In SEM-PLS, effect size (f^2) evaluates the substantive impact of an independent variable on an endogenous (dependent) construct within the structural model. Unlike path coefficients, which indicate the strength and direction of relationships, f^2 quantifies how much an independent variable contributes to the R^2 value of the dependent construct. It provides a measure of practical significance beyond statistical significance (Hair J. F., 2019).

3.8. Hypothesis testing

Hypothesis testing in Partial Least Squares Structural Equation Modeling (SEM-PLS) is performed to assess the proposed relationships among latent constructs and to ascertain whether the theoretical assumptions of the study are empirically validated (Hair J. F., 2022). This study investigates the direct impacts of Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean

Continuous Improvement (LCI) on Organizational Resilience (OR), as well as LCI's mediating influence on the relationship between HCO and SA and OR.

CHAPTER IV

FINDINGS, ANALYSIS, AND DISCUSSION

4.1 Descriptive Analysis

This study employs Structural Equation Modeling using Partial Least Squares (SEM-PLS) to analyze the relationships between human-centric organizational behavior, sustainability awareness, lean continuous improvement, and organizational resilience within the Cimanggis plant. The descriptive analysis indicates that human-centric organizational behavior is perceived highly, reflecting strong employee empowerment, psychological safety, and participatory leadership practices. Sustainability awareness is also well embedded, as evidenced by the organization's commitment to environmental responsibility, ethical governance, and stakeholder engagement. Furthermore, lean continuous improvement practices demonstrate a consistent application of process standardization, waste reduction, and employee involvement in operational enhancements.

The findings suggest that these three variables collectively strengthen organizational resilience by enhancing adaptability, operational efficiency, and responsiveness to disruptions. SEM-PLS analysis further confirms that Dynamic Operational Agility (DOA) is the mediator in translating human-centric and sustainability-oriented practices into resilience outcomes. Overall, the Multinational Pharmaceutical Company in Indonesia demonstrates strong alignment among people-centered management, sustainability initiatives, and continuous improvement practices, supporting the development of a resilient organizational structure capable of responding effectively to dynamic environmental challenges.

4.1.1 Demographic

The participants in this study are professional employees of the Multinational Pharmaceutical Company in Indonesia, Cimanggis plant. Of the 329 employees, 175 responded to the survey.

Figure 4.1 Respondent Demographic (Department and Tenure)

The demographic variables analysed include department and tenure (length of service). According to Figure 4.1 above, respondents came from six departments: Manufacturing Business Unit, Quality, Engineering Project, COE, SCM, and Enabling. Stratified random sampling was used to generate the respondent pool, which is dominated by the Manufacturing Business Unit, the largest Department at the Cimanggis site, accounting for 83 respondents (47.4%). The second-largest representation is from the Quality department with 34 respondents (19.4%). The remaining respondents are distributed across Engineering and Project (16; 9.1%), COE (15; 8.6%), SCM (14; 8.0%), and Enabling (13; 7.4%).

To understand respondents' experience profiles, tenure was grouped into five categories: <1 year, 1–3 years, 4–7 years, 8–10 years, and >10 years. The results show that the largest group of respondents is the 4–7 years category, representing 66 respondents (37.7%). The second-largest group is >10 years, with 46 respondents (26.3%), followed by 8–10 years with 38 respondents (21.7%). Respondents with 1–3 years of service total 22 (12.6%), and the smallest group is <1 year, with 3 respondents (1.7%). Overall, the sample is largely composed of employees with moderate to extensive experience, as respondents with more than 8 years of service account for approximately 48.0% of the dataset (8–10 years plus >10 years).

In summary, the respondent demographics show that the dataset is primarily represented by the Manufacturing Business Unit (47.4%) and Quality (19.4%),

while other departments contribute smaller but meaningful proportions. The tenure composition is dominated by employees with 4–7 years of service (37.7%), and the sample contains a substantial proportion of experienced employees with more than 8 years of service (~48.0%).

4.1.2 Descriptive Statistic

The data analysis method used in this study is mean analysis, which is used to determine the average values of the variables under study and their respective indicators, thereby providing a general overview of the data collected in the field. Mean values are mapped to a scale range using intervals, and the formula for calculating the intervals is as follows:

$$\text{Interval} = \frac{\text{Highest V}alue - \text{L}owest\ Value}{\text{Category}}$$

$$\text{Interval} = \frac{5 - 1}{5}$$

$$\text{Interval} = 0{,}8$$

Table 4.1 Variable Human-Centric Organization (HCO)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Human-Centric Organization (HCO)	HCO1	2	5	0,573	4,622
	HCO2	2	5	0,622	4,552
	HCO3	2	5	0,615	4,605
	HCO4	2	5	0,615	4,605
	HCO5	2	5	0,614	4,610
	Mean				**4,599**

SmartPLS Output (2026)

Based on the table above, the minimum value for all Human-Centric Organization (HCO) indicators is 2, indicating that respondents answered: "disagree." The maximum value for all indicators is 5, indicating that respondents answered, "strongly agree." The standard deviation ranges from 0.573 to 0.622, and the mean ranges from 4.552 to 4.622. The lowest mean value, 4.552, is for the HCO2 indicator, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with the HCO2 indicator. The highest mean value, 4.622, was for the HCO1 indicator, which falls within the 4.21–5.00 interval,

indicating that respondents strongly agreed with it. The overall mean value of 4.599 falls within the 4.21–5.00 interval, indicating that respondents strongly agreed.

Table 4.2 Variable Sustainability Awareness (SA)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Sustainability Awareness (SA)	SA1	3	5	0,560	4,576
	SA2	3	5	0,646	4,413
	SA3	3	5	0,575	4,535
	SA4	2	5	0,655	4,419
	SA5	2	5	0,738	4,413
	SA6	2	5	0,711	4,488
	SA7	2	5	0,623	4,535
	SA8	2	5	0,642	4,512
	SA9	3	5	0,561	4,628
	Mean				**4,502**

SmartPLS Output (2026)

On the table above, the minimum values for all indicators of the Sustainability Awareness (SA) variable range from 2 to 3, indicating that respondents answered “disagree” or “neutral.” The maximum value for all indicators is 5, indicating that respondents answered: “strongly agree.” The standard deviation values range from 0.560 to 0.738, and the mean values range from 4.413 to 4.628. The lowest mean value, 4.413, is observed for indicator SA5, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with it. The highest mean value of 4.628 was observed for indicator SA9, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with it. The overall mean value of 4.502 falls within the 4.21–5.00 interval, indicating that respondents strongly agreed.

Table 4.3 Variable Lean/Continuous Improvement (LCI)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Lean/Continuous Improvement (LCI)	LCI1	3	5	0,573	4,622
	LCI2	2	5	0,642	4,529
	LCI3	2	5	0,679	4,401
	LCI4	3	5	0,532	4,657
	LCI5	2	5	0,603	4,547
	LCI6	2	5	0,555	4,610
	Mean				**4,561**

SmartPLS Output (2026)

Based on the table above, the minimum values for all Lean/Continuous Improvement (LCI) indicators range from 2 to 3, indicating that respondents answered “disagree” or “neutral.” The maximum value for all indicators is 5,

indicating that respondents answered: “strongly agree.” The standard deviation ranges from 0.532 to 0.679, and the mean ranges from 4.401 to 4.657. The lowest mean value, 4.401, is for the LCI3 indicator, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with it. The highest mean value of 4.657 was observed for indicator LCI4, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with it. The overall mean value of 4.561 falls within the 4.21–5.00 interval, indicating that respondents strongly agreed.

Table 4.4 Variable Dynamic Operational Agility (DOA)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Dynamic Operational Agility (DOA)	DOA1	3	5	0,575	4,471
	DOA2	2	5	0,716	4,227
	DOA3	3	5	0,603	4,337
	DOA4	2	5	0,711	4,285
	DOA5	2	5	0,614	4,471
	DOA6	2	5	0,622	4,448
	DOA7	2	5	0,674	4,250
	DOA8	2	5	0,674	4,250
	DOA9	1	5	0,692	4,442
	DOA10	1	5	0,732	4,169
	DOA11	2	5	0,685	4,279
	DOA12	2	5	0,724	4,227
		Mean			**4,321**

SmartPLS Output (2026)

Based on the table above, the minimum values for all indicators of the Dynamic Operational Agility (DOA) variable range from 1 to 3, indicating that respondents answered “strongly disagree,” “disagree,” or “neutral.” The maximum value for all indicators is 5, indicating that respondents answered: “strongly agree.” The standard deviation values range from 0.575 to 0.732, and the mean values range from 4.169 to 4.471. The lowest mean value, 4.169, is for the DOA10 indicator, which falls within the 3.41–4.20 interval, indicating that respondents tended to agree with it. The highest mean value of 4.471 was observed for the DOA5 and DOA1 indicator, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with it. The overall mean value of 4.321 falls within the 4.21–5.00 interval, indicating that respondents strongly agreed.

Table 4.5 Variable Organizational Resilience (OR)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Organizational Resilience (OR)	OR1	2	5	0,619	4,297
	OR2	2	5	0,685	4,308
	OR3	2	5	0,639	4,302
	OR4	3	5	0,601	4,372
	OR5	2	5	0,620	4,331
	OR6	3	5	0,600	4,419
	Mean				**4,338**

SmartPLS Output (2026)

Based on the table above, the minimum values for all indicators of the Organizational Resilience (OR) variable range from 2 to 3, indicating that respondents answered "disagree" or "neutral." The maximum value for all indicators is 5, indicating that respondents answered: "strongly agree." The standard deviation values range from 0.600 to 0.685, and the mean values range from 4.297 to 4.419. The lowest mean value, 4.297, is found for indicator OR1, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with indicator OR1. The highest mean value of 4.419 was found for indicator OR6, which falls within the 4.21–5.00 interval, indicating that respondents strongly agreed with indicator OR6. The overall mean value of 4.338 falls within the 4.21–5.00 interval, indicating that respondents strongly agreed.

4.2 Research Model Analysis: Outer Model

4.2.1 Indicator Reliability

Item reliability indicates that the relevant indicators share commonalities within the variable, or that the instrument can be relied upon to consistently measure the same variable. Item reliability is tested by examining factor loadings; factor loadings ≥ 0.708 (0.70 is considered close enough to 0.708 to be acceptable), factor loadings ≥ 0.40 may still be considered or accepted (if removing the item improves Construct Reliability and Convergent Validity), while factor loadings < 0.40 must be dropped or removed (Hair J. F., 2022)

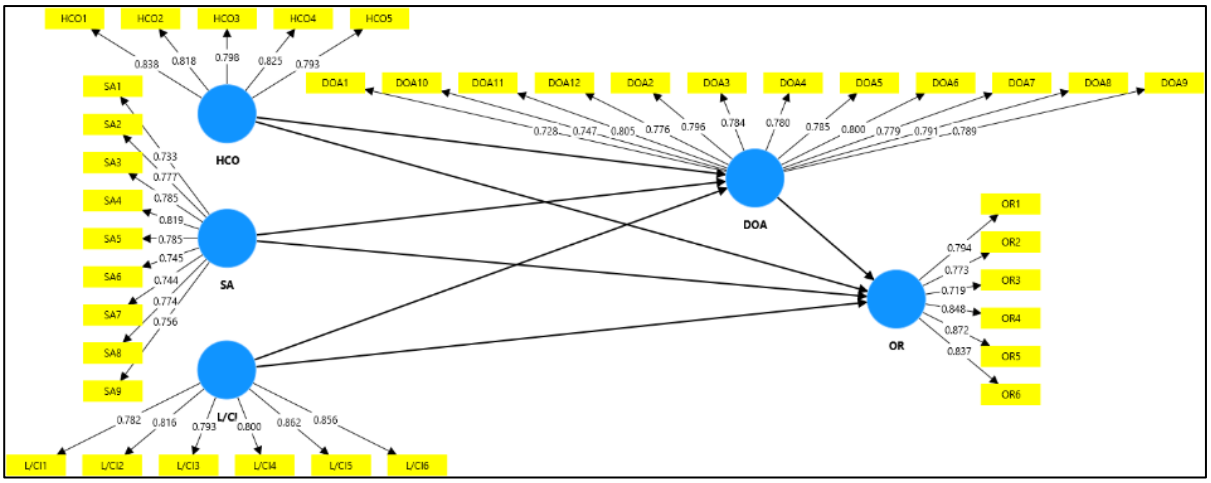

Figure 4.2 Indicator Reliability, SmartPLS Output (2026)

4.2.2 The Outer Loadings

Table 4.6 The Outer Loadings

Variable	Indicator	Loading Factor
Human-Centric Organization (HCO)	HCO1	0,838
	HCO2	0,818
	HCO3	0,798
	HCO4	0,825
	HCO5	0,793
Sustainability Awareness (SA)	SA1	0,733
	SA2	0,777
	SA3	0,785
	SA4	0,819
	SA5	0,785
	SA6	0,745
	SA7	0,744
	SA8	0,774
	SA9	0,756
Lean/Continuous Improvement (LCI)	LCI1	0,782
	LCI2	0,816
	LCI3	0,793
	LCI4	0,800
	LCI5	0,862
	LCI6	0,856
Dynamic Operational Agility (DOA)	DOA1	0,728
	DOA2	0,796
	DOA3	0,784
	DOA4	0,780
	DOA5	0,785
	DOA6	0,800
	DOA7	0,779
	DOA8	0,791
	DOA9	0,789
	DOA10	0,747
	DOA11	0,805
	DOA12	0,776

Variable	Indicator	Loading Factor
Organizational Resilience (OR)	OR1	0,794
	OR2	0,773
	OR3	0,719
	OR4	0,848
	OR5	0,872
	OR6	0,837

SmartPLS Output (2026)

Based on the table above, it can be seen that the Human-Centric Organization (HCO) variable is measured by 5 indicators, Sustainability Awareness (SA) by 9 indicators, Lean/Continuous Improvement (LCI) by 6 indicators, Dynamic Operational Agility (DOA) by 12 indicators, and Organizational Resilience (OR) by 6 indicators.

The loading factor values for all indicators in each variable are ≥ 0.70, so it can be concluded that the indicators are reliable for consistently measuring the same variables, or that item reliability has been met.

4.2.3 Construct Reliability

Construct reliability measures the internal consistency of the entire instrument by combining the reliability of all its items or by assessing whether all indicators collectively measure the same variable. Variable reliability is tested by examining Cronbach's alpha and composite reliability; values of Cronbach's alpha and composite reliability ≥ 0.70 indicate that reliability is met, while values of Cronbach's alpha and composite reliability > 0.95 are not acceptable. (Hair J. F., 2022) (Hair J. F., 2019)

Table 4.7 Construct Reliability

	Cronbach's Alpha	Composite Reliability
HCO	0,873	0,908
SA	0,913	0,929
LCI	0,901	0,924
DOA	0,942	0,949
OR	0,893	0,919

SmartPLS Output (2026)

Based on the table above, it can be seen that the variables Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean/Continuous Improvement (LCI), Dynamic Operational Agility (DOA), and Organizational

Resilience (OR) have Cronbach's alpha and composite reliability values of ≥ 0.70, and none have Cronbach's alpha and composite reliability values > 0.95, therefore, it can be concluded that all indicators work together to measure the same variable, or that construct reliability has been met.

4.2.4 Convergent Validity

Convergent validity measures the extent to which an indicator correlates positively with other indicators of the same variable. Convergent validity is tested by examining the Average Variance Extracted (AVE); an AVE value greater than 0.50 indicates that convergent validity is met. (Hair J. F., 2022) (Hair J. F., 2019)

Table 4.8 Convergent Validity

	Average Variance Extracted (AVE)
HCO	0,663
SA	0,591
LCI	0,670
DOA	0,609
OR	0,654

SmartPLS Output 2026

Based on the table above, it can be seen that the variables Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean/Continuous Improvement (LCI), Dynamic Operational Agility (DOA), and Organizational Resilience (OR) have Average Variance Extracted (AVE) values greater than 0.50, therefore, it can be concluded that an indicator is positively correlated with other indicators of the same variable, meaning that convergent validity has been met.

4.2.5 Discriminant Validity

Discriminant validity assesses how uniquely the indicators of a construct represent that construct compared to how strongly the construct correlates with other constructs in the model. Discriminant validity ensures that an indicator is truly distinct from indicators measuring different constructs, meaning that each indicator measures only its intended construct and not others. The assessment of discriminant validity is conducted by examining the heterotrait-monotrait ratio (HTMT). The threshold values are 0.90 for conceptually similar constructs and 0.85 for conceptually distinct constructs. (Hair J. F., 2022) (Hair J. F., 2019)

Table 4.9 Discriminant Validity

	DOA	HCO	LCI	OR	SA
DOA					
HCO	0,793				
LCI	0,773	0,794			
OR	0,842	0,757	0,778		
SA	0,816	0,782	0,760	0,826	

SmartPLS Output 2026

Based on the table above, the Heterotrait-Monotrait Ratio (HTMT) values for the correlations between variables are ≤ 0.85. Therefore, it can be concluded that each indicator measures only its intended construct and does not measure other constructs. In other words, discriminant validity has been established.

4.2.6 Inner Model

R Square Test

Value ranges from 0 to 1, with higher values indicating greater explanatory power. The R-squared values for the endogenous latent variables in the structural model indicate that the model is 0.75 (Strong), 0.50 (Moderate), and 0.25 (Weak) (Hair et al., 2019: 780). In some fields of study, an R-squared value of 0.10 is considered satisfactory (Hair J. F., 2022) (Hair J. F., 2019)

Table 4.10 R-Square Test

	R Square	R Square Adjusted
DOA	0,678	0,672
OR	0,685	0,677

SmartPLS Output 2026

Based on the table above, the adjusted R^2 value for the Dynamic Operational Agility (DOA) variable is 0.672. This indicates that Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI) collectively explain 67.2% of the variance in Dynamic Operational Agility (DOA), with the remaining 32.8% attributable to other variables outside the model. Since the R^2 value of 0.672 falls between 0.50 and 0.75, the model is considered to have moderate explanatory power.

Furthermore, the adjusted R-square value for Organizational Resilience (OR) is 0.677. This suggests that Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean/Continuous Improvement (LCI), and Dynamic Operational

Agility (DOA) explain 67.7% of the variance in Organizational Resilience (OR), while the remaining 32.3% is influenced by other variables not included in the model. As the R-square value of 0.677 falls between 0.50 and 0.75, the model also demonstrates moderate explanatory power.

F Square Test

Effect size indicates the change in the R-squared value when a particular exogenous construct is removed from the model. This metric is calculated to determine whether excluding a predictor construct from the structural model has a substantive impact on the endogenous construct. (Hair J. F., 2019). Value f square < 0.02 indicates no effect, 0.02 indicates a small-to-medium effect, 0.15 indicates a medium effect, and 0.35 indicates a large effect. (Hair J. F., 2019) (Hair J. F., 2022).

Table 4.11 F-Square Test

	F Square
HCO -> DOA	0,087
SA -> DOA	0,221
LCI -> DOA	0,084
HCO -> OR	0,005
SA -> OR	0,094
LCI -> OR	0,047
DOA -> OR	0,141

SmartPLS Output (2026)

The explanations are as follows:

1. The f-square value for the path Human-Centric Organization (HCO) → Dynamic Operational Agility (DOA) is 0.087, which is greater than 0.02 and less than 0.15. This indicates that the contribution of Human-Centric Organization (HCO) to the change in R-square, or to the increase in the R-square value of Dynamic Operational Agility (DOA), falls within the small-effect category.
2. The f-square value for the path Sustainability Awareness (SA) → Dynamic Operational Agility (DOA) is 0.221, which is greater than 0.15 and less than 0.35. This indicates that the contribution of Sustainability Awareness (SA) to the change in R-square for Dynamic Operational Agility (DOA) is in the medium-effect category.

3. The f-square value for the path Lean/Continuous Improvement (LCI) → Dynamic Operational Agility (DOA) is 0.084, which is greater than 0.02 and less than 0.15. This indicates that Lean/Continuous Improvement (LCI) contributes little to the R-square of Dynamic Operational Agility (DOA).
4. The f-square value for the path Human-Centric Organization (HCO) → Organizational Resilience (OR) is 0.005, which is less than 0.02. This indicates that Human-Centric Organization (HCO) has no effect on the change in R-square of Organizational Resilience (OR).
5. The f-square value for the path Sustainability Awareness (SA) → Organizational Resilience (OR) is 0.094, which is greater than 0.02 and less than 0.15. This indicates a small-to-medium effect contribution to Organizational Resilience (OR).
6. The f-square value for the path Lean/Continuous Improvement (LCI) → Organizational Resilience (OR) is 0.047, which is greater than 0.02 and less than 0.15. This indicates a small-to-medium effect contribution to Organizational Resilience (OR).
7. The f-square value for the path Dynamic Operational Agility (DOA) → Organizational Resilience (OR) is 0.141, which is greater than 0.02 and less than 0.15. This indicates that the contribution of Dynamic Operational Agility (DOA) to Organizational Resilience (OR) falls within the small-to-medium effect category.

Q Square Test Predictive Relevance

According to (Hair J. F., 2022), The most relevant criterion for assessing predictive relevance is to use the PLS Predict procedure, with the following conditions:

a. If all PLS SEM RMSE or PLS SEM MAE values are less than LM RMSE or LM MAE, the model has high predictive power
b. If the majority of PLS SEM RMSE or PLS SEM MAE values are less than LM RMSE or LM MAE, the model has moderate predictive power
c. If a minority or an equal number of PLS SEM RMSE or PLS SEM MAE values are ≤ LM RMSE or LM MAE, the predictive power is low

d. If all PLS SEM RMSE or PLS SEM MAE values are > LM RMSE or LM MAE, there is no predictive power.

Table 4.12 Q-Square Test

Variable	Indicator	Q²predict	PLS SEM RMSE	LM RMSE	PLS SEM MAE	LM MAE
Dynamic Operational Agility (DOA)	DOA1	0,486	0,415	0,472	0,341	0,354
	DOA2	0,317	0,595	0,661	0,471	0,513
	DOA3	0,379	0,478	0,536	0,403	0,429
	DOA4	0,268	0,613	0,683	0,475	0,526
	DOA5	0,465	0,452	0,483	0,342	0,335
	DOA6	0,505	0,440	0,494	0,345	0,365
	DOA7	0,380	0,534	0,598	0,441	0,484
	DOA8	0,399	0,526	0,586	0,417	0,472
	DOA9	0,422	0,530	0,553	0,377	0,402
	DOA10	0,316	0,610	0,619	0,478	0,501
	DOA11	0,367	0,548	0,552	0,424	0,442
	DOA12	0,370	0,578	0,597	0,452	0,481
Organizational Resilience (OR)	OR1	0,349	0,503	0,575	0,410	0,448
	OR2	0,355	0,553	0,588	0,431	0,430
	OR3	0,271	0,550	0,568	0,443	0,451
	OR4	0,426	0,458	0,500	0,373	0,394
	OR5	0,509	0,437	0,468	0,360	0,376
	OR6	0,497	0,428	0,444	0,344	0,344

SmartPLS Output (2026)

Based on the table above, all indicators of the Dynamic Operational Agility (DOA) variable have Q-square predictive relevance values greater than 0. This indicates that Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI) are appropriate explanatory variables capable of predicting Dynamic Operational Agility (DOA). Furthermore, the PLS-SEM RMSE values for all DOA indicators are lower than the LM RMSE values, and the PLS-SEM MAE values are also lower than the LM MAE values for all indicators except DOA5. Therefore, it can be concluded that the predictive power is in the moderate category.

Similarly, all indicators of the Organizational Resilience (OR) variable have Q-square predictive relevance values greater than 0, indicating that Human-Centric Organization (HCO), Sustainability Awareness (SA), Lean/Continuous Improvement (LCI), and Dynamic Operational Agility (DOA) are suitable predictors of Organizational Resilience (OR). In addition, the PLS-SEM RMSE values for all OR indicators are lower than the LM RMSE values, and the PLS-

SEM MAE values are also lower than the LM MAE values for all indicators except OR2. Thus, the model demonstrates moderate predictive power.

4.3 Hypothesis Test

Table 4.13 Hypothesis Test

	Coefficient	T Statistic	P Value	Description
HCO -> OR	0,064	0,606	0,272	H_1 Rejected
SA -> OR	0,288	2,339	0,010	H_2 Accepted
LCI -> OR	0,194	2,001	0,023	H_3 Accepted
HCO -> DOA -> OR	0,097	1,980	0,024	H_4 Accepted
SA -> DOA -> OR	0,150	2,363	0,009	H_5 Accepted
LCI -> DOA -> OR	0,094	2,073	0,019	H_6 Accepted
Integrated Effect (Collective -> DOA -> OR)	0,341	3,125	0,001	H_7 Accepted

SmartPLS Output (2026)

The explanation is as follows:

1. **H_1**: The path coefficient of Human-Centric Organization (HCO) → Organizational Resilience (OR) is positive at 0.064, with a t-statistic value of 0.606 < 1.65 and a p-value of 0.272 > 0.05. Therefore, H_1 is rejected, indicating that Human-Centric Organization has no positive effect on Organizational Resilience.
2. **H_2**: The path coefficient of Sustainability Awareness (SA) → Organizational Resilience (OR) is positive at 0.288, with a t-statistic value of 2.339 > 1.65 and a p-value of 0.010 < 0.05. Thus, H_2 is accepted, indicating that Sustainability Awareness positively affects Organizational Resilience.
3. **H_3**: The path coefficient of Lean/Continuous Improvement (LCI) → Organizational Resilience (OR) is positive at 0.194, with a t-statistic value of 2.001 > 1.65 and a p-value of 0.023 < 0.05. Therefore, H_3 is accepted, indicating that Lean/Continuous Improvement has a positive effect on Organizational Resilience.
4. **H_4**: The indirect path coefficient of Human-Centric Organization (HCO) → Dynamic Operational Agility (DOA) → Organizational Resilience (OR) is positive at 0.097, with a t-statistic value of 1.980 > 1.65 and a p-value of 0.024 < 0.05. Thus, H_4 is accepted, indicating that Dynamic Operational

Agility mediates the relationship between Human-Centric Organization and Organizational Resilience.

5. **H_5**: The indirect path coefficient of Sustainability Awareness (SA) → Dynamic Operational Agility (DOA) → Organizational Resilience (OR) is positive at 0.150, with a t-statistic value of 2.363 > 1.65 and a p-value of 0.009 < 0.05. Therefore, H_5 is accepted, indicating that Dynamic Operational Agility mediates the relationship between Sustainability Awareness and Organizational Resilience.
6. **H_6**: The indirect path coefficient of Lean/Continuous Improvement (LCI) → Dynamic Operational Agility (DOA) → Organizational Resilience (OR) is positive at 0.094, with a t-statistic value of 2.073 > 1.65 and a p-value of 0.019 < 0.05. Thus, H_6 is accepted, indicating that Dynamic Operational Agility mediates the relationship between Lean/Continuous Improvement and Organizational Resilience.
7. **H_7**: Hypothesis 7 (H_7) examined the integrated mediation effect of Dynamic Operational Agility on the collective relationship between the independent variables (HCO, SA, LCI) and Organizational Resilience. As shown in Table 4.13, the total indirect effect was highly significant ($\beta = 0.341$, $t = 3.125$, $p < 0.001$). This confirms that while individual direct paths may vary in significance, the synergistic impact of these organizational capabilities is powerfully mediated by the firm's agility, thus providing strong empirical support for the Pharmaceutical Excellence Framework (PEF).

4.3.1 Importance-Performance Map Analysis (IPMA)

To provide actionable recommendations for management, an Importance-Performance Map Analysis (IPMA) was conducted using Organizational Resilience (OR) as the target construct. IPMA contrasts the total effects (importance) of the predecessor constructs against their average latent variable scores (performance), rescaled from 0 to 100.

Table 4.14 IPMA results for Organizational Resilience

Construct	Importance (Total Effect on OR)	Performance (0-100 Scale)	IPMA Quadrant / Interpretation
Sustainability Awareness (SA)	0.439 (Highest Importance)	79.87 (Lowest Performance)	Quadrant IV (Concentrate Here): High importance, but lowest performance. This is the primary area for improvement. Management must urgently invest in improving SA because it yields the highest return on resilience.
Dynamic Operational Agility (DOA)	0.372 (High Importance)	76.73 (Low Performance)	Quadrant IV (Concentrate Here): As the direct mediator, agility is highly important but currently performing the lowest overall.
Lean / Continuous Improvement (LCI)	0.288 (Moderate Importance)	83.43 (High Performance)	Quadrant I (Keep up the good work): Performing well and moderately important. Maintain current efforts.
Human-Centric Organization (HCO)	0.160 (Lowest Importance)	86.65 (Highest Performance)	Quadrant II (Possible Overkill): Performing extremely well but has the lowest overall impact on resilience. Management may be over-investing here relative to its resilience payoff.

Table 4.15 IPMA results for DOA

Construct	Importance (Total Effect on DOA)	Performance (0-100 Scale)	IPMA Quadrant / Interpretation
Sustainability Awareness (SA)	0.404 (Highest Importance)	79.87 (Lowest Performance)	Concentrate Here: SA is the most critical driver of agility, but it underperforms relative to HCO and LCI.
Human-Centric Organization (HCO)	0.260 (Moderate Importance)	86.65 (Highest Performance)	Possible Overkill: Excellent performance, but lower impact on agility than SA.
Lean / Continuous Improvement (LCI)	0.254 (Moderate Importance)	83.43 (High Performance)	Keep up the good work: Good balance of performance and importance.

SmartPLS Output 2026

The IPMA results reveal a critical strategic gap. Sustainability Awareness (SA) exhibits the highest importance (0.439) in driving organizational resilience but currently has the lowest performance score (79.87) among the foundational pillars. Conversely, Human-Centric Organization (HCO) demonstrates the highest performance (86.65) but the lowest relative importance (0.160) for resilience. This indicates that while the Multinational Pharmaceutical Company in Indonesia excels in human-centric practices, the most urgent area for management intervention, with the greatest potential to increase resilience, is to enhance Sustainability Awareness and Dynamic Operational Agility.

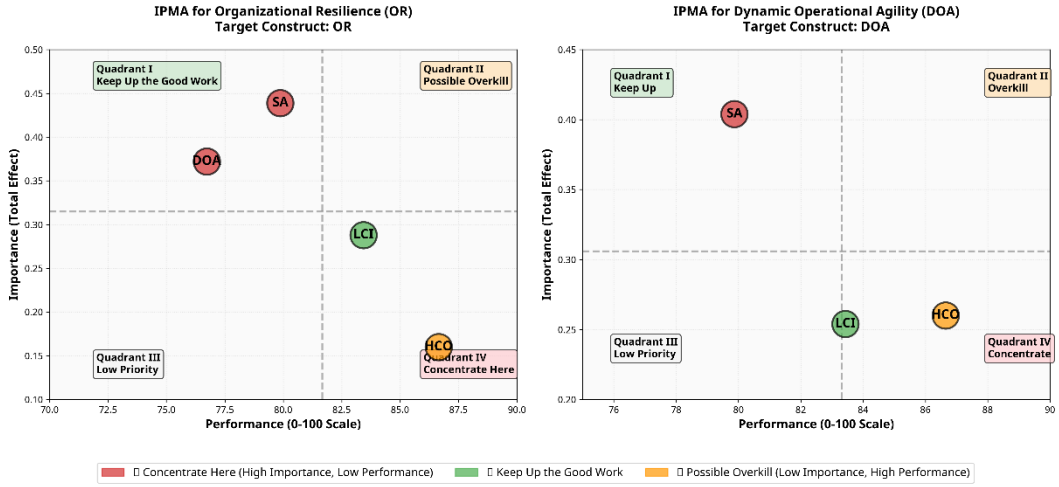

Figure 4.2 IPMA Quandran Analysis

4.4 Discussion of Findings

The findings from the structural model evaluation provide a nuanced understanding of how organizational resilience is cultivated within PT Bayer Indonesia's Cimanggis plant. The results indicate that sustainability awareness and lean continuous improvement have a significant positive effect on organizational resilience, suggesting that organizations that integrate sustainability principles and continuous improvement practices are better equipped to adapt to environmental uncertainties and operational disruptions. In contrast, human-centric organizations do not directly influence organizational resilience, implying that their impact may be indirect rather than immediate.

4.4.1 Theoretical Foundation: Integrating RBV, DCV, and VRIN

Before discussing the individual hypotheses, it is essential to establish the theoretical integration that underpins this study's research model. The Resource-Based View (RBV), originally formalized by Barney (1991), posits that firms achieve sustained competitive advantage by possessing and deploying resources that satisfy the VRIN criteria: they must be Valuable (enabling the firm to exploit opportunities or neutralize threats), Rare (not widely available among competitors), Inimitable (difficult to replicate due to causal ambiguity, social complexity, or path dependence), and Non-substitutable (no strategically equivalent alternatives exist) (Barney J. , 1991). In the context of this study, Human-Centric Organization (HCO), Sustainability Awareness (SA), and Lean/Continuous Improvement (LCI) represent strategic organizational resources that, when properly developed, satisfy the VRIN criteria. For instance, a deeply embedded human-centric culture at Multinational Pharmaceutical Company in Indonesia is socially complex and path-dependent, making it rare and inimitable by competitors. Similarly, the firm's integrated approach to sustainability awareness and continuous improvement represents a unique combination of routines and knowledge that is difficult to replicate.

However, the RBV alone is insufficient to explain how these static resources translate into resilience outcomes in dynamic environments. This is where the Dynamic Capabilities View (DCV), advanced by Teece, Pisano, and Shuen (1997) and further elaborated by Teece (2007), becomes essential. The DCV argues that in rapidly changing environments, firms must possess dynamic capabilities, the capacity to sense environmental shifts, seize emerging opportunities, and reconfigure their resource base accordingly, to sustain competitive advantage (Teece D. , 2007). In this study, Dynamic Operational Agility (DOA) operationalizes the DCV construct, serving as the mechanism through which foundational VRIN resources are activated and transformed into resilience outcomes. The structural model results strongly validate this theoretical integration: while VRIN resources (HCO, SA, LCI) provide the foundation, it is the dynamic capability of agility (DOA) that translates them into Organizational Resilience (OR).

H_1: Human-Centric Organization (HCO) direct effect on Organizational Resilience (OR).

The analysis reveals that Human-Centric Organization (HCO) has no statistically significant direct effect on Organizational Resilience (H1 rejected; $\beta = 0.064$, $t = 0.606$, $p = 0.272$). The f-square value of 0.005 further confirms that HCO has virtually no direct effect on the variance of OR. This finding challenges the conventional assumption that merely fostering a positive, employee-centric culture is sufficient to weather operational disruptions.

From the perspective of the Resource-Based View (RBV), organizational resources must possess the characteristics of being valuable, rare, inimitable, and non-substitutable (VRIN) to generate sustainable competitive advantage and performance outcomes, including organizational resilience. The finding that Human-Centric Organization (HCO) does not significantly influence Organizational Resilience (OR) suggests that human-centric practices alone may not yet be fully transformed into strategic capabilities within the organization. In line with RBV, human-related resources require effective integration, alignment, and deployment with organizational processes to create value (Barney, 1991; further extended in contemporary studies).

Recent studies indicate that human resource practices may not directly enhance resilience unless supported by complementary capabilities such as operational agility, learning systems, or strategic alignment (Gayed, 2023) (Yu, 2022). This implies that human-centric practices, while important, may function as enabling resources rather than direct drivers of resilience outcomes. Additionally, organizational culture and human-centric values often require mediation through dynamic capabilities to produce measurable resilience effects (Srivastava, 2025).

Therefore, the rejection of H1 can be explained by the possibility that HCO has an indirect rather than direct influence on resilience, requiring transformation through operational capabilities such as Dynamic Operational Agility. This finding reinforces RBV arguments that resources alone are insufficient unless effectively orchestrated into strategic capabilities.

In practical terms, this means that PT Bayer Indonesia's investment in employee empowerment, psychological safety, and participatory leadership creates the cultural soil from which agility can grow, but it does not directly prevent or mitigate operational disruptions. The human-centric culture must be operationalized through agile processes and rapid decision-making structures to produce tangible resilience outcomes.

H_2: Sustainability Awareness (SA) direct effect on Organizational Resilience (OR)

Sustainability Awareness (SA) emerged as the most influential direct predictor of Organizational Resilience (H2 accepted; $\beta = 0.288$, $t = 2.339$, $p = 0.010$), with an f-square of 0.094 indicating a small-to-medium effect. This finding demonstrates that an organizational mindset oriented toward long-term environmental and social sustainability inherently builds a more robust enterprise.

From the perspective of the Resource-Based View (RBV), sustainability awareness can be conceptualized as a strategic intangible resource that enhances an organization’s ability to achieve long-term competitive advantage and resilience. RBV posits that organizational capabilities derived from valuable, rare, inimitable, and non-substitutable (VRIN) resources enable firms to respond effectively to environmental uncertainties. In this context, sustainability awareness reflects a firm’s commitment to environmental, social, and governance (ESG) principles, which strengthens its adaptive capacity and long-term orientation.

The empirical finding that sustainability awareness has a significant positive effect on organizational resilience supports this theoretical argument. Organizations that integrate sustainability into their strategic and operational practices are more likely to develop robust risk management systems, enhance stakeholder trust, and improve resource efficiency, all of which contribute to resilience (ortiz-de-mandojana, 2016). Moreover, sustainability-oriented firms tend to adopt proactive approaches to environmental and social challenges, enabling them to anticipate disruptions and respond more effectively (Saunila M. U., 2018).

Recent studies further confirm that sustainability practices enhance organizational resilience by fostering innovation, flexibility, and long-term strategic alignment (Feng, 2020). Therefore, sustainability awareness can be

viewed as a critical strategic resource that strengthens resilience by enabling organizations to adapt, recover, and thrive in dynamic environments, particularly in highly regulated industries such as pharmaceutical manufacturing.

The direct SA → OR pathway can be understood through the VRIN lens as follows: Organizations with high sustainability awareness have already internalized the practice of long-term thinking, scenario planning, and multi-stakeholder engagement. These cognitive and strategic capabilities directly contribute to the anticipatory and absorptive dimensions of resilience, enabling the organization to detect threats earlier and absorb their impact more effectively. In the context of PT Bayer Indonesia, sustainability awareness manifests as proactive environmental management, resource optimization, and alignment with global pharmaceutical sustainability standards, which creates operational buffers that enhance resilience independently of agility.

Furthermore, the IPMA results highlight SA as the primary strategic priority; despite its high importance, its relatively lower performance score (79.87) indicates a critical area where management intervention will yield the highest return on investment for building resilience.

H_3: Lean/Continuous Improvement (LCI) direct effect on Organizational Resilience (OR).

The results indicate that Lean/Continuous Improvement (LCI) practices have a significant direct effect on Organizational Resilience (H3 accepted; $\beta = 0.194$, $t = 2.001$, $p = 0.023$), with an f-square of 0.047 indicating a small-to-medium effect. This finding confirms that the core tenets of lean management waste reduction, process standardization, and systematic problem-solving create an operational baseline that is inherently more capable of withstanding shocks.

From the standpoint of the Resource-Based View (RBV), lean continuous improvement (LCI) represents a strategic organizational capability that enables firms to enhance efficiency, adaptability, and long-term performance. RBV emphasizes that competitive advantage and resilience derive from the effective use of valuable, difficult-to-imitate capabilities embedded within organizational

processes. In this regard, LCI practices such as process standardization, waste elimination, and continuous learning constitute dynamic operational routines that strengthen a firm's ability to respond to environmental uncertainty.

The empirical finding that LCI has a significant positive effect on organizational resilience supports this theoretical perspective. Organizations that systematically implement continuous improvement practices are better equipped to detect inefficiencies, optimize resource utilization, and maintain operational stability during disruptions (Rahi, 2019). Moreover, lean systems foster a culture of problem-solving and incremental innovation, thereby enhancing organizational flexibility and recovery capacity (Bhamu, 2014).

Recent research also highlights that continuous improvement initiatives contribute to resilience by enhancing organizational learning and responsiveness to change (Saunila M. U., 2018). These capabilities enable firms to adapt processes quickly, minimize operational risks, and sustain performance in turbulent environments. Therefore, within the RBV framework, lean continuous improvement can be considered a critical capability that transforms internal resources into resilient outcomes, particularly in complex and highly regulated industries such as pharmaceutical manufacturing.

The direct LCI → OR pathway operates through what can be described as operational resilience infrastructure: standardized processes provide visibility and control, enabling deviations to be detected and corrected rapidly before they escalate into systemic failures. In the context of PT Bayer Indonesia's Cimanggis plant, lean practices such as visual management, standardized work instructions, and systematic root cause analysis create an operational environment where disruptions are identified early and contained effectively.

H_4: Dynamic Operational Agility (DOA) mediates the relationship between Human-Centric Organization (HCO) and Organizational Resilience (OR).

While the direct effect of HCO on OR is not significant, the indirect effect through Dynamic Operational Agility is statistically significant (H4 accepted; β =

0.097, t = 1.980, p = 0.024). The f-square value for HCO → DOA is 0.087, indicating a small but meaningful effect. This finding confirms that HCO operates as a foundational enabler of agility, which in turn drives resilience.

From the perspective of the Dynamic Capabilities View (DCV), organizational resilience is not solely determined by the presence of internal resources but by the organization's ability to integrate, reconfigure, and deploy these resources in response to rapidly changing environments (Teece D. J., 2018). In this context, Human-Centric Organization (HCO) represents a foundational resource that enhances employee engagement, knowledge sharing, and collaborative problem-solving. However, these human-centric attributes must be transformed into actionable capabilities to generate resilience outcomes.

The empirical finding that Dynamic Operational Agility (DOA) significantly mediates the relationship between HCO and Organizational Resilience (OR) supports this theoretical argument. DOA enables organizations to sense environmental changes, make rapid decisions, and reconfigure operational processes effectively. Thus, human-centric practices contribute indirectly to resilience by strengthening the organization's agility in responding to disruptions. Prior studies confirm that organizational agility acts as a critical mechanism linking human resource practices to performance and resilience outcomes (Adiawaty, 2025) (Teece D. J., 2016).

Furthermore, recent research highlights that employee empowerment and participatory leadership enhance agility, which in turn improves organizational adaptability and recovery capacity (AlNuaimi, 2022). Therefore, within the DCV framework, HCO can be viewed as an enabling resource that enhances dynamic operational agility, ultimately strengthening organizational resilience in complex and uncertain environments.

In the VRIN framework**,** the combination of HCO and DOA represents a resource-capability bundle that is particularly difficult for competitors to replicate. While individual human-centric practices (such as employee engagement programs) can be imitated, their deep integration with agile operational routines

creates a socially complex and causally ambiguous system that satisfies the inimitability criterion. This resource-capability synergy is what ultimately generates sustained resilience.

H_5: Dynamic Operational Agility (DOA) mediates the relationship between Sustainability Awareness (SA) and Organizational Resilience (OR).

Beyond its direct effect, Sustainability Awareness also exerts a significant indirect effect on Organizational Resilience through Dynamic Operational Agility (H5 accepted; $\beta = 0.150$, $t = 2.363$, $p = 0.009$). The f-square for SA → DOA is 0.221, representing a medium effect, the largest among all paths to DOA. This means that SA is the strongest driver of operational agility in the model.

From the perspective of the Dynamic Capabilities View (DCV), organizational resilience is achieved through a firm's ability to sense environmental changes, seize opportunities, and reconfigure internal resources in response to dynamic conditions (Teece D. J., 2018). In this context, sustainability awareness (SA) represents a strategic orientation that enhances organizational sensitivity to environmental, social, and regulatory changes. However, transforming sustainability awareness into resilience outcomes requires dynamic capabilities, particularly Dynamic Operational Agility (DOA).

The empirical finding that DOA significantly mediates the relationship between SA and Organizational Resilience (OR) supports this theoretical perspective. Organizations with strong sustainability awareness are more likely to monitor external changes proactively and adopt adaptive strategies, but it is through operational agility that these insights are translated into effective actions. DOA enables firms to respond swiftly, reconfigure processes, and maintain operational continuity during disruptions. Prior research indicates that sustainability-oriented firms exhibit higher levels of agility, thereby enhancing their adaptive capacity and resilience (Feng, 2020) (Dubey, 2017).

The total effect of SA on OR (direct + indirect = 0.288 + 0.150 = 0.438) makes Sustainability Awareness the most impactful construct in the entire model. This dual-pathway influence works both directly on resilience and indirectly

through agility, positioning SA as a uniquely powerful strategic resource. In VRIN terms, the combination of SA's direct resilience-building properties and its agility-enabling properties creates a resource that is not only valuable and rare but also generates multiple streams of competitive advantage, making it exceptionally difficult for competitors to substitute.

H_6: Dynamic Operational Agility (DOA) mediates the relationship between Lean/Continuous Improvement (LCI) and Organizational Resilience (OR).

Lean/Continuous Improvement also exerts a significant indirect effect on Organizational Resilience through Dynamic Operational Agility (H6 accepted; $\beta = 0.094$, $t = 2.073$, $p = 0.019$). The f-square for LCI → DOA is 0.084, indicating a small-to-medium effect. This finding highlights a critical theoretical nuance: lean practices must be carefully managed to enhance flexibility rather than create rigid bureaucracies.

From the perspective of the Dynamic Capabilities View (DCV), organizational resilience is driven by a firm's ability to continuously reconfigure operational processes in response to environmental changes (Teece D. J., 2018). Lean/Continuous Improvement (LCI) can be understood as an operational capability that enhances efficiency, process reliability, and organizational learning. However, within the DCV framework, these capabilities must be dynamically deployed through agility mechanisms to generate resilience outcomes.

From a DCV perspective, the acceptance of H6 demonstrates that continuous improvement practices can serve as micro foundations for dynamic capabilities. (Tetteh, 2024) examined the role of lean manufacturing in the pharmaceutical industry under the Pharma 4.0 paradigm and found that lean approaches foster a culture of continuous improvement that optimizes processes and builds the adaptive capacity needed to navigate Industry 4.0 transformations. When continuous improvement is leveraged not merely for cost-cutting but for building flexibility and responsiveness, it successfully develops the sensing (detecting process inefficiencies and emerging problems), seizing (rapidly

implementing solutions), and reconfiguring (adjusting production processes) capabilities that constitute dynamic operational agility.

Furthermore, recent research has shown that organizations that integrate continuous improvement with agility are better positioned to respond to disruptions and sustain operational continuity (Dubey, 2017). Therefore, within the DCV framework, LCI serves as a foundational capability that enhances DOA, which, in turn, drives organizational resilience in complex and highly regulated industries.

H_7: Integrated Effect (Collective -> DOA -> OR)

Accepting H7 is a pivotal finding of this research. It demonstrates that organizational resilience is not driven by isolated factors but by an integrated ecosystem of capabilities. Even though HCO (H1) did not show a direct effect, its contribution to the overall model is validated through this integrated mediation path. This suggests that at PT Bayer Indonesia, human-centric practices, sustainability awareness, and lean processes work in tandem to build a foundation of agility, which in turn secures the organization's resilience in the BANI environment."

The total effect of LCI on OR (direct + indirect = 0.194 + 0.094 = 0.288) demonstrates that Lean/Continuous Improvement contributes to resilience through a dual mechanism: stabilizing baseline operations (direct effect) and building adaptive capacity through agility (indirect effect). In VRIN terms, this dual contribution makes LCI a particularly robust strategic resource; it simultaneously provides the stable foundation needed for day-to-day operational excellence and the flexible capability needed for crisis response.

4.4.2. The Critical Mediating Role of Dynamic Operational Agility: Bridging RBV and DCV

A central theme emerging from the analysis is the indispensable role of Dynamic Operational Agility (DOA) as the bridge between foundational resources and resilience outcomes. The structural model demonstrates that DOA successfully mediates the relationships between all three foundational constructs (HCO, SA, LCI) and Organizational Resilience. The R-square value for DOA is 0.672, indicating that HCO, SA, and LCI collectively explain 67.2% of the variance in

operational agility, a moderate and substantively meaningful level of explanatory power. The R-square for OR is 0.677, confirming that the full model (including DOA as mediator) explains 67.7% of the variance in organizational resilience.

This finding provides strong empirical support for the theoretical integration of RBV and DCV. The RBV explains what resources matter (HCO, SA, LCI as VRIN resources), while the DCV explains how those resources are activated and transformed into performance outcomes through dynamic capabilities (DOA). (Ali Shojaee, 2024) Empirically demonstrated this integration, finding that the dynamic capability view significantly enhances organizational resilience by enabling firms to be agile and responsive in volatile environments. Similarly, (Prayag.G., 2024) showed that different types of dynamic capabilities build and sustain organizational resilience, particularly during crisis periods such as the COVID-19 pandemic. According to (Teece D. L., 2016) further clarified that organizational agility is not an immutable quality but must be deliberately cultivated through strong dynamic capabilities. They argued that agility involves the capacity to sense opportunities and threats, make timely decisions, and reconfigure resources cost-effectively. In the context of PT Bayer Indonesia, DOA represents this cultivated agility: the ability to rapidly adjust production schedules, reallocate resources across product lines, and implement contingency plans when disruptions occur. The fact that all three foundational resources contribute to DOA, albeit with different effect sizes (SA being the strongest driver with $f^2 = 0.221$, followed by HCO with $f^2 = 0.087$ and LCI with $f^2 = 0.084$), demonstrates that agility is a multi-sourced capability that draws on cultural, strategic, and operational foundations simultaneously.

4.4.3. Summary: The VRIN-DCV Resilience Model

The Following table summarizes how each construct in the research model maps to the RBV, VRIN, and DCV frameworks:

Table 4.15 VRIN-DCV resilience model

Construct	RBV Role	VRIN Properties	DCV Role	Effect on OR
HCO	Intangible resource (human capital, culture)	Valuable (enables engagement), Rare (genuine culture is uncommon), Inimitable (socially complex, path-dependent), non-substitutable	Microfoundation for sensing and seizing (employee willingness to share information and collaborate)	Indirect only, through DOA (β = 0.097)
SA	Strategic resource (sustainability orientation)	Valuable (anticipates threats), Rare (strategic ESG orientation uncommon in pharma), Inimitable (embedded in routines and mindsets), non-substitutable	Catalyst for all three DCV pillars: sensing (environmental scanning), seizing (green innovation), reconfiguring (resource optimization)	Direct (β = 0.288) and indirect through DOA (β = 0.150); Total = 0.438
LCI	Operational resource (processes, methodologies)	Valuable (reduces waste, improves quality), Rare (truly embedded lean culture is uncommon), Inimitable (tacit knowledge, collective routines), non-substitutable	Foundation for sensing (detecting inefficiencies) and reconfiguring (rapid process adjustment)	Direct (β = 0.194) and indirect through DOA (β = 0.094); Total = 0.288
DOA	Dynamic capability	Valuable (enables rapid response), Rare (true operational agility is uncommon), Inimitable (complex integration of multiple resources), non-substitutable	The dynamic capability itself: sensing, seizing, and reconfiguring in action	Mediates all three resource-resilience pathways: f^2 on OR = 0.141
OR	Performance outcome	The sustained competitive advantage resulting from VRIN resources activated through dynamic capabilities	The outcome of successful dynamic capability deployment	R^2 = 0.677 (67.7% variance explained)

In conclusion, the analysis demonstrates that organizational resilience at Multinational Pharmaceutical Company in Indonesia is not the product of any single resource or practice. Rather, it emerges from the synergistic interaction between VRIN-qualified foundational resources (HCO, SA, LCI) and the dynamic capability of operational agility (DOA). The RBV explains why these resources matter; they are valuable, rare, inimitable, and non-substitutable. The DCV explains how they work through the sensing, seizing, and reconfiguring mechanisms that constitute dynamic operational agility. Together, these theoretical perspectives provide a comprehensive framework for understanding and cultivating organizational resilience in the pharmaceutical manufacturing context.

In summary, the structural model analysis supported six out of the seven proposed hypotheses. While the direct effect of HCO on resilience (H1) was rejected, the individual mediation paths (H4-H6) and the comprehensive integrated mediation effect (H7) were all confirmed with high levels of significance. This validates the central role of Dynamic Operational Agility as the primary engine of resilience in the pharmaceutical industry.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Based on the data analysis, hypothesis testing, and theoretical integration of the Resource-Based View (RBV) and Dynamic Capabilities View (DCV) conducted in Chapter IV, this research draws several critical conclusions regarding the cultivation of organizational resilience in pharmaceutical manufacturing at the Cimanggis plant. The study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) with 175 respondents across six departments, yielding models that explain 67.7% of the variance in Organizational Resilience ($R^2 = 0.677$) and 67.2% of the variance in Dynamic Operational Agility ($R^2 = 0.672$).

The conclusions are drawn from the seven hypotheses tested:

The first finding reveals that human-centric organizational practices do not have a significant direct effect on organizational resilience. This suggests that although employee empowerment, participatory leadership, and psychological safety are important organizational attributes, they may not immediately translate into resilience outcomes. Instead, such practices may function as foundational resources that require further transformation through organizational capabilities.

The second finding demonstrates that sustainability awareness has a significant positive effect on organizational resilience. This indicates that organizations with strong environmental, social, and governance orientations are better equipped to anticipate disruptions, manage risks, and maintain long-term operational stability. Sustainability awareness enables firms to adopt proactive strategies and strengthen their adaptive capacity.

The third finding confirms that lean continuous improvement positively influences organizational resilience. Continuous improvement practices enhance operational efficiency, reduce waste, and foster a culture of learning, which contributes to the organization's ability to respond to uncertainty and recover from disruptions.

The fourth finding highlights that dynamic operational agility mediates the relationship between human-centric organizational practices and organizational resilience. This implies that human-centered approaches contribute to resilience indirectly by enhancing the organization's ability to respond quickly and reconfigure operations.

The fifth finding indicates that dynamic operational agility also mediates the relationship between sustainability awareness and organizational resilience. This suggests that sustainability-oriented strategies strengthen resilience when they are translated into agile operational responses.

The sixth finding further confirms that dynamic operational agility mediates the relationship between lean continuous improvement and organizational resilience. This demonstrates that continuous improvement initiatives are most effective in building resilience when supported by the organization's capability to adapt dynamically to changing conditions.

The Seventh finding is that organizational resilience is not driven by isolated factors but by an integrated ecosystem of capabilities. Even though HCO (H1) did not show a direct effect, its contribution to the overall model is validated through this integrated mediation path.

The study concludes that Human-Centric Organization, Sustainability Awareness, and Lean-Continuous Improvement collectively serve as significant and powerful drivers of Organizational Resilience. Together, these capabilities explain 67.7% of the variance in the resilience model, providing a robust empirical foundation for the proposed Pharmaceutical Excellence Framework (PEF). The findings reveal a nuanced interplay between these variables:

- Sustainability Awareness (SA) and Lean-Continuous Improvement (LCI) provide critical direct paths to resilience, ensuring that the organization remains both strategically aligned with long-term goals and operationally efficient.
- Human-Centric Organization (HCO), while not showing a direct effect, is a fundamental prerequisite for resilience. Its impact is fully realized through the mediation of Dynamic Operational Agility (DOA), demonstrating that a focus on people enables rapid resource reconfiguration.

In conclusion, the proposed Pharmaceutical Excellence Framework (PEF) provides a robust roadmap for navigating the BANI environment. By integrating the operational discipline of LCI, the strategic foresight of SA, and the human foundation of HCO, PT Bayer Indonesia can build a Dual-Track Resilience that is both stable and highly adaptive.

5.2 Theoretical Implications

This study offers several important theoretical contributions to the literature on organizational resilience by integrating the Resource-Based View (RBV) and the Dynamic Capabilities View (DCV) into a unified framework.

First, this research provides empirical validation for the integration of the Resource-Based View (RBV) and the Dynamic Capabilities View (DCV) in explaining organizational resilience. While prior studies have applied these theories independently, this study demonstrates that they are complementary rather than competing perspectives. The RBV explains **what** resources matter, HCO, SA, and LCI as resources satisfying the VRIN criteria (Valuable, Rare, Inimitable, Non-substitutable), while the DCV explains **how** those resources are activated and transformed into performance outcomes through dynamic capabilities. This integration advances the theoretical understanding that possessing VRIN resources is a necessary but insufficient condition for resilience; firms must also develop dynamic capabilities to deploy those resources effectively in turbulent environments (Barney J. , 1991) (Teece D. , 2007).

Second, the study contributes to the literature on dynamic capabilities by identifying specific microfoundations that enable the development of Dynamic Operational Agility. The finding that Human-Centric Organization works exclusively through agility (H1 rejected, H4 accepted) provides empirical evidence for Teece's (2007) argument that dynamic capabilities are built upon microfoundations, the skills, processes, and organizational structures that enable sensing, seizing, and reconfiguring. Employee empowerment and psychological safety create the conditions under which employees are willing to engage in the behaviors that constitute dynamic capabilities: sharing information, collaborating across functions, and flexibly adapting their work processes.

Third, this research extends the organizational resilience literature by demonstrating that resilience is a multi-pathway phenomenon. The finding that Sustainability Awareness operates through both direct and indirect pathways (total effect = 0.438), while Human-Centric Organization operates exclusively through an indirect pathway ($\beta = 0.097$), challenges the assumption that all organizational resources contribute to resilience in the same manner. This nuanced understanding advances theory by establishing that different types of VRIN resources have different activation mechanisms for generating resilience.

Fourth, the study contributes to the pharmaceutical manufacturing literature by providing a context-specific model of organizational resilience. The VRIN-DCV resilience model (Table 4.14) offers a comprehensive theoretical framework that maps each construct to its RBV role, VRIN properties, DCV role, and effect on Organizational Resilience. This framework can serve as a foundation for future theoretical development in highly regulated manufacturing contexts where both operational stability and adaptive flexibility are simultaneously required.

In summary, this study contributes to the growing body of resilience research by providing empirical evidence from an emerging economic context, particularly within the pharmaceutical manufacturing industry. It offers a more comprehensive and integrative perspective on how multiple organizational capabilities interact to build resilience in complex and highly regulated environments.

5.3 Practical Implications

The findings of this study offer actionable insights for management at Multinational Pharmaceutical Company in Indonesia and similar pharmaceutical manufacturing organizations seeking to strengthen their organizational resilience.

First, management should implement a dual-track resilience strategy. The research demonstrates that organizational resilience requires both a strong operational foundation and the agility to activate that foundation during crises. Prioritize Sustainability as the Primary Resilience Lever (Based on IPMA): The Importance-Performance Map Analysis reveals that Sustainability Awareness has the highest total effect on resilience but the lowest current performance. Management should immediately reallocate resources to close this sustainability gap, as improvements here will yield the highest exponential gains in both agility and overall resilience. Conversely, while human-centric practices perform exceptionally well (score: 86.65), they offer diminishing returns for resilience compared with sustainability investments. Then continue strengthening the operational baseline in Lean/Continuous Improvement practices, directly enhancing the organization's capacity to absorb shocks. The second track involves deliberately cultivating Dynamic Operational Agility to ensure the organization can rapidly sense environmental changes, seize emerging opportunities, and reconfigure its resources in response to disruptions. Neither track alone is sufficient; both must be pursued simultaneously.

Second, human-centric practices should be explicitly repositioned as enablers of agility. Since HCO does not directly impact resilience but works exclusively through Dynamic Operational Agility, management should link employee engagement initiatives directly to operational agility goals. Training programs, leadership development, and employee empowerment efforts should focus on encouraging cross-functional collaboration, rapid problem-solving, and decentralized decision-making. Performance metrics for human-centric initiatives should include agility indicators such as speed of response to disruptions, frequency of cross-functional problem-solving, and employee participation in continuous improvement activities.

Third, Sustainability Awareness should be elevated to a core strategic capability. Given that SA has the largest total effect on Organizational Resilience (0.438), the Multinational Pharmaceutical Company in Indonesia should elevate sustainability from a compliance or corporate social responsibility (CSR) function to a strategic driver of resilience. The organization should continuously scan the environment for emerging ESG (Environmental, Social, and Governance) trends and use sustainability goals as a catalyst for process innovation and resource optimization. Sustainability-driven initiatives, such as green manufacturing, circular economy practices, and energy efficiency programs, should be framed not merely as environmental obligations but as strategic investments in organizational resilience.

Fourth, Lean/Continuous Improvement practices should evolve beyond cost reduction toward adaptive capacity building. To maximize the dual benefits of LCI (direct resilience and agility-mediated resilience), management must ensure that lean methodologies are not implemented in ways that create rigid bureaucracies. Standardized work procedures should be designed to allow for rapid reconfiguration during disruptions. Root cause analysis should be used not only to fix past errors but also to anticipate future vulnerabilities. Continuous improvement events (kaizen) should include scenarios that test the organization's ability to adapt, not just its ability to optimize.

Fifth, Dynamic Operational Agility should be measured and managed as a strategic capability. Given that DOA mediates all three resource-resilience pathways and has a direct f-square of 0.141 on Organizational Resilience, management should establish key performance indicators (KPIs) for operational agility. These may include production changeover time, time to respond to supply chain disruptions, speed of regulatory change implementation, and the organization's ability to reallocate resources across product lines during demand fluctuation.

5.4 Limitations of the Research

While this study provides valuable insights into the determinants of organizational resilience, several limitations must be acknowledged.

First, the study employs a cross-sectional research design, capturing data at a single point in time. Organizational resilience, dynamic capabilities, and the foundational resources examined in this study are developed and tested over extended periods. The cross-sectional design limits the ability to definitively establish causal relationships, as it cannot capture the temporal dynamics of how resources are transformed into capabilities

and subsequently into resilience outcomes. The relationships observed may differ during periods of actual crisis versus periods of relative stability.

Second, the study is limited to a single organizational context PT Bayer Indonesia's Cimanggis plant. While this provides depth of understanding within the pharmaceutical manufacturing sector, it constrains the external validity and generalizability of the findings. The highly regulated nature of pharmaceutical manufacturing, the specific organizational culture of PT Bayer Indonesia, and the Indonesian business environment may influence the relationships observed in ways that do not apply to other industries, organizations, or countries.

Third, the sample size of 175 respondents, while adequate for PLS-SEM analysis and exceeding the minimum threshold calculated using the G-Power method, represents a response rate of 53.2% from the 329 employees in the target population. Non-response bias may exist if the employees who did not participate differ systematically from those who did in their perceptions of organizational practices and resilience.

Fourth, all data were collected through self-reported questionnaires, which introduces the potential for common method bias. Although the measurement model demonstrated satisfactory discriminant validity (all HTMT values ≤ 0.85), the reliance on perceptual measures means that the findings reflect employees' subjective assessments rather than objective organizational outcomes. Actual organizational resilience, measured through recovery time from disruptions, financial performance during crises, or operational continuity metrics, may differ from perceived resilience.

Fifth, the study focuses on Dynamic Operational Agility as the sole mediating variable between foundational resources and Organizational Resilience. Other potential mediating mechanisms, such as digital transformation capabilities, supply chain integration, organizational learning, or innovation capacity, were not included in the model. The R-squared value of 0.677 for Organizational Resilience, while moderate and substantively meaningful, indicates that approximately 32.3% of the variance remains unexplained by the current model.

5.5 Recommendations for future research

Based on the study's findings and limitations, several directions for future research are proposed.

First, Integration of Financial Resilience: Future studies should incorporate objective financial metrics (such as liquidity ratios, debt-to-equity stability, and cash flow volatility during disruptions) to complement the perceptual data used in

this study. This would provide a more holistic understanding of how operational resilience translates into financial sustainability.

Second, Objective Performance Triangulation: Researchers should consider using secondary operational data (e.g., actual production downtime logs, supply chain recovery speeds, or waste reduction percentages) to triangulate survey-based findings, thereby enhancing the auditability and reliability of the results.

Third, Longitudinal Analysis: A longitudinal study design would be beneficial for observing how these resilience drivers evolve over time and impact performance across different stages of a major disruption.

Fourth, Cross-Industry Comparison: Expanding this research to other highly regulated manufacturing sectors (e.g., aerospace, food and beverage) would help validate the generalizability of the Pharmaceutical Excellence Framework.

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APPENDIX A

Skala Likert (Kuisioner):

1. Sangat tidak Setuju (Strongly Disagree)
2. Tidak Setuju (Disagree)
3. Netral (agree/Disagree)
4. Cenderung setuju (Agree)
5. Sangat Setuju (Strongly Agree)

Human-Centric Organization

1. Bayer Pabrik Cimanggis mendorong karyawan untuk memberikan ide dalam meningkatkan kinerja organisasi.
2. Leader secara aktif melibatkan karyawan dalam menyelesaikan masalah operasional.
3. Bayer Pabrik Cimanggis mendukung peningkatan keterampilan karyawan
4. Saya merasa memiliki rasa kepemilikan yang kuat terhadap pekerjaan saya dan hasilnya
5. Saya merasa bahwa organisasi ini adalah organisasi kita bersama

Sustainability Awareness

1. Bayer Pabrik Cimanggis secara aktif mempertimbangkan dampak lingkungan dalam setiap pengambilan keputusan bisnis
2. Bayer Pabrik Cimanggis secara aktif mempertimbangkan dampak sosial dalam setiap pengambilan keputusan bisnis
3. Bayer Pabrik Cimanggis memiliki sasaran dan target keberlanjutan (sustainability program) yang terdefinisi dengan baik
4. Kinerja KPI dari sustainability program (program keberlanjutan) secara rutin dikomunikasikan
5. Program keberlanjutan (sustainability) secara rutin dikomunikasikan
6. Bayer Pabrik Cimanggis mendorong saya secara aktif berupaya mengurangi limbah dalam proses produksi
7. Bayer Pabrik Cimanggis memprioritaskan penggunaan teknologi yang hemat energi
8. Bayer Pabrik Cimanggis memprioritaskan penggunaan praktik yang hemat energi
9. Bayer Pabrik Cimanggis berpartisipasi aktif dalam kegiatan yang memberikan manfaat bagi masyarakat

Lean Continuous Improvement

1. Bayer Pabrik Cimanggis secara konsisten menggunakan prinsip Lean Six Sigma untuk meningkatkan proses operasional kami seperti (5S, Value Stream, Kanban, QCC, CIL, CL)
2. Pemecahan masalah berbasis data (misalnya DMAIC/A3R/QCC) merupakan praktik standar di Bayer pabrik Cimanggis

3. Bayer Pabrik Cimanggis berfokus pada pengurangan variasi proses untuk meningkatkan kualitas
4. Semua karyawan didorong untuk mengusulkan perbaikan di area kerja mereka
5. Bayer Pabrik Cimanggis mendorong karyawan memiliki budaya yang mendukung perbaikan kecil secara berkelanjutan
6. Manajemen Bayer Pabrik Cimanggis mendorong tim untuk mengimplementasikan ide-ide perbaikan mereka baik sendiri atau berkelompok

Dynamic Operational Agility

1. Manajemen Bayer Pabrik Cimanggis secara aktif memantau perubahan Regulasi yang mempengaruhi operasional
2. Organisasi Bayer Pabrik Cimanggis mampu mengidentifikasi tantangan operasional pada tahap awal
3. Manajemen Bayer pabrik Cimanggis mampu mengenali peluang yang muncul secara cepat
4. Manajemen Bayer pabrik Cimanggis mampu mengenali ancaman yang muncul secara cepat
5. Leader di Bayer pabrik Cimanggis mampu mengambil keputusan dengan cepat dalam merespons perubahan operasional
6. Organisasi Bayer pabrik Cimanggis merespons dengan cepat terhadap tantangan operasional yang tidak terduga.
7. Proses pengambilan keputusan dalam organisasi berlangsung secara efisien
8. Proses pengambilan keputusan dalam organisasi berlangsung secara responsive
9. Organisasi dapat dengan cepat menyesuaikan proses operasional ketika terjadi perubahan
10. Karyawan mampu menyesuaikan cara kerja mereka untuk menghadapi tuntutan yang berubah
11. Organisasi dapat dengan cepat mengalokasikan kembali sumber daya untuk menghadapi tantangan operasional
12. Manajemen mampu menyesuaikan penempatan tenaga kerja ketika diperlukan

Organizational Resilience

1. Organisasi secara aktif mengantisipasi potensi risiko operasional
2. Strategi manajemen risiko diterapkan untuk menghadapi situasi yang tidak pasti
3. Karyawan bekerja sama secara efektif dalam menghadapi situasi krisis operasional
4. Organisasi menyesuaikan strategi berdasarkan perubahan lingkungan
5. Rencana pemulihan tersedia untuk mengembalikan operasi normal secara efisien
6. Organisasi secara sistematis mengevaluasi gangguan untuk meningkatkan respons di masa depan

APPENDIX B : SmartPLS Output

Statistical Description

Variable Human-Centric Organization (HCO)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Human-Centric Organization (HCO)	HCO1	2	5	0,573	4,622
	HCO2	2	5	0,622	4,552
	HCO3	2	5	0,615	4,605
	HCO4	2	5	0,615	4,605
	HCO5	2	5	0,614	4,610
	Mean				**4,599**

Variable Sustainability Awareness (SA)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Sustainability Awareness (SA)	SA1	3	5	0,560	4,576
	SA2	3	5	0,646	4,413
	SA3	3	5	0,575	4,535
	SA4	2	5	0,655	4,419
	SA5	2	5	0,738	4,413
	SA6	2	5	0,711	4,488
	SA7	2	5	0,623	4,535
	SA8	2	5	0,642	4,512
	SA9	3	5	0,561	4,628
	Mean				**4,502**

Variable Lean/Continuous Improvement (LCI)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Lean/Continuous Improvement (LCI)	LCI1	3	5	0,573	4,622
	LCI2	2	5	0,642	4,529
	LCI3	2	5	0,679	4,401
	LCI4	3	5	0,532	4,657
	LCI5	2	5	0,603	4,547
	LCI6	2	5	0,555	4,610
	Mean				**4,561**

Variable Dynamic Operational Agility (DOA)

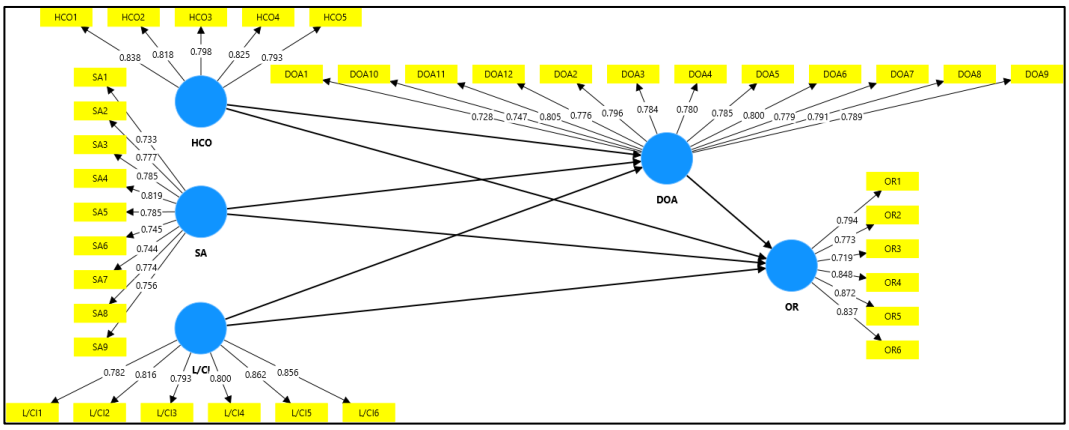
Variable	Indicator	Min	Max	Standard Deviation	Mean
Dynamic Operational Agility (DOA)	DOA1	3	5	0,575	4,471
	DOA2	2	5	0,716	4,227
	DOA3	3	5	0,603	4,337
	DOA4	2	5	0,711	4,285
	DOA5	2	5	0,614	4,471
	DOA6	2	5	0,622	4,448
	DOA7	2	5	0,674	4,250
	DOA8	2	5	0,674	4,250
	DOA9	1	5	0,692	4,442
	DOA10	1	5	0,732	4,169
	DOA11	2	5	0,685	4,279
	DOA12	2	5	0,724	4,227
			Mean		**4,321**

Variable Organizational Resilience (OR)

Variable	Indicator	Min	Max	Standard Deviation	Mean
Organizational Resilience (OR)	OR1	2	5	0,619	4,297
	OR2	2	5	0,685	4,308
	OR3	2	5	0,639	4,302
	OR4	3	5	0,601	4,372
	OR5	2	5	0,620	4,331
	OR6	3	5	0,600	4,419
			Mean		**4,338**

OUTER MODEL

Indicator Reliability



Nilai Loading Factor

Variable	Indicator	Loading Factor
Human-Centric Organization (HCO)	HCO1	0,838
	HCO2	0,818
	HCO3	0,798
	HCO4	0,825
	HCO5	0,793
Sustainability Awareness (SA)	SA1	0,733
	SA2	0,777
	SA3	0,785
	SA4	0,819
	SA5	0,785
	SA6	0,745
	SA7	0,744
	SA8	0,774
	SA9	0,756
Lean/Continuous Improvement (LCI)	LCI1	0,782
	LCI2	0,816
	LCI3	0,793
	LCI4	0,800
	LCI5	0,862
	LCI6	0,856
Dynamic Operational Agility (DOA)	DOA1	0,728
	DOA2	0,796
	DOA3	0,784
	DOA4	0,780
	DOA5	0,785
	DOA6	0,800
	DOA7	0,779
	DOA8	0,791
	DOA9	0,789
	DOA10	0,747
	DOA11	0,805
	DOA12	0,776
Organizational Resilience (OR)	OR1	0,794
	OR2	0,773
	OR3	0,719
	OR4	0,848
	OR5	0,872
	OR6	0,837

Construct Reliability

	Cronbach's Alpha	Composite Reliability
HCO	0,873	0,908
SA	0,913	0,929
LCI	0,901	0,924
DOA	0,942	0,949
OR	0,893	0,919

Convergent Validity

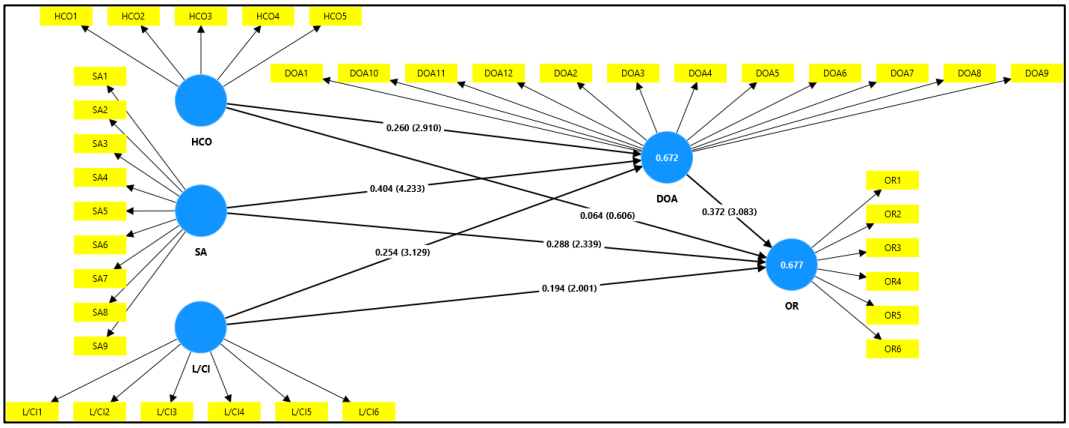
	Average Variance Extracted (AVE)
HCO	0,663
SA	0,591
LCI	0,670
DOA	0,609
OR	0,654

Discriminant Validity

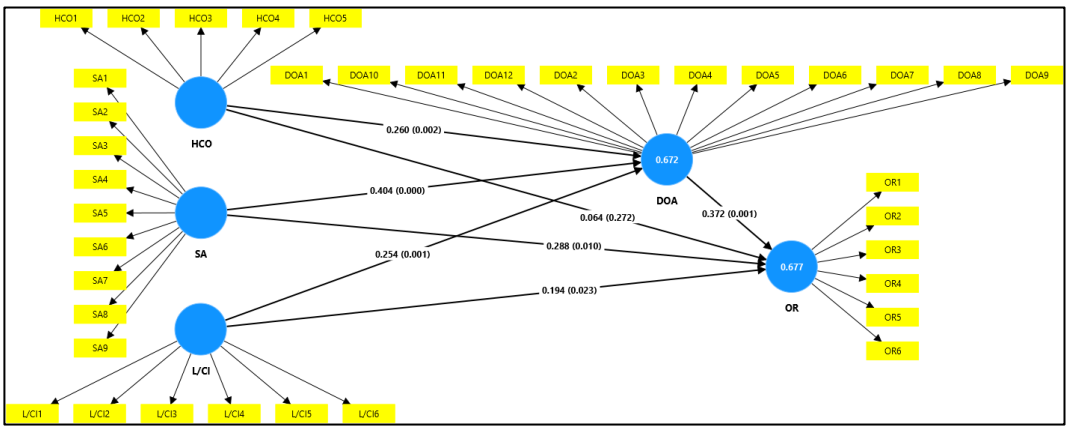
	DOA	HCO	LCI	OR	SA
DOA					
HCO	0,793				
LCI	0,773	0,794			
OR	0,842	0,757	0,778		
SA	0,816	0,782	0,760	0,826	

INNER MODEL

Uji Path Koefisien dan Hipotesis



Nilai Koefisien, T Statistic dan R Square Adjusted



Nilai Koefisien, P Value dan R Square Adjusted

	Koefisien	T Statistic	P Value	Keterangan
HCO -> OR	0,064	0,606	0,272	H1 Ditolak
SA -> OR	0,288	2,339	0,010	H2 Diterima
LCI -> OR	0,194	2,001	0,023	H3 Diterima
HCO -> DOA -> OR	0,097	1,980	0,024	H4 Diterima
SA -> DOA -> OR	0,150	2,363	0,009	H5 Diterima
LCI -> DOA -> OR	0,094	2,073	0,019	H6 Diterima

Uji R Square

	R Square	R Square Adjusted
DOA	0,678	0,672
OR	0,685	0,677

Uji F Square

	F Square
HCO -> DOA	0,087
SA -> DOA	0,221
LCI -> DOA	0,084
HCO -> OR	0,005
SA -> OR	0,094
LCI -> OR	0,047
DOA -> OR	0,141

Uji Q Square Predictive Relevance

Variable	Indicator	Q^2predict	PLS SEM RMSE	LM RMSE	PLS SEM MAE	LM MAE
Dynamic Operational Agility (DOA)	DOA1	0,486	0,415	0,472	0,341	0,354
	DOA2	0,317	0,595	0,661	0,471	0,513
	DOA3	0,379	0,478	0,536	0,403	0,429
	DOA4	0,268	0,613	0,683	0,475	0,526
	DOA5	0,465	0,452	0,483	0,342	0,335
	DOA6	0,505	0,440	0,494	0,345	0,365
	DOA7	0,380	0,534	0,598	0,441	0,484
	DOA8	0,399	0,526	0,586	0,417	0,472
	DOA9	0,422	0,530	0,553	0,377	0,402
	DOA10	0,316	0,610	0,619	0,478	0,501
	DOA11	0,367	0,548	0,552	0,424	0,442
	DOA12	0,370	0,578	0,597	0,452	0,481
Organizational Resilience (OR)	OR1	0,349	0,503	0,575	0,410	0,448
	OR2	0,355	0,553	0,588	0,431	0,430
	OR3	0,271	0,550	0,568	0,443	0,451
	OR4	0,426	0,458	0,500	0,373	0,394
	OR5	0,509	0,437	0,468	0,360	0,376
	OR6	0,497	0,428	0,444	0,344	0,344