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Leveraging digital transformation and absorptive capacity for competitive advantage: Empirical insights from the automotive components sector

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Abstract

This study examines how Indonesian automotive component firms leverage digital transformation capabilities and absorptive capacity to enhance innovation performance within the "Making Indonesia 4.0" initiative. By analyzing survey data from 100 senior executives—CEOs, Directors, and Owners—of automotive component companies, the research identifies a significant relationship between digital transformation and the improvement of absorptive capacity, which is essential for achieving superior innovation outcomes. The findings emphasize that digital transformation capability significantly strengthens absorptive capacity, which is crucial for achieving superior innovation outcomes. This highlights absorptive capacity as a key mechanism for translating digital investments into competitive advantage. Building upon existing research on dynamic capabilities, the study underscores the strategic importance of simultaneously developing absorptive capacity and digital technologies to promote sustained innovation. Firms are encouraged to cultivate absorptive capacity alongside their digital technologies in order to effectively translate these digital investments into long-term competitive benefits.

Keywords: Absorptive Capacity, Automotive Components Industry, Competitive advantage, Digital Transformational Capability, Innovation Performance.

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1. Introduction

The automotive industry is undergoing a significant and far-reaching transformation, characterized by disruptive innovations and swift advancement in digital technologies aimed at achieving sustainable competitive advantage [1]. In this fast-paced landscape, the ability to embrace digital transformation has emerged as a critical factor for companies aiming to remain competitive. However, the effective realization of these capabilities hinges on a firm's capacity to absorb and integrate new knowledge seamlessly into its operations. This process is deeply rooted in the principles of absorptive capacity theory, which emphasizes the importance of learning and innovation in navigating the complexities of the modern market [2]. In order to address the existing gap in the literature, our study investigates the intricate relationship between digital transformation capabilities and their impact on absorptive capacity and innovation performance specifically within the Indonesian automotive components sector.

Indonesia presents a compelling context for this research, particularly considering the automotive industry's strategic importance role in the nation's economy and its rapid growth. The automotive components sector, in particular, is a fascinating area for exploration, given its swift growth and increasing integration into the global market. This study builds upon the foundational theories of Resource-Based View (RBV), offering a comprehensive analysis of how these dynamic capabilities can enhance organizational performance in a rapidly evolving industry [3]. Additionally, our research also incorporates [4] disruptive innovation theory, which explains how smaller companies with limited resources can challenge established incumbents by introducing innovations that create new markets or reshape existing ones [4]. These factors create a unique setting for examining how firms in an emerging market leverage digital technologies and knowledge absorption to drive innovation and achieve a sustainable competitive advantage.

This study draws upon several theoretical frameworks, including the RBV, Dynamic Capability Theory, Disruptive Innovation Theory, and Institutional Theory, to formulate our hypothesis regarding the interplay between digital transformation capabilities, absorptive capacity, and innovation performance in firms. We propose that a firm's ability to implement digital transformation capabilities significantly enhances its absorptive capacity. In this context, absorptive capacity serves as a critical mediator, influencing the degree to which digital transformation capabilities translate into successful innovation performance.

While some scholars argue that digital transformation inherently leads to improved performance [5] we argue that absorptive capacity acts as a critical filter and enabler. It shapes the extent to which firms can effectively leverage digital technologies, indicating that simply adopting digital tools is not sufficient for enhanced performance. Although some suggest that external institutional pressures are the predominant driving force behind the adoption of digital technologies [6]. We argue that a firm’s internal capabilities are equally important in unlocking these technologies' potential benefits.

This diverse range of opinions highlights the need for a nuanced understanding of the components that drive innovation in the digital age, particularly within emerging market contexts. To address this gap, the present study aims to explore the dynamics at play in the Indonesian automotive components sector. We investigate how digital transformation capabilities influence the development of absorptive capacity and subsequently affect innovation performance. Additionally, we seek to clarify the mediating role that absorptive capacity holds in this relationship. To guide our inquiry, this study aims to answer the following research questions:

1. How do digital transformation capabilities influence absorptive capacity and innovation performance in the Indonesian?
   automotive components sector?
2. How does absorptive capacity mediate the relationship between digital transformation capabilities and innovation?
   performance?

By addressing these questions, this research contributes to both theoretical knowledge and practical applications. On a theoretical level, it sheds light on the intricate relationship between dynamic capabilities and absorptive capacity, illustrating how these concepts work together to foster innovation in industries experiencing swift technological changes. This deeper understanding can help scholars and practitioners alike better grasp the mechanisms that underpin successful innovation strategies. On a practical front, the findings provide valuable, actionable insights for industry leaders, equipping them with strategies to harness digital transformation effectively. This, in turn, aims to enhance organizational performance and bolster competitive advantage within the ever-evolving landscape of the Indonesian automotive components sector, which is marked by rapid advancements and shifting market demands.

2. Theoretical Framework

The investigation into the interplay between digital transformation capabilities, absorptive capacity, and innovation performance is anchored in three fundamental theoretical perspectives: the Resource-Based View (RBV), Dynamic Capability Theory, Disruptive Innovation Theory, and Institutional Theory. These theories collectively establish a robust framework for comprehending how organizations can effectively leverage their internal resources and capabilities to achieve a sustained competitive advantage and foster innovation. The RBV emphasizes the importance of unique, valuable, and non-substitutable resources as a source of competitive advantage [7]. Dynamic Capability Theory builds on this by focusing on an organization’s ability to adapt, reconfigure, and integrate its resources in response to changing environments, thereby enhancing its capacity for innovation [8]. Meanwhile, Disruptive Innovation Theory sheds light on how new entrants can challenge established firms by introducing simpler, more affordable alternatives that ultimately transform industries [9]. The Institutional Theory examines how organizations conform to societal norms and pressures, leading to homogeneity across industries through processes such as coercive, mimetic, and normative isomorphism [6]. As depicted in Figure 1, the relationship among various latent variables and these principal theories is illustrated through a

synthesis of insights gathered from numerous literature reviews. This visual representation underscores the interconnectedness of these theoretical frameworks within the field of strategic management, providing a clearer understanding of how firms can navigate the complexities of digital transformation and innovation.

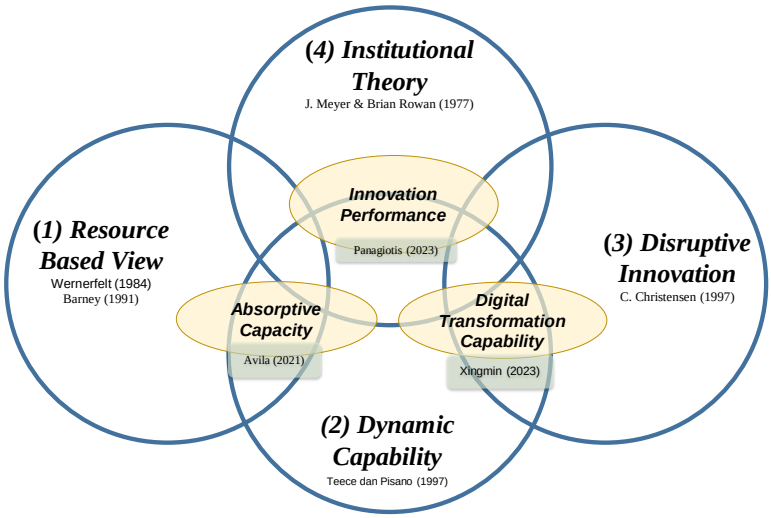

Figure 1.
Conceptual Theory and Model Development.

2.1. Resource-Based View (RBV)

The exploration of digital transformation capabilities, absorptive capacity, and innovation performance is grounded in four key theories: Resource-Based View (RBV), Dynamic Capability Theory, Disruptive Innovation Theory, and Institutional Theory. These theories provide a comprehensive framework for understanding how firms can leverage internal resources and capabilities to achieve sustained competitive advantage and drive innovation. Institutional Theory emphasizes the influence of external norms and pressures on organizational strategies, suggesting that aligning digital capabilities with institutional expectations enhances legitimacy and competitiveness. Figure 1 explains the relationship between several latent variables and the main theories in strategic management science from various literature reviews.

Strategic resources provide a long-term competitive edge and strategically position a company. This advantage is achieved through the development and accumulation of resources and organizational capabilities that are valuable, rare, inimitable, and non-substitutable [3, 7]. The ability to continuously update resources to foster innovation is a key determinant of competitive and positional advantage [8]. Capabilities are fundamental to RBV theory and are part of a coordinated routine process within organizations to achieve goals.

In the context of the automotive components industry, digital transformation capability and absorptive capacity are critical. Digital transformation capability involves integrating digital technologies to enhance operations. Absorptive capacity, as defined by Cohen and Levinthal [2] is a firm's ability to recognize the value of new external information, assimilate it, and apply it to commercial ends. These capabilities enable firms to innovate and maintain a competitive advantage by leveraging Industry 4.0 technologies and innovative solutions [10]. By aligning digital transformation capability with absorptive capacity, firms in the automotive supply chain can enhance their innovation performance, ensuring they remain competitive in a rapidly evolving market [11].

2.2. Dynamic Capability Theory

The Dynamic Capability Theory, introduced by Teece, et al. [8] emphasizes a firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. In the context of the automotive components industry, digital transformation capabilities are viewed as dynamic capabilities that enable firms to adapt to technological changes and market volatility, fostering innovation. This involves leveraging digital tools to enhance operational efficiency and innovation performance, which is crucial for maintaining competitiveness in a fast-evolving market [12].

Incorporating digital transformation capability within the automotive supply chain allows companies to improve their absorptive capacity. This refers to the ability to recognize, assimilate, and apply new information, which is essential for driving innovation performance. By enhancing these capabilities, firms can better respond to technological advancements and market demands, ensuring sustained growth and competitive advantage [10]. This synergy between digital transformation and absorptive capacity highlights the importance of strategic alignment in the automotive components industry. By fostering an environment conducive to continuous learning and adaptation, companies can effectively leverage their resources to achieve superior innovation outcomes [11].

2.3. Disruptive Innovation Theory

The theory of disruptive innovation, introduced by Christensen, et al. [4] explains how disruptive technologies can create new markets and value networks, eventually displacing established market leaders. In the automotive components

industry, digital transformation acts as a disruptive force, compelling firms to innovate continuously to remain competitive. This involves integrating digital technologies to enhance operational efficiency and innovation performance, which is crucial for maintaining competitiveness in a rapidly evolving market. In the context of the automotive supply chain, digital transformation capability enhances absorptive capacity—the ability to recognize, assimilate, and apply new knowledge. This synergy allows firms to better respond to technological advancements and market demands, ensuring sustained growth and competitive advantage. By fostering an environment conducive to continuous learning and adaptation, companies can effectively leverage their resources to achieve superior innovation outcomes [12].

2.4. Institutional Theory

Institutional theory provides a framework for understanding how organizations conform to social norms and expectations, emphasizing the influence of external pressures on organizational behavior [6]. It highlights three mechanisms of institutional isomorphism: coercive, mimetic, and normative pressures. Coercive pressures arise from legal and political influences, mimetic pressures stem from uncertainty leading organizations to imitate successful peers, and normative pressures are rooted in professional standards and cultural expectations. This theory suggests that organizations adopt practices perceived as legitimate to gain acceptance and support from their environment. By aligning with institutional norms, organizations enhance their legitimacy and competitiveness. Institutional theory is crucial for understanding how firms navigate complex environments, ensuring that their strategies align with societal expectations while fostering innovation and strategic growth. It also provides insights into how digital transformation can be seen as an institutional change, where organizations adapt to new technological norms and practices.

2.5. Automotive Component Industry

The automotive component industry in Indonesia operates within a complex, multi-tiered supply chain structure. At the top are the Original Equipment Manufacturers (OEMs) or assemblers, followed by Tier 1, Tier 2, and Tier 3 suppliers3 [13]. This tiered structure allows for specialization but also creates challenges in coordination and information flow across the supply chain OEMs are responsible for final vehicle assembly and typically have the strongest bargaining power in the supply chain. They face significant pressure to innovate and adapt to disruptive technologies like electric and autonomous vehicles [14]. Tier 1 suppliers provide major systems and components directly to OEMs. They often have significant R&D capabilities and play a crucial role in innovation. Tier 2 suppliers provide components to Tier 1 suppliers, while Tier 3 suppliers provide raw materials and basic parts to Tier 1 and 2 suppliers.

Digital transformation and innovation present distinct challenges for each tier of the automotive supply chain. To meet evolving consumer demands and integrate new technologies, OEMs must cultivate new digital skills and develop strong absorptive capacity to assimilate knowledge related to digital innovations [15]. Tier 1 suppliers face pressure to innovate and satisfy OEM demands, making absorptive capacity essential for leveraging new digital technologies. They must also balance exploring new innovations with exploiting existing competencies [16]. On the other hand, Tier 2 and 3 suppliers often encounter resource constraints, making digital transformation particularly challenging. Their innovation performance heavily depends on building absorptive capacity to adopt emerging technologies, though they risk lagging behind due to rapid technological advancements [17].

Firms across all tiers must develop digital capabilities to enhance supply chain visibility, agility, and resilience. However, significant variations in digital maturity across tiers can hinder seamless end-to-end supply chain integration [18]. Companies that can effectively identify and seize new digital opportunities will be better positioned to thrive in an increasingly complex automotive ecosystem. The strategic adoption of technologies such as cloud computing, blockchain, artificial intelligence (AI), and the Internet of Things (IoT) plays a pivotal role in fostering collaboration, improving transparency, and enabling data-driven decision-making [19].

3. Hypotheses Development

3.1. Digital Transformation Capability and Absorptive Capacity

Digital transformation capability refers to a firm's ability to leverage digital technologies to fundamentally change business processes, customer experiences, and value propositions [14]. This capability enables organizations to sense and respond to technological changes in their environment. Absorptive capacity, on the other hand, is defined as a firm's ability to recognize the value of new external information, assimilate it, and apply it to commercial ends [2].

In the automotive industry, the relationship between digital transformation capability and absorptive capacity is explained through several mechanisms. First, digital technologies enhance a firm's ability to acquire and process external information [20]. For example, big data analytics and artificial intelligence tools can help automotive firms identify and assimilate relevant knowledge from vast amounts of data [21]. Second, digital transformation often involves the implementation of new information systems and platforms that facilitate knowledge sharing and integration within the organization [21]. These systems can enhance a firm's ability to assimilate and transform new knowledge, key components of absorptive capacity [21]. Third, digital transformation fosters a culture of continuous learning and adaptation2, which is conducive to developing absorptive capacity.

As firms become more digitally mature, they tend to develop dynamic capabilities that allow them to better sense and seize new opportunities [21]. Empirical evidence supports this relationship. For instance, Natu and Aparicio [20] found that digital transformation has a significant positive correlation with the absorptive capacity of manufacturing enterprises [20]. Similarly, Jin, et al. [22] demonstrated that knowledge derived from the digital operation of the business can only result in product innovation if absorptive capacity plays an intermediation role [22]. Given these theoretical arguments and

empirical evidence, it is posited that automotive firms with stronger digital transformation capabilities are likely to have higher levels of absorptive capacity.

Hypothesis 1 (H1): Digital transformation capability positively influences absorptive capacity.

3.2. Digital Transformation Capability and Innovation Performance

Digital transformation capability serves as a critical driver for organizations seeking to effectively leverage digital technologies, fundamentally reshaping business processes, customer experiences, and value propositions. This capability equips firms to perceive and respond to technological shifts, fostering innovation and agility. Empirical studies, such as research on Chinese manufacturing enterprises from 2008 to 2020, indicate that digital transformation significantly improves enterprise innovation performance [23]. Furthermore, digital transformation reconstructs dynamic capabilities, which in turn positively affects innovation performance [23].

The relationship between digital transformation capability and innovation performance is underpinned by several mechanisms. Firstly, digital technologies enhance an organization's ability to collect, analyze, and utilize data for innovation purposes [24]. Advanced analytics and artificial intelligence tools provide deeper insights into customer needs and market trends, enabling more targeted and effective innovation efforts. Secondly, digital platforms facilitate collaboration, knowledge sharing, and idea generation across organizations [25]. These capabilities accelerate innovation processes by enabling rapid prototyping, virtual testing, and faster time-to-market for new products. Thirdly, digital transformation fosters a culture of experimentation and continuous improvement [24]. Organizations with higher digital maturity develop dynamic capabilities that allow them to adapt quickly to changing market conditions and customer preferences, leading to more frequent innovations.

Empirical evidence supports the positive relationship between digital transformation capability and innovation performance. Studies highlight the role of digital technologies in streamlining workflows, automating processes, and optimizing supply chains, which leads to innovation and value creation [24, 25]. Given these theoretical arguments and empirical evidence, it is posited that firms with stronger digital transformation capabilities are likely to achieve higher levels of innovation performance.

Hypothesis 2 (H2): Digital transformation capability positively affects innovation performance.

3.3. Absorptive Capacity and Innovation Performance

Absorptive capacity, defined as a firm's ability to recognize, assimilate, and apply new external knowledge, is essential for enhancing innovation performance [2]. This capability allows organizations to effectively leverage external knowledge sources and integrate them with internal knowledge, driving successful innovation outcomes.

The relationship between absorptive capacity and innovation performance can be understood through several mechanisms. Firstly, absorptive capacity enhances a firm's ability to identify and acquire valuable external knowledge relevant to innovation opportunities. Firms with a higher absorptive capacity are better equipped to recognize emerging technologies, market trends, and customer needs that can inform their innovation efforts [26]. Secondly, absorptive capacity facilitates the assimilation and transformation of acquired knowledge within the organization. This process involves interpreting, combining, and internalizing new knowledge, which is crucial for developing novel ideas and solutions. Thirdly, absorptive capacity enables the effective application of assimilated knowledge to commercial ends, translating it into innovative products, services, or processes. Firms with strong absorptive capacity can exploit new knowledge for innovation purposes. Empirical evidence supports the positive relationship between absorptive capacity and innovation performance. Prior research suggests that absorptive capacity positively influences both incremental and radical innovation outcomes. This is achieved when firms can effectively leverage external knowledge sources [27].

In the context of digital transformation, absorptive capacity plays a particularly important role. As firms increasingly rely on digital technologies and external knowledge sources to drive innovation, the ability to absorb and utilize this knowledge becomes critical [14]. Research indicates that absorptive capacity enables firms to better understand and integrate digital technologies into their innovation processes, leading to improved performance. Furthermore, absorptive capacity can enhance the effectiveness of a firm's digital capabilities in driving innovation. For instance, absorptive capacity may moderate the relationship between digital capabilities and performance outcomes [28] suggesting that absorptive capacity is crucial in translating digital capabilities into valuable outcomes. Given these theoretical arguments and empirical evidence, it is posited that firms with higher levels of absorptive capacity are likely to achieve superior innovation performance, particularly in the context of digital transformation.

Hypothesis 3 (H3): Absorptive capacity positively influences innovation performance.

3.4. Mediating role of Absorptive Capacity

The strategic information systems literature has consistently highlighted the crucial mediating role of absorptive capacity in translating digital transformation capabilities into tangible innovation performance improvements. Digital transformation capability, encompassing the resources and skills needed to integrate digital technologies across an organization, provides access to unprecedented amounts of data and advanced technological tools [29]. However, the mere presence of these capabilities does not automatically guarantee enhanced innovation; a critical bridge is needed to convert these digital assets into meaningful innovation outcomes.

Absorptive capacity, defined as a firm's ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends [2], serves as that essential mediator. It enables firms to effectively interpret and utilize the complex knowledge gained through digital transformation initiatives. In essence, absorptive capacity enables organizations

to deeply understand the potential applications of digital technologies and strategically integrate them into their existing innovation processes. This mediating effect is multifaceted.

Firstly, absorptive capacity enhances a firm's ability to reconfigure existing operational capabilities in response to dynamic environments. Rukani and Ratnasari [24] demonstrated that IT-enabled absorptive capacity allows firms to adapt and innovate more effectively in turbulent market conditions. Secondly, absorptive capacity improves a firm's ability to sense and respond to emerging environmental changes and market trends [30]. This agility is critical for continuous innovation, as it enables firms to anticipate future needs and leverage their digital capabilities proactively. Thirdly, research by Setia and Patel [27] and Kulik, et al. [28] indicates that absorptive capacity moderates the relationship between digital capabilities and performance outcomes. This suggests that a higher absorptive capacity allows firms to extract greater value from their digital investments, leading to superior customer service and, ultimately, enhanced innovation.

In conclusion, absorptive capacity acts as a critical catalyst, amplifying the impact of digital transformation capability on innovation performance. Firms with a robust absorptive capacity are far better equipped to leverage their digital transformation capabilities, driving innovation and achieving a sustained competitive advantage in today's rapidly evolving digital landscape.

Hypothesis 4 (H4): Absorptive capacity mediates the relationship between digital transformation capability and innovation performance.

The overall conceptual framework is illustrated in Figure 2, which outlines the key hypotheses of the study. Hypothesis 1 (H1) investigates the role of transformational leadership in enhancing organizational ambidexterity, which refers to the ability of an organization to balance the exploitation of existing competencies with an exploration of new opportunities. Secondly, Hypothesis 2 (H2) explores how transformational leadership influences innovation performance, emphasizing its importance in fostering a culture of creativity and responsiveness. Hypothesis 3 (H3) delves into the relationship between organizational ambidexterity and innovation, assessing whether the capacity to navigate both existing and new ventures has a direct impact on innovative outcomes. Finally, Hypothesis 4 (H4) aims to uncover the dynamics between transformational leadership and innovation performance, specifically examining how this relationship is mediated by organizational ambidexterity. Through these hypotheses, the study seeks to provide a comprehensive understanding of the interconnectedness between leadership styles, organizational capabilities, and innovation success.

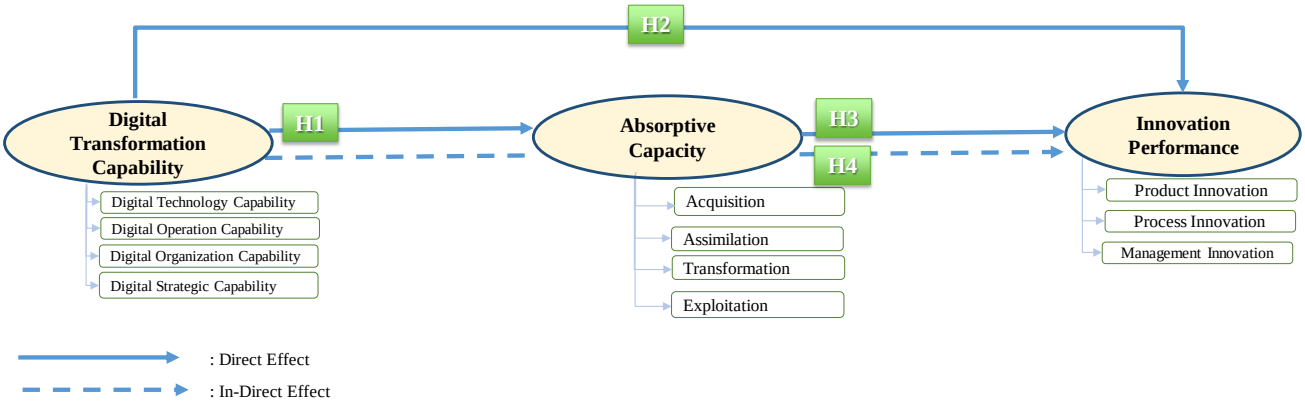

Figure 2.
Conceptual framework.

4. Methodology

4.1. Design and Participants

This study adopts a deductive quantitative methodology, utilizing a survey design to gather data through a carefully structured questionnaire. The questionnaire focuses on three significant variables that are pivotal to understanding organizational performance in a digital context: Digital Technology Capability (DTC), Absorptive Capacity (AC), and Innovation Performance (IP). These variables are essential for gaining insights into how organizations can thrive and adapt in today's rapidly evolving digital environment.

Digital Technology Capability (DTC) is evaluated using the comprehensive framework established by Ren, et al. [10]. This variable encompasses four critical dimensions: digital technology, digital operations, digital organization, and digital strategy. Digital technology, which pertains to the tools and systems employed; digital operations, which refers to the processes that leverage these technologies; digital organization, which involves the structural and cultural adaptations within the company; and digital strategy, which outlines the overall plan for integrating digital advancements into business goals. To measure DTC, the questionnaire includes 12 specific items (numbered DTC0 through DTC12), each designed to assess various facets of an organization's technological readiness and its effective implementation of digital solutions.

Absorptive Capacity (AC) is grounded in the framework developed by Müller, et al. [30] and Hong, et al. [31]. This variable covers four critical dimensions: acquisition, assimilation, transformation, and exploitation. acquisition, which involves identifying and acquiring valuable external knowledge; assimilation, referring to the organization's ability to analyze and interpret this knowledge; transformation, which is about reshaping and enhancing existing competencies; and exploitation, which pertains to utilizing the assimilated knowledge for commercial purposes. The AC section of the

questionnaire includes 20 items (ranging from AC0 to AC19), designed to capture the organization's capacity to manage and leverage knowledge effectively in the pursuit of innovation.

Innovation Performance (IP) is based on the framework proposed by Hong, et al. [31] and Taherdoost [32]. It consists of product, process, and management innovation. Product innovation focuses on new or improved goods. Process innovation is related to advancements in manufacturing or service delivery. Management innovation involves novel management practices or organizational structures. The questionnaire consists of 9 targeted items (labeled IP0 to IP8) that provide valuable insights into the different dimensions of a company's innovation outcomes, illuminating the effectiveness and impact of its innovative efforts.

The survey uses Likert scales to capture respondents' levels of agreement, facilitating detailed quantitative analysis. This method is effective in quantifying attitudes and perceptions. The questionnaire, formatted according to best practices [33] ensures clarity and consistency, supporting robust statistical analysis of the relationships among the variables. The population consists of 319 companies from the Indonesian Ministry of Industry database [34] with the sample targeting top management (CEO/Director/Owner). Following Hair, et al. [35] PLS-SEM guidelines, a minimum sample size of 40 was determined based on the number of formative indicators and structural pathways. This was increased to 100 to improve precision and statistical power, ensuring more reliable results.

The measurement model evaluation in this study assesses both validity and reliability. Outer loadings must exceed 0.70 to confirm indicator reliability, as per [36, 37]. Internal consistency is ensured through Cronbach's Alpha, Rho A, and Composite Reliability, with acceptable values above 0.70. Convergent validity is demonstrated by an AVE value greater than 0.50 [38]. For discriminant validity, this study employs both the HTMT ratio and the Fornell-Larcker criterion. According to [37] HTMT is better at detecting discriminant validity, with an acceptable threshold of <0.90. The Fornell-Larcker criterion is met when the square root of AVE for each construct exceeds its correlations with other construct

4.2. Data Collection

The data collection process for this study was meticulously designed to specifically target top management professionals within the Indonesian automotive components industry. To systematically gather relevant information, we developed a series of comprehensive questionnaires that were distributed via email and accessible through online links. These questionnaires served as the primary research instrument, designed to assess the respondents' perceptions of essential constructs related to the industry. Our instrument was informed by established theoretical frameworks and reviewed existing literature, ensuring that the questions were both relevant and scientifically grounded. To enhance the survey's reach and ensure a robust response rate, we established collaborative partnerships with prominent industry associations. These collaborations allowed us to leverage networks and facilitate a broader distribution of the questionnaires. This approach not only increased the number of responses but also significantly contributed to the credibility and depth of the data collected.

In addition to the quantitative data obtained from the surveys, we also conducted a series of in-depth discussions with company leaders and other key industry stakeholders. These conversations were strategically designed to validate the findings from the survey and to extract further insights from seasoned industry experts. By adopting this dual approach, we not only ensured a higher level of accuracy in our results but also gained a more nuanced understanding of the various factors that influence the dynamics of the Indonesian automotive components sector. This comprehensive methodology ultimately provided a richer context for our analysis and conclusions.

4.3. Respondents Profile

A total of 100 completed questionnaires were deemed suitable for data analysis. The demographic characteristics of the respondents are detailed in Table 1.

Table 1.
Respondents' demographic characteristics (n = 100).

Demographic		Frequency	Percentage
Gender	Male	87	87%
	Female	13	13%
Service year in the company	More than 10 years	26	26%
	5 - 10 years	38	38%
	Less than 5 years	36	36%
Position in organization	President Director	14	14%
	Vice President Director	14	14%
	Director	72	72%
Number of employee	More than 5000 employees	5	5%
	1001 - 5000 employees	18	17%
	501 - 1000 employee	21	21%
	101 - 500 employees	44	44%
	Less than 100 employees	12	12%

The findings reveal that a substantial majority, specifically 87%, of the respondents identified as male, highlighting a gender imbalance within the surveyed population. Furthermore, 73% of these individuals had dedicated over five years of their careers to working in automotive components companies, pointing to a wealth of experience and stability prevalent in this sector. The roles held by respondents exhibited a diverse array of positions, with 14% holding the title of President Director, while another 14% served as Vice President Director. Meanwhile, a substantial 72% occupied various director-level roles, indicating a strong representation of leadership within these organizations. Additionally, the study revealed that 44% of the respondents were employed in companies with a workforce ranging from 101 to 500 employees, shedding light on the significant presence of medium-sized enterprises in this industry. This demographic snapshot provides valuable insights into the professional landscape within the automotive components sector.

5. Results

5.1. Measurement Model Evaluation

5.1.1. Descriptive Statistics and Convergent Validity Test

The descriptive statistics presented in Table 2 reveal that the average scores for the research variables and their corresponding measurement dimensions are relatively high, all exceeding 5.177. This trend suggests that the companies included in the sample have effectively implemented digital transformational capability, absorptive capacity, and innovation performance. Moreover, the standard deviation values among the various variables are relatively stable, indicating consistency in the data. Exploring deeper into the dimension level, the outer loading values for the indicators surpass the threshold of 0.70, which confirms the validity and reliability of these measurements. Additionally, the internal consistency of the constructs is reinforced by the fact that Cronbach's Alpha, Rho A, and Composite Reliability values all stand above 0.70, signifying a strong degree of reliability. Furthermore, convergent validity is established, as evidenced by the Average Variance Extracted (AVE) value, which exceeds 0.50. Overall, the evaluation of the outer model aligns well with the established criteria for robustness and validity, reflecting a solid foundation for the research findings.

Table 2.
Descriptive statistics dan Convergent validity assessment.

Dimension	Number of Item	Mean	Standard Deviation	Outer Loading	Cronbach's Alpha	Rho A	Composite Reliability	AVE
Digital Technology Capability	3	5.223	0.417	0.934 - 0.958	0.944	0.944	0.964	0.900
Digital Operation Capability	3	5.177	0.382	0.743 - 0.919	0.776	0.805	0.870	0.693
Digital Organization Capability	4	5.230	0.421	0.795 - 0.902	0.880	0.884	0.918	0.736
Digital Strategic Capability	2	5.190	0.393	0.870 - 0.922	0.759	0.791	0.891	0.804
Acquisition	6	5.398	0.500	0.728 - 0.809	0.836	0.840	0.879	0.549
Assimilation	3	5.387	0.488	0.834 - 0.913	0.856	0.856	0.913	0.778
Transformation	6	5.402	0.470	0.708 - 0.795	0.852	0.853	0.890	0.575
Exploitation	5	5.504	0.487	0.724 - 0.802	0.833	0.840	0.881	0.596
Product Innovation	3	5.260	0.516	0.845 - 0.921	0.870	0.873	0.921	0.795
Process Innovation	3	5.293	0.511	0.810 - 0.930	0.862	0.863	0.916	0.786
Management Innovation	3	5.240	0.666	0.729 - 0.885	0.765	0.781	0.865	0.683
Variable	Number of Dimension	Mean	Standard Deviation	Outer Loading	Cronbach's Alpha	Rho A	Composite Reliability	AVE
Absorptive Capacity	4	5.423	0.486	0.708 - 0.913	0.927	0.934	0.936	0.527
Digital Transformational Capability	4	5.205	0.406	0.744 - 0.958	0.937	0.943	0.947	0.602
Innovation Performance	3	5.264	0.569	0.730 - 0.929	0.913	0.920	0.929	0.593

5.1.2. Discriminant validity (HTMT and Fornell Lacker Criterion)

The assessment of discriminant validity presented in Table 3 reveals satisfactory results. The HTMT (Heterotrait-Monotrait ratio) values for all pairs of variables fall below the threshold of 0.90, indicating that the constructs are sufficiently distinct from one another. Additionally, the Fornell-Larcker criterion further reinforces these findings, as the square roots of the Average Variance Extracted (AVE) for each variable are greater than the correlations among the variables. This confirms that the constructs exhibit adequate discriminant validity, suggesting that they measure different underlying concepts effectively.

Table 3.
Discriminant validity (HTMT and Fornell Lacker Criterion).

	Absorptive Capacity	Digital Transformational Capability	Innovation Performance
Absorptive Capacity	0.726	0.721	0,805
Digital Transformational Capability	0.681	0.776	0,836
Innovation Performance	0.750	0.768	0,77

Source: Diagonal = root of AVE, value above the diagonal = HTMT and value below the diagonal = correlation

The Partial Least Squares (PLS) model estimation presented in Figure 3 offers a nuanced perspective on the interplay between Digital Technology Capability (DTC), Absorptive Capacity (AC), and Innovation Performance (IP) within Indonesia's automotive components sector. Grounded in the Resource-Based View (RBV) and Dynamic Capability Theory, the model's architecture assesses how a firm's strategic resources (DTC) and dynamic capabilities (AC) jointly influence its ability to achieve superior IP. Path coefficients reveal a significant positive relationship between DTC and AC ($\beta = 0.58$, $p < 0.01$), aligning with the premise that digital technologies, when strategically deployed, augment a firm's capacity to recognize, assimilate, and apply external knowledge. Furthermore, AC exhibits a robust positive effect on IP ($\beta = 0.67$, $p < 0.001$), underscoring its role as a critical mediator in translating technological resources into innovative outputs and reinforcing the central tenet of Dynamic Capability Theory that adaptive capacity drives competitive advantage in dynamic environments. The model's explanatory power, with DTC accounting for 49% of the variance in AC and AC explaining 34% of the variance in IP, highlights the substantial impact of these capabilities on firm-level outcomes.

A critical finding is the comparatively weaker direct path from DTC to IP ($\beta = 0.22$, $p < 0.05$) relative to the indirect path mediated by AC. This aligns with arguments against technological determinism, suggesting that the mere adoption of digital technologies does not automatically translate into innovation. Instead, it requires the concurrent development of AC to effectively leverage and integrate these technologies. The bootstrapping analysis (5,000 resamples) confirms the significance of AC's mediating role (indirect effect = 0.39, $p < 0.001$), reinforcing its function as a strategic filter and enabler. Furthermore, the limited influence of control variables such as firm size and R&D intensity ($\beta < 0.10$) suggests that strategic capability development is more crucial than scale or resource expenditure. This challenges conventional wisdom and highlights the importance of prioritizing AC-enhancing practices (e.g., cross-departmental collaboration, continuous upskilling) to unlock DTC's transformative potential, consistent with calls for more nuanced understandings of innovation drivers in emerging markets.

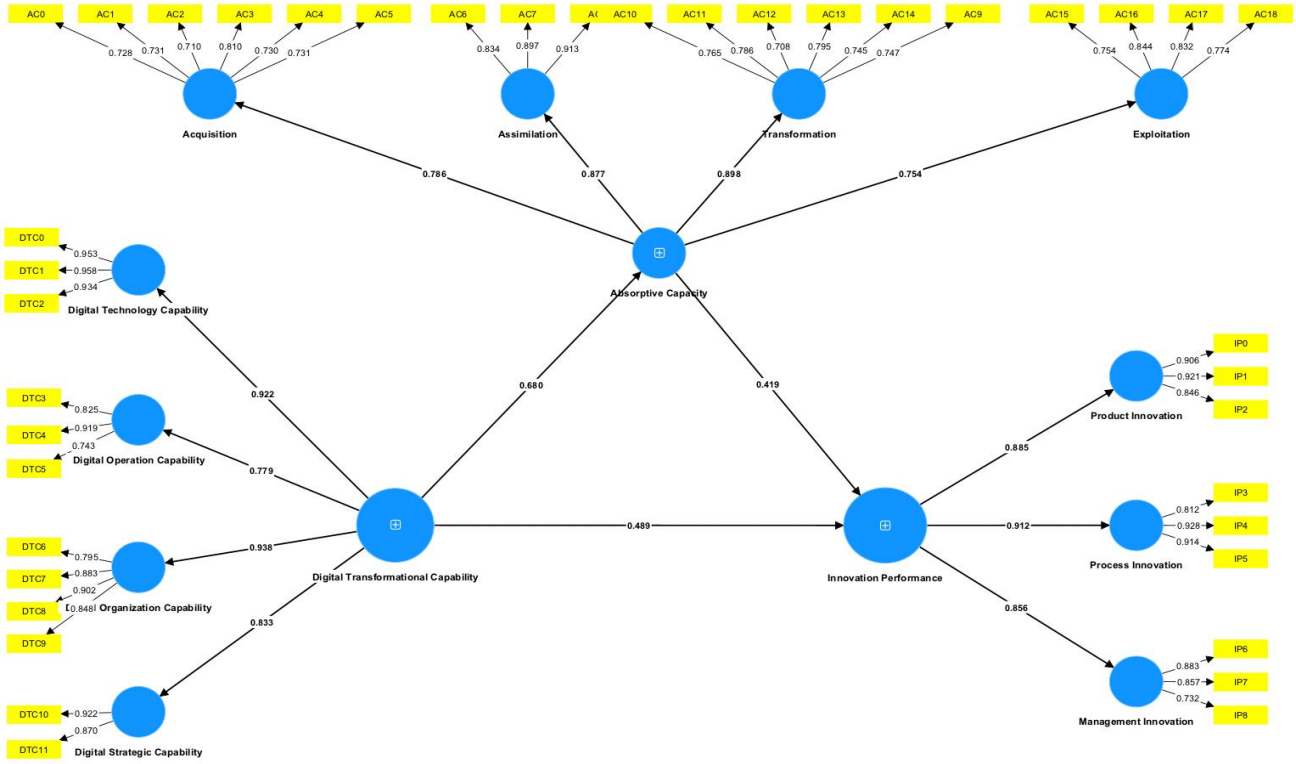

Figure 3.
PLS Model Estimation.

From a strategic perspective, Figure 3 offers actionable insights for firms navigating the "Making Indonesia 4.0" initiative. It validates the notion that synergizing DTC with AC can create a self-reinforcing cycle where digital tools streamline knowledge acquisition, and AC ensures its effective deployment for product and process innovations. The model's predictive relevance ($Q^2 > 0.35$) supports the argument that this synergistic relationship enhances organizational resilience and adaptability in the face of disruptive market forces. Drawing upon Disruptive Innovation Theory and Institutional Theory, this model extends beyond a dyadic relationship, positioning AC as both a strategic asset and a compliance mechanism. Firms meeting evolving market demands while sustaining competitive differentiation are vital in Indonesia's rapidly evolving automotive ecosystem, leading to sustainable competitive advantage and potentially reshaping industry dynamics.

5.2. Structural Model Measurement

The findings outlined in Table 4 provide strong empirical evidence supporting the proposed relationships among digital transformation capability, absorptive capacity, and innovation performance, specifically within the automotive

components industry. Beginning with H1, the analysis indicates a significant positive influence of digital transformation capability on absorptive capacity, reflected in a standardized coefficient (β) of 0.681 and a highly significant p-value of less than 0.001. This relationship is characterized by a large effect size ($f^2 = 0.864$), underscoring the powerful impact that digital technologies have on a firm's ability to acquire, assimilate, and apply new knowledge. The theoretical foundation for this finding lies in the notion that digital transformation enhances capabilities related to information processing and knowledge management, thus facilitating the organization's development of absorptive capacity. H2 demonstrates that digital transformation capability also plays a direct role in driving innovation performance ($\beta = 0.480$, $p < 0.001$). This shows a moderate effect size ($f2 = 0.392$), supporting the notion that digital technologies provide tools and platforms that accelerate innovation processes, enable rapid prototyping, and foster a culture of experimentation. H3 confirms the positive relationship between absorptive capacity and innovation performance ($\beta = 0.423$, $p < 0.001$), with a moderate effect size ($f2 = 0.305$). This reinforces previous research highlighting absorptive capacity's crucial role in leveraging external knowledge for innovation. Importantly, H4 reveals the significant mediating role of absorptive capacity in the relationship between digital transformation capability and innovation performance ($\beta = 0.288$, $p < 0.001$). This suggests that while digital transformation directly influences innovation, a considerable portion of this effect operates through the enhancement of absorptive capacity. This insight illustrates the interconnectedness of these variables and signifies the importance of developing absorptive capacity as an integral part of the digital transformation journey in driving innovation outcomes.

Table 4.
Hypotheses testing and model evaluation.

Hypotheses	Hypothesis Statement	Original sample (O)	T statistics (|O/STDEV|)	P-value	F Square	R Square	Q^2 Predict
H1	Digital Transformational Capability -> Absorptive Capacity	0.681	11.433	0.000	0.864	0.464	0.193
H2	Digital Transformational Capability -> Innovation Performance	0.480	4.882	0.000	0.392	0.693	0.405
H3	Absorptive Capacity -> Innovation Performance	0.423	4.380	0.000	0.305	0.693	0.405
H4	Digital Transformational Capability -> Absorptive Capacity -> Innovation Performance	0.288	3.970	0.000	0.285		

The high R2 value for innovation performance (0.693) indicates that the model explains a large proportion of the variance in this outcome. The Q2 predicted values above zero for both absorptive capacity and innovation performance suggest the model has good predictive relevance. These findings underscore the complementary nature of digital transformation and absorptive capacity in driving innovation performance. While digital technologies provide powerful tools, a firm's ability to recognize, assimilate, and apply new knowledge remains crucial for translating digital capabilities into innovative outcomes. This has important implications for managers in the automotive components industry, suggesting that investments in digital technologies should be accompanied by efforts to enhance organizational learning and knowledge absorption capabilities.

Table 5.
Goodness of fit model test.

Goodness of Fit Index	SRMR	CVPAT Evaluation					
		Variable	PLS-SEM vs. Indicator average (IA)			PLS-SEM vs. Linear model (LM)	
			Average loss difference	t value	p value	Average loss difference	t value	p value
0.595	0.102	Absorptive Capacity	-0.001	3.89	0.000	-0.005	3.955	0.000
		Innovation Performance	-0.009	4.026	0.000	-0.005	4.79	0.000

PLS-SEM, or Partial Least Squares Structural Equation Modeling is a prediction-oriented approach where several measures are developed to assess model acceptability beyond R-square and Q2 predict. One such metric is the goodness of fit index, reported in Table 5. Despite being one of the oldest measures available, the goodness of fit index remains relevant and widely used in PLS studies [35]. This index is calculated by taking the square root of the average communality combined with the average R-square. In our analysis, the PLS model yielded a goodness of fit index (GoF Index) of 0.595, which indicates a strong model fit, as values exceeding 0.36 are classified as high.

Additionally, the Standardized Root Mean Square Residual (SRMR) measure, which shares a similar purpose with covariance-based SEM, provides a comparison between the observed data's correlation matrix and the estimated correlations derived from the model. The result we obtained for the SRMR was 0.102, which suggests that the model fits the data reasonably well but is only marginally acceptable. Furthermore, the predictive power of our PLS model was

assessed using PLS Predict, an approach developed by Sarstedt, et al. [37] and Zhang, et al. [39]. This method compares the Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) values from the PLS model against those from a conventional linear model (LM). Our findings revealed that the RMSE and MAE values associated with the PLS model were lower across all indicators, indicating a strong predictive capability.

Another crucial assessment of predictive power is conducted through the cross-validated predictive ability test (CVPAT), which applies an out-of-sample prediction approach to calculate the model's prediction error. For our analysis, we compared the average loss value obtained from the PLS model against the average loss values generated by using indicator averages (IA) and forecasts from a linear model (LM). Ideally, the average loss from the PLS-SEM should be less than the benchmarks, indicated by a negative difference in average loss values. Our PLS estimation demonstrated negative average loss differences for both innovation performance and absorptive capacity variables, with a statistical significance of $p<0.05$. This confirms that the predictive power of our PLS model surpasses that of both the indicator average (IA) and the linear model (LM) approaches.

6. Discussion

The findings of this study highlight the pivotal role of digital transformational capability in significantly improving both absorptive capacity and innovation performance within the automotive components industry. According to insights gathered from respondents, companies that have effectively integrated digital technologies, such as advanced IT infrastructure and digital research and development (R&D) capabilities, reported remarkable advancements in their innovation outcomes. The results supporting Hypothesis 1 provide compelling evidence that digital transformational capability significantly enhances absorptive capacity. This aligns with recent academic literature, which emphasizes that digital transformation is not only a catalyst for innovation but also enhances an organization's ability to adapt effectively in competitive and rapidly changing environments [40]. The integration of digital technologies facilitates a more flexible organizational structure, enabling companies to respond rapidly to market changes and technological advancements, thereby enhancing both innovation performance and operational efficiency [14].

Hypothesis 2 reveals a direct impact of digital transformational capability on innovation performance. Respondents noted that firms with robust digital capabilities such as those in digital production and supply chain management demonstrated improved success in developing competitive new products and enhancing production processes. This finding emphasizes the vital significance of digital organizational capabilities in driving both product innovation and process improvements, reinforcing research that notes the synergy between digital transformation and robust R&D capabilities [41].

The positive effect of absorptive capacity on innovation performance, as indicated by H3, is substantiated by the feedback from respondents, which shows that firms with higher absorptive capacity are better at identifying new business opportunities and implementing innovative solutions. This observation is consistent with existing literature that highlights the importance of exploration and innovation in fostering an innovation-friendly environment [42]. By maintaining a balance between exploration and exploitation, companies can enhance their innovation capabilities and sustain a competitive edge.

Finally, Hyphothesis 4 demonstrates that absorptive capacity mediates the relationship between digital transformational capability and innovation performance. Respondents indicated that their firms effectively balance exploration of new technologies with exploitation of existing resources, which is crucial for fostering innovation. This mediation effect underscores the importance of managing both exploratory and exploitative activities to achieve superior innovation outcomes. Collectively, these findings validate that both digital transformational capability and absorptive capacity are essential drivers of innovation performance, enabling automotive component manufacturers to remain competitive and responsive in a dynamic market environment.

7. Conclusion and Implications

This study examined how digital transformation capability and absorptive capacity impact innovation performance within the automotive components industry, highlighting the mediating role of absorptive capacity. The findings make a compelling case that digital transformation capability significantly enhances both absorptive capacity and innovation performance. Moreover, absorptive capacity partially mediates the relationship, emphasizing its role in converting digital capabilities into tangible innovation outcomes. This highlights how critical it is for companies to effectively convert their digital capabilities into substantive innovation results.

The study enriches the theoretical framework of dynamic capabilities by demonstrating how the interplay between digital transformation and absorptive capacity can propel innovation in a rapidly evolving technological landscape. Institutional theory adds another dimension by highlighting how external norms and pressures influence these capabilities. This suggests that companies that align their strategies with institutional expectations can improve their legitimacy and competitiveness in the marketplace.

From a practical standpoint, the study highlights the need for a comprehensive approach to innovation management within the automotive components sector. It advocates for managers to build robust digital transformation capabilities while enhancing their firms' ability to recognize, assimilate, and apply new knowledge. The mediating role of absorptive capacity suggests that firms should invest decisively in digital technologies while cultivating the capability to leverage these technologies effectively for innovation. From a strategic information systems perspective, this study underscores the essential role of digital capabilities in facilitating knowledge absorption and innovation. As digital business strategies become intertwined with organizational capabilities and competitive advantage, future research could explore how specific

information systems and digital technologies contribute to enhancing absorptive capacity and innovation performance, particularly within Industry 4.0 and smart manufacturing frameworks.

In conclusion, as the automotive components industry navigates ongoing disruptions driven by rapid digitalization and emerging technologies, firms that skillfully develop and integrate their digital transformation capabilities while enhancing their absorptive capacity to absorb and adapt to new information will find themselves in a distinctly advantageous position. By aligning their strategies with established industry standards and institutional practices, these firms will be better equipped to foster innovation and maintain a competitive advantage in an increasingly complex and ever-evolving business landscape.

8. Limitations and Future Research

This study primarily concentrates on the automotive components industry, which inherently constrains the extent to which its findings can be generalized across different sectors. To strengthen the validity and breadth of these insights, future research should consider expanding its focus to encompass a diverse range of industries beyond the automotive realm. By doing so, researchers can foster a more comprehensive understanding of the underlying phenomena.

In addition to expanding the industrial scope, several promising avenues for further exploration could be pursued. For instance, investigating the influence of organizational culture on digital transformation initiatives could reveal how varying cultural aspects either facilitate or hinder the adoption of new technologies. Similarly, examining the impact of different leadership styles on innovation could provide valuable insights into how leaders can effectively nurture and inspire creativity within their teams.

It's also essential to consider the effects of evolving market trends and shifts in consumer behavior, as these factors can significantly impact an organization's ability to innovate and adapt. Furthermore, understanding the implications of regulatory changes on business practices could shed light on how compliance influences strategic decisions related to digital transformation and innovation.

Conducting longitudinal studies would be beneficial to gaining a deeper and more nuanced understanding of the complex relationships among digital transformation, absorptive capacity, and innovation performance. Such research could illuminate how these capabilities evolve over time and interact with one another, ultimately influencing long-term innovation outcomes. This approach would not only provide valuable perspectives on the sustainability of these capabilities but also highlight their broader impact in an increasingly dynamic and competitive business environment.

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Appendix A.

Questionnaire List.

No	Variable	Dimension	Questionnaire	
1	Digital Technology Capability [10]	Digital technology capability	DTC0	Your company has digital integration capability, consistently collecting, storing, and processing data interfaces, enabling digital intercommunication and interconnection.
			DTC1	Your company has digital infrastructure, building IT infrastructure and information management platforms for the company.
			DTC2	Your company implements digital technology by empowering and implementing intelligent systems in company decision-making processes.
		Digital operation capability	DTC3	Your company has market formation capability, identifying external market opportunities, reallocating resources, and adjusting pricing strategies to respond quickly and clearly to consumer markets.
			DTC4	Your company has digital supply chain capability, with a flexible supply chain driven by digital technology that rapidly responds to market demands.
			DTC5	Your company has digital R&D capability, reducing trial-and-error costs during new product development (e.g., using 3D simulation software).
			DTC6	Your company has digital production capability, able to visualize and control the entire production process for efficiency and quality.
		Digital organization capability	DTC7	Your company has management cognition capability, where managers are required to guide employees during the transformation process.
			DTC8	Your company has two-way communication capability, enhancing communication between departments at the same hierarchical level to collaboratively envision future business development.
			DTC9	Your company has digital leadership reflected in decision-making, learning, and new demands on the ability to discern information quality.
			DTC10	Your company has reorganization capability, an important driving force for digital organizational ability. Timely organizational structure adjustments, merger and acquisition strategies, proper resource coordination, and reorganization abilities are crucial components of the company's digital transformation capability.
		Digital strategic capability	DTC11	Your company has dual digital capability, possessing both exploitation (current business) and exploration (new business) abilities.
			DTC12	Your company has digital ecology capability, the ability to connect with suppliers and customers, create closed loops, and lead partners towards digitalization to create competitive advantages.
2.	Absorptive Capacity [30]	Acquisition	AC0	Your company frequently interacts with others in the automotive industry to obtain new knowledge related to product and process development.
			AC1	Your company always involves employees in cross-functional work
			AC2	Your company gathers information through informal means.
			AC3	Your company always connects with other companies and stakeholders in the automotive industry.
			AC4	Your company regularly arranges special meetings with customers, suppliers, or third parties to acquire new knowledge about processes, products, logistics, and innovation.
			AC5	Your company routinely approaches third parties outside the industry (business associations and consulting firms) to gather information.
		Assimilation	AC6	Your company quickly recognizes changes in the business environment (e.g. competition, regulations, and demographics).
			AC7	Your company quickly identifies new opportunities to meet customer needs.
			AC8	Your company quickly analyzes and interprets changes in market demand.

No	Variable	Dimension	Questionnaire	
		Transformation	AC9	Your company regularly considers the consequences of changing market demands in terms of new products or processes.
			AC10	Your company records and stores newly acquired knowledge for future reference.
			AC11	Your company quickly recognizes the usefulness of new external knowledge to improve existing knowledge.
			AC12	Every employee easily shares practical experiences (best practices) with each other.
			AC13	Your company easily captures opportunities from new external knowledge.
			AC14	Your company always holds regular meetings to discuss the consequences of new product development and new processes or company innovations.
		Exploitation	AC15	Your company reflects innovation activities in the action plans of all departments.
			AC16	Your company is very responsive to customer complaints.
			AC17	Your company has a clear division of roles and responsibilities.
			AC18	Your company continuously considers ways to better utilize new knowledge.
			AC19	Your company has employees who have a common understanding of innovation practices.
3.	Innovation Performance [31]	Product Innovation	IP0	The company's product innovation results have increased
			IP1	The number of new products or new ideas introduced by companies is increasing
			IP2	New products are able to compete in the market.
		Process Innovation	IP3	The company's innovation process uses value innovation to improve new product development
			IP4	The company uses a new production process to increase production line efficiency
			IP5	Companies buy new equipment or supplies to increase work efficiency on production lines
		Management Innovation	IP6	The company uses a new application system to make improvements in the administration process
			IP7	The company implements a reward scheme for employees who innovate
			IP8	The company always updates its organizational structure oriented towards company innovation.