STRATEGIC ORIENTATIONS AND DIGITAL CAPABILITY AS DRIVERS OF INNOVATION PERFORMANCE IN MANUFACTURING COMPANIES

A THESIS

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This thesis has been written and submitted to fulfill the final examination requirements for a Bachelor's degree in the Management Study Program.

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DECLARATION ORIGINALITY

I, the undersigned, hereby declare that this thesis is my own work and has never been submitted for a degree at any university.

To the best of my understanding, all citations, references, and ideas derived from the works of others in this paper have been properly acknowledged and listed in the bibliography in accordance with academic writing conventions. Should this declaration later be proven inaccurate, I am prepared to accept any sanctions in accordance with the applicable rules and regulations.

Yogyakarta, 28 October 2025

Author,

Jashinta Miranda Hasna

BERITA ACARA UJIAN TUGAS AKHIR

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STRATEGIC ORIENTATIONS AND DIGITAL CAPABILITY AS DRIVERS OF INNOVATION PERFORMANCE IN MANUFACTURING COMPANIES

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ABSTRACT

In the era of Industry 4.0, manufacturing firms face increasing pressure to enhance innovation performance while maintaining economic efficiency and sustainability. This study examines the influence of Technology Orientation, Economic Orientation, Digital Capability, and Sustainable Product Design on Innovation Performance. A quantitative approach was employed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyse data collected from 159 manufacturing company respondents. The findings reveal that Technology Orientation significantly enhances Digital Capability, Economic Orientation, Sustainable Product Design, and Innovation Performance. Likewise, Economic Orientation positively affects both Sustainable Product Design and Innovation Performance, emphasizing the importance of financial discipline in supporting innovation-driven outcomes. Additionally, Digital Capability has a significant impact on Sustainable Product Design and Innovation Performance, underscoring the role of digital transformation in improving sustainability practices. However, Sustainable Product Design does not significantly influence Innovation Performance, indicating that sustainability-oriented design efforts may not always translate directly into higher innovation outcomes. These results highlight that integrating technology, economic focus, and digital capabilities is essential for achieving sustainable innovation and competitiveness in the manufacturing sector.

Keywords: Technology Orientation, Digital Capability, Economic Orientation, Strategic Orientation, Sustainability Performance, Sustainable Product Design, Innovation Performance

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ABSTRAK

Di era Industri 4.0, perusahaan manufaktur menghadapi tekanan yang semakin besar untuk meningkatkan kinerja inovasi sambil mempertahankan efisiensi ekonomi dan keberlanjutan. Studi ini mengkaji pengaruh Orientasi Teknologi, Orientasi Ekonomi, Kapabilitas Digital, dan Desain Produk Berkelanjutan terhadap Kinerja Inovasi. Pendekatan kuantitatif digunakan menggunakan Partial Least Squares Structural Equation Modeling (PLS-SEM) untuk menganalisis data yang dikumpulkan dari 159 responden perusahaan manufaktur. Temuan ini mengungkapkan bahwa Orientasi Teknologi secara signifikan meningkatkan Kapabilitas Digital, Orientasi Ekonomi, Desain Produk Berkelanjutan, dan Kinerja Inovasi. Demikian pula, Orientasi Ekonomi berdampak positif pada Desain Produk Berkelanjutan dan Kinerja Inovasi, yang menekankan pentingnya disiplin finansial dalam mendukung hasil yang didorong oleh inovasi. Selain itu, Kapabilitas Digital memiliki dampak signifikan pada Desain Produk Berkelanjutan dan Kinerja Inovasi, yang menggarisbawahi peran transformasi digital dalam meningkatkan praktik keberlanjutan. Namun, Desain Produk Berkelanjutan tidak secara signifikan memengaruhi Kinerja Inovasi, yang menunjukkan bahwa upaya desain yang berorientasi pada keberlanjutan mungkin tidak selalu langsung menghasilkan hasil inovasi yang lebih tinggi. Hasil ini menyoroti bahwa mengintegrasikan teknologi, fokus ekonomi, dan kemampuan digital sangat penting untuk mencapai inovasi dan daya saing berkelanjutan di sektor manufaktur.

Kata Kunci: Orientasi Teknologi, Kemampuan Digital, Orientasi Ekonomi, Orientasi Strategis, Kinerja Keberlanjutan, Desain Produk Berkelanjutan, Kinerja Inovasi

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INTRODUCTION

1.1 Background

In today's era of digital transformation and accelerating global competition, companies are increasingly challenged to maintain competitiveness through innovation, efficiency, and sustainability. The advent of the Fourth Industrial Revolution (Industry 4.0) has reshaped business landscapes through the integration of digital technologies, data-centric operations, and advanced automation. This evolution has heightened operational complexity and compelled firms to realign their strategic orientations toward technology, economic growth, and sustainability (Yaqub & Alsabban, 2023). Driven by changing market forces and international sustainability goals, the manufacturing sector is increasingly required to align technology adoption with sustainable practices and cost-efficient operations (Baca-Neglia et al., 2025). Within this framework, firms need to cultivate both technological and digital capabilities, align these with their economic goals, and incorporate sustainable design principles to enhance innovation performance, which acts as an essential indicator of their capacity to transform ideas and resources into valuable outputs.

According to Thomran et al. (2022), the degree of Technology Orientation within an organization critically shapes its technological adoption capability, creative development, and innovation output, all of which contribute to enhanced competitiveness and adaptability (Thomran et al., 2022). However, technological proficiency by itself does not suffice to sustain long-term business viability. Rather, it must be complemented by an economic orientation that prioritizes efficiency, profitability, and value generation (Campos-Núñez & Serrano-Malebrán, 2024). Furthermore, economic considerations in the planning and monitoring of the production process demonstrate that time, quality, and price all play key roles in how well a business does in competing in the marketplace (Rounaghi et al., 2021). This has made the formerly rapid economic growth paradigm need to prioritise high-quality development (Tang & Cao, 2025). This balance between technological and economic orientations forms the foundation for innovation-driven competitiveness in modern companies. Beyond technological and economic priorities, the advent of the Fourth Industrial Revolution underscores digital capability as a decisive element of organizational achievement, surpassing traditional technological and economic imperatives (Huber et al., 2024). Companies that develop high levels of digital capability can harness the power of analytics, automation, and digital tools to drive innovation and guide strategic management decisions (Samsuden et al., 2024). Digital capabilities enable faster product development, integration of customer feedback, and operational optimization, thereby strengthening innovation performance and sustainability outcomes (Zhuge et al., 2023).

Companies often aim to maintain a strong brand reputation, foster consumer confidence, and develop effective profit-driven strategies, while also adapting to economic and environmental pressures that increasingly necessitate sustainable production methods (Mazumdar et al., 2025). To align environmental responsibility with revenue generation, companies should embed regenerative methods into their workflows, ensuring thoughtful use of natural resources (Hussain et al., 2025). In companies, the cost management implemented has the main objective of reducing costs and maximizing profits. However, companies are progressively realising that they must integrate sustainability into their cost management strategies as a consequence of growing awareness of resource destruction and environmental degradation (Hossain & Hasan, 2024). Moreover, in order to maintain their competitive advantage, manufacturing companies must implement sustainable practices. Sustainable Design Product (SDP) is one of the approaches to adopt sustainability practices, it also plays an important role in improving product sustainability and has garnered significant interest from manufacturing companies (Mengistu et al., 2024). Sustainable product design (SPD) involves incorporating environmental and social considerations into the product development process, such as the use of renewable and recyclable materials, energy-efficient manufacturing processes, and waste minimization (Jiang et al., 2021). By adopting sustainable product design, manufacturing companies can not only reduce their environmental impact but also increase their competitive advantage and innovation performance (Labella-Fernández et al., 2021).

The capacity for innovation is significant. The method of innovation keeps changing, particularly in green innovation initiatives (C. C. J. Cheng, 2020). Company innovation has become an important driver of economic growth and industrial improvement in an increasingly competitive global business environment (R. Yang et al., 2025). To encourage high-quality development in the manufacturing sector, it is important to support the innovative productivity of manufacturing companies (Meng & Gong, 2024). Furthermore, internal company economic factors, including organisational size, investment in research and development, financial arrangement, and resources, are seen to be primary determinants of innovation performance (Liu et al., 2025). Meanwhile, organizational slack establishes if a company is capable of funding costly innovations, covering the expenses of enforcing innovations, or attempting out innovative ideas before they are truly required (Rosner, 1968).

This research paper aims to further explore the influence of technological orientation on sustainable product design and innovation performance and its relationship with economic orientation in manufacturing firms. It is important to understand how these factors interact to support the implementation of sustainable practices and drive innovation in the industry. This study is conducted without differentiating firm size; therefore, the findings reflect a general perspective across firms and may not fully capture variations arising from differences in organizational scale and operational complexity. The focus of this research is on how a company's technology orientation becomes the basis for the organization and the role of economic orientation, digital capabilities, and sustainable product design on innovation performance.

Previous studies have highlighted that adopting a sustainable orientation can be a significant aspect for established companies to clarify the wide range in innovation performance (C. C. J. Cheng, 2020). Companies that are generating profits beat their competition by exceeding them on basic requirements. These companies integrate environmental, social, and corporate governance (ESG) priorities into their growth strategies (The Triple Play: Growth, Profit, and Sustainability, n.d.). On the other hand, economic orientation has gotten little consideration, despite the fact that there are plenty of studies on sustainable orientation and how it affects innovation performance (Jagani, 2023).

Key studies cited in the two main articles in this research examine how technology orientation influences sustainability activities in new product development and innovation performance while maintaining financial priorities, and also how digital capabilities play a role in this relationship. This study highlights that a company's technology orientation is a key driving factor in improving innovation performance that implements environmental protection and social responsibility aspects through sustainable product design and digital capabilities while maintaining the company's financial priorities, so the variables in this study are important to determine the technology orientation factor through digital capabilities, sustainability, and also the company's financial factors that also influence the company's innovation and operational performance in producing its products (Jagani, 2023) (Xi et al., 2025).

Referring to the work of Jagani and Xi et al., this study was conducted to expand previous literature on how companies' orientation influences the way companies innovate and engage directly with sustainability strategies that are currently important for companies to implement, especially manufacturing companies. The variable in the main article has been examined by conducting a literature review related to new product development, strategic orientation, digital capability, and sustainable product design. This study will present a different perspective on new product development and innovation performance in a company.

1.2 Research Questions

Based on the background of the research that the author has presented above, several main problems in this research can be formulated as follows:

1. Does a firm's economic orientation influence its sustainable product design practices?
2. Is sustainable product design positively related to innovation performance?
3. Does a firm's economic orientation affect its innovation performance?
4. Does technology orientation influence sustainable product design in firms?
5. Is technology orientation positively related to innovation performance?
6. Does technology orientation influence a firm's economic orientation?
7. Does a firm's digital capability influence its sustainable product design?
8. Does digital capability influence a firm's innovation performance?
9. Does digital capability influence a firm's technology orientation?

1.3 Research Objectives

Based on the background and research problem stated before, the objectives of this study are as follows:

1. To examine whether a firm's economic orientation influences its sustainable product design practices.
2. To determine whether sustainable product design is positively related to innovation performance.
3. To assess whether a firm's economic orientation affects its innovation performance.
4. To analyse whether technology orientation influences sustainable product design in firms.
5. To determine whether technology orientation is positively related to innovation performance.
6. To evaluate whether technology orientation influences a firm's economic orientation.
7. To examine whether a firm's digital capability influences its sustainable product design.
8. To assess whether digital capability influences a firm's innovation performance.
9. To analyse whether digital capability influences a firm's technology orientation.

1.4 Research Benefits

This research offers several benefits in theory and practice, which are described as follows:

1.4.1 Theoretical Benefits

This research contributes to the theoretical development of strategic management, sustainability, and innovation literature by integrating economic orientation, technology orientation, and digital capability into a single conceptual framework to examine their influence on sustainable product design and innovation performance. Although these factors have been examined separately in previous research, little is known about how they interact in a sustainable setting. In this regard, digital capability has been recognized as a pivotal catalyst for sustainable entrepreneurship, as it empowers enterprises to generate socio-environmental value simultaneously with economic returns (Holzmann & Gregori, 2023). Through the convergence of these perspectives, this study provides an original conceptual standpoint that explicates the dynamic interrelations between strategic orientations and innovation underpinned by sustainable imperatives.

1.4.2 Practical Benefits

In a practical sense, this study presents practical recommendations that can assist individuals in making decisions to determine which strategy orientation (economic, technological, or digital) is best suited to promoting innovation performance and sustainable product design. Product designers will find these insights useful in incorporating sustainability considerations into the design process without sacrificing innovative goals. According to research, a cohesive alignment between product innovation, organization, and business model is necessary for manufacturing to successfully achieve digital transformation (Fan et al., 2023). Furthermore, the findings of this study will support digital transformation teams by highlighting how enhancing digital capabilities can indirectly strengthen economic and technological orientations. This study offers evidence-based suggestions to regulators to promote the adoption of innovative and sustainable design practices in the manufacturing sector

CHAPTER II

LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Company's Orientation

Orientations in organization are the operational emphasis that influences the intended objectives and affects company policies (Jagani, 2023). Prior to the start of manufacturing or marketing activities, this orientation includes identifying the company's objectives and capabilities and formulating plans (Garcia et al., 2025). The article also states that companies develop the essential elements of their style and tradition through their business orientation. The company's orientation revolves around the business; the orientation in which the company runs its operations is determined by how the company functions, the products or services it provides, the challenges it faces, and the philosophies it follows (RingCentral Team, 2021). The companies generally strive to mitigate the effects of price competition, consistently enhance cost efficiency, and simultaneously optimise new market opportunities (Masa'deh et al., 2018). In order to accomplish this, selecting a suitable orientation is critical to a company's success (Spooner, 2023). This affects every aspect from the manufacturing process to marketing strategy and consumer relations.

2.1.2 Understanding the Company's Sustainable Performance

The recognition of the vital role of company sustainability has increased over the last two decades. At the organizational level, sustainability refers to managing a company in such a way that it will keep operating for generations to come while maintaining its environmental and social programs (Danciu, 2013). Subsequently describes the interaction of the company's operational performance with its environmental, economic, and social performance, including its ability to fulfill its company goals and increase shareholder value while taking consideration of long-term economic, environmental, and social responsibilities (Al-Abbadi & Abu Rumman, 2023).

In the past few years, stakeholders have begun to show an increasing proficiency in risks associated with environmental and other elements, which has also raised expectations for organizations' effective communication of information (Ştefan & Ștefănescu, 2024). In an ideal world, the socio-economic environment in which they operate would be designed to reward enterprises that demonstrate superior sustainability performance in order to stimulate further action (Smiljkovic, 2023). The concept of sustainability performance describes the extent to which a firm acknowledges and responds responsibly to the outcomes that arise from its business operations (Kantabutra, 2024).

According to previous research, sustainability in new product design and manufacturing is a broadly understood notion, even though it is not yet commonly implemented (Shetty, 2016). Viability risk occurred in industries such as manufacturing industries, which give rise to a significant amount of waste materials. As a consequence, in the manufacturing sector, it becomes increasingly important to assess and evaluate fast-changing innovation concepts for addressing environmental concerns and fostering sustainable business practices (Sarfraz et al., 2022). This article examines how sustainable product design (SPD), as a form of company sustainability performance, mediates the relationships among economic orientation, technological orientation, digital capabilities, and company innovation performance.

2.2 Variables Explanation

2.2.1 Economic Orientation

The foundation of an organization's primary focus on financial objectives is its economic orientation (Jagani, 2023). According to existing literature, economic orientation is a strategic management technique that promotes the concept that a company's primary responsibility is to prioritize its shareholders' financial interests. Considering the economic factors, rather than corruption, this orientation encompasses revenue growth from long-term investment and strategic production (Busch et al., 2021). It also refers to a company's strategic preference for long-term financial stability, cost control, and profitability achieved by intentional planning and managerial methods (R. Zhang et al., 2023). Previous studies have shown that the company's value is profoundly affected by its financial or economic performance. As a result, increased profitability will bring in investors, demand larger market shares, and increase the company's value (Lim et al., 2024). More recent studies have shown that economic orientation plays a critical role in influencing resource allocation and defining behaviour within organizations, especially in dynamic markets where profitability is directly linked to business value and investor trust (Khan et al., 2022). Therefore, in this study, economic orientation is operationalized as the firm's commitment to sustained revenue growth, strategic cost advantage, clear return-on-investment guidelines, contingency planning, senior management accountability, and communication of financial priorities. In this sense, economics provides a structure for organizations to maintain financial resilience while pursuing larger innovation and sustainability objectives.

2.2.2 Technology Orientation

Technology orientation refers to a company's inclination to implement, investigate, and use advanced technological capabilities in order to generate innovation, optimise business processes, and preserve a competitive advantage (Borodako et al., 2022). This perspective is distinguished by action instances such as making investments in advanced technologies, systematically exploring opportunities in technology, and acknowledging technical innovation as an essential aspect of strategies (Nikkhah et al., 2024). According to Borodako (2022) technology orientation indicates a company's commitment to conducting investigations, advancing technology, potential for invention examination, and technological forecasting of developments (Borodako et al., 2022).

Empirical research repeatedly emphasizes the significance of this perspective. For example, Xi et al. (2025) discovered that technology orientation has a direct and positive effect on green process innovation along with indirectly defining conclusions with the help of the mediating role of digital capabilities, emphasizing the way technology-driven firms reallocate resources regarding sustainable innovation strategies (Xi et al., 2025). Recently, Lee and Trimi (2024) demonstrated the way technological orientation, together with absorptive capability, supports digital innovation and sustainable performance in the digital market, further confirming its critical role in assuring flexibility and competitiveness (Lee & Trimi, 2024). Collectively, these insights underscore that technology orientation should be conceptualized not solely as the utilization of modern technological tools, but rather as a strategic framework through which firms orchestrate resource allocation, cultivate innovative competencies, and secure long-term resilience amidst dynamic market uncertainties.

2.2.3 Digital Capability

Many studies define digital capability as an indicator of dynamic capacities in the digital age, such as the capacity to notice technology opportunities (sensing), capture opportunities (seizing), and rearrange organizational resources and procedures (transforming). This model connects digital competence with strategic readiness and organizational flexibility (M. Zhang et al., 2024). It encompasses not only the possession of modern digital resources, but also the strategic and cultural agility to capitalize on digital possibilities and respond properly to digital transformation (Melhem & Jacobsen, n.d.). An alternative conceptualization highlights the functional outcomes of digital capability, framing it as the organizational capacity to develop novel products, services, and processes through the deployment of digital technologies, while simultaneously reconfiguring business models to enhance performance. Thus, digital capability serves as a critical mechanism linking digital investments to measurable organizational outcomes (Wang et al., 2022).

Scientific studies have emphasized its importance for determining business performance. In this instance, Warner and Wäger (2019) contend that digital capability is a multidimensional concept encompassing detecting, acquiring, and converting processes, which combined enable organizations to respond immediately to disruptive technological advancements and build new business models. Similarly, Joensuu and Matalamäki (2023) discovered that companies that have greater digital capability are more inclined to produce innovative products and services, because these abilities assist them in determining possibilities, allocating resources with greater efficiency, and executing digital solutions that improve their market agility (Joensuu-Salo & Matalamäki, 2023). More recently, several studies have highlighted that digital capabilities operate as a bridge between technology adoption and sustainable performance, permitting organizations to transform investment in digital technologies into organizational development, process improvement, and long-term value generation (Kraus et al., 2021; Asbeetah et al., 2025). In synthesis, the findings underscore that digital capability transcends the realm of technical expertise, representing instead a strategic orientation that aligns technology, human resources, and organizational processes, positioning it as indispensable for fostering sustainable product design and enhancing innovation performance within competitive contexts.

2.2.4 Sustainable Product Design

Multiple manufacturing companies, particularly those that have built their operations around producing and marketing technologically advanced goods, are currently worried about their prospects for future growth (Tan et al., 2007).

According to previous literature, they also stated that in the categories of price, performance, and design, these businesses are already having difficulty setting themselves apart from the competition. By minimizing product sensitivity to manufacturing and changing environments and optimizing performance response through design quality procedures, manufacturers can achieve this goal and drastically reduce their operating expenditures (Shetty, 2016). The procedural aspects of minimising the negative ecological effects of raw materials, assets, and consumption of energy are the key focus of the majority of the available literature on sustainable (Jagani, 2023).

Innovative product strategies and marketing efforts generally are seen to benefit significantly from design. The operational, appearance, and economic capabilities of design, particularly its role in generating value for customers are frequently the only perspectives that are considered when evaluating it. Furthermore, a lot of managers are still not fully conscious of the importance of strategic design (Selinšek et al., 2021). According to Thomas (2007), Numerous design processes can be viewed as directly contributing to unsustainability as they impact the adoption of products and services. On the other hand, designers may be seen as supporting sustainable development if they facilitate the creation of goods that decrease their negative effects on the environment or change behaviour. Furthermore, studies show that incorporating sustainability into product design and manufacturing leads to environmental gains while also providing significant business advantages (Shetty, 2016).

2.2.5 Innovation Performance

Innovation is a major factor influencing company success and results (Ayinaddis, 2023). Innovation performance reflects the contribution of innovations in enhancing a company's business performance and securing a competitive edge (Almodóvar & Nguyen, 2022). From an academic perspective, innovation performance denotes the organizational capability to systematically introduce and apply innovations that deliver significant value creation. It encompasses the measurement of a firm's proficiency in conceiving, developing, and executing novel initiatives, highlighting the extent to which innovation activities translate into measurable results and sustainable organizational advancement (Gupta, 2021). Stated differently, the construct captures how effectively a company's innovation-related activities, such as the creation of new products, improvements in operational processes, and structural adaptation, contribute to strengthening competitiveness, fostering market growth, and supporting long-term organizational viability (Bogetoft et al., 2024). Prior studies affirm that innovation performance constitutes a fundamental catalyst of organizational competitiveness and fosters sustainable development. According to Bate et al. (2023), it reflects an organization's ability to transform knowledge assets and resource endowments into new value-creating outputs, positioning it as a decisive factor for sustaining competitive advantage under conditions of turbulent markets (Bate et al., 2023). Recent studies within the sustainable entrepreneurship domain have demonstrated that firms exhibiting high levels of innovation performance possess greater resilience to external disruptions while simultaneously improving their responsiveness to evolving stakeholder interests (Alaskar, 2025). Taken together, these insights emphasize that innovation performance cannot be reduced solely to the output of research and development or technological expenditures, but rather represents an integrative construct that unites strategic, operational, and market-oriented perspectives, which is essential for elucidating the mechanisms through which organizations secure competitive positioning and sustain long-term growth.

2.3 Hypothesis Formulation

2.3.1 Technology Orientation and Digital Capability

Technology orientation influences digital capability. Companies that adopt and operationalize a technological orientation not only shape the ways in which technology is utilized within the organization but also cultivate the internal digital capabilities essential for effectively responding to technological disruptions (Ardolino et al., 2025). According to the dynamic capabilities theory, technology orientation acts as a foundational driver in cultivating digital capabilities, providing companies with the absorptive capacity necessary to identify, capture, and reconfigure technological opportunities into strategic digital competencies (Jang & Lee, 2025). Companies with pronounced technology orientation possess the strategic and infrastructural basis that enables organizations to effectively obtain and deploy digital technologies, platforms, and analytical systems, ultimately enhancing the pace and effectiveness of digital transformation (Yu & Moon, 2021). These findings indicate that companies with a technology orientation approach tend to demonstrate greater structural alignment and a learning culture, both of which are essential for cultivating advanced digital capabilities. Furthermore, empirical research indicates that technology orientation serves as a critical antecedent in the formation and advancement of organizational digital capabilities. Yu et al. (2022) assert that a coherent integration of technology orientation and digital capabilities provides the strategic foundation for transforming digital resources into competitive assets, enabling the translation of technological opportunities into improved operational effectiveness (Yu et al., 2022). The accumulated evidence from extensive literature highlights that technology orientation constitutes a critical strategic basis for the formation of digital capabilities. Fostering continuous technological learning, resource investment, technological experimentation, and sustained investment allows companies to effectively integrate digital technologies throughout their operations, resulting in achieving enhanced operational and strategic outcomes. Hence, the following hypothesis is proposed.

H1: Technology orientation influences digital capability

2.3.2 Technology Orientation and Sustainable Product Design

Technology orientation influences sustainable product design. From a strategic management standpoint, technology orientation amplifies a company's capacity to absorb and assimilate new technological knowledge, foster innovative experimentation, and incorporate emerging technological advancements into product design and manufacturing processes (Nassani et al., 2023). Viewed through the lens of sustainable innovation, technology orientation constitutes a fundamental driver of sustainable product design (SPD) by embedding ecological, social, and economic considerations into the product innovation and development framework, thereby minimizing environmental degradation and supporting resource-efficient outcomes (Zhang et al., 2025). When companies embed digital technologies into their operational activities, they not only improve their market competitiveness but also engage in environmentally responsible practices that lead to sustainable development (Li et al., 2022). Furthermore, companies with a technology orientation strategy demonstrate advanced proficiency in leveraging technological knowledge to environmentally friendly design practice (Dogbe & Marwa, 2024). Additionally, Dogbe & Marwa (2024) also argue that these companies systematically utilize technological innovations to maximize resource efficiency, minimize production waste, and implement an environmentally sustainable manufacturing system, which collectively embody the essential principles of sustainable product design. Empirical research shows that technology-oriented companies are more inclined to employ digital and green design technologies, including CAD or computer-aided design, simulation technologies, and life cycle assessment framework to enhance their capacity for developing environmentally sustainable and energy-efficient products (Popowicz et al., 2025). These technological capabilities serve not only as catalysts for innovation in sustainable design practices but also as mechanisms that facilitate organizational compliance with environmental requirements and responsiveness to customer demand regarding sustainability. In essence, the notion that technology orientation serves as a crucial precursor to sustainable product design has been confirmed by both theoretical frameworks and empirical evidence. By integrating environmental consideration into technological development and design processes, companies can stimulate eco-innovation and sustain long-term competitive advantage. Based on these results, the following hypothesis can be proposed.

H2: Technology orientation influences sustainable product design

2.3.3 Technology Orientation and Economic Orientation

Technology orientation is positively related to economic orientation. According to Yang et al. (2022), within the strategic management domain, technology-oriented companies conceptualize technology as a core determinant of lasting profitability and sustainable competitiveness, influencing not only their innovative capacity but also the configuration of their economic decision-making framework. Drawing on the principles of the Resource-Based View (RBV) and dynamic capabilities perspectives, technological capabilities of a company are perceived as pivotal intangible assets that support the continuous reconfiguration of resources, leading to enhanced cost effectiveness and achieving greater productivity outcomes (Bertacchini et al., 2025). Furthermore, Daraojimba et al. (2023) conducted research containing case studies highlighting how the transformative power of technology and innovation overcomes challenges and risks, resulting in financial growth and market expansion(Daraojimba et al., 2023). Encountering technology orientation as a purposeful strategic trajectory enables companies to cultivate stronger internal mechanisms to manage costs, maximize return on investment, and strategic coherence between financial objectives and technology-driven initiatives (Krishnamurthy et al., n.d.). The integration of advanced technological systems into organizational or company operations enables firms to attain scale efficiencies, process simplification, and resource optimization, ultimately leading to stronger alignment with economic objectives (Hwang & Kim, 2022) (Hanusch et al., 1818). Drawing upon the empirical evidence presented, it can be inferred that a company's technology orientation exhibits a significant relationship with economic orientation. Therefore, the ensuing hypothesis is posited.

H3: Technology orientation is positively related to economic orientation

2.3.4 Technology Orientation and Innovation Performance

Technology orientation is positively related to innovation performance. Companies with a pronounced technology orientation leverage technological learning and experimentation to foster unique capabilities that support differentiation and durable innovation performance (Nassani et al., 2023). From a strategic management perspective, companies characterized by technological orientation extend beyond the mere adoption of advanced technologies by developing dynamic capabilities that empower them to detect and respond effectively to technological disruptions through continuous product and process innovation (Pan et al., 2021). Research from He et al. (2020) shows that technology orientation substantially influences the success of new products by encouraging structured technology monitoring and fostering internal research and development collaboration. Accordingly, it serves as a critical innovation driver that directs firms in detecting technological opportunities and transforming emerging technological advancements into viable innovations (He et al., 2020). Insight derived from both theoretical perspectives and empirical findings collectively indicates that technology orientation constitutes a critical antecedent of innovation performance. Through its role in fostering technological learning, supporting the reconfiguration of organizational resources, and promoting innovation-orientation processes, technology orientation empowers companies to continuously enhance their innovative capabilities and maintain a sustained competitive advantage. Thus, the following hypothesis is proposed.

H4: Technology orientation is positively related to innovation performance

2.3.5 Digital Capability and Sustainable Product Design

Digital capability influences sustainable product design. Within the framework of sustainability, digital capabilities enable companies to embed environmental and social objectives into their design and manufacturing processes, thereby fostering Sustainable Product Design (SPD) which is a systematic approach that incorporates eco-efficiency, material recycling, and life-cycle optimization throughout product development (Zhang & Liu, 2024). Companies equipped with digital capabilities deploy advanced technologies such as data analytics, IoT, cloud infrastructures, and artificial intelligence to facilitate real-time environmental monitoring, optimize resource efficiency, and ensure the seamless integration of life-cycle principles within sustainable design frameworks (Vijay Kumar & Shahin, 2025). This integration empowers product designers to anticipate and evaluate environmental impacts, optimize material utilization, and enhance recyclability during the early design phase, thus operationalizing the strategic tenets of sustainable product design. The empirical literature provides robust support for this linkage, Chen et al. (2020) emphasize that digitalization fosters greater transparency, traceability, and resource utilization efficiency, all of which are indispensable in achieving sustainable manufacturing and advancing eco-design outcomes (Chen et al., 2020). Furthermore, Xu et al. (2022) also demonstrate that digital capabilities function as an integrative mechanism linking digital transformation with sustainability-oriented innovation, facilitating the strategic alignment of technological advancements with companies' environmental performance goals. This finding also suggests that digital capabilities foster entrepreneurial sustainability by empowering organizations to identify and capitalize on opportunities in products and processes that yield economic benefits (Xu et al., 2022). Additionally, digital capabilities increase the flexibility of product design by facilitating real-time data analytics and simulation throughout the development phase, thereby ensuring that sustainability considerations such as energy efficiency, recyclability, and material efficiency are systematically integrated into product design (Zhuge et al., 2023). Consequently, digital capabilities constitute a pivotal foundation for sustainable product design, by enabling companies to integrate sustainability principles through advanced technological infrastructure, analytical intelligence, and strategic adaptability required to embed sustainability considerations into product development processes. Through the effective utilization of digital tools and data-driven decision-making, companies can enhance the environmental efficiency of their products while simultaneously fostering innovation and achieving competitive differentiation based on responsible and sustainable production practices. Hence, the following hypothesis is proposed.

H5: Digital capability influences sustainable product design

2.3.6 Digital Capability and Innovation Performance

Digital capability influences innovation performance. Empirical studies indicate that a company’s digital capability serves as a pivotal enabler of innovation performance enhancement through multidimensional collaboration. This encompasses digital perception capability, which allows firms to sense market dynamics, digital operational capability which enhances the efficiency of transforming innovative outcomes, and digital resource coordination capability which fosters an open and cooperative innovation ecosystem. These synergies collectively contribute to higher rates of new product introduction, improved process innovation outcomes, and increased operational dynamism within production systems (Tian et al., 2025). An increasing body of empirical research provides evidence that company's digital capacity exhibits a significant positive relationship with multiple dimensions of innovation performance, encompassing product innovation, process improvement, and organizational adaptability. Wang et al. (2022) found that business performance is positively affected by digital capabilities, which have been empirically indicated to directly shape the digital innovation processes. Companies that capable of mastering emerging technologies and skills are more inclined to adopt and transform them into innovative products, services, and process enhancements. (Wang et al., 2022). Furthermore, Cheng et al. (2024) conducted a similar study, highlighting the crucial role of digital capabilities in corporate green innovation. The study explored the importance of digital capabilities in enhancing green innovation performance, suggesting that manufacturing companies should continue investing in digital capabilities to improve their environmental performance, product innovation, and processes (W.

Cheng et al., 2024). Meanwhile, Zhuge et al. (2023) show that digital capabilities nurture the development of green knowledge and stimulate sustainable innovation within new ventures, establishing a clear connection between digital investments and performance indicators related to both commercial success and sustainability-oriented innovation outcomes (Zhuge et al., 2023). Drawing upon the theoretical underpinnings of the Resource-Based View (RBV) and Dynamic Capabilities Theory, as well as the sensing, seizing, transforming framework, and substantiated by convergent empirical evidence, this study posits that digital capability significantly and positively contributes to organizational innovation performance. Therefore, the following hypothesis is proposed.

H6: Digital capability influences innovation performance

2.3.7 Sustainable Product Design and Innovation Performance

Sustainable product design influences innovation performance. The concept of Sustainable Product Design (SPD) reflects the deliberate embedding of ecological considerations, efficiency in resource utilization, and life-cycle assessments into product innovation, encompassing the utilization of recycled and recyclable materials, the reduction of material and energy consumption, and the design for reusability and recovery at the end of a product lifespan (Mengistu et al., 2024) (Wu et al., 2025). While previous research has shown that eco-innovation offers significant benefits for sustainability, research from Karman & Bartoszczuk (2023) shows that the adoption of eco-innovation initiatives does not consistently fulfil existing standards or requirements, suggesting that their implementation may not always produce the anticipated outcomes (Karman & Bartoszczuk, 2023).

Conversely, another study stated that incorporating environmental criteria within the design stage elevates innovation toward upstream activities, moving beyond incremental modifications to foster systemic eco-innovations that reshape product characteristics and production process, ultimately opening new opportunities for value generation and strategic distinctiveness (Lu et al., 2011). In addition to reducing adverse environmental impacts, sustainable product design reinforces firms' absorptive capability and innovation capacities through the generation of codified design knowledge, enabling replication and adaptation across diverse product and process domains (Forés & Fernández-Yáñez, 2024). Extant literature on sustainable innovation indicates that organizational engagement in eco-design and sustainable product design methods (SPDM) consistently correlates with a higher incidence of product introductions, superior process innovation outcomes, and reinforced innovation pipelines, thereby underpinning the construct of innovation performance (Jiang et al., 2021b). Moreover, studies on green innovation behaviour demonstrate that the synergistic application of industry 4.0 technologies, eco-design practices, and open innovation mechanisms enhances both green innovation outcomes and overall sustainability organizational performance, affirming that Sustainable product design yields stronger innovation results when complemented by supportive capabilities (Labella-Fernández et al., 2021b). In conclusion, prior empirical studies provide consistent support for a positive and significant linkage between sustainable product design and innovation performance. Through the provision of essential technical and organizational capabilities, sustainable product design empowers firms to design develop, and market innovations that secure both competitive positioning and sustainable growth. Hence, the following hypothesis is posited.

H7: Sustainable product design has a positive impact on innovation performance.

2.3.8 Economic Orientation and Sustainable Product Design

The economic orientation of a firm affects sustainable product design. As explained previously in the literature review, a company's economic orientation can be interpreted as a company management strategy in which the company prioritizes financial interest such as cost management, returns on investment, and revenue growth (Jagani, 2023). A prevailing perspective on sustainability adopts the triple-bottom-line framework, underscoring the equal significance of economic resilience, ecological responsibility, and social justice (Gao et al., 2023). Gao et al, (2023) also stated that Sustainable Product Design (SPD) is essential in realizing sustainable objectives. Product sustainability can thus be understood as the capacity to extend a product's lifespan while simultaneously mitigating ecological consequences and generating socio-economic outcomes for stakeholders (Gao et al., 2023). Enterprises with a pronounced economic orientation establish deliberate strategic pathways to secure enduring financial returns, which in turn function as a foundation for promoting sustainability-oriented product design and reinforcing innovation performance (Jagani, 2023). Findings from the (Mengistu et al., 2025) study indicate that firms prioritize reliability, durability, maintainability, and material cost as essential economic attributes. The integration of these factors within the design process is fundamental to improving reliability, whereas reducing energy and material consumption further lowers production costs and strengthens market position.

Prior studies have highlighted that the integration of economic ambitions with environmental imperatives substantially advances sustainable product design practices, given that organizations pursue efficiency gains by lowering material inputs, optimizing energy consumption, and minimizing waste generation (Dangelico & Pujari, 2010). Furthermore, empirical studies on sustainable entrepreneurship reveal that solid financial performance or economic outcomes are significantly associated with organizational strategies that allocate resources toward eco-innovation and sustainable product design, which in turn enable companies to sustain competitiveness and fulfill stakeholder expectations and demands (Kraus et al., 2020). In response to market demand to cut prices, delay complete cycle times, and enhance quality, businesses are being compelled by the need for sustainability to investigate innovative ways of redesigning their goods. In addition, reducing costs and increasing profitability are the objectives of businesses. Prioritising both short-term and long-term economic objectives will make the transition to sustainable product design more affordable for businesses (Jagani, 2023). Therefore, it can be concluded that a company's economic orientation influences sustainable product design. Based on these results, the following hypothesis can be proposed.

H8: The economic orientation of a firm affects sustainable product design.

2.3.9 Economic Orientation and Innovation Performance

The economic orientation of a firm affects its innovation performance. Companies that exhibit pronounced economic orientation prioritize objectives centered on revenue expansion, operational efficiency, and the optimization of investment returns. These financial imperatives subsequently shape and direct the firm's strategic approach toward innovation (Jagani, 2023). Based on a study from Kruglov & Shaw (2024), Several policy implications arise from the findings, emphasizing the enhancement of the positive linkage between total assets and research and development intensity. The results suggest that policies promoting easier access to financial resources for firms can encourage greater innovation activities. (Kruglov & Shaw, 2024). This coherence between economic goals and innovation initiatives enables companies to approach innovation as a purposeful instrument for enhancing market capitalization and ensuring sustainable organizational growth, rather than merely pursuing creative experimentation. Jagani (2023) also stated that firms that adopt an economic orientation tend to integrate financial discipline to develop organized innovation mechanisms, which enhance operational efficiency and shorten the time required for market introduction of new products (Jagani, 2023). These efficiency-driven innovation practices reinforce a company's competitive advantage, enhance market positioning, and promote sustainable growth over time in dynamic market conditions. Moreover, through an economic orientation, companies optimize resource efficiency and systematically reinvest in innovation-driven processes, promoting a continuous cycle of profitability enhancement and technological advancement (Simone et al., 2024). Overall, insights from theoretical and empirical studies reveal that economic orientation affects innovation performance by aligning financial imperatives with innovation outcomes. Companies that embed economic principles within their innovation strategy tend to achieve improved financial performance and enduring competitive advantage through systematic and sustainable innovation processes. Therefore, the following hypothesis is proposed.

H9: The economic orientation of a firm affects its innovation performance.

2.4 Research Framework

The framework of the study:

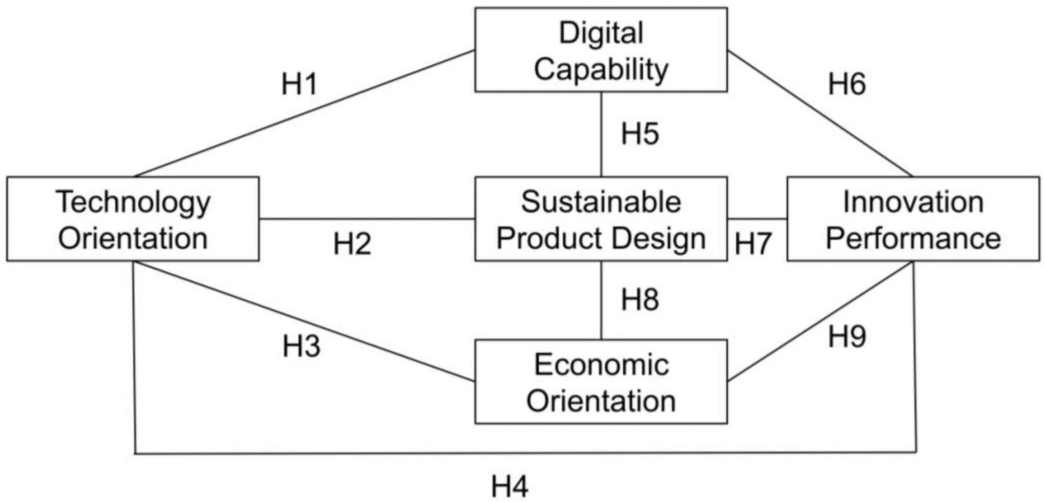

Figure 2.1 Research Framework

Source: adapted from (Jagani, 2023) and (Xi et al., 2025)

H1. Technology orientation influences digital capability

H2. Technology orientation influences sustainable product design

H3. Technology orientation is positively related to economic orientation

H4. Technology orientation is positively related to innovation performance

H5. Digital capability influences sustainable product design

H6. Digital capability influences innovation performance

H7. Sustainable product design has a positive impact on innovation performance

H8. The economic orientation of a firm affects sustainable product design

H9. The economic orientation of a firm affects its innovation performance

CHAPTER III

RESEARCH METHODS

3.1 Research Design

This thesis examines "Strategic Orientation and Digital Capability as Drivers of Innovation Performance in Manufacturing Companies". This study uses a quantitative research design, which is appropriate for testing nine hypotheses regarding the relationships among strategic orientation (economic, technological, digital capabilities), sustainable product design, and innovation performance. Quantitative research design refers to a systematic study that employs numerical data to validate hypotheses, investigate the correlation between variables, and draw findings that may be applied substantially. By emphasising measurement, impartiality, and statistical analysis, this method helps researchers spot patterns and linkages between causes. A quantitative design seeks to offer quantifiable data that can be repeated and compared across contexts, in contrast to qualitative techniques, which concentrate on examining meanings and experiences (Apuke, 2017). Because quantitative research enables objective measurement of variables and accurate evaluation of hypothesis-driven causal links (such as H1-H9), it is especially suitable in this context. This is in line with the positivist paradigm, which places a strong emphasis on accuracy and generalisability.

The framework, which is based on the theories of strategic orientation and dynamic capabilities, defines economic, technological, and digital capabilities as determinants that have a simultaneous direct and indirect effect on innovation performance and sustainable product design. Similar conceptual relations are supported by prior empirical studies. As an instance, a framework assessing the connections among innovation, sustainable product design, and economic orientation validates the theoretical viability of these relations (Jagani, 2023). Further investigations on digital sustainability orientation, which are based on resource-based theory and strategic orientation, reveal how digital sustainability affects environmental practices in a manufacturing setting through the implementation of digital green capabilities (Zhang & Liu, 2024). This study classifies its variables into three main categories to structure the research framework. The independent variable is Technology Orientation, which represents the strategic and technological drivers within the firm. The mediating variable is Digital Capability, Sustainable Product Design, and Economic Orientation, which serve as an intermediaries for assessing the impact of capabilities and orientations on results. The dependent variable in this study is Innovation Performance, which serve as the highest possible indicator of organizational accomplishment. This configuration allows for the examination of both direct effects, in which each orientation independently contributes to innovation performance, and indirect effects, in which their influence is transmitted through sustainable product design.

In this study, data collection was conducted through a structured online questionnaire distributed via Google Forms. Respondents identified their level of satisfaction in accordance with each of the statements on a Likert scale. A Likert scale is a commonly utilised psychometric instrument for measuring perceptions and beliefs that uses numerical response possibilities. The Likert approach enables the measurement of subtle variables such as economic orientation and innovation performance, and averaging responses across topics results in accurate overall scores that capture each covered component (Koo & Yang, 2025). Furthermore, the 7-point scale is frequently used in the social sciences due to its dependability and sensibility (Ibrahim, 2025). The use of a 7-point Likert scale can be seen in this study.

Table 3.1 Likert Scale Points

No.	Scale Descriptions	Point
1.	Strongly Disagree	1
2.	Disagree	2
3.	Somewhat Disagree	3
4.	Neutral	4
5.	Somewhat Agree	5
6.	Agree	6
7.	Strongly Agree	7

Source: adapted from (Ibrahim, 2025)

3.2 Research Variables

Research variables are the foundation of any academic investigation because they reflect quantifiable notions that enable researchers to examine hypotheses and clarify correlations between categories. A variable refers to any distinctive component or property that varies across persons, divisions, or organizations (DuVall, 2019). In social science and management research, variables are typically classified into categories such as independent variables (IVs), which act as predictors or causes, mediating variables (MVs), which transmit the influence of the independent variables, and dependent variables (DVs), which represent the desired outcomes.

3.2.1 Independent Variable

An independent variable is a variable that predicts changes in the dependent variable. Independent indicates that the variable stands alone and that other variables in the model do not influence it. In this study, there are three independent variables:

1. **Technology Orientation (X1):** The businesses' strategic propensity to invest in and employ new technology in order to encourage innovation and gain a competitive edge.

3.2.2 Mediating Variable

Mediating variables act as mechanisms that demonstrate the manner in which independent variables affect dependent variables. In this study, the mediating variable:

1. **Digital Capability (M1):** Comprises the capacity to collaborate, innovate, solve difficulties, engage with internet-based information, use digital technologies responsibly, and participate in digital platforms.
2. **Sustainable Product Design (M2):** Product manufacturing processes that have an minimal adverse effect on human society and the environment throughout their entire life span, from the procurement of raw materials to the disposal at the end of life**.**

3. **Economic Orientation (M3):** The guiding principles of economic activity, which can fluctuate from profit-driven to socially conscious and have an impact on how markets function, how resources are distributed, and how economic decisions are reached.

3.2.3 Dependent Variable

The dependent variable is the outcome that is influenced by the independent variable and the mediating variable. In this study, the dependent variable:

1. **Innovation Performance (Y):** A company's activity in assessing its capacity to successfully develop, implement, and leverage new ideas, which leads to enhanced competitiveness, effectiveness, and market dominance.

3.3 Operational Definition of Variables and Research Instruments

3.3.1 Economic Orientation

Economic Orientation refers to a company's strategy focus in long-term financial growth, cost efficiency, and profitability through systematic planning and accountability procedures. Economic Orientation describes how a company's assets and strategies are aligned to achieve long-term economic performance (Jagani, 2023). Operationally, this variable is measured through indicators such as revenue growth objectives, cost leadership practices, return on investment standards, and senior management accountability for financial outcomes. This variable is measured in six question items adapted from (Jagani, 2023), as shown in **Table 3.1**:

Table 3.2 Measurement of Economic Orientation

Code	Indicator
EO1	Our company has a shared plan to continuously increase revenue.
EO2	Our company is implementing long-term steps to achieve cost leadership.
EO3	Our company has clear rules regarding return-on-investment targets for key projects.
EO4	Our company assigns senior management responsibility for achieving economic performance.

Source: adapted from (Jagani, 2023)

3.3.2 Technology Orientation

Technology Orientation refers to the extent to which a company prioritises the adoption, development, and application of modern technologies in order to create innovative products and enhance processes. This perspective demonstrates a company's willingness to embrace technical innovation and its aggressive efforts to incorporate new technologies into business operations (Xi et al., 2025). Operationally, this construct can be measured through four indicators. This is measured by whether a company uses modern technology in their processes, which reflects the company's ability to integrate advanced technology into product development. According to evidence from sustainability-oriented companies, successful adoption of technical innovation accelerated ecological innovation and sustainable product design (Shahzad et al., 2022). In this study, this variable is measured using four question items adapted from (Xi et al., 2025), as presented in **Table 3.2**:

Table 3.3 Measurement of Technology Orientation

Code	Indicator

TO1	Our company uses modern technology to create new products.
TO2	Every new product we produce always incorporates the latest technology.
TO3	Our company continuously seeks out and develops new products with modern technology.
TO4	The results of technical innovation are easily implemented in this company.

Source: adapted from (Xi et al., 2025)

3.3.3 Digital Capability

Digital capability refers to a company's ability to acquire, integrate, and apply digital technologies to support innovation, sustainability, and competitive advantages (Van Hoang et al., 2025). It reflects an organization's readiness to respond to digital transformation, recognize new opportunities, and develop innovative offerings using digital tools (Cenamor et al., 2019). Empirical research also demonstrates that organizations with strong digital adaptive capabilities perform better in dynamic environment (C. Chen et al., 2023). In operational terms, this variable is measured using several indicators that reflect a company's ability to recognize, acquire, and adapt to digital technologies. These measurements are using five items adapted from (Xi et al., 2025), as shown in **Table 3.3**:

Table 3.4 Measurement of Digital Capability

Code	Indicator
DC1	Our company is capable of acquiring key digital technologies.
DC2	Our company is capable of recognizing and capitalizing on new digital opportunities.
DC3	Our company adapts quickly to digital change.
DC4	Our company is proficient in the latest digital technologies.
DC5	Our company is capable of creating new products, services, or processes using digital technologies.

Source: adapted from (Xi et al., 2025)

3.3.4 Sustainable Product Design

Sustainable Product Design (SPD) is the incorporation of environmental factors into product creation, focusing on the adoption of recycled and recyclable materials, resource efficiency, the conservation of energy, and decreased negative environmental effects throughout the product's life cycle (Jiang et al., 2021a). Sustainable product development not only combines green materials and methods, but also aims to reconcile environmental, economic, and social elements in order to provide a competitive advantage (Dangelico & Pujari, 2010). Operationally, this research variable explains how sustainability aspects, such as energy saving and minimum waste, are measured using five question items that have been adapted from (Jagani, 2023), as presented in **Table 3.4**:

Table 3.5 Measurement of Sustainable Product Design

Code	Indicator
SPD1	Our company's final products are made using recycled materials.
SPD2	Our company's final products are made with minimal raw materials.
SPD3	Our company's final products are designed to require minimal energy during adoption.
SPD4	Our company's final products are reusable after use.
SPD5	Our company's production process uses energy more efficiently than competitors.

Source: adapted from (Jagani, 2023)

3.3.5 Innovation Performance

Innovation performance is defined as the extent to which a company successfully increases its innovation output through the introduction of new products, product quality enhancements, shorter product launch timelines, process innovation, and extended product development activities (Na & Kang, 2019). Jagani (2023) emphasizes that innovation success may be measured by a business's ability to bring new products to market, ass new features, and shorten development cycles, all of which contribute to competitiveness and sustainability outcomes (Jagani, 2023). Operationally, this variable is measured with product updates and shortened launch, further measured using five items adapted from (Jagani, 2023), as shown in **Table 3.5**:

Table 3.6 Measurement of Innovation Performance

Code	Indicator
IP1	Our company demonstrated an increase in new product launches to the market.
IP2	Our company reported excellent results from process innovation.
IP3	Our company demonstrated improved new features for existing products.
IP4	Our company was able to reduce the time required to launch products to the market.
IP5	Our company demonstrated an increase in the number of new products.

Source: adapted from (Jagani, 2023)

3.4 Data Collection Methods

3.4.1 Types of Data Required

The research study involves both primary and secondary data. Primary data were collected directly from respondents via a survey questionnaire administered to workers and employees at a manufacturing company. This data collection comprises responses to the dimensions of economic orientation, technology orientation, digital capability, sustainable product design, and innovation performance, which were measured using Likert-scale items. The use of primary data enables researchers to gather organizational-level beliefs and procedures directly relevant to the hypotheses under investigation. In this study, secondary data were gathered from scholarly journals, open-access articles, and relevant literature to supplement the theoretical framework and operational definitions of variables. According to Johnston (2017), combining primary and secondary data strengthens study findings by providing contextual insights and theoretical grounding (Johnston et al., 2017).

3.4.2 Data Collection Technique

The data collection technique used in this study was an online survey with a well-organized questionnaire delivered via Google Forms. This method was chosen due to its inexpensive cost, wider geographic distribution, and ease of accessibility for respondents. Each item in the questionnaire was constructed using a 7-point Likert scale: “Strongly Disagree" (1), "Disagree" (2), "Somewhat Disagree" (3), "Neutral/Undecided" (4), "Somewhat Agree" (5), "Agree" (6), and "Strongly Agree" (7), which is widely used within management and social science studies to measure levels of perception and attitude (Joshi, 2015). This survey is intended for all workers or employees with a basic understanding of company operations. Respondents of this study must be knowledgeable about their organizations’ strategic approach, digital capabilities, and innovation methods. This approach is comparable with prior sustainability and innovation studies, which employed in-line surveys to obtain firm-level data from organizational employees (Del Giudice et al., 2021).

3.5 Population and Sample

3.5.1 Population

In quantitative research, a population can be characterised as the total group of individuals, organizations, or objects who share particular attributes related to the study and can be used as data sources (Etikan, 2017). In simple terms, a population includes any components of analysis that can possibly contribute to the understanding of the topic under investigation. The target population for this study is workers at manufacturing companies that have a tendency towards economic orientation, technological orientation, and digital capabilities, as well as those who have put into effect or are transitioning to sustainable product design and innovation performance. Workers at manufacturing companies were chosen as a population based on the specific characteristics of the industry, which was strongly related to product creation, technology used, and the challenges of responding to digital disruption and sustainability. Previous studies on manufacturing companies in the United States have found that economic orientation and sustainable product design methods have a substantial association with innovation performance, displaying the industry's significance as a research population (Jagani, 2023).

3.5.2 Sample

According to research, a sample is a subsection of a population chosen to reflect the entire population, allowing the acquired data to be utilised to draw wide-ranging inferences about the population (Taherdoost, 2016). In this study, the sample was determined using convenience sampling, a sampling method based on the researcher's ease of access to respondents. Convenience sampling is often used in social and management research because it allows researchers to efficiently collect data from individuals or organizations that are available and willing to respond (Etikan, 2017). In the context of this study, convenience sampling was used to distribute an online questionnaire (Google Form) to employees at a manufacturing company. This includes any staff, managers, and supervisors who were available to the researcher. This method enabled data gathering from respondents with prior expertise or a basic awareness of business orientation, digitalization, and sustainability and innovation strategies. Although convenience sampling has limitations in terms of population accountability, it remains valuable for quantitative research that focuses on investigating the relationship between variables, especially when data is required from respondents directly involved in company strategy and innovation. In this study, respondents were required to meet the following criteria:

a. Currently working in a manufacturing company
b. Have been working in a manufacturing company
c. Understand or have a grasp of the company's operational systems

The methods used in this study have been frequently used in business and management research due to their adaptability and research-saving capabilities. For instance, studies on the digital transformation of small and medium enterprises (SMEs) have demonstrated that, regardless of its restricted generalisability, convenience sampling can yield significant empirical findings (Etikan, 2017). As a result, the use of convenience sampling in this study is projected to give enough accurate data to investigate the relationship between economic orientation, technological orientation, digital capabilities, sustainable product design, and innovation performance in accordance with the conceptual framework.

The sample size was determined based in the number of measurement indicators in the research instrument. Data analysis was conducted using Structural Equation Modelling (SEM). According to methodological standards, SEM analysis typically requires a minimum sample size ranging from 100 to 200 respondents, depending on the number and complexity of the observed indicators. The sample requirement for this study ranges from $5a \leq x \leq 10a$, where a is the number of indicators plus the number of variables in the study, and x is the number of respondents. In this study, there are a total of 23 indicators in 5 research variables, so a = 23 + 5 = 28 ($\boldsymbol{a = 28}$). Therefore,

$$\boldsymbol{5a \leq x \leq 10a \approx 5 \times 28 \leq x \leq 10 \times 28}$$

$$\boldsymbol{\approx 140 \leq x \leq 280}$$

According to Wolf et al. (2013), the sample size for structural equation modelling (SEM) analysis varies with model complexity. However, indicator-based computation is a useful tool that is widely utilised in social and management research (Wolf et al., 2013). With a minimum target of 140 respondents, this study is expected to provide valid results for testing the relationships between variables within the established conceptual framework.

3.6 Validity and Reliability Test

3.6.1 Validity Test

In quantitative research, the assessment of validity represents an essential methodological process to determine whether the measurement instrument accurately and appropriately captures the theoretical construct under investigation. According to Indu et al. (2025), Validity denotes the degree to which a measurement instrument accurately captures the construct it purports to measure, distinguishing it from the measurement of unrelated or indeterminate aspects. In this regard, it evaluates the congruence between empirical indicators and the theoretical dimensions that define the construct under study (Indu et al., 2025). Conducting a validity test serves to refine the precision of measurement instruments, reinforce the theoretical coherence of the research model, and ensure that the derived interpretations are congruent with the intended conceptual and theoretical assumptions (Hawkins et al., 2020). Because constructs in behavioural and management research are typically latent and not directly observable, validity testing plays a pivotal role in confirming the adequacy of their operationalization. Researchers, therefore, utilize specific indicators or measurement items designed to indirectly capture the essence of the underlying theoretical construct (Hair et al., 2019). The process of validating an instrument involves examining how each indicator accurately represents the intended theoretical concept, effectively minimizing potential sources of measurement error and conceptual bias (Gonzalez et al., 2021). Furthermore, to establish the adequacy of the measurement model, factor loadings must surpass 0.70, evidencing that each observed variable is a strong representation of its corresponding latent construct. Convergent validity was examined using the Average Variance Extracted (AVE) and Composite Reliability (CR), with an AVE benchmark of 0.50 or higher signifying that the construct captures a substantial proportion of the variance among its measurement items.

3.6.2 Reliability Test

The reliability test aims to evaluate the extent to which an instrument produces uniform and reproducible measurements over time and under varying circumstances, thereby confirming its internal stability and measurement precision. Reliability is conceptualized as the extent to which a measurement tool maintains consistency in its outcomes when utilized multiple times under comparable conditions, indicating that observed variations are attributable to the construct itself rather than to measurement error (Hamed Taherdoost & Lumpur, 2016). Therefore, reliability testing plays a critical role in ascertaining the stability and dependability of measurement results by minimizing the potential effects of random error, interpretative discrepancies among respondents, and procedural irregularities that could compromise data accuracy. The primary function of reliability analysis is to evaluate the internal consistency of measurement instruments, typically through statistical indices such as Cronbach's Alpha and Composite Reliability. This process also helps identify weak or inconsistent indicators that may compromise the overall accuracy of the measurement model. Generally, a Cronbach's Alpha coefficient above 0.70 denotes acceptable reliability, whereas values exceeding 0.80 indicate a high degree of measurement stability and consistency. High reliability implies that the instrument performs consistently and dependably, thereby enhancing the credibility of the empirical relationships established among the underlying constructs (Taber, 2018).

3.7 Data Analysis Techniques and Hypothesis Testing

In this research, the data analysis techniques used are descriptive analysis and statistical analysis, which are described as follows.

3.7.1 Descriptive Analysis

Descriptive analysis was conducted as the initial stage of data processing to summarize and present sample characteristics and research variables clearly and systematically. This analysis includes calculating frequencies and percentages for categorical variables, and measures of central tendency and dispersion for interval or ratio variables. Through this process, descriptive statistics provided an overview of data distribution, central tendency, and variability before proceeding to inferential or structural analysis. Furthermore, the descriptive stage involved checking for missing values and identifying outliers that may impact subsequent analysis, thus ensuring the accuracy and reliability of the dataset. This approach aligns with established methodological recommendations in quantitative research, which emphasize that descriptive statistics form the basis for meaningful data interpretation and subsequent analytical procedures (Cooksey, 2020).

3.7.2 Statistical Analysis

This study employed a statistical technique called Partial Least Squares-Structural Equation Modeling (PLS-SEM), executed using the SmartPLS software. PLS-SEM represents a variance-based approach within the broader Structural

Equation Modeling framework, designed to estimate and evaluate complex causal relationships between latent constructs, which are unobservable theoretical concepts, and their corresponding indicator variables, which serve as observable measures. This analytical approach is particularly advantageous in studies involving intricate theoretical models, smaller sample sizes, or data that deviate from the assumption of multivariate normality. PLS-SEM enables researchers to comprehensively assess both the measurement model, which validates the reliability and validity of the indicators, and the structural model, which explains the causal relationships among constructs (Sarstedt et al., 2017).

In this study, the PLS-SEM model was applied to test the hypothesized relationships among several latent constructs. Specifically, Technology Orientation serves as the independent variable, while Digital Capability, Sustainable Product Design, Economic Orientation, and Innovation Performance serve as the dependent variables. Each of these latent variables represents a theoretical concept that cannot be directly measured but is reflected through several observed indicators. The application of PLS-SEM allows for robust estimation of the interrelations among these constructs, providing empirical support for the proposed theoretical framework. The model testing process in this study follows two main stages: evaluation of the measurement model to ensure the validity and reliability of the constructs, and assessment of the structural model to test the proposed hypotheses and determine the strength and significance of the relationships between the variables.

3.7.2.1 Outer Model Estimation (Measurement Model)

In Partial Least Squares-Structural Equation Modeling (PLS-SEM), the outer model, also referred to as the measurement model. This model specifies the associations between latent constructs and their corresponding observed indicators, defining how each indicator represents the underlying theoretical concept (Hair, Risher, et al., 2019). In essence, the evaluation of the outer model assesses the extent to which the measurement items included in the questionnaire reliably and accurately capture the underlying theoretical construct under investigation. Furthermore, assessing a measurement model follows a multi-step procedure, such as a convergent validity test, discriminant validity test, and a reliability test of the indicators, which collectively constitute the measurement quality of the construct (Henseler et al., 2016).

a. Convergent Validity Test

Convergent validity denotes the extent to which multiple measurement indicators of a given construct exhibit strong intercorrelations and collectively provide a consistent representation of the same underlying theoretical dimension (Hair, Risher, et al., 2019). In the convergent validity test, indicator validity is examined through outer loadings. Each indicator is expected to have a loading value of $\geq$ 0.70, which considered acceptable, indicating that an indicator explains at least 50% of the variance in the construct. Furthermore, convergent validity is evaluated using the Average Variance Extracted (AVE), with an AVE value $\geq$ 0.50 indicating that each construct has adequate convergent validity (Carlson & Herdman, 2012). Establishing convergent validity confirms that the measurement model accurately captures the construct it is designed to assess, thereby enhancing the overall reliability, credibility, and explanatory power of the structural model (Sarstedt et al., 2017).

b. Discriminant Validity Test

Discriminant validity assesses whether the indicators of a specific construct are sufficiently distinct from those of other constructs, thereby confirming the construct's empirical independence within the measurement framework (Hair, Risher, et al., 2019). Discriminant validity assessment in PLS-SEM is generally conducted using two approaches, such as the Fornell–Larcker criterion and the Heterotrait-Monotrait correlation ratio (HTMT) (Henseler et al., 2016). According to the Fornell-Larcker criterion, discriminant validity is established when the square root of a construct's Average Variance Extracted (AVE) surpasses its highest correlation with any other construct, signifying that the construct explains more variance in its own indicators than in those of other constructs. On the other hand, the HTMT criterion provides a more stringent assessment of discriminant validity, suggesting that HTMT values less than 0.90 (or 0.85 in more conservative settings) confirm that constructs exhibit adequate empirical distinctiveness. Ensuring discriminant validity serves to affirm that the constructs represent distinct theoretical entities, which in turn reinforces the interpretive validity and empirical robustness of the associations tested within the structural framework (Sarstedt et al., 2017).

c. Reliability Test

In this study, internal consistency reliability was assessed using composite reliability (CR) and Cronbach's alpha. These measurements measure the level of intercorrelation between items within a construct, with values above 0.70 indicating satisfactory construct reliability and generally indicating acceptable internal consistency (Hair, 2014). Overall, these measurements confirm that the constructs are consistently measured across indicators, thereby ensuring the robustness and reliability of the measurement model.

These procedures adhere to the latest PLS-SEM measurement evaluation standards and were implemented to confirm the reliability and validity of the indicators, composites, and constructs employed in this study. The external model assessment thus guarantees that the measurement items meet both statistical reliability and theoretical validity requirements prior to conducting the structural model analysis.

3.7.2.2 Inner Model Estimation (Structural Model)

In Partial Least Squares-Structural Equation Modeling (PLS-SEM), the structural model illustrates the theoretical linkages among latent constructs that form the foundation of the research framework. It serves to assess the causal pathways between constructs as specified by the underlying theoretical propositions. Through the structural model, the strength, orientation, and significance of the interconstruct relationships are analysed to test the formulated hypotheses and to assess the model's capacity for prediction. The evaluation of the inner model was conducted to ascertain that the hypothesized interrelations among constructs are empirically justified and statistically supported, thus reinforcing the model's ability to offer theoretically meaningful and empirically grounded insights into the structural associations under investigation. The primary evaluation criteria for the internal model include collinearity, coefficient of determination (R^2), and path coefficients, which collectively assess how well the independent variables explain the variance in the dependent variable (J. Hair & Alamer, 2022).

a. Collinearity Test

Collinearity assessment is performed to identify the presence of multicollinearity among predictor variables within the structural model, ensuring that the independent constructs do not exhibit excessive intercorrelation. Collinearity arises when predictor constructs exhibit a strong interrelationship, which can potentially inflate standard errors and lead to biased or unstable estimates of the path coefficients (Jung & Park, 2018). In Partial Least Squares-Structural Equation Modeling (PLS-SEM), collinearity is typically examined using the Variance Inflation Factor (VIF). In assessing multicollinearity, a VIF value below five is typically considered acceptable, implying that collinearity is not problematic. However, more stringent evaluations advocate for tolerance values above 0,20 to enhance the robustness of the estimates. Any construct that violates this guideline may reflect conceptual duplication or overlap, suggesting the need for model structure refinement. By ensuring that every predictor construct yields VIF values within the accepted criteria, the study establishes that the structural estimates are devoid of collinearity bias and can be interpreted as robust and trustworthy representations of the hypothesized relationships (J. Hair & Alamer, 2022).

b. Coefficient of Determination (R-Square)

To assess the explanatory strength of a structural model, the coefficient of determination (R-Squared) is examined. In the context of PLS-SEM, this coefficient reflects the percentage of variance in the dependent construct that is explained by the independent constructs included in the model. The magnitude of the R-Square coefficient reflects the predictive strength of the model, where higher values correspond to better predictive performance. Conventionally, R-Square values around 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory power, although their interpretation may vary depending on the research context and the complexity of the model. By examining the R-Square coefficient, researchers can ensure that the hypothesized interactions among constructs substantially contribute to explaining variance within the model and validate the overall fit of the structural framework. Serving as a principal measure of predictive strength, this value reveals how accurately the theoretical assumptions embedded in the model are corroborated by empirical observations (J. F. Hair, Risher, et al., 2019) (Henseler et al., 2016).

c. **Path Coefficient Test**

The path coefficients were analysed to verify the hypothesized causal connections among latent constructs, providing insight into the strength and significance of these structural relationships. In order to verify the statistical significance of the hypothesized linkages, the study utilized a non-parametric bootstrapping procedure, which generates empirical sampling distributions for path estimates. This bootstrapping-based resampling procedure allows the computation of standard errors and confidence intervals without assuming normality, thus enabling robust hypothesis testing. A t-value greater than 1.96 or a p-value less than 0.05 indicates a statistically significant path, supporting the hypothesized causal link between constructs. This analytical approach complies with recognized PLS-SEM evaluation criteria, and this approach guarantees that the model's structural relationships demonstrate both statistical rigor and theoretical coherence(Becker et al., 2018) (Henseler et al., 2016).

CHAPTER IV
RESULTS & DISCUSSIONS

4.1 Results

This chapter presents the results of the data analysis and discusses the findings related to the research objectives and hypotheses formulated in the previous chapters. This analysis aims to examine the relationship between Economic Orientation, Technology Orientation, Digital Capability, Sustainable Product Design, and Innovation Performance in manufacturing companies. This chapter begins by presenting the results of data collection and the demographic characteristics of respondents, followed by an assessment of the measurement model to test the reliability and validity of the constructs. Next, the results of the structural model are presented to evaluate the hypothesized relationships between the variables. These findings are then interpreted and discussed in comparison with previous research, thus providing theoretical insights and practical implications for both academia and industry.

4.1.1 Respondent Description Analysis Based on Gender

Based on questionnaire data (Google Form) collected from 159 respondents, the following characteristics of the respondents are shown.

Table 4.1 Respondent Characteristics Based on Gender

Gender	Amount	Percentage (%)
Male	83	52,2%
Female	76	47,8%

Total	159	100%

Source: Questionnaire data (Google Form)

Table 4.1 presents the distribution of respondents according to gender. Out of a total of 159 respondents, 83 individuals (52.2%) were male, while 76 respondents (47.8%) were female. This indicates that male participants slightly outnumbered female participants in this study. The relatively balanced proportion between male and female respondents suggests that both genders were fairly represented in the data collection process.

4.1.2 Respondent Description Analysis Based on Ages

Based on the results of the questionnaire data collection, the author obtained the average age of participants as follows:

Table 4.2 Respondent Characteristics Based on Ages

Ages	Amount (n)	Percentage (%)
< 20 Years old	4	2,5%
21-30 Years old	100	62,9%
31-40 Years old	32	20,1%
41-50 Years old	19	11,9%
> 51 Years old	4	2,5%
Total	**159**	**100%**

Source: Questionnaire data (Google Form)

Table 4.2 shows the distribution of respondents according to their age groups. The majority of respondents (62.9%) were between 21 and 30 years old, indicating that most participants are in the early adulthood stage, which is typically characterized by active engagement in education or early career development. This is followed by respondents aged 31–40 years old (20.1%) and 41–50 years old (11.9%), representing individuals who are generally more experienced and professionally established. Meanwhile, respondents aged below 20 years old and above 51 years old each account for only 2.5% of the total sample.

4.1.3 Respondent Description Analysis Based on Last Education

Based on the results of the questionnaire data collection, the author obtained the participants' Last Education as follows:

Table 4.3 Respondent Characteristics Based on Last Education

Education	Amount (n)	Percentage (%)
Elementary School	-	-
Middle School	-	-
High School	47	29,6%
Diploma	22	13,8%
(S1)Bachelor's Degree	88	55,3%
(S2)Master's Degree	2	1,3%
Total	**159**	**100%**

Source: Questionnaire data (Google Form)

Table 4.3 presents the educational background of respondents. The majority of participants, accounting for 55.3%, hold a Bachelor's degree (S1), indicating that most respondents have attained higher education and possess adequate academic understanding relevant to the research topic. This is followed by high school graduates who make up 29.6% of the total sample, while Diploma holders represent 13.8%. Meanwhile, only 1.3% of respondents have completed a Master's degree (S2), and none of the participants reported having only an elementary or middle school education.

4.1.4 Respondent Description Analysis Based on Work Area

Based on the results of the questionnaire data collection, the author obtained the participants' work domiciles as follows:

Table 4.4 Respondent Characteristics Based on Work Area

Domicile	Amount (n)	Percentage (%)
Yogyakarta	23	14,5%
Jakarta	5	3,1%
Jawa Barat	40	25,2%
Jawa Tengah	43	27%
Jawa Timur	25	15,7%
Bali	1	0,6%
Kepulauan Riau	7	4,4%
Kalimantan Timur	8	5%
Kalimantan Tengah	7	4,4%
Total	**159**	**100%**

Source: Questionnaire data (Google Form)

Table 4.4 presents the distribution of respondents according to their domicile or work area. The data show that the majority of respondents are from Central Java (27%) and West Java (25.2%), indicating that these two provinces contribute the largest share of participants in this study. This is followed by respondents from East Java (15.7%) and Yogyakarta (14.5%), while smaller proportions come from East Kalimantan (5%), Riau Islands (4.4%), and Central Kalimantan (4.4%). Only 3.1% of respondents are from Jakarta, and 0.6% are from Bali.

4.1.5 Respondent Description Analysis Based on Work Duration at the Company

Based on the results of the questionnaire data collection, the author obtained the average length of time the participants worked at the company as follows:

Table 4.5 Respondent Characteristics Based on Work Duration

	Amount (n)	**Percentage (%)**
< 1 Year	7	4,4%
1-3 Years	56	35,2%
4-6 Years	42	26,4%
7-10 Years	35	22%
> 10 Years	19	11,9%
Total	**159**	**100%**

Source: Questionnaire data (Google Form)

Table 4.5 presents the distribution of respondents based on their work experience. The data show that the majority of respondents have 1–3 years of experience (35.2%), followed by those with 4–6 years of experience (26.4%) and 7–10 years of experience (22%). Respondents with more than 10 years of experience account for 11.9%, while those with less than 1 year of experience represent the smallest group at 4.4%.

4.2 Description Analysis of Variable

Descriptive analytical procedures were implemented to systematically present and interpret the fundamental properties and distributions of the variables included in the study. To facilitate the analysis of continuous variables, data were categorized into class intervals, calculated by taking the difference between the maximum and minimum values and dividing it by the total number of classes. Through descriptive statistical measures, the study systematically summarizes the dataset, thereby enhancing insight into its fundamental patterns and trends. This procedure guarantees that the dataset is grouped to highlight key patterns, thereby facilitating robust statistical examination (Cooksey, 2020). Below is the calculation of the interval value, the results of which will later be used as a classification guide.

$$\text{Interval} = \frac{maximum\ value - minimum\ value}{class\ interval}$$

$$\text{Interval} = \frac{7-1}{7} = 0{,}86$$

Table 4.6 Respondent Characteristics

Interval	Categories

1,00 s/d 1,86	**Very Low**
1,87 s/d 2,72	**Low**
2,73 s/d 3,58	**Fairly Low**
3,59 s/d 4,44	**Moderate**
4,45 s/d 5,30	**Fairly High**
5,31 s/d 6,16	**High**
6,17 s/d 7,00	**Very High**

Source: Questionnaire data (Google Form)

4.2.1 Description Analysis of Variable Economic Orientation

The following are the results of the descriptive analysis calculations of the Economic Orientation variable.

Table 4.7 Description Analysis of Variable Economic Orientation

Code	Indicator Measurement	Mean	Criteria
EO1	Our company has a shared plan to continuously increase revenue.	5,86	High
EO2	Our company is implementing long-term steps to achieve cost leadership.	5,62	High
EO3	Our company has clear rules regarding return-on-investment targets for key projects.	5,18	Fairly High
EO4	Our company assigns senior management responsibility for achieving economic performance.	5,40	High

Source: Processed Questionnaire Data

Based on the table above, the overall results indicate that the majority of companies surveyed exhibit a high level of economic orientation. The indicator "Our company has a shared plan to continuously increase revenue" (EO1) showed the highest average score of 5.86, categorized as High, indicating strong organizational alignment in pursuing revenue growth. The indicator "Our company implements long-term measures to achieve cost leadership" (EO2) also scored High with an average of 5.62, indicating consistent strategic efforts toward cost efficiency. Meanwhile, the indicator "Our company has clear rules regarding return on investment targets for key projects" (EO3) scored a slightly lower average score of 5.18, categorized as Fairly High, implying that although the company has established ROI guidelines, there is still room for improvement in terms of consistency and clarity. Finally, the indicator "Our company assigns senior management responsibility for achieving economic performance" (EO4) achieved a High rating with an average of 5.40, reflecting that leadership involvement in achieving economic results has been well established. Overall, the findings indicate that these companies maintain a solid economic orientation, with most indicators achieving high levels of performance.

4.2.2 Description Analysis of Variable Technology Orientation

The following are the results of the descriptive analysis calculations of the Technology Orientation variable.

Table 4.8 Description Analysis of Variable Technology Orientation

Code	Indicator Measurement	Mean	Criteria
TO1	Our company uses modern technology to create new products.	5,37	High
TO2	Every new product we produce always incorporates the latest technology.	5,31	High

TO3	Our company continuously seeks out and develops new products with modern technology.	5,45	High
TO4	The results of technical innovation are easily implemented in this company.	5,3	Fairly High

Source: Processed Questionnaire Data

The data presented in the table shows that the companies included in this survey demonstrate a high level of technology orientation. The indicator "Our company uses modern technology to create new products" (TO1) recorded an average score of 5.37, which is categorized as High, indicating that modern technology is actively used in the company's product development process. Similarly, the indicator "Every new product we produce always incorporates the latest technology" (TO2) achieved the High criterion with an average score of 5.31, indicating that the company consistently integrates the latest technology into its new products. The highest average score, 5.45, on the indicator "Our company continuously seeks and develops new products with modern technology" (TO3) also falls into the High category, reflecting a proactive approach to technological innovation and product advancement. Meanwhile, the indicator "Technical innovation results are easy to implement in this company" (TO4) had a slightly lower average score, 5.30, which is categorized as Fairly High, implying that although innovation results are generally well implemented, there may still be some challenges in implementation efficiency. Overall, the findings indicate that these companies maintain a strong technology orientation, with ongoing efforts to leverage technology for innovation and product development.

4.2.3 Description Analysis of Variable Digital Capability

The following are the results of the descriptive analysis calculations of the Digital Capability variable.

Table 4.9 Description Analysis of Variable Digital Capability

Code	Indicator Measurement	Mean	Criteria
DC1	Our company is capable of acquiring key digital technologies.	5,67	High
DC2	Our company is capable of recognizing and capitalizing on new digital opportunities.	5,32	High
DC3	Our company adapts quickly to digital change.	5,09	Fairly High
DC4	Our company is proficient in the latest digital technologies.	5,51	High
DC5	Our company is capable of creating new products, services, or processes using digital technologies.	5,88	High

Source: Processed Questionnaire Data

The data indicate that the companies in the study have a strong level of digital capability. The indicator "Our company is able to acquire key digital technologies" (DC1) achieved a High criterion with an average score of 5.67, indicating the company has an effective capacity to acquire essential digital tools and systems. Similarly, the indicator "Our company is able to recognize and exploit new digital opportunities" (DC2) also achieved a High rating with an average score of 5.32, indicating that the company can identify and capitalize on emerging digital prospects. The indicator "Our company adapts quickly to digital change" (DC3) had a slightly lower average of 5.09, which is categorized as Fairly High, indicating that while the company is relatively responsive to digital transformation, there is still room for improvement in agility. Furthermore, the indicator “Our company is proficient in the latest digital technologies” (DC4) received a High rating with an average of 5.51, reflecting strong competence in utilizing advanced digital tools. The highest average score, 5.88, was seen for the question "Our company is able to create new products, services, or processes using digital technologies" (DC5), which also falls into the High category. This indicates that digital innovation is a key strength of the organization.

4.2.4 Description Analysis of Variable Sustainable Product Design

The following are the results of the descriptive analysis calculations of the Sustainable Product Design variable.

Table 4.10 Description Analysis of Variable Sustainable Product Design

Code	Indicator Measurement	Mean	Criteria
SPD1	Our company’s final products are made using recycled materials.	5,73	High
SPD2	Our company’s final products are made with minimal raw materials.	5,37	High
SPD3	Our company’s final products are designed to require minimal energy during adoption.	5,57	High
SPD4	Our company’s final products are reusable after use.	5,20	Fairly High
SPD5	Our company’s production process uses energy more efficiently than competitors.	5,96	High

Source: Processed Questionnaire Data

The data reveal that these companies demonstrate a strong commitment to sustainable product development practices. The indicator "Our company's final products are made using recycled materials" (SPD1) is in the High category with an average score of 5.73, indicating that the company actively uses recycled materials in its production process. The indicator "Our company's final products are made with minimal raw materials" (SPD2) also achieved a High rating with an average score of 5.37, reflecting efficient use of resources and efforts to minimize material consumption. Furthermore, the indicator "Our company's final products are designed to require minimal energy during application" (SPD3) achieved the High criterion with an average score of 5.57, indicating that energy efficiency is an important consideration in the company's product design. Meanwhile, the indicator "Our company's final products are reusable after use" (SPD4) obtained a slightly lower average score of 5.20, which is categorized as Fairly High, indicating that although reuse is considered, there is still potential for improvement in this area. The highest average score, 5.96, was for the indicator "Our company's production processes use energy more efficiently than competitors" (SPD5), which is categorized as High. This implies that the company's production processes are highly energy-efficient and competitive. Overall, these findings indicate that the company's sustainable product development performance is high, particularly in terms of material efficiency, energy conservation, and environmentally friendly production processes.

4.2.5 Description Analysis of Variable Innovation Performance

The following are the results of the descriptive analysis calculations of the Innovation Performance variable.

Table 4.11 Description Analysis of Variable Innovation Performance

Code	Indicator Measurement	Mean	Criteria
IP1	Our company demonstrated an increase in new product launches to the market.	5,27	Fairly High
IP2	Our company reported excellent results from process innovation.	5,52	High
IP3	Our company demonstrated improved new features for existing products.	5,39	High
IP4	Our company was able to reduce the time required to launch products to the market.	5,8	High
IP5	Our company demonstrated an increase in the number of new products.	5,91	High

Source: Processed Questionnaire Data

The data shows that the company demonstrates strong levels of innovation performance. The indicator "Our company demonstrates an increase in new product launches to the market" (IP1) was rated Fairly High with an average score of 5.27, indicating that while the company's new product introduction rate is positive, there is potential for further improvement. The indicator "Our company reports excellent results from process innovation" (IP2) achieved a High rating with an average score of 5.52, reflecting the company's success in achieving significant benefits from innovation in its processes. Similarly, the indicator "Our company demonstrates improvements in new features for existing products" (IP3) recorded a High rating with an average score of 5.39, indicating a consistent focus on improving product features and functionality. The indicator "Our company is able to reduce the time it takes to launch products to the market" (IP4) achieved a High rating with an average score of 5.80, indicating that efficiency and speed in product development are strong aspects of the company's innovation strategy. Finally, the indicator “Our company demonstrates an increasing number of new products” (IP5) obtained the highest average score, namely 5.91, which is also in the High category, implying continued success in expanding the company's product portfolio.

4.3 External Model Analysis (Outer Model)

Within the framework of variance-based structural equation modeling (PLS-SEM), the outer model specifies the associations between latent variables which are theoretical constructs that cannot be directly observed and corresponding observable indicators. This procedure is undertaken to confirm that the measurement instruments demonstrate reliability and validity before evaluating the structural relationships. A robust and validated measurement model is critical for deriving meaningful insights from the inner structural relationships in PLS-SEM (Riou et al., 2016).

4.3.1 Convergent Validity Test

Convergent validity assesses how closely related a set of indicators is in representing the same construct, as reflected in their shared variance. In PLS-SEM analysis, this validity was evaluated through the examination of outer loadings and the Average Variance Extracted (AVE), both of which should surpass 0.50. Indicators with loadings above 0.70 demonstrate a strong relationship with their corresponding latent construct, confirming their adequacy in measuring the underlying theoretical concept.

Table 4.12 Outer Loading

	DC	EO	IP	SPD	TO
DC 1	0,867				
DC 2	0,876				
DC 3	0,788				
DC 4	0,859				
DC 5	0,850				
EO 1		0,866			
EO 2		0,860			
EO 3		0,838			
EO 4		0,872			
IP 1			0,804		
IP 2			0,772		
IP 3			0,861		
IP 4			0,848		
IP 5			0,885		
SPD 1				0,754	
SPD 2				0,789	
SPD 3				0,834	
SPD 4				0,789	

SPD 5				0,837	
TO 1					0,805
TO 2					0,840
TO 3					0,825
TO 4					0,836

Source: Processed Questionnaire Data

The validity of the indicators in representing their respective constructs is evidenced by the reported outer loading values. As a general guideline, outer loadings of 0.70 or above are regarded as acceptable, reflecting a substantial contribution of each indicator to its construct.

The outer loading results for the Technology Orientation (TO) construct indicate that all items (TO1–TO4) load between 0.805 and 0.840, reflecting strong measurement validity and confirming that each indicator adequately represents the technology orientation dimension.

The Digital Capability (DC) construct has all indicators (DC1 to DC5) with outer loading values between 0.788 and 0.876, suggesting that these indicators strongly reflect the firm's digital capability.

The Economic Orientation (EO) construct also demonstrates satisfactory results, with all indicators (EO1 to EO4) showing outer loading values between 0.838 and 0.872, indicating that these items are valid measures of the firm's economic orientation.

Similarly, the Sustainable Product Design (SPD) construct has outer loading values ranging from 0.754 to 0.837, signifying that all indicators are valid and adequately represent the sustainable product design concept.

Lastly, the Innovation Performance (IP) construct exhibits outer loading values between 0.772 and 0.885, showing that all indicators are valid and make a strong contribution to explaining innovation performance.

Based on the results, all indicators in this study exhibit outer loading values exceeding 0.70, indicating that the requirement for convergent validity has been satisfied.

Table 4.13 Average Variance Extracted (AVE)

Variable	Average Variance Extracted
Digital Capability	0,720
Economic Orientation	0,738
Innovation Performance	0,697
Sustainable Product Design	0,642
Technology Orientation	0,683

Source: Processed Questionnaire Data

Furthermore, from the Average Variance Extracted calculation, the table shows that all constructs recorded AVE values higher than the minimum acceptable level of 0.50, indicating that the measures effectively capture the variance shared with their indicators and thus demonstrate sufficient convergent validity.

4.3.2 Discriminant Validity Test

Table 4.14 Discriminant Validity Results (Fornell-Larcker)

	DC	EO	IP	SPD	TO
DC	0,849				
EO	0,334	0,859			
IP	0,688	0,708	0,835		
SPD	0,593	0,613	0,772	0,801	
TO	0,363	0,375	0,692	0,617	0,826

Source: Processed Questionnaire Data

Based on Table 4.14, the square roots of the AVEs for each construct are Technology Orientation (TO) = 0.826, Digital Capability (DC) = 0.849, Economic Orientation (EO) = 0.859, Sustainable Product Design (SPD) = 0.801, and Innovation Performance (IP) = 0.835. Each of these values is greater than any correlation value in the corresponding row and column. This pattern holds consistently for all constructs. Therefore, the results of this study confirm that each construct in the model is empirically distinct and measures a unique concept. Thus, the results in this table meet the Fornell-Larcker criteria, indicating that the model has achieved acceptable discriminant validity.

Table 4.15 Discriminant Validity Results (HTMT)

	DC	EO	IP	SPD	TO
DC					
EO	0,370				
IP	0,768	0,797			

SPD	0,668	0,700	0,879		
TO	0,411	0,434	0,797	0,722	

Source: Processed Questionnaire Data

Based on the test results displayed in the table above, the Heterotrait-Monotrait correlation ratio (HTMT) values between constructs show relatively low results and are all below the threshold of 0.90. Specifically, the relationship between Digital Capability (DC) and other constructs has an HTMT value of 0.370 with Economic Orientation (EO), 0.768 with Innovation Performance (IP), 0.668 with Sustainable Product Design (SPD), and 0.411 with Technology Orientation (TO). Furthermore, the relationship between Economic Orientation (EO) and Innovation Performance (IP) is 0.797, with Sustainable Product Design (SPD) is 0.700, and with Technology Orientation (TO) is 0.434. The highest HTMT value is found in the relationship between Sustainable Product Design (SPD) and Innovation Performance (IP) at 0.879, but is still below the recommended maximum limit of 0.90. According to Henseler et al., a value below 0.90 indicates good discriminant validity for models with similar contexts. However, a stricter value (below 0.85) is used for closely related constructs to avoid overlap (Henseler et al., 2016).

4.3.3 Reliability Test

The reliability of the measurement instrument was evaluated through the application of Cronbach's Alpha, with the objective of enhancing the credibility of the results in the quantitative analysis. Reliability is deemed acceptable when the Cronbach's Alpha coefficient exceeds the recommended value, which is greater than 0.70, indicating adequate internal consistency. The corresponding results are displayed below.

Table 4.16 Cronbach's Alpha and Composite Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DC	0,902	0,906	0,928	0,720
EO	0,881	0,883	0,918	0,738
IP	0,891	0,893	0,920	0,697
SPD	0,860	0,865	0,899	0,642
TO	0,845	0,847	0,896	0,683

Source: Processed Questionnaire Data

4.4 Structural Model Testing (Inner Model)

In assessing the structural model, researchers focus on examining the interrelationships between latent constructs while also determining the model's ability to explain and predict outcomes. The evaluation relies on several indicators, including collinearity statistics, R-Square values, and path coefficients obtained through bootstrapping analysis (J. Hair & Alamer, 2022) (Sarstedt et al., 2017)

4.4.1 Collinearity Test

Effect estimates are only reliable when collinearity among predictor constructs is adequately assessed and controlled. As an initial step in structural model assessment, the Variance Inflation Factor (VIF) values are examined for predictor constructs entering each endogenous construct. High collinearity among predictors can distort the precision of path estimates and increase standard errors. Based on existing literature, a VIF threshold of less than 5 indicates acceptable levels of collinearity, while values exceeding this threshold denote critical issues that should be corrected. Therefore, the results indicate that multicollinearity does not pose a significant concern, ensuring that the interpretation of the following structural path analysis remains valid and reliable.

Table 4.17 Collinearity Test

	DC	**EO**	**IP**	**SPD**	**TO**
DC			**1,546**	**1,215**	
EO			**1,605**	**1,228**	
IP					
SPD			**2,826**		
TO	**1,000**	**1,000**	**1,614**	**1,257**	

Source: Processed Questionnaire Data

4.4.2 Coefficient of Determination (R-Square)

The proportion of variance in an endogenous construct that is explained by its predictor constructs is reflected in the coefficient of determination (R^2) within the structural, or inner, model. Maximizing the R^2 value for the target construct is a primary objective in variance-based structural equation modeling (PLS-SEM), as it reflects the model's substantive predictive power. The interpretation of R^2 values commonly follows benchmark thresholds, where values of 0.75 or higher indicate substantial explanatory power, those between 0.50 and 0.75 suggest moderate strength, and values near 0.25 reflect weak explanatory capability.

Table 4.18 R-Square Results

	R-square	R-square adjusted
DC	0,132	0,126
EO	0,141	0,135
IP	0,852	0,848
SPD	0,646	0,639

Source: Processed Questionnaire Data

Based on the test results in the table above, the Digital Capability (DC) construct has an R^2 value of 0.132 and an Adjusted R^2 of 0.126, indicating that approximately 13.2% of the variation in DC can be explained by the exogenous variables influencing it, while the remainder is explained by factors outside the model. The Economic Orientation (EO) construct has an R^2 value of 0.141 and an Adjusted R^2 of 0.135, indicating that approximately 14.1% of the variation in EO can be explained by the predictor variables in the model. Both values indicate a weak level of explanation, but are still acceptable in social research involving organizational behaviour. Furthermore, the Innovation Performance (IP) construct has an R^2 value of 0.852 and an Adjusted R^2 of 0.848, indicating that 85.2% of the variation in IP can be explained by the constructs influencing it. These values are considered strong (substantial), indicating that the model has high predictive ability for innovation performance. Meanwhile, the Sustainable Product Design (SPD) construct has an R^2 value of 0.646 and an Adjusted R^2 of 0.639, indicating that 64.6% of the variation in SPD can be explained by exogenous variables in the model. This value is in the moderate or quite strong category (Hair Jr et al., 2021).

4.4.3 Path Coefficient Test

In Partial Least Squares-Structural Equation Modeling (PLS-SEM), path coefficients indicate the estimated strength and direction of the relationships linking the model's constructs. The bootstrapping procedure in PLS-SEM was employed to assess the statistical significance of path coefficients by estimating standard errors and corresponding t-values used in hypothesis evaluation. Significance at the 5% level is established when the computed t-value surpasses 1.96 and the p-value is under 0.05, confirming empirical support for the hypothesized relationship (J. Hair & Alamer, 2022).

Table 4.19 Path Coefficient Results

	Original sample (O)	**Sample mean (M)**	**Standard deviation (STDEV)**	**T statistics (|O/STDEV|)**	**P values**	**Conclusion**
DC -> IP	0,375	0,376	0,040	9,346	0,000	**H6 is supported**
DC -> SPD	0,342	0,340	0,051	6,682	0,000	**H5 is supported**
EO -> IP	0,395	0,395	0,042	9,468	0,000	**H9 is supported**

EO -> SPD	0,365	0,362	0,049	7,443	0,000	**H8 is supported**
SPD -> IP	0,091	0,090	0,053	1,715	0,086	**H7 is not supported**
TO -> DC	0,363	0,356	0,105	3,440	0,001	**H1 is supported**
TO -> EO	0,375	0,367	0,097	3,847	0,000	**H3 is supported**
TO -> IP	0,352	0,358	0,048	7,290	0,000	**H4 is supported**
TO -> SPD	0,355	0,356	0,058	6,182	0,000	**H2 is supported**

Source: Processed Questionnaire Data

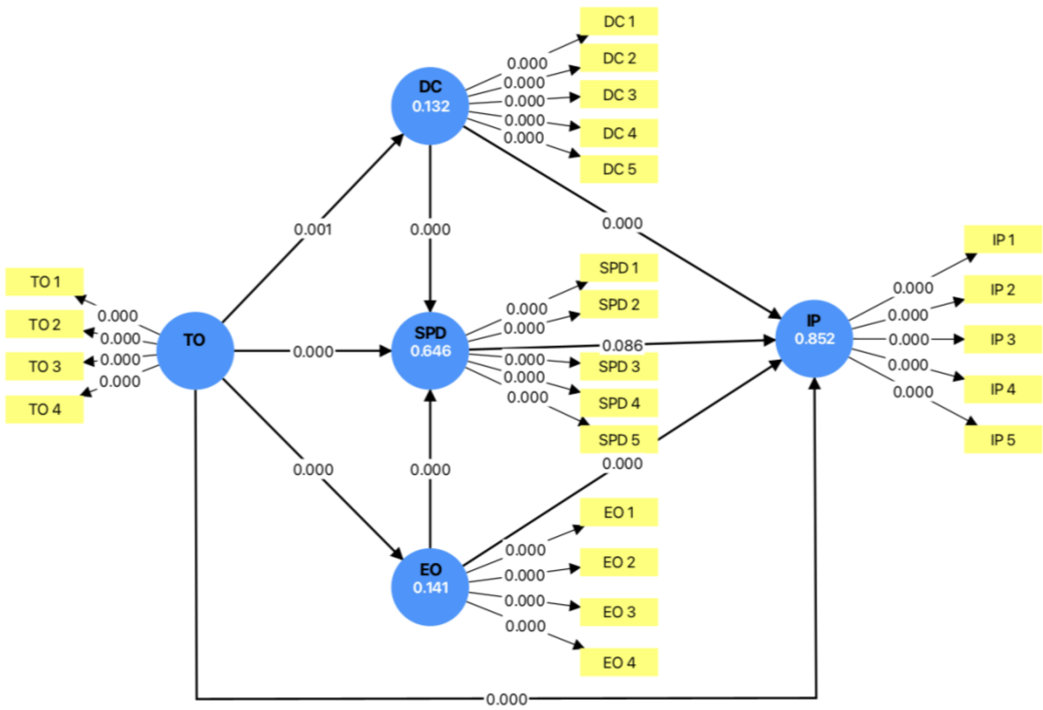

Figure 4.1 Path Coefficient Results

4.5 Discussion

4.5.1 Technology Orientation on Digital Capability

The results of the path coefficient analysis indicate that Technology Orientation has a positive and significant effect on Digital Capability, with a path coefficient of 0.363, a T-statistic of 3.440, and a P-value of 0.001. These results meet the significance threshold of a T-statistic above 1.96 and a P-value below 0.05, confirming that the relationship between the two variables is positive and statistically significant. The finding underscores that a strong orientation toward technology, which manifested through proactive adoption and assimilation of technological innovations, correlates with enhanced digital capability. Continuous engagement with technological advancements equips organizations with the means to expand their digital infrastructure, resources, and innovative capacity.

These results align with the findings of Yu & Moon (2021), who asserted that technology orientation fosters digital competencies in the form of digital infrastructure, digital integration, and digital capabilities, in driving digital transformation and increasing organizational agility. Studies have revealed that organizations emphasizing innovation and ongoing technological advancement are more capable of building resilient digital capabilities that sustain competitive performance and adaptive capacity. Similarly, Yu et al. (2022) found that technology orientation has a positive influence on digital transformation capability. This indicates that the effective use of technology and digital processes within a company enhances digital transformation capabilities in sensing, organizing, and restructuring. leading to improvements in innovation capacity, organizational efficiency, and market competitiveness. These studies substantiate contemporary evidence suggesting that prioritizing technology orientation within organizational strategy plays a pivotal role in advancing digital capability development. The results affirm that greater technology orientation contributes to the advancement of digital capabilities, ultimately enabling organizations to drive digital transformation and secure sustainable competitive advantage. Therefore, the hypothesis stating that Technology Orientation positively influences Digital Capability is **supported**.

4.5.2 Technology Orientation on Sustainable Product Design

The results of the path coefficient analysis indicate that Technology Orientation has a positive and significant effect on Sustainable Product Design, with a path coefficient value of 0.355, a T-statistic of 6.182, and a P-value of 0.000. These results meet the established significance criteria, namely a T-statistic above 1.96 and a P-value below 0.05, indicating that the relationship between technology orientation and sustainable product design is statistically significant. This finding suggests that the greater a company's technology orientation, the stronger its ability to design environmentally sustainable and resource-efficient products. In other words, technology-oriented organizations can effectively integrate advanced technologies to improve product life cycle performance, reduce environmental impacts, and enhance sustainability outcomes.

The results of this study are consistent with research by Li et al. (2022), which demonstrates a positive relationship between digital technology and environmental performance. Firms that integrate technology into their operations and possess a strong understanding of its application tend to manage resources more efficiently while simultaneously advancing environmental consciousness across their organizational practices (Li et al., 2022). This is also in line with research by Zhang et al. that by promoting knowledge accumulation, technology integration, and improved innovation outcomes, the incorporation of digital technologies within organizations enhances sustainable product design, thereby strengthening overall sustainable product development performance (Zhang et al., 2025). The findings indicate that sustainable product design is strongly influenced by a firm’s level of technology orientation. Organizations that actively invest in technological advancement and digital transformation tend to achieve superior sustainability outcomes through environmentally responsible design and manufacturing practices.

Thus, the hypothesis asserting that Technology Orientation positively impacts Sustainable Product Design is **supported.**

4.5.3 Technology Orientation on Economic Orientation

The results of the path coefficient analysis indicate that Technology Orientation has a positive and significant effect on Economic Orientation, with a path coefficient value of 0.375, a T-statistic of 3.847, and a P-value of 0.000. These results meet the significance threshold of a T-statistic above 1.96 and a P-value below 0.05, indicating that technology orientation contributes significantly to strengthening a company's economic orientation. These findings suggest that companies with higher levels of technology orientation tend to exhibit greater focus and economic performance. In other words, a strong technology orientation enables companies to increase productivity, reduce operational costs, and create competitive advantages that increase overall economic value.

These findings align with research by Yang et al. (2022), which emphasizes that technology orientation significantly contributes to economic sustainability. By adopting new technologies, companies can strengthen their competitive advantage and ensure long-term economic viability, as technological advancements offer substantial benefits that enhance business acceptance and achieve sustained economic growth (Yang et al., 2022). This also aligns with Daraojimba et al. (2023)'s study, which illustrates the transformative power of technology and innovation in entrepreneurship. By emphasizing resilience, adaptability, and continuous innovation, the study demonstrates how firms can overcome challenges and risks to achieve financial growth and expand their market presence. These examples reveal how entrepreneurial ventures have adopted and exploited technological advancements and innovation to create value, reshape industries, and deliver positive social impact (Daraojimba et al., 2023). The reviewed studies and the present findings suggest that technological orientation plays a central role in shaping firms' economic orientation, as it enables organizations to improve efficiency, productivity, and profitability through innovation. This reinforces the idea that technological advancement functions as a cornerstone for sustainable and competitive business growth. Overall, the results demonstrate that companies with a high level of technological orientation exhibit stronger economic orientation, primarily due to their capacity to integrate innovation, improve efficiency, and optimize resource utilization. Hence, it is concluded that the hypothesis proposing a positive influence of technological orientation on economic orientation is empirically **supported**.

4.5.4 Technology Orientation on Innovation Performance

The results of the path coefficient analysis indicate that Technology Orientation has a positive and significant effect on Innovation Performance, with a path coefficient value of 0.352, a T-statistic of 7.290, and a P-value of 0.000. These results meet the significance criteria of a T-statistic above 1.96 and a P-value below 0.05, which confirms that the relationship between the two variables is positive and statistically significant. These findings indicate that companies with a strong technology orientation are more likely to achieve superior innovation performance. In this context, technology orientation enables organizations to enhance their product and process innovation, strengthen competitive advantage, and accelerate the development of new ideas and solutions.

These findings are supported by research by Nassani et al. (2023), which asserts that technology orientation significantly enhances organizational innovation performance. Companies that emphasize technological advancement are better equipped to utilize digital transformation as a strategic tool for boosting innovation capability and achieving superior business performance. Accordingly, these results emphasize that modern organizations must prioritize technological orientation to strengthen innovation outcomes and maintain competitive growth (Nassani et al., 2023). Furthermore, He et al. (2020) emphasized that companies that adopt a technology-oriented strategy tend to strengthen their innovation capacity by leveraging extensive technical knowledge accumulated from past experiences. This accumulated expertise serves as a crucial foundation for enhancing innovation ability, which enables these companies to intensify their international research and development activities (He et al., 2020). The evidence from this study confirms that a high degree of technology orientation enables organizations to innovate more effectively and remain competitive in the long run. Thus, the proposed hypothesis that Technology Orientation positively influences Innovation Performance is **supported**.

4.5.5 Digital Capability on Sustainable Product Design

The path coefficient results indicate that Digital Capability has a positive and significant effect on Sustainable Product Design, with a path coefficient of 0.342, a T-statistic of 6.682, and a P-value of 0.000. These values meet the general significance threshold of T above 1.96 and P below 0.05, confirming a positive and statistically significant relationship. This implies that companies with stronger digital capabilities, including advanced data analytics, IoT integration, and digital design tools, are better able to implement sustainable product design practices, such as optimizing material use, increasing energy efficiency, and improving product lifecycle management. Practically, these findings suggest that investments in digital infrastructure and competencies result in tangible improvements in green design and resource-efficient product development.

These results are consistent with the findings of Zhang & Liu (2024), which emphasize that by leveraging data-driven insights in design and manufacturing processes, these digital capabilities can strengthen environmentally conscious sustainability practices, which include the integration of sustainable principles into product design processes. Zhang & Liu also stated that by combining digital empowerment with sustainable value generation in their organizational culture, enterprises strengthen their digital green capabilities and advance environmentally responsible business practices (Zhang & Liu, 2024). Furthermore, Xu et al. (2022) highlight that the development of entrepreneurial sustainability is shaped by digital capabilities that facilitate the recognition and exploitation of opportunities for product and process, which leads to economic benefits. These studies collectively demonstrate that digital capability drives sustainable product design by enabling innovative approaches and reinforcing organizational commitment to environmental sustainability. The findings suggest that enhanced digital capability leads to improved implementation of sustainability-oriented design practices that comply with current industrial norms. Therefore, the hypothesis asserting a positive relationship between Digital Capability and Sustainable Product Design is empirically **supported**.

4.5.6 Digital Capability on Innovation Performance

The results of the path coefficient analysis indicate that Digital Capability has a positive and significant effect on Innovation Performance, with a path coefficient value of 0.375, a T-statistic of 9.346, and a P-value of 0.000. These results meet the established significance criteria namely, a T-statistic above 1.96 and a P-value below 0.05, which confirms that Digital Capability plays an important role in improving a company's innovation performance. These findings indicate that organizations equipped with stronger digital capabilities are better able to drive innovation in products, services, and processes. Companies that effectively utilize digital tools and infrastructure can accelerate their innovation cycles, improve decision-making accuracy, and respond more dynamically to market demands.

These results align with the findings of Tian et al. (2025), that a company's digital capabilities serve as a critical driver of enhanced innovation performance. The synergistic interaction among digital perception, digital operation, and digital resource coordination capabilities substantially increases innovation efficiency across product development, service enhancement, and market responsiveness. (Tian et al., 2025). These results also align with research conducted by Cheng et al. (2024), which highlights the crucial role of digital capabilities in corporate green innovation. Cheng et al. found that innovation performance can be improved when companies consistently invest in digital capabilities aimed at enhancing environmental outcomes, innovation in products, and operational processes. This includes the adoption of digital transformation initiatives, the use of analytics technologies, the creation of digital platforms, and the deep integration of operations with digital systems. They should also strengthen data analysis and mining capabilities, process efficiency through real-time, and foster an environment conducive to sustainable innovation. The findings indicate that enhanced digital capability contributes to improved innovation outcomes through the effective application of digital technologies that stimulate creativity, organizational agility, and continuous enhancement. Hence, the hypothesis asserting that Digital Capability positively influences Innovation Performance is **supported**.

4.5.7 Sustainable Product Design on Innovation Performance

Path coefficient analysis indicates that Sustainable Product Design (SPD) does not have a statistically significant effect on Innovation Performance (IP). In this study, the path coefficient was 0,091, the T-statistic was 1,715 and the P-value was 0,086. These results do not meet the established significance criteria, which includes a T-statistic below 1.96 and a P-value above 0.05; the hypothesized direct relationship was not supported. The findings indicate that, among the manufacturing companies examined, measurable enhancements in innovation performance appear to result solely from the adoption of sustainable product design practices, at least not in a direct or unconditional manner.

The results of this study align with research by Karman & Bartoszczuk (2023), which found that the implementation of eco-innovation does not necessarily contribute to sustainability. According to Karman & Bartoszczuk, eco-innovation should produce mutually beneficial outcomes, it should not place economic performance above social or environmental objectives, and should not make the innovators disregard potential negative consequences. However, research indicates that these conditions are not always fulfilled. This, highlights the need for a more systemic perspective in assessing their impact on sustainable performance (Karman & Bartoszczuk, 2023). In other words, this explains that eco-innovation (the integration of sustainable production/process and innovation) does not always produce beneficial results. Study from Ahmadi-Gh & Bello-Pintado (2021) also found that sustainable practices such as sustainable product design did not have a direct effect on the success of new product development or product innovation (Ahmadi-Gh & Bello-Pintado, 2021). The findings indicate that, among the manufacturing companies studied, measurable improvements in innovation performance do not appear to result solely from the implementation of sustainable product design practices. The relationship might not be evident, as the implementation of sustainable product design does not necessarily guarantee positive outcomes. Potential negative implications, including increased production costs, process complexity, overconsumption, and restricted innovation, can occur when sustainability is pursued too rigidly (Minseo, 2025). Based on the research evidence, sustainable product design does not always have a positive influence on innovation performance. Therefore, the hypothesis that sustainable product design has a positive impact on innovation performance is **not supported.**

4.5.8 Economic Orientation on Sustainable Product Design

The path coefficient results indicate that Economic Orientation (EO) has a positive and significant influence on Sustainable Product Design (SPD), with a path coefficient = 0.365, T-statistic = 7.443, and P-value = 0.000. These values meet the general significance criteria of T above 1.96 and P below 0.05, indicating that companies with a stronger economic orientation characterized by an emphasis on cost efficiency, ROI targets, and financial planning are more likely to incorporate sustainability principles into product design, such as material efficiency, energy optimization, and life cycle thinking. The empirical results reported here are drawn from questionnaire data that have been processed in this study.

These results align with research by Jagani (2023), which found that a clearly formulated strategic direction is established by economically oriented firms to achieve stable financial gains, which later becomes the cornerstone for fostering sustainable product design and improving innovation outcomes (Jagani, 2023). According to Mengistu et al. (2025), the integration of economic dimensions such as product reliability, durability, and maintainability within the design stage is fundamental to achieving sustainable product performance. The study indicates that firms place high importance on these attributes, as well as material cost considerations, within their sustainable production frameworks. Furthermore, improving resource efficiency through reduced energy and material consumption enhances affordability and market share. These findings are consistent with previous open-access research showing that economic motives can drive the adoption of sustainable product practices when sustainability is framed as a source of efficiency and competitive advantage. Hence, the hypothesis asserting that the Economic Orientation of a Firm Affects Sustainable Product Design is **supported**

4.5.9 Economic Orientation on Innovation Performance

The path coefficient results indicate that Economic Orientation (EO) has a positive and significant effect on Innovation Performance (IP), with a path coefficient = 0.395, T-statistic = 9.468, and P-value = 0.000 (processed questionnaire data). Since the T-statistic exceeds 1.96 and the P-value is below 0.05, the relationship is statistically significant and the direct effect hypothesis is supported. These findings suggest that firms emphasizing an economic orientation manifested through strong cost-efficiency concerns, clear ROI targets, and persistent efforts to improve financial results are more likely to allocate resources and managerial attention in ways that enhance innovation outcomes, for example, new products, process improvements, and faster commercialization. In practice, an economic focus appears to drive strategic investments and managerial priorities that result in higher innovation performance in manufacturing firms.

This result is consistent with Kruglov & Shaw's (2024) research, which suggests several policy recommendations aimed at increasing the positive correlation between financial resources and an organization's research and development department. The increasing demand for financial resource accessibility highlights the critical role of cost management, which is one of an elements of economic orientation, in shaping innovation performance. This implies that companies with a strong financial focus or emphasizing economic orientation are better positioned to enhance their innovation outcomes (Kruglov & Shaw, 2024).

Jagani (2023) also argues that companies with a strong economic orientation apply financial discipline to structure their innovation processes, thereby increasing operational effectiveness and speeding up the introduction of new products to the market (Jagani, 2023). The overall evidence aligns with this study's results, showing that firms with a strong economic orientation tend to enhance both financial and innovation performance through targeted investments in technology and innovation-driven strategies aimed at achieving competitive advantage. Therefore, the hypothesis of Economic Orientation of a Firm Affect Its Innovation Performance is **supported**.

CHAPTER V
CONCLUSIONS

5.1 Conclusions

This study examines the relationships between Technology Orientation, Economic Orientation, Digital Capabilities, Sustainable Product Design, and Innovation Performance in manufacturing firms. Using Partial Least Squares-Structural Equation Modeling (PLS-SEM) and data from 159 respondents, the study tests nine hypotheses to identify direct and indirect influences among these constructs. Empirical findings provide substantial support for most of the proposed hypotheses and contribute to a deeper understanding of how strategic orientation and digital capabilities collectively shape innovation outcomes in a sustainability-driven industrial context. The research results show that Technology Orientation plays a fundamental role in enhancing organizational capabilities and performance. This orientation has a significant positive influence on Digital Capability, Economic Orientation, Sustainable Product Design, and Innovation Performance. These findings confirm that technology-oriented companies are more likely to adopt and integrate new technologies effectively, leading to stronger digital infrastructure, operational efficiency, and competitive innovation outcomes. Furthermore, Technology Orientation indirectly strengthens innovation through its influence on Digital Capability and Sustainable Product Design. The study also found that Digital Capability significantly influences Sustainable Product Design and Innovation Performance. Furthermore, Economic Orientation was shown to have a positive and significant influence on Sustainable Product Design and

Innovation Performance, indicating that financially disciplined and efficiency-oriented companies can leverage economic resources to support sustainable innovation strategies. However, Sustainable Product Design did not demonstrate a significant direct impact on Innovation Performance; the relationship might not be evident, as the implementation of sustainable product design does not necessarily guarantee positive outcomes. In summary, this study confirms that companies with a strong technological and economic orientation, supported by robust digital capabilities, are better positioned to enhance innovation outcomes and integrate sustainable practices into their operations. These findings contribute both theoretically and practically by highlighting the interconnected roles of strategic orientation, digitalization, and sustainability in driving competitive advantage in modern manufacturing industries.

5.2 Implications of the research

This research provides several significant theoretical and practical insights that enrich the current understanding of strategic orientation, digital capabilities, and innovation performance, and provides valuable insights for practitioners, particularly in the manufacturing sector.

5.2.1 Theoretical Implications

1. Through the lens of the Resource-Based View (RBV), this study demonstrates that Strategic Orientations are pivotal strategic assets that promote the development of Digital Capability and subsequently stimulate Innovation Performance. The results show that technology

orientation serves both as an independent strategic enabler and as a reinforcing element that bolsters an organization's ability to achieve sustainable innovation.

2. The theoretical understanding of Digital Capability is further enhanced by these findings, which demonstrate its mediating role in linking strategic orientation to innovation performance. This evidence confirms that digital capability functions as a pathway enabling firms to translate technological resources into observable innovation achievements.
3. The contribution of this study to the literature on Sustainable Product Design (SPD) lies in demonstrating that its relationship with innovation performance is not inherently direct or absolute, as the implementation of sustainable product design does not necessarily guarantee positive outcomes.

By combining the dimensions of strategic orientation, digital capability, and sustainability, this research refines theoretical perspectives in strategic management and innovation studies, offering a richer explanation of how firms create and maintain competitive advantage in the digital age. innovation.

5.2.2 Practical Implications

1. This study contributes to managerial practice by deepening the understanding of how a strong technology orientation enables firms to manage digital transformation effectively and enhance innovation performance. Managers should emphasize ongoing technological

investment, infrastructure strengthening, and workforce upskilling as strategic imperatives for improving organizational agility and innovation potential.

2. While Sustainable Product Design alone may have limited direct influence on innovation, its effectiveness increases when coupled with digital technologies and good economic orientation. Consequently, managers should integrate sustainability with digital and financial strategies to align innovation performance with both ecological responsibility and economic viability.

This study concludes that achieving lasting competitiveness requires organizations to balance their strategic focus across technological, economic, and sustainability dimensions, allowing them to strengthen innovation and adapt effectively to the challenges of a digital and sustainability-focused environment.

5.3 Research Limitations

Despite contributing valuable empirical evidence to the understanding of how Technology Orientation, Economic Orientation, Digital Capabilities, and Sustainable Product Design influence Innovation Performance, the study's scope is subject to certain limitations. Acknowledgment of these constraints is necessary to refine future investigations and enhance the overall rigor and generalizability of the conclusions.

1. A cross-sectional design was applied in this study, meaning that data were obtained at only one point in time. Therefore, causal interpretations of the relationships among variables should be made cautiously. To capture the dynamic nature of these relationships, future research should consider adopting a longitudinal design that tracks changes in strategic orientation and digital capability development over time.
2. The scope of this study was limited to manufacturing firms within a defined regional and industry context. While this provided sector-specific insights, it restricts the generalizability of the conclusions to other types of organizations, including service firms, technology startups, or public institutions. Subsequent research should therefore test the model across different industries and geographic regions to assess its applicability under distinct environmental conditions.
3. Data for this study were obtained through self-reported questionnaires, a method that may introduce social desirability tendencies or common method bias. To strengthen measurement validity and reduce such bias, subsequent research should draw upon multi-source data, including objective or archival performance measures.

5.4 Recommendations for Future Research

The insights and constraints identified in this study lead to several recommendations for subsequent research. These recommendations focus on improving theoretical understanding, increasing methodological robustness, and enhancing the external validity of findings in relation to strategic orientation, digital capabilities, sustainable product design, and innovation performance.

1. A longitudinal or panel research design should be utilized in future studies to examine the temporal and developmental aspects of the linkages between strategic orientation, digital capabilities, and innovation results. This methodological shift would provide a more comprehensive understanding of how firms cultivate digital competencies over time and how such processes influence innovation outcomes.
2. Future researchers should broaden the empirical scope beyond the manufacturing domain by examining other contexts, such as service industries, technology-driven startups, and public sector organizations. Conducting studies across diverse sectors and geographic regions will allow for a more comprehensive assessment of whether the relationships observed in this research remain valid under varying institutional and environmental conditions.
3. Future research should consider using multi-source or mixed-method approaches to strengthen measurement validity. Combining statistical data with qualitative insights, such as those from interviews or case analyses, will provide more detailed explanations of how organizations integrate digital transformation with sustainability practices.

4. Future research is encouraged to incorporate firm size as a key consideration in the research design and data collection process. Differences between small and medium-sized enterprises (SMEs) and large firms may lead to varying research findings, as each category operates under distinct managerial practices, operational systems, and organizational structures. Therefore, narrowing the research focus to a specific firm size or explicitly categorizing firms based on size or type can enhance the precision of the analysis and improve the accuracy and relevance of the research outcomes.

REFERENCES

Ahmadi-Gh, Z., & Bello-Pintado, A. (2021). The effect of sustainability on new product development in manufacturing—internal and external practices. *Administrative Sciences*, *11*(4). https://doi.org/10.3390/admsci11040115

Al-Abbadi, L. H., & Abu Rumman, A. R. (2023). Sustainable performance based on entrepreneurship, innovation, and green HRM in e-Business Firms. *Cogent Business and Management*, *10*(1). https://doi.org/10.1080/23311975.2023.2189998

Alaskar, T. H. (2025). Data-driven innovation and innovation ambidexterity for sustaining firm resilience: the mediating role of BA capabilities and digital culture. *Discover Sustainability*, *6*(1). https://doi.org/10.1007/s43621-025-01860-z

Almodóvar, P., & Nguyen, Q. T. K. (2022). Product innovation of domestic firms versus foreign MNE subsidiaries: The role of external knowledge sources. *Technological Forecasting and Social Change*, *184*. https://doi.org/10.1016/j.techfore.2022.122000

Apuke, O. D. (2017). Quantitative Research Methods : A Synopsis Approach. *Kuwait Chapter of Arabian Journal of Business and Management Review*, *6*(11), 40–47. https://doi.org/10.12816/0040336

Ardolino, M., Bino, A., Ciano, M. P., & Bacchetti, A. (2025). Enabling Digital Capabilities with Technologies: A Multiple Case Study of Manufacturing Supply Chains in Disruptive Times. *Systems*, *13*(1). https://doi.org/10.3390/systems13010039

Asbeetah, Z., Alzubi, A., Khadem, A., & Iyiola, K. (2025). Harnessing Digital Transformation for Sustainable Performance: Exploring the Mediating Roles of Green Knowledge Acquisition and Innovation Performance Under Digital Transformational Leadership. *Sustainability (Switzerland)*, *17*(5). https://doi.org/10.3390/su17052285

Ayinaddis, S. G. (2023). The effect of innovation orientation on firm performance: evidence from micro and small manufacturing firms in selected towns of Awi Zone, Ethiopia. *Journal of Innovation and Entrepreneurship*, *12*(1). https://doi.org/10.1186/s13731-023-00290-3

Baca-Neglia, M., Barreto-Pio, C., Virú-Vásquez, P., Badillo-Rivera, E., Césare-Coral, M. F., Castro-Pantoja, J. B., Sotelo-Méndez, A., Saldivar-Villarroel, J., Arroyo-Paz, A., Cruz-Martinez, R. V., Norabuena Meza, E., & Quispe-Ojeda, T. C. (2025). Industry 4.0, Circular Economy and Sustainable Development Goals: Future Research Directions Through Scientometrics and Mini-Review. In *Sustainability (Switzerland)* (Vol. 17, Issue 14). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/su17146468

Bate, A. F., Wachira, E. W., & Danka, S. (2023). The determinants of innovation performance: an income-based cross-country comparative analysis using the Global Innovation Index (GII). *Journal of Innovation and Entrepreneurship*, *12*(1). https://doi.org/10.1186/s13731-023-00283-2

Becker, J.-M., Ringle, C. M., & Sarstedt, M. (2018). Journal of Applied Structural Equation Modeling ESTIMATING MODERATING EFFECTS IN PLS-SEM AND PLSc-SEM: INTERACTION TERM GENERATION*DATA TREATMENT. In *Journal of Applied Structural Equation Modeling* (Vol. 2, Issue 2).

Bertacchini, F., Gabrielli, G., Lugli, E., & Magri, C. (2025). From bits to profits: exploring the digitalization-performance nexus. *Review of Managerial Science*. https://doi.org/10.1007/s11846-025-00928-4

Bogetoft, P., Kroman, L., Smilgins, A., & Sørensen, A. (2024). Innovation strategies and firm performance. *Journal of Productivity Analysis*, *62*(2), 175–196. https://doi.org/10.1007/s11123-024-00727-1

Borodako, K., Berbeka, J., Rudnicki, M., Łapczyński, M., Kuziak, M., & Kapera, K. (2022). Market orientation and technological orientation in business services: The moderating role of organizational culture and human resources on performance. *PLoS ONE*, *17*(6 June). https://doi.org/10.1371/journal.pone.0270737

Busch, T., Bruce-Clark, P., Derwall, J., Eccles, R., Hebb, T., Hoepner, A., Klein, C., Krueger, P., Paetzold, F., Scholtens, B., & Weber, O. (2021). Impact investments: a call for (re)orientation. In *SN Business and Economics* (Vol. 1, Issue 2). Springer Nature. https://doi.org/10.1007/s43546-020-00033-6

Campos-Núñez, F., & Serrano-Malebrán, J. (2024). Enhancing Firm Performance: How Entrepreneurial Orientation and Information Technology Capability Interact. *Applied Sciences (Switzerland)*, *14*(16). https://doi.org/10.3390/app14167243

Carlson, K. D., & Herdman, A. O. (2012). Understanding the impact of convergent validity on research results. *Organizational Research Methods*, *15*(1), 17–32. https://doi.org/10.1177/1094428110392383

Chen, C., Zhang, Y., & Wang, S. (2023). Digital transformation and firm performance: a case study on China's listed companies in 2009–2020. *Digital Economy and Sustainable Development*, *1*(1). https://doi.org/10.1007/s44265-023-00018-x

Chen, X., Despeisse, M., & Johansson, B. (2020). Environmental sustainability of digitalization in manufacturing: A review. In *Sustainability (Switzerland)* (Vol. 12, Issue 24, pp. 1–33). MDPI. https://doi.org/10.3390/su122410298

Cheng, C. C. J. (2020). Sustainability Orientation, Green Supplier Involvement, and Green Innovation Performance: Evidence from Diversifying Green Entrants. *Journal of Business Ethics*, *161*(2), 393–414. https://doi.org/10.1007/s10551-018-3946-7

Cheng, W., Li, Q., Wu, Q., Ye, F., & Jiang, Y. (2024). Digital capability and green innovation: The perspective of green supply chain collaboration and top management's environmental awareness. *Heliyon*, *10*(11). https://doi.org/10.1016/j.heliyon.2024.e32290

Cooksey, R. W. (2020). Descriptive Statistics for Summarising Data. In *Illustrating Statistical Procedures: Finding Meaning in Quantitative Data* (pp. 61–139). Springer Singapore. https://doi.org/10.1007/978-981-15-2537-7_5

Danciu, V. (2013). The sustainable company: new challenges and strategies for more sustainability. In *Theoretical and Applied Economics: Vol. XX* (Issue 9).

Dangelico, R. M., & Pujari, D. (2010a). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *Journal of Business Ethics*, *95*(3), 471–486. https://doi.org/10.1007/s10551-010-0434-0

Dangelico, R. M., & Pujari, D. (2010b). Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *Journal of Business Ethics*, *95*(3), 471–486. https://doi.org/10.1007/s10551-010-0434-0

Daraojimba, C., Abioye, K. M., Bakare, A. D., Mhlongo. Noluthando Zamanjomane, Onunka, O., & Daraojimba, D. O. (2023). TECHNOLOGY AND INNOVATION TO GROWTH OF ENTREPRENEURSHIP AND FINANCIAL BOOST: A DECADE IN REVIEW (2013-2023). *International Journal of Management & Entrepreneurship Research*, *5*(10), 769–792. https://doi.org/10.51594/ijmer.v5i10.593

Del Giudice, M., Scuotto, V., Papa, A., Tarba, S. Y., Bresciani, S., & Warkentin, M. (2021). A Self-Tuning Model for Smart Manufacturing SMEs: Effects on Digital Innovation. *Journal of Product Innovation Management*, *38*(1), 68–89. https://doi.org/10.1111/jpim.12560

Dogbe, C. S. K., & Marwa, N. (2024). Digital Orientation and Manufacturing Firms' Green Innovation Performance: The Mediating Role of Green Competence. *Journal of Risk and Financial Management*, *17*(10). https://doi.org/10.3390/jrfm17100430

DuVall, M. (2019). Identifying Variables. In *Screen Printing* (Vol. 94, Issue 3, pp. 26–28). https://doi.org/10.21275/art20196166

Etikan, I. (2017). Sampling and Sampling Methods. *Biometrics & Biostatistics International Journal*, *5*(6). https://doi.org/10.15406/bbij.2017.05.00149

Fan, X., Wang, Y., & Lu, X. (2023). Digital Transformation Drives Sustainable Innovation Capability Improvement in Manufacturing Enterprises: Based on FsQCA and NCA Approaches. *Sustainability (Switzerland)*, *15*(1). https://doi.org/10.3390/su15010542

Forés, B., & Fernández-Yáñez, J. M. (2024). Sustainability performance in science and technology parks: how can firms benefit most? *European Journal of Management and Business Economics*. https://doi.org/10.1108/EJMBE-06-2023-0200

Gao, M., Ma, K., He, R., Vezzoli, C., & Li, N. (2023). A Bibliometric Analysis of Sustainable Product Design Methods from 1999 to 2022: Trends, Progress, and Disparities between China and the Rest of the World. In *Sustainability (Switzerland)* (Vol. 15, Issue 16). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/su151612440

Garcia, R., Eads, A., Herrity, J., & Gafner, J. (2025, March 26). *What Is Business Orientation? (With Types and Examples)*. Indeed:Career Development. https://www.indeed.com/career-advice/career-development/what-is-business-orientation

Gonzalez, C. M., Grochowalski, J. H., Garba, R. J., Bonner, S., & Marantz, P. R. (2021). Validity evidence for a novel instrument assessing medical student attitudes toward instruction in implicit bias recognition and management. *BMC Medical Education*, *21*(1). https://doi.org/10.1186/s12909-021-02640-9

Gupta, A. K. (2021). Innovation dimensions and firm performance synergy in the emerging market: A perspective from Dynamic Capability Theory & Signaling Theory. *Technology in Society*, *64*. https://doi.org/10.1016/j.techsoc.2020.101512

Hair, J., & Alamer, A. (2022). Partial Least Squares Structural Equation Modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. *Research Methods in Applied Linguistics*, *1*(3). https://doi.org/10.1016/j.rmal.2022.100027

Hair, J. F. . (2014). *A primer on partial least squares structural equations modeling (PLS-SEM)*. SAGE.

Hair, J. F., L.D.S. Gabriel, M., da Silva, D., & Braga Junior, S. (2019). Development and validation of attitudes measurement scales: fundamental and practical aspects. *RAUSP Management Journal*, *54*(4), 490–507. https://doi.org/10.1108/RAUSP-05-2019-0098

Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. In *European Business Review* (Vol. 31, Issue 1, pp. 2–24). Emerald Group Publishing Ltd. https://doi.org/10.1108/EBR-11-2018-0203

Hair Jr, J. F., M.Hult, G. T., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). *Classroom Companion: Business Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R AAWorkbook*. http://www.

Hamed Taherdoost, A., & Lumpur, K. (2016). Validity and Reliability of the Research Instrument; How to Test the Validation of a Questionnaire/Survey in a Research. In *International Journal of Academic Research in Management (IJARM)* (Vol. 5, Issue 3). https://ssrn.com/abstract=3205040

Hanusch, M., Zaourak, G., & Morgandi, M. (1818). *The Brazil of the Future Towards Productivity, Inclusion, and Sustainability*. www.worldbank.org

Hawkins, M., Elsworth, G. R., Hoban, E., & Osborne, R. H. (2020). Questionnaire validation practice within a theoretical framework: a systematic descriptive literature review of health literacy assessments. In *BMJ open* (Vol. 10, Issue 6, p. e035974). NLM (Medline). https://doi.org/10.1136/bmjopen-2019-035974

He, J., Chen, H., & Tsai, F. S. (2020). Strategy orientation, innovation capacity endowment, and international R&D intensity of listed companies in China. *Sustainability (Switzerland)*, *12*(1), 1–20. https://doi.org/10.3390/su12010344

Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: Updated guidelines. *Industrial Management and Data Systems*, *116*(1), 2–20. https://doi.org/10.1108/IMDS-09-2015-0382

Holzmann, P., & Gregori, P. (2023). The promise of digital technologies for sustainable entrepreneurship: A systematic literature review and research agenda. In *International Journal of Information Management* (Vol. 68). Elsevier Ltd. https://doi.org/10.1016/j.ijinfomgt.2022.102593

Hossain, M. Z., & Hasan, L. (2024). Sustainable Cost Management and Green Business: The Role of Managerial Accounting Innovations. *European Modern Studies Journal*, *8*(4), 464–484. https://doi.org/10.59573/emsj.8(4).2024.24

Huber, R., Oberländer, A. M., Faisst, U., & Röglinger, M. (2024). Disentangling Capabilities for Industry 4.0 - an Information Systems Capability Perspective. *Information Systems Frontiers*, *26*(5), 1667–1695. https://doi.org/10.1007/s10796-022-10260-x

Hussain, R. Y., Adil, M., Tumwine, G. N., Hussain, H., & Irshad, H. (2025). Balancing green and growth: do innovation and contribution drive sales and environmental performance? *Discover Sustainability*, *6*(1). https://doi.org/10.1007/s43621-025-01083-2

Hwang, W. S., & Kim, H. S. (2022). Does the adoption of emerging technologies improve technical efficiency? Evidence from Korean manufacturing SMEs. *Small Business Economics*, *59*(2), 627–643. https://doi.org/10.1007/s11187-021-00554-w

Ibrahim, M. Y. (2025). The most appropriate scale for behavioral research is a seven-point rating. *Multidisciplinary Reviews*, *8*(4). https://doi.org/10.31893/multirev.2025126

Indu, P. V., Vidhukumar, K., Chacko, D., Menon, V., Grover, S., & Gupta, S. (2025). Criterion validity, construct validity, and factor analysis: An introductory overview. *Indian Journal of Psychiatry*, *67*(9), 916–921. https://doi.org/10.4103/indianjpsychiatry_911_25

Jagani, S. (2023). The relationships between economic orientation, sustainable product design and innovation performance: Empirical evidence from the US manufacturing firms. *Sustainable Manufacturing and Service Economics*, *2*, 100010. https://doi.org/10.1016/j.smse.2023.100010

Jang, S. H., & Lee, C. W. (2025). Digital Entrepreneurial Orientation, Technology Absorptive Capacity, and Digital Innovation on Business Performance. *Systems*, *13*(4). https://doi.org/10.3390/systems13040300

Jiang, P., Dieckmann, E., Han, J., & Childs, P. R. N. (2021a). A bibliometric review of sustainable product design. *Energies*, *14*(21). https://doi.org/10.3390/en14216867

Jiang, P., Dieckmann, E., Han, J., & Childs, P. R. N. (2021b). A bibliometric review of sustainable product design. *Energies*, *14*(21). https://doi.org/10.3390/en14216867

Joensuu-Salo, S., & Matalamäki, M. (2023). The Impact of Digital Capability on Firm Performance and Growth in Incumbent SMEs. *Journal of Enterprising Culture*, *31*(02), 211–232. https://doi.org/10.1142/s0218495823500073

Johnston, R. J., Boyle Virginia Tech, K. J., Adamowicz, W., Bennett, J., Brouwer, R., Ann Cameron, T., Michael Hanemann, W., Hanley, N., Ryan, M., Scarpa, R., Tourangeau, R., & Vossler, C. A. (2017). *This content downloaded from 129.101.079*. http://www.journals.uchicago.edu/t-and-c

Joshi. (2015). *Likert scale: Explored and explained*.

Jung, S., & Park, J. H. (2018). Consistent partial least squares path modeling via regularization. *Frontiers in Psychology*, *9*(FEB). https://doi.org/10.3389/fpsyg.2018.00174

Kantabutra, S. (2024). Toward a sustainability performance management framework. In *Heliyon* (Vol. 10, Issue 13). Elsevier Ltd. https://doi.org/10.1016/j.heliyon.2024.e33729

Karman, A., & Bartoszczuk, P. (2023). THE AMBIGUOUS EFFECTS OF ECO-INNOVATIONS: A SYSTEMATIC LITERATURE REVIEW. *Economics and Environment*, *87*(4). https://doi.org/10.34659/eis.2023.87.4.660

Khan, R. U., Salamzadeh, Y., Abbasi, M. A., Amin, A., & Sahar, N. E. (2022). Strategic Orientation and Sustainable Competitive Performance of Family Firms: Evidence of an Emerging Economy. *Journal of Small Business Strategy*, *32*(2), 67–82. https://doi.org/10.53703/001c.32406

Koo, M., & Yang, S.-W. (2025). Likert-Type Scale. *Encyclopedia*, *5*(1), 18. https://doi.org/10.3390/encyclopedia5010018

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital Transformation: An Overview of the Current State of the Art of Research. *SAGE Open*, *11*(3). https://doi.org/10.1177/21582440211047576

Kraus, S., Rehman, S. U., & García, F. J. S. (2020). Corporate social responsibility and environmental performance: The mediating role of environmental strategy and green innovation. *Technological Forecasting and Social Change*, *160*. https://doi.org/10.1016/j.techfore.2020.120262

Krishnamurthy, K., Sharma, V., Sarangarajan, R., & Uppal, N. (n.d.). *Spending smart instead of just spending big Maximizing the value from technology investments*.

Kruglov, P., & Shaw, C. (2024). *Financial Performance and Innovation: Evidence From USA, 1998-2023*. http://arxiv.org/abs/2403.10982

Labella-Fernández, A., Serrano-Arcos, M. M., & Payán-Sánchez, B. (2021a). Firm growth as a driver of sustainable product innovation: Mediation and moderation analysis. evidence from manufacturing firms. *International Journal of Environmental Research and Public Health*, *18*(5), 1–22. https://doi.org/10.3390/ijerph18052588

Labella-Fernández, A., Serrano-Arcos, M. M., & Payán-Sánchez, B. (2021b). Firm growth as a driver of sustainable product innovation: Mediation and moderation analysis. evidence from manufacturing firms. *International Journal of Environmental Research and Public Health*, *18*(5), 1–22. https://doi.org/10.3390/ijerph18052588

Lee, S. M., & Trimi, S. (2024). *Econnovation: Ecosystem-Focused Innovation with Autosapient AI*. https://jaiai.org/

Li, X., Wu, T., Zhang, H., & Yang, D. (2022). Digital Technology Adoption and Sustainable Development Performance of Strategic Emerging Industries. *Journal of Organizational and End User Computing*, *34*(8), 1–18. https://doi.org/10.4018/joeuc.315645

Lim, B., Sotes-Paladino, J., Wang, G. J., & Yao, Y. (2024). The value of growth: Changes in profitability and future stock returns. *Journal of Banking and Finance*, *158*. https://doi.org/10.1016/j.jbankfin.2023.107036

Liu, F., Zhang, Z., Zhang, J., & Guo, F. (2025). Nationalism and corporate innovation performance. *International Review of Economics and Finance*, *102*. https://doi.org/10.1016/j.iref.2025.104285

Lu, B., Zhang, J., Xue, D., & Gu, P. (2011). Systematic lifecycle design for sustainable product development. *Concurrent Engineering Research and Applications*, *19*(4), 307–323. https://doi.org/10.1177/1063293X11424513

Masa'deh, R., Al-Henzab, J., Tarhini, A., & Obeidat, B. Y. (2018). The associations among market orientation, technology orientation, entrepreneurial orientation and organizational performance. *Benchmarking*, *25*(8), 3117–3142. https://doi.org/10.1108/BIJ-02-2017-0024

Mazumdar, S., Kauffmann, R. J., Jensen, T., Mukkamala, R. R., & Damsgaard, J. (2025). Developing blockchain-based transparent e-commerce solutions for Danish SMEs to promote sustainable design products. *Blockchain: Research and Applications*, 100330. https://doi.org/10.1016/j.bcra.2025.100330

Melhem, S., & Jacobsen, A. H. (n.d.). *2 A GLOBAL STUDY ON DIGITAL CAPABILITIES Acknowledgement*.

Meng, X., & Gong, X. (2024). Digital transformation and innovation output of manufacturing companies—An analysis of the mediating role of internal and external transaction costs. *PLoS ONE*, *19*(1 January). https://doi.org/10.1371/journal.pone.0296876

Mengistu, A. T., Dieste, M., Panizzolo, R., & Biazzo, S. (2024). Sustainable product design factors: A comprehensive analysis. In *Journal of Cleaner Production* (Vol. 463). Elsevier Ltd. https://doi.org/10.1016/j.jclepro.2024.142260

Mengistu, A. T., Dieste, M., Panizzolo, R., & Biazzo, S. (2025). Achieving Product Sustainability: Analyzing Key Factors Influencing Sustainable Product Design in Manufacturing Companies. *Corporate Social Responsibility and Environmental Management*, *32*(4), 5021–5037. https://doi.org/10.1002/csr.3215

Minseo, M. (2025, February 25). *Advantages and disadvantages of eco-friendly products*. Cue.

Na, K., & Kang, Y. H. (2019). Relations between innovation and firm performance of manufacturing firms in Southeast Asian emerging markets: Empirical evidence from Indonesia, Malaysia, and Vietnam. *Journal of Open Innovation: Technology, Market, and Complexity*, *5*(4). https://doi.org/10.3390/joitmc5040098

Nassani, A. A., Grigorescu, A., Yousaf, Z., Condrea, E., Javed, A., & Haffar, M. (2023). Does Technology Orientation Determine Innovation Performance through Digital Innovation? A Glimpse of the Electronic Industry in the Digital Economy. *Electronics (Switzerland)*, *12*(8). https://doi.org/10.3390/electronics12081854

Nikkhah, Y., Karami, A., & Tekmedash, Y. N. (2024). *Technology Orientation Strategy and Innovation Performance in SMEs The Mediating Role of Dynamic Capabilities*. https://www.researchgate.net/publication/380074770
Pan, X., Oh, K. S., & Wang, M. (2021). Strategic orientation, digital capabilities, and new product development in emerging market firms: The moderating role of corporate social responsibility. *Sustainability (Switzerland)*, *13*(22). https://doi.org/10.3390/su132212703
Popowicz, M., Katzer, N. J., Kettele, M., Schöggl, J. P., & Baumgartner, R. J. (2025). Digital technologies for life cycle assessment: a review and integrated combination framework. In *International Journal of Life Cycle Assessment* (Vol. 30, Issue 3, pp. 405–428). Springer. https://doi.org/10.1007/s11367-024-02409-4
RingCentral Team. (2021, February 10). *Business Orientation: Product Orientation and Market Orientation – What's the Difference?*
Riou, J., Guyon, H., & Falissard, B. (2016). An introduction to the partial least squares approach to structural equation modelling: a method for exploratory psychiatric research. *International Journal of Methods in Psychiatric Research*, *25*(3), 220–231. https://doi.org/10.1002/mpr.1497
Rosner, M. M. (1968). Economic Determinants of Organizational Innovation. In *Source: Administrative Science Quarterly* (Vol. 12, Issue 4).
Rounaghi, M. M., Jarrar, H., & Dana, L.-P. (2021). Implementation of strategic cost management in manufacturing companies: overcoming costs stickiness and increasing corporate sustainability. *Future Business Journal*, *7*(1). https://doi.org/10.1186/s43093-021-00079-4
Samsuden, N. S., Kohar, U. H. A., Khatib, S. F. A., & Abbas, A. F. (2024). Digital Capabilities and Business Performance: A Systematic Literature Review. In *Sustainability (Switzerland)* (Vol. 16, Issue 24). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/su162411108
Sarfraz, M., Ivascu, L., Abdullah, M. I., Ozturk, I., & Tariq, J. (2022). Exploring a Pathway to Sustainable Performance in Manufacturing Firms: The Interplay between Innovation Capabilities, Green Process and Product Innovations and Digital Leadership. *Sustainability (Switzerland)*, *14*(10). https://doi.org/10.3390/su14105945
Sarstedt, M., Ringle, C. M., & Hair, J. F. (2017). Partial Least Squares Structural Equation Modeling. In *Handbook of Market Research* (pp. 1–40). Springer International Publishing. https://doi.org/10.1007/978-3-319-05542-8_15-1
Selinšek, A., Rocco, S., & Milfelner, B. (2021). Design orientation as a source of sustainable company performance. *International Journal of Sustainable Economy*, *13*(1), 87–106. https://doi.org/10.1504/IJSE.2021.113310
Shahzad, M., Qu, Y., Rehman, S. U., & Zafar, A. U. (2022). Adoption of green innovation technology to accelerate sustainable development among manufacturing industry. *Journal of Innovation and Knowledge*, *7*(4). https://doi.org/10.1016/j.jik.2022.100231
Shetty, D. (2016). *Developing a System for Sustainable Product Design and Manufacture*.

Simone, G., Evangelista, R., & Pianta, M. (2024). Profits, Innovation, Investment. Exploring the Virtuous Circle. *Italian Economic Journal*. https://doi.org/10.1007/s40797-024-00281-7
Smiljkovic, K. (2023). *Exploring the influence of company sustainability performance on financial performance within and across GICS sectors*.
Spooner, A. (2023, July 19). *New Employee Orientation: 12 Best Practices & Strategies*. Workramp. https://www.workramp.com/blog/new-employee-orientation/
Ştefan, A., & Ştefănescu, A. (2024). The Impact of Sustainability Performance on Company Profitability in the COVID-19 Pandemic and Post-Pandemic Context. *Proceedings of the International Conference on Business Excellence*, *18*(1), 2183–2195. https://doi.org/10.2478/picbe-2024-0183
Sujanska, L., & Nadanyiova, M. (2023). Sustainable Marketing and its Impact on the Image of the Company. *Marketing and Management of Innovations*, *14*(2), 51–57. https://doi.org/10.21272/mmi.2023.2-06
Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2
Taherdoost, H. (2016). Sampling Methods in Research Methodology; How to Choose a Sampling Tech-nique for Research. In *International Journal of Academic Research in Management (IJARM)*. https://hal.science/hal-02546796v1
Tan, A. R., Mcaloone, T. C., & Gall, C. (2007). *INTERNATIONAL CONFERENCE ON ENGINEERING DESIGN, ICED'07 PRODUCT/SERVICE-SYSTEM DEVELOPMENT-AN EXPLORATIVE CASE STUDY IN A MANUFACTURING COMPANY*.
Tang, S., & Cao, X. (2025). How economic uncertainty affect enterprises' strategic orientation. *International Review of Economics and Finance*, *101*. https://doi.org/10.1016/j.iref.2025.104127
The triple play: Growth, profit, and sustainability. (n.d.).
Thomas, A. (2007). *The Proceedings of the 5 th International Conference on Design and Manufacture for Sustainable Development Loughborough Design and manufacture for Sustainable Development in Wales*.
Thomran, M., Alshallaqi, M., Al-Mamary, Y. H., & Abdulrab, M. (2022). The key enablers of competitive advantage formation in small and medium enterprises: The case of the Ha'il region. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.1030405
Tian, S., Lai, X., Dong, L., & Xu, X. (2025). Digital Capabilities, Integration into Global Innovation Networks, and Enterprise Innovation Performance. *Systems*, *13*(3). https://doi.org/10.3390/systems13030212
Van Hoang, D., Thi Hien, N., Van Thang, H., Nguyen Truc Phuong, P., & Thi-Thuy Duong, T. (2025). Digital Capabilities and Sustainable Competitive Advantages: The Case of Emerging Market Manufacturing SMEs. *SAGE Open*, *15*(2). https://doi.org/10.1177/21582440251329967
Vijay Kumar, V., & Shahin, K. (2025). Artificial Intelligence and Machine Learning for Sustainable Manufacturing: Current Trends and Future

Prospects. *Intelligent and Sustainable Manufacturing*, *2*(1), 10002–10002. https://doi.org/10.70322/ism.2025.10002
Wang, X., Gu, Y., Ahmad, M., & Xue, C. (2022). The Impact of Digital Capability on Manufacturing Company Performance. *Sustainability (Switzerland)*, *14*(10). https://doi.org/10.3390/su14106214
Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326–349. https://doi.org/10.1016/j.lrp.2018.12.001
Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample Size Requirements for Structural Equation Models: An Evaluation of Power, Bias, and Solution Propriety. *Educational and Psychological Measurement*, *73*(6), 913–934. https://doi.org/10.1177/0013164413495237
Wu, X., Gao, Q., & Li, W. (2025). Design for Recycling: A Systematic Review of Approaches for Enhancing Product Recyclability. In *Sustainability (Switzerland)* (Vol. 17, Issue 5). Multidisciplinary Digital Publishing Institute (MDPI). https://doi.org/10.3390/su17051790
Xi, Q., Li, Z., Zhao, J., & Ding, J. (2025). How Can Technology Orientation Promote Green Process Innovation? The Mediating Effect of Digital Capability and the Moderating Role of Innovation-Oriented Leadership. *Sustainability (Switzerland)*, *17*(9). https://doi.org/10.3390/su17094071
Xu, G., Hou, G., & Zhang, J. (2022a). Digital Sustainable Entrepreneurship: A Digital Capability Perspective through Digital Innovation Orientation for Social and Environmental Value Creation. *Sustainability (Switzerland)*, *14*(18). https://doi.org/10.3390/su141811222
Xu, G., Hou, G., & Zhang, J. (2022b). Digital Sustainable Entrepreneurship: A Digital Capability Perspective through Digital Innovation Orientation for Social and Environmental Value Creation. *Sustainability (Switzerland)*, *14*(18). https://doi.org/10.3390/su141811222
Yang, M., Jaafar, N., Al Mamun, A., Salameh, A. A., & Nawi, N. C. (2022). Modelling the significance of strategic orientation for competitive advantage and economic sustainability: the use of hybrid SEM–neural network analysis. *Journal of Innovation and Entrepreneurship*, *11*(1). https://doi.org/10.1186/s13731-022-00232-5
Yang, R., Tu, Y., & Shen, Y. (2025). Can the degree of party membership among management enhance corporate innovation performance? The moderating role of technology finance. *International Review of Economics and Finance*, *101*. https://doi.org/10.1016/j.iref.2025.104184
Yaqub, M. Z., & Alsabban, A. (2023). Industry-4.0-Enabled Digital Transformation: Prospects, Instruments, Challenges, and Implications for Business Strategies. *Sustainability (Switzerland)*, *15*(11). https://doi.org/10.3390/su15118553
Yu, J., & Moon, T. (2021a). Impact of digital strategic orientation on organizational performance through digital competence. *Sustainability (Switzerland)*, *13*(17). https://doi.org/10.3390/su13179766

Yu, J., & Moon, T. (2021b). Impact of digital strategic orientation on organizational performance through digital competence. *Sustainability (Switzerland)*, *13*(17). https://doi.org/10.3390/su13179766

Yu, J., Wang, J., & Moon, T. (2022). Influence of Digital Transformation Capability on Operational Performance. *Sustainability (Switzerland)*, *14*(13). https://doi.org/10.3390/su14137909

Zhang, J., & Liu, M. (2024). How to Leverage Digital Sustainability Orientation to Promote Environmentally Sustainable Practices of Manufacturing Enterprises in China. *Sustainability (Switzerland)* , *16*(12). https://doi.org/10.3390/su16125112

Zhang, M., Chen, X., Xie, H., Esposito, L., Parziale, A., Taneja, S., & Siraj, A. (2024). Top of tide: Nexus between organization agility, digital capability and top management support in SME digital transformation. *Heliyon*, *10*(10). https://doi.org/10.1016/j.heliyon.2024.e31579

Zhang, R., Lin, J., Li, S., & Cai, Y. (2023). Addressing the loss of exploratory innovation: the roles of organizational foresight and strategic orientation. *Journal of Business and Industrial Marketing*, *39*(13), 27–48. https://doi.org/10.1108/JBIM-02-2023-0095

Zhang, S., Xu, G., & Zheng, Z. (2025). Sustainable Product Innovation in SMEs: The Role of Digital–Green Learning Orientation and R&D Ambidexterity. *Sustainability*, *17*(19), 8703. https://doi.org/10.3390/su17198703

Zhuge, K., Lin, W., Yuan, Y., He, H., & Zhang, Y. (2023). Does Digital Capability Promote Sustainable Development of New Ventures? The Dual Impact of Green Knowledge Creation and Green Pressure. *International Journal of Environmental Research and Public Health*, *20*(3). https://doi.org/10.3390/ijerph20032274

APPENDICES

Appendix 1: RESEARCH QUESTIONNAIRE

Assalamualaikum Warahmatullah Wabarakatuh,

Perkenalkan Saya Jashinta Miranda Hasna Mahasiswa Program Studi Manajemen International Program Universitas Islam Indonesia. Pada saat Ini Saya berkesempatan untuk melakukan penelitian tugas akhir Skripsi terkait Pengaruh Orientasi Ekonomi, Orientasi Teknologi, dan Kapabilitas Digital terhadap Desain Produk Berkelanjutan dan Kinerja Inovasi.

Kriteria Responden yang dibutuhkan antara lain:

1. Saat ini sedang/pernah bekerja di perusahaan manufaktur
2. Memahami atau menguasai sistem dasar operasional perusahaan

Saya menyampaikan terima kasih yang sebesar-besarnya atas perhatian dan bantuan yang telah diberikan. Semoga segala kebaikan tersebut memperoleh balasan yang sepadan.

Section 1: Questions to filter respondents

Apakah Anda pernah atau sedang bekerja?

- Ya
- Tidak

Apa jenis perusahaan manufaktur tempat Anda bekerja?

- Makanan dan Minuman
- Tekstil dan Garmen

- Otomotif
- Elektronik
- Kimia dan Farmasi
- Hasil Tambang
- Industri Manufaktur Lainnya

Section 2: Respondent data and identity

Jenis Kelamin

- Perempuan
- Laki-laki

Usia

- < 20 Tahun
- 21-30 Tahun
- 31-40 Tahun
- 41-50 Tahun
- > 51 Tahun

Pendidikan Terakhir

- SD
- SMP
- SMA
- Diploma
- S1
- S2
- Yang Lain

Daerah Tempat Bekerja

- Daerah Istimewa Yogyakarta
- Jakarta
- Jawa Barat

- Jawa Tengah
- Jawa Timur
- Bali
- Kepulauan Riau
- Kalimantan Timur
- Kalimantan Tengah
- Yang Lain

Lama Waktu Bekerja di Perusahaan ini

- < 1 Tahun
- 1-3 Tahun
- 4-6 Tahun
- 7-10 Tahun
- > 10 Tahun

Skala Likert

No.	Scale Descriptions	Point
1.	Strongly Disagree	1
2.	Disagree	2
3.	Somewhat Disagree	3
4.	Neutral	4
5.	Somewhat Agree	5
6.	Agree	6
7.	Strongly Agree	7

Section 3:

Pertanyaan seputar Economic Orientation (Jagani, 2023)

Ini adalah tentang tiga tahun terakhir strategi perusahaan Anda dalam kaitannya dengan orientasi ekonomi.

Economic Orientation**:** Fokus utama perusahaan untuk mencapai tujuan bisnis yang berfokus pada keuntungan finansial, serta mencakup pemahaman mendalam terhadap kebutuhan pelanggan dan lingkungan bisnis secara keseluruhan.

Petunjuk pengisian:

1. Sangat Tidak Setuju (STS)
2. Tidak Setuju (TS)
3. Agak Tidak Setuju (ATS)
4. Netral (N)
5. Agak setuju (AS)
6. Setuju (S)
7. Sangat Setuju (SS)

Question Item:

1. **EO 1** Perusahaan kami memiliki rencana bersama untuk terus meningkatkan pendapatan secara berkelanjutan.
2. **EO 2** Perusahaan kami menjalankan langkah jangka panjang untuk mendapatkan keunggulan dalam hal biaya
3. **EO 3** Perusahaan kami memiliki aturan yang jelas mengenai target pengembalian investasi pada proyek-proyek utama

4. **EO 4** Perusahaan kami menugaskan manajemen senior untuk bertanggung jawab atas pencapaian kinerja ekonomi.

Section 4:

Pertanyaan seputar Technology Orientation (Xi et al., 2025)

Ini adalah tentang tiga tahun terakhir strategi perusahaan Anda dalam kaitannya dengan orientasi teknologi.

Technology Orientation: Fokus strategis perusahaan pada penelitian dan pengembangan, perolehan, dan pemanfaatan teknologi canggih untuk inovasi dan keunggulan kompetitif.

Petunjuk pengisian:

1. Sangat Tidak Setuju (STS)
2. Tidak Setuju (TS)
3. Agak Tidak Setuju (ATS)
4. Netral (N)
5. Agak setuju (AS)
6. Setuju (S)
7. Sangat Setuju (SS)

Question Item:

1. **TO 1** Perusahaan kami menggunakan teknologi modern dalam membuat produk baru
2. **TO 2** Setiap produk baru kami selalu memakai teknologi terbaru

3. **TO 3** Perusahaan kami terus mencari dan mengembangkan produk baru dengan teknologi modern
4. **TO 4** Hasil inovasi teknis mudah diterapkan di perusahaan ini

Section 5:

Pertanyaan seputar Digital Capability (Xi et al., 2025)

Mohon tunjukkan tingkat kapabilitas digital perusahaan Anda di bidang-bidang berikut.

Digital Capability: Kemampuan menggunakan teknologi secara efektif untuk mencari informasi, berkomunikasi, berkolaborasi, memecahkan masalah, dan berpartisipasi dalam lingkungan digital.

Petunjuk pengisian:

1. Sangat Tidak Setuju (STS)
2. Tidak Setuju (TS)
3. Agak Tidak Setuju (ATS)
4. Netral (N)
5. Agak setuju (AS)
6. Setuju (S)
7. Sangat Setuju (SS)

Question Item:

1. **DC 1** Perusahaan kami mampu mengakuisisi teknologi digital yang penting

2. **DC 2** Perusahaan kami mampu mengenali dan memanfaatkan peluang digital baru
3. **DC 3** Perusahaan kami cepat beradaptasi dengan perubahan digital
4. **DC 4** Perusahaan kami menguasai teknologi digital terbaru
5. **DC 5** Perusahaan kami mampu membuat produk, layanan, atau proses baru dengan teknologi digital

Section 6:

Pertanyaan seputar Sustainable Product Design (Jagani, 2023)

Mohon tunjukkan tingkat penerapan praktik keberlanjutan melalui desain produk berkelanjutan di perusahaan Anda.

Sustainable Product Design: Penciptaan produk yang meminimalkan dampak negatif terhadap lingkungan dan sosial di seluruh siklus hidupnya, mulai dari ekstraksi bahan baku hingga pembuangan akhir masa pakainya. (mengurangi, menggunakan kembali, mendaur ulang, tahan lama, mudah dipisahkan, mendorong efisiensi energi, meminimalkan limbah dan polusi).

Petunjuk pengisian:

1. Sangat Tidak Setuju (STS)
2. Tidak Setuju (TS)
3. Agak Tidak Setuju (ATS)
4. Netral (N)
5. Agak setuju (AS)
6. Setuju (S)

7. Sangat Setuju (SS)

Question Item:

1. **SPD 1** Produk akhir perusahaan kami dibuat dengan menggunakan bahan daur ulang
2. **SPD 2** Produk akhir perusahaan kami dibuat dengan bahan baku seminimal mungkin
3. **SPD 3** Produk akhir perusahaan kami dirancang agar membutuhkan sedikit energi saat digunakan
4. **SPD 4** Produk akhir perusahaan kami dapat dipakai kembali setelah digunakan
5. **SPD 5** Proses produksi perusahaan kami menggunakan energi dengan efisien dibandingkan pesaing

Section 7:

Pertanyaan seputar Innovation Performance (Jagani, 2023)

Ini adalah tentang hasil kinerja inovasi saat ini dalam perusahaan Anda.

Innovation Performance: Efektivitas suatu perusahaan dalam menghasilkan dan menerapkan ide, produk, proses, dan model bisnis baru untuk mencapai tujuan strategis dan memperoleh keunggulan kompetitif.

Petunjuk pengisian:

1. Sangat Tidak Setuju (STS)

2. Tidak Setuju (TS)

3. Agak Tidak Setuju (ATS)

4. Netral (N)

5. Agak setuju (AS)

6. Setuju (S)

7. Sangat Setuju (SS)

Question Item:

1. **IP 1** Perusahaan kami menunjukkan peningkatan dalam pengenalan produk baru ke pasar
2. **IP 2** Perusahaan kami melaporkan hasil inovasi proses yang sangat baik
3. **IP 3** Perusahaan kami menunjukkan peningkatan fitur baru untuk produk yang sudah ada
4. **IP 4** Perusahaan kami mampu mengurangi waktu yang dibutuhkan untuk meluncurkan produk ke pasar
5. **IP 5** Perusahaan kami menunjukkan peningkatan jumlah pengembangan produk baru

Appendix 2: RAW DATA TABULATION

Economic Orientation

EO 1	EO 2	EO 3	EO 4
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Technology Orientation

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Digital Capability

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Sustainable Product Design

SPD 1	SPD 2	SPD 3	SPD 4	SPD 5
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Innovation Performance

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Appendix 3: SMARTPLS OUTPUT RESULTS

Outer Loading

	DC	EO	IP	SPD	TO
DC 1	0,867				
DC 2	0,876				
DC 3	0,788				
DC 4	0,859				
DC 5	0,850				
EO 1		0,866			
EO 2		0,860			
EO 3		0,838			
EO 4		0,872			
IP 1			0,804		
IP 2			0,772		
IP 3			0,861		
IP 4			0,848		
IP 5			0,885		
SPD 1				0,754	
SPD 2				0,789	
SPD 3				0,834	
SPD 4				0,789	
SPD 5				0,837	

TO 1					0,805
TO 2					0,840
TO 3					0,825
TO 4					0,836

Average Variance Extracted (AVE)

Variable	Average Variance Extracted
Digital Capability	0,720
Economic Orientation	0,738
Innovation Performance	0,697
Sustainable Product Design	0,642
Technology Orientation	0,683

Discriminant Validity Results (Fornell-Larcker)

	DC	EO	IP	SPD	TO
DC	0,849				
EO	0,334	0,859			
IP	0,688	0,708	0,835		
SPD	0,593	0,613	0,772	0,801	
TO	0,363	0,375	0,692	0,617	0,826

Discriminant Validity Results (HTMT)

	DC	EO	IP	SPD	TO
DC					
EO	0,370				
IP	0,768	0,797			
SPD	0,668	0,700	0,879		
TO	0,411	0,434	0,797	0,722	

Cronbach's Alpha dan Composite Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
DC	0,902	0,906	0,928	0,720
EO	0,881	0,883	0,918	0,738
IP	0,891	0,893	0,920	0,697
SPD	0,860	0,865	0,899	0,642
TO	0,845	0,847	0,896	0,683

Collinearity Test

	DC	EO	IP	SPD	TO
DC			**1,546**	**1,215**	

EO			**1,605**	**1,228**	
IP					
SPD			**2,826**		
TO	**1,000**	**1,000**	**1,614**	**1,257**	

R-Square Results

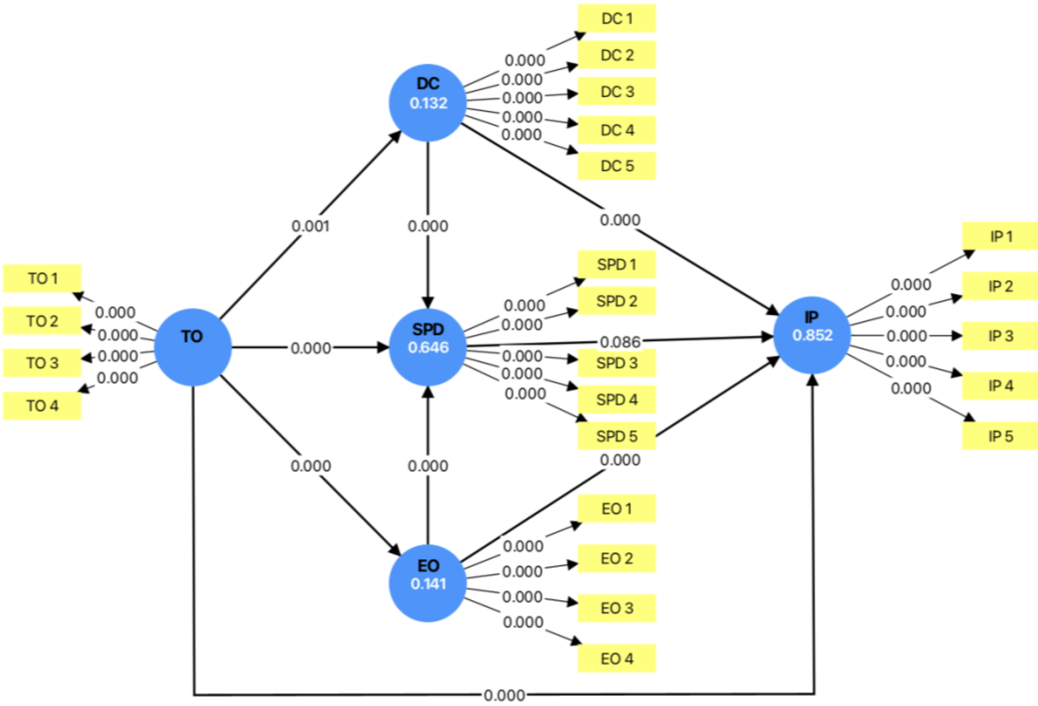
	R-square	R-square adjusted
DC	0,132	0,126
EO	0,141	0,135
IP	0,852	0,848
SPD	0,646	0,639

Path Coefficient Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Conclusion
DC -> IP	0,375	0,376	0,040	9,346	0,000	**H6 is supported**
DC -> SPD	0,342	0,340	0,051	6,682	0,000	**H5 is supported**

EO -> IP	0,395	0,395	0,042	9,468	0,000	**H9 is supported**
EO -> SPD	0,365	0,362	0,049	7,443	0,000	**H8 is supported**
SPD -> IP	0,091	0,090	0,053	1,715	0,086	**H7 is not supported**
TO -> DC	0,363	0,356	0,105	3,440	0,001	**H1 is supported**
TO -> EO	0,375	0,367	0,097	3,847	0,000	**H3 is supported**
TO -> IP	0,352	0,358	0,048	7,290	0,000	**H4 is supported**
TO -> SPD	0,355	0,356	0,058	6,182	0,000	**H2 is supported**

Path Coefficient Results (Bootstrapping)



Questionnaire