

Enhancing Digital Service Performance through Transformation Capability and Knowledge Sharing in MSMEs

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ABSTRACT

This study addresses the growing need for manufacturing Micro, Small, and Medium-Sized Enterprises (MSMEs) to transform digital technology investments into sustainable business performance. **Grounded** in the Knowledge-Based View and Dynamic Capability Theory, this study aims to examine the effect of Digital Transformation Capability on Business Performance through the mediating roles of Absorptive Capacity and Knowledge Sharing among metal machining MSMEs in Bekasi City and Bekasi Regency, Indonesia. A quantitative explanatory research design was employed using a structured questionnaire distributed to 289 owners and managers selected through purposive sampling. The data were analyzed using Covariance-Based Structural Equation Modeling with IBM SPSS AMOS. **The structural model** demonstrated a good fit with the empirical data, indicated by CFI = 0.982, TLI = 0.960, and RMSEA = 0.027. The findings show that Digital Transformation Capability positively strengthens organizational capabilities, while Absorptive Capacity plays a critical mediating role in translating digital transformation into improved Business Performance. The mediation analysis confirms that Absorptive Capacity fully mediates the relationship between Digital Transformation Capability and Business Performance, indicating that digital investments generate greater value when firms can effectively acquire, assimilate, transform, and exploit strategic knowledge. **The study extends** the Knowledge-Based View and Dynamic Capability Theory by integrating digital transformation, Absorptive Capacity, and knowledge sharing within a unified MSME performance framework. The findings also highlight the importance of combining digital adoption with organizational learning, employee capability development, and knowledge-sharing practices to achieve sustainable competitiveness.

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1. INTRODUCTION

Digital transformation has become one of the most important strategic issues shaping the global business environment [1]. The development of technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), cloud computing, big data analytics, and digital manufacturing enables MSMEs to improve not only business processes and competitiveness but also the integration of digital manufacturing systems, information management platforms, and technology-supported knowledge-sharing mechanisms [2]. For MSMEs, digital transformation is no longer an option but a strategic necessity for maintaining business sustainability in an increasingly competitive market [3]. Previous studies have shown that organizations with strong digital capabilities achieve greater operational flexibility, better decision-making quality, and more sustainable business value creation.

The important role of MSMEs in the global economy further highlights the need for digital transformation [4]. Globally, MSMEs account for approximately 90% of all businesses and employ more than 50% of the world's workforce [5]. In many developing countries, they contribute around 70% of economic growth. Despite their significant contribution, many MSMEs continue to face challenges in adopting digital technologies because of limited organizational capabilities, resource constraints, and weak knowledge management practices [6]. As a result, many digitalization initiatives have not produced the expected improvements in business performance [7]. Therefore, Digital transformation should be viewed not simply as technology adoption but as a continuous process of developing organizational capabilities, including the ability to manage digital information, maintain reliable digital services, and utilize secure technology infrastructures to support sustainable business operations.

From a theoretical perspective, research on digital transformation is mainly grounded in the Knowledge-Based View (KBV) and Dynamic Capability Theory [8]. The Knowledge-Based View argues that knowledge is a strategic organizational resource that creates sustainable competitive advantage through the creation, integration, and application of knowledge. Meanwhile, Dynamic Capability Theory emphasizes an organization's ability to sense, seize, and reconfigure resources in response to a rapidly changing business environment [9]. Recent studies related to digital transformation, knowledge management, Absorptive Capacity, and MSME performance have been incorporated to provide stronger and more relevant theoretical support [10]. Together, these theories suggest that organizations with stronger digital capabilities are better able to acquire, integrate, and utilize new knowledge, leading to higher levels of innovation and organizational performance [11]. Therefore, Digital Transformation Capability can be considered a manifestation of dynamic capability that enables organizations to build competitive advantage through digital technologies and continuous organizational learning [12].

Within the Knowledge-Based View, knowledge sharing is one of the key mechanisms that supports successful digital transformation [8]. Knowledge sharing enables individuals and organizations to exchange experience, technical information, skills, and best practices, thereby accelerating organizational learning [13]. In small manufacturing businesses, knowledge sharing is particularly important because much of the organizational knowledge is tacit and developed through practical experience [8]. Recent studies have demonstrated that a strong knowledge-sharing culture improves innovation, organizational agility, adaptive capability, and the effectiveness of digital technology implementation, ultimately enhancing MSME performance [14].

Previous studies have reported inconsistent findings regarding the relationship between Digital Transformation Capability, knowledge sharing, and business performance [15]. Some studies have found significant positive effects on business performance, while others have reported weaker relationships when organizations lack the ability to acquire, interpret, and apply new knowledge effectively [16]. These inconsistent findings suggest that an important mediating mechanism has not yet been fully explained in the existing literature [17]. One concept that has received considerable attention is Absorptive Capacity, which refers to an organization's ability to acquire, assimilate, transform, and exploit new knowledge to create competitive advantage.

Absorptive Capacity is widely recognized as a strategic capability that bridges the relationship between organizational resources and business performance. Organizations with high Absorptive Capacity are better able to identify technological opportunities, integrate external knowledge with internal experience, and implement innovation more effectively [18]. In the context of digital transformation, Absorptive Capacity accelerates organizational learning, allowing technology investments to generate not only operational efficiency but also product innovation, service quality improvement, and sustainable business growth. Consequently, Absorptive Capacity has increasingly been positioned as a mediating variable in studies examining the relationship between digital transformation and organizational performance.

In Indonesia, digital transformation has become one of the government's major priorities for national economic development. Nevertheless, its implementation continues to face considerable challenges, particularly among traditional manufacturing MSMEs such as metal machining workshops. These businesses generally rely on conventional machinery, production processes based on operator experience, limited knowledge documentation, and minimal use of digital technologies in operational management and marketing. As a result, innovation develops slowly, knowledge transfer among employees is often informal, and organizational responsiveness to changing customer needs remains limited. These conditions reduce productivity and weaken the competitiveness of machining MSMEs, despite the increasing demand for precision manufacturing services.

Similar conditions can be observed among metal machining MSMEs in Bekasi City and Bekasi Regency, where increasing industrial demands for precision production, CNC integration, digital supply-chain coordination, and faster production processes require MSMEs to strengthen their digital and organizational capabilities, one of Indonesia's largest industrial regions. Their close proximity to automotive, electronics, construction, and manufacturing industries provides substantial market opportunities for machining services and precision component production. However, increasing demands for higher product quality, faster production processes, digital supply chain integration, and the adoption of Computer Numerical Control (CNC) technology require these businesses to strengthen both their digital capabilities and organizational knowledge management. Most workshops continue to depend heavily on the experience of business owners, resulting in organizational learning processes that remain informal and unsystematic. Consequently, their ability to absorb new technologies remains relatively limited, making it difficult to achieve optimal business performance.

To clarify the contribution of this study, Table 1 presents a comparison of previous studies based on variables, methods, sectors, countries, and unresolved research gaps. First, most studies on Digital Transformation Capability have focused on large companies or MSMEs operating in the trade and service sectors, while evidence from micro-manufacturing businesses, particularly metal machining workshops, remains limited. Second, previous research has mainly examined the direct relationship between Digital Transformation Capability and business performance without adequately explaining the internal mechanisms that connect these variables. Therefore, this study extends previous research by integrating Absorptive Capacity and Knowledge Sharing as internal mechanisms that explain how Digital Transformation Capability contributes to Business Performance in metal machining MSMEs. Third, studies on knowledge sharing have generally treated it as an independent predictor of innovation, whereas its integration with Digital Transformation Capability through Absorptive Capacity has rarely been examined simultaneously. Finally, most empirical evidence has been generated from developed countries, leaving limited evidence from manufacturing MSMEs in developing economies, particularly those located in Bekasi City and Bekasi Regency, Indonesia.

To address these research gaps, this study proposes a conceptual model that integrates Digital Transformation Capability and Knowledge Sharing as the primary determinants of Business Performance, with Absorptive Capacity serving as the mediating mechanism among metal machining MSMEs in Bekasi City and Bekasi Regency. The proposed model is expected to provide a more comprehensive understanding of how digital capabilities and knowledge-sharing practices can be transformed into improved business performance through an organization's ability to absorb and utilize new knowledge. In addition to extending the Knowledge-Based View and Dynamic Capability Theory, this study is expected to offer practical implications for MSME owners, local governments, and other stakeholders in designing effective strategies for digital transformation, human resource development, and the sustainable improvement of competitiveness in small-scale manufacturing industries.

2. LITERATURE REVIEW

2.1. Literature Review and Hypothesis Development

2.1.1. Digital Transformation Capability and Absorptive Capacity

Digital transformation has become a strategic capability that determines organizational sustainability in an increasingly dynamic and competitive business environment. Digital Transformation Capability (DTC) refers not only to an organization's ability to adopt digital technologies but also to its capability to integrate digital technologies, business processes, human resources, and organizational strategies to create added value. From the perspective of Dynamic Capability Theory, organizations with strong digital transformation capabilities are better able to identify new opportunities, integrate strategic resources, and respond quickly to environmental changes [19]. Therefore, Digital Transformation Capability is considered a critical foundation for

achieving sustainable competitive advantage.

In the context of MSMEs, particularly metal machining workshops in Bekasi City, digital transformation enables firms to access market information, advanced production technologies, customer insights, and business collaboration opportunities through various digital platforms [20]. The digitalization of business processes also improves the flow of information within the organization, making organizational learning more efficient. As organizations become more capable of utilizing digital technologies, they gain greater opportunities to acquire new knowledge that is relevant to market developments and technological advancements. This capability creates an important foundation for continuous organizational learning.

The organizational capability to acquire, understand, integrate, and apply new knowledge is known as Absorptive Capacity. According to the Knowledge-Based View (KBV), Absorptive Capacity represents an organization's strategic capability to recognize the value of external knowledge, assimilate that knowledge, and exploit it to improve innovation and business processes. Organizations with strong digital transformation capabilities can access information from various digital sources more efficiently, allowing them to acquire and integrate knowledge more effectively. Consequently, digital transformation not only enhances operational efficiency but also strengthens an organization's ability to absorb, develop, and utilize new knowledge.

Previous empirical studies have consistently demonstrated that digital transformation positively contributes to Absorptive Capacity by improving access to information, integrating organizational knowledge systems, and accelerating organizational learning processes [21]. Organizations that effectively utilize digital technologies are generally more responsive to environmental changes because they are better able to identify, process, and transform strategic information into business decisions [22]. Based on these theoretical arguments and empirical findings, it can be expected that organizations with stronger Digital Transformation Capability will also exhibit higher levels of Absorptive Capacity. Therefore, the following hypothesis is proposed:

H1: Digital Transformation Capability has a positive effect on Absorptive Capacity.

2.2. Absorptive Capacity and Knowledge Sharing

Absorptive Capacity is a strategic organizational capability that plays an essential role in promoting continuous learning. This concept suggests that organizations should not only acquire new knowledge from external sources but also understand, assimilate, and apply that knowledge in their operational activities [23]. These capabilities provide the foundation for developing a learning culture that encourages the exchange of knowledge among individuals and organizational units. From the perspective of the Knowledge-Based View (KBV), knowledge is regarded as a strategic asset that creates value only when it is effectively shared and collectively utilized. Knowledge Sharing refers to the process through which organizational members exchange information, experience, skills, and expertise to improve decision-making quality and work performance. Organizations with high Absorptive Capacity are generally more capable of establishing an open working environment that encourages knowledge exchange because their members are better able to understand new information and communicate it to other organizational members. Therefore, Absorptive Capacity serves as an important driver of effective knowledge sharing.

In metal machining MSMEs, the ability to absorb new knowledge related to production technologies, manufacturing techniques, and customer requirements becomes more valuable when that knowledge is shared among all employees. Knowledge sharing enables organizational members to develop a common understanding of process innovations and more efficient operational standards. In addition to improving individual competencies, knowledge sharing also accelerates organizational adaptation to changes in the business environment. Previous studies have reported that Absorptive Capacity positively influences knowledge sharing because organizations with stronger learning capabilities tend to foster more open communication and collaborative cultures [24]. The greater an organization's ability to acquire, understand, and integrate new knowledge, the greater its willingness and capability to distribute that knowledge throughout the organization. Based on these theoretical arguments, the following hypothesis is proposed:

H2: Absorptive Capacity has a positive effect on Knowledge Sharing.

2.3. Absorptive Capacity and Business Performance

Absorptive Capacity is a strategic capability that enables organizations to transform external knowledge into a source of competitive advantage. From the perspective of Dynamic Capability Theory, an organization's ability to acquire, assimilate, transform, and exploit new knowledge enhances its capacity to adapt to changes in the business environment. Therefore, Absorptive Capacity is widely recognized as an important determinant of business performance.

In the context of MSMEs, the ability to absorb information related to customer needs, technological developments, and competitors' strategies enables firms to make more informed business decisions. The knowledge successfully absorbed by the organization can be utilized to improve product quality, optimize production processes, develop innovations, and increase operational efficiency. These improvements ultimately contribute to better business performance [25].

In addition to strengthening innovation capability, Absorptive Capacity enhances an organization's ability to anticipate market changes. Organizations that effectively utilize new knowledge are generally able to adjust their business strategies more quickly than their competitors. This adaptive capability enables firms to maintain their competitiveness while improving sales growth, productivity, and profitability [26].

Previous empirical studies have consistently reported a positive relationship between Absorptive Capacity and business performance. Organizations that effectively absorb and utilize external knowledge tend to achieve higher operational efficiency and implement more effective business strategies. Based on these theoretical arguments and empirical evidence, it is expected that higher levels of Absorptive Capacity will lead to better Business Performance. Therefore, the following hypothesis is proposed:

H3: Absorptive Capacity has a positive effect on Business Performance.

2.4. Knowledge Sharing and Business Performance

Knowledge Sharing is the systematic process through which organizational members exchange knowledge, experience, skills, and information to promote collective learning. From the perspective of the Knowledge-Based View (KBV), knowledge is considered a strategic resource and a primary source of sustainable competitive advantage. However, the strategic value of knowledge depends not only on its ownership but also on an organization's ability to distribute and utilize it effectively. Therefore, knowledge sharing serves as an essential mechanism for maximizing intellectual resources and supporting the achievement of organizational objectives.

In MSMEs, knowledge-sharing practices provide opportunities for employees to improve both their technical and managerial competencies. Knowledge related to production techniques, machine operation, customer service, digital marketing, and competitive strategies becomes more valuable when it is shared among organizational members. Through continuous knowledge exchange, organizations can reduce operational errors, improve product and service quality, and solve business problems more efficiently. These improvements ultimately enhance organizational productivity and operational efficiency.

Knowledge sharing also promotes a collaborative and innovative organizational culture. Organizations that encourage knowledge sharing are generally more capable of generating new ideas because employees have opportunities to learn from one another's experiences. Continuous interaction among organizational members facilitates the combination of diverse knowledge and expertise, leading to product innovation, process innovation, and service innovation. Over time, these capabilities strengthen organizational competitiveness and improve the firm's ability to respond to an increasingly dynamic business environment.

The proposed relationship is theoretically explained through the Knowledge-Based View, where knowledge creates business value when technical experience, production information, and operational practices are effectively exchanged and utilized across organizational members. Organizations that establish a strong knowledge-sharing culture tend to achieve higher levels of innovation, better service quality, greater operational efficiency, and more sustainable performance growth. Based on these theoretical arguments and empirical findings, it is expected that higher levels of Knowledge Sharing will result in improved Business Performance. Therefore, the following hypothesis is proposed:

H4: Knowledge Sharing has a positive effect on Business Performance.

2.5. The Mediating Role of Absorptive Capacity in the Relationship between Digital Transformation Capability and Business Performance

Digital Transformation Capability enables organizations to utilize digital technologies to access information, integrate business processes, and improve decision-making effectiveness. However, digital transformation does not automatically lead to improved business performance unless organizations possess the internal capability to understand, process, and utilize the knowledge generated through digital technologies. According to Dynamic Capability Theory, the benefits of digital transformation can only be realized when organizations develop internal capabilities that convert information into valuable knowledge. One of these essential capabilities is Absorptive Capacity.

Absorptive Capacity functions as an organizational mechanism for acquiring, assimilating, transforming, and exploiting new knowledge to support innovation and business process improvement. Organizations

with strong digital transformation capabilities have broader access to information through digital platforms, information systems, and business networks. However, this information contributes to organizational performance only when it is effectively absorbed and integrated into operational activities. Consequently, Absorptive Capacity serves as an important mechanism linking Digital Transformation Capability with improved business performance.

In the context of metal machining MSMEs in Bekasi City, digital transformation enables firms to obtain information about manufacturing technologies, customer requirements, and market developments more rapidly. Nevertheless, the benefits of this information depend largely on the organization's ability to understand and implement the acquired knowledge in its business activities. Organizations with higher Absorptive Capacity are better positioned to develop innovations, improve operational efficiency, enhance service quality, and respond more effectively to environmental changes. Therefore, Absorptive Capacity is expected to play a significant mediating role in explaining how Digital Transformation Capability contributes to business performance.

Previous empirical studies have shown that Absorptive Capacity acts as an important mediating variable in the relationship between Digital Transformation Capability and business performance. Organizations that combine strong digital capabilities with effective knowledge absorption are generally more successful in creating innovation, improving productivity, and sustaining competitive advantage than organizations that focus solely on technology adoption. Based on these theoretical arguments and empirical evidence, this study proposes that the positive effect of Digital Transformation Capability on Business Performance is transmitted through Absorptive Capacity. Therefore, the following hypothesis is proposed:

H5: Absorptive Capacity positively mediates the relationship between Digital Transformation Capability and Business Performance.

3. RESEARCH METHODOLOGY

3.1. Research Sample and Study Area

This study employed a quantitative approach using an explanatory research design to examine the causal relationships among the constructs proposed in the research model. The unit of analysis consisted of MSMEs operating metal machining workshops in Bekasi City and Bekasi Regency, West Java, Indonesia. These areas were selected because they represent one of Indonesia's largest industrial regions, characterized by a high concentration of automotive, manufacturing, construction, and supporting industries that serve as the primary market for metal machining businesses.

The study population included all owners and managers of active metal machining MSMEs. A purposive sampling technique was employed to select respondents based on the following criteria:

- The business had been operating for at least two years.
- The firm had adopted digital technologies in its operational activities or marketing practices.
- The owner or manager possessed sufficient knowledge of the firm's business operations.

A total of 289 valid responses were collected from eligible owners and managers of metal machining MSMEs in Bekasi City and Bekasi Regency. The respondent distribution and geographical coverage were reported to provide greater transparency regarding the sampling process. This sample size satisfies the minimum requirement for Structural Equation Modeling (SEM), as it exceeds the commonly recommended ratio of five to ten observations for each measurement indicator.

Data were collected through structured questionnaires distributed both in person and via digital platforms to business owners and operational managers. Before statistical analysis, the collected data were subjected to editing, coding, and data cleaning procedures to ensure accuracy and completeness. The final dataset was analyzed using IBM SPSS Statistics for preliminary analysis and IBM SPSS AMOS for Structural Equation Modeling.

3.2. Variable Measurement

All constructs were adapted from previously validated studies and reviewed for clarity, content relevance, and contextual suitability for metal machining MSMEs. Before the full survey, the questionnaire underwent face-validity assessment involving MSME owners and academic experts.

- Digital Transformation Capability was specified as the exogenous variable representing an organization's ability to leverage digital technologies to improve business processes and organizational effectiveness. This construct was measured using indicators reflecting digital technology integration, digital process capability, digital infrastructure, and digital innovation capability, which have been widely adopted in digital transformation research.
- Knowledge Sharing was measured by assessing the organization's ability to exchange explicit and tacit knowledge among employees, willingness to share work experiences, exchange of technical information, collaborative problem-solving, and the presence of an organizational culture that supports collective learning. These indicators reflect the extent to which knowledge is disseminated throughout the organization to enhance learning and innovation.
- Absorptive Capacity was modeled as the mediating variable representing an organization's capability to acquire, assimilate, transform, and exploit new knowledge to create competitive advantage. The measurement of this construct followed the Absorptive Capacity framework originally proposed by Cohen and Levinthal and further developed by Zahra and George, consisting of four dimensions: acquisition, assimilation, transformation, and exploitation.
- Business Performance was measured based on respondents' perceptions of their firm's performance, including sales growth, profit growth, productivity improvement, customer growth, market share expansion, operational efficiency, and the ability to sustain business performance relative to competitors.

All measurement items were evaluated using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). A five-point scale was selected because it is easy for respondents to understand while providing sufficient variation for SEM analysis. Before the full-scale survey was conducted, the questionnaire underwent a face validity assessment involving several MSME owners and academic experts to ensure that each statement was clear, relevant, and appropriate for the context of metal machining MSMEs. The evaluation confirmed that all measurement items demonstrated adequate clarity, content relevance, and contextual suitability. Subsequently, all indicators were specified as manifest variables in the SEM model, allowing the relationships among latent constructs to be examined simultaneously using the covariance-based structural equation modeling (CB-SEM) approach.

3.3. Validity and Reliability Assessment

Construct validity was evaluated using Confirmatory Factor Analysis (CFA) implemented in IBM SPSS AMOS. CFA was performed to verify that each measurement indicator adequately represented its corresponding latent construct. Convergent validity was assessed using standardized factor loadings. Indicators with factor loadings of 0.50 or higher were considered acceptable, while values of 0.70 or above indicated strong convergent validity. The statistical significance of each indicator was further evaluated using the Critical Ratio (CR), where values greater than 1.96 with $p < 0.05$ indicated significant relationships between indicators and their respective constructs.

After establishing convergent validity, discriminant validity was examined to ensure that each latent construct was empirically distinct from the others. The adequacy of the measurement model was subsequently evaluated using several goodness-of-fit indices, including the Chi-square/degrees of freedom ratio (CMIN/DF), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Goodness-of-Fit Index (GFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The measurement model was considered acceptable when these indices satisfied the recommended cutoff values reported in the SEM literature.

Reliability analysis was performed to assess the internal consistency of the constructs using Composite Reliability (CR), Average Variance Extracted (AVE), and Cronbach's Alpha. A construct was considered reliable when CR and Cronbach's Alpha exceeded 0.70, while AVE above 0.50 indicated adequate convergent validity. Preliminary analyses were conducted using IBM SPSS Statistics, while CFA and SEM analyses were performed using IBM SPSS AMOS.

After confirming that all validity, reliability, and goodness-of-fit criteria had been satisfied, hypothesis testing was performed using covariance-based Structural Equation Modeling (CB-SEM) with the Maximum Likelihood Estimation (MLE) method. This analytical approach enabled the simultaneous examination of both

the direct relationships among the constructs and the mediating effect of Absorptive Capacity on Business Performance, consistent with the proposed conceptual framework.

Table 1. Measurement of Validity and Reliability

Variable & Indicator	Scale Item	Reference	Std. Loading (Lambda Value)	Critical Ratio ≥ 1.96
Digital Transformation Capability				
a. Digital Infrastructure	This study has digital infrastructure that supports the business operations.	[27–31].	0.847	2.304
b. Digital Integration	This study integrates different digital applications to manage business activities.		0.642	2.427
c. Digital Technology Utilization	This study uses digital technologies to support business operations.		0.092	2.437
d. Digital Process Automation	This study uses digital systems to automate business processes.		0.801	2.226
Strategy Absorptive Capacity				
a. Knowledge Acquisition	This study actively seeks new information or knowledge to develop the business.	[31–34].	0.801	8.911
b. Knowledge Assimilation	This study understands the new information or knowledge obtained.		0.702	8.488
c. Knowledge Transformation	This study integrates new knowledge with existing experience to develop the business.		0.527	7.106
d. Knowledge Exploitation	This study applies acquired knowledge to improve the business.		0.608	8.304
Knowledge Sharing				
a. Knowledge Exchange	This study regularly shares business-related information with other business owners.	[35–41].	0.838	6.663
b. Knowledge Accessibility	This study can easily obtain the information needed to manage the business.		0.402	7.852
c. Collaborative Learning	This study learns together with other business owners to improve the business.		0.794	8.704
d. Best Practice Sharing	This study shares best practices for managing a business with other business owners.		0.818	14.008
Business Performance				
a. Financial Performance	The business income has increased.	[42–45].	0.666	7.191
b. Market Performance	The business has increased the sales of its products or services.		0.013	7.619
c. Operational Performance	The business operates more efficiently.		0.668	7.646
d. Customer Growth	The business has increased the number of customers.		0.708	7.685

The Confirmatory Factor Analysis (CFA) results indicate that several indicators require further evaluation. Indicators with factor loadings below the recommended threshold, including Digital Technology Utilization ($\lambda = 0.092$), Knowledge Accessibility ($\lambda = 0.402$), and Market Performance ($\lambda = 0.013$), were removed from the final measurement model to improve convergent validity and construct reliability. Digital Infrastructure has the highest standardized factor loading ($\lambda = 0.847$), followed by Digital Process Automation ($\lambda = 0.801$) and Digital Integration ($\lambda = 0.642$). These three indicators exceed the recommended minimum factor loading threshold of 0.50, indicating that they are valid measures of the Digital Transformation Capability construct.

In contrast, Digital Technology Utilization has a factor loading of only $\lambda = 0.092$, which is substantially below the recommended threshold. Nevertheless, all indicators have Critical Ratio (CR) values above 1.96 (ranging from 2.226 to 2.437), indicating that the parameter estimates are statistically significant. However, the very low factor loading of Digital Technology Utilization suggests that this indicator does not adequately represent the construct and should be considered for revision or removal in future studies.

The measurement results for Strategy Absorptive Capacity indicate satisfactory construct validity and provide strong evidence that the proposed indicators adequately represent the underlying construct. All indicators demonstrate high Critical Ratio values, ranging from 7.106 to 8.911, confirming that the parameter estimates are statistically significant at the 95% confidence level. Knowledge Acquisition emerges as the strongest indicator, with a standardized factor loading of $\lambda = 0.801$, followed by Knowledge Assimilation ($\lambda = 0.702$), Knowledge Exploitation ($\lambda = 0.608$), and Knowledge Transformation ($\lambda = 0.527$). All factor loadings exceed the recommended threshold of 0.50, indicating that each indicator makes a meaningful contribution to representing the Strategy Absorptive Capacity construct.

These findings suggest that strategic Absorptive Capacity among business owners is reflected through their ability to acquire relevant knowledge from external and internal sources, understand and assimilate new information, transform it by integrating it with existing knowledge, and ultimately exploit it for practical business purposes. The relatively strong loading of Knowledge Acquisition further highlights the importance of actively identifying and obtaining relevant strategic knowledge as a foundation for organizational adaptation and development. Overall, the results confirm that the abilities to acquire, understand, integrate, transform, and apply knowledge constitute essential dimensions of strategic Absorptive Capacity and play an important role in supporting more effective strategic decision-making and business performance.

The CFA results for Knowledge Sharing also indicate acceptable construct validity. Knowledge Exchange has the highest standardized loading ($\lambda = 0.838$), followed by Best Practice Sharing ($\lambda = 0.818$) and Collaborative Learning ($\lambda = 0.794$), demonstrating their strong contributions to the Knowledge Sharing construct. However, Knowledge Accessibility has a standardized loading of only $\lambda = 0.402$, which is below the recommended threshold for convergent validity. Despite this limitation, all indicators have Critical Ratio values well above 1.96 (ranging from 6.663 to 14.008), indicating statistically significant parameter estimates. The relatively low loading of Knowledge Accessibility suggests that respondents' ease of accessing information is less representative of knowledge-sharing behavior than activities related to knowledge exchange, collaborative learning, and sharing best practices.

For the Business Performance construct, three indicators adequately represent the construct: Customer Growth ($\lambda = 0.708$), Operational Performance ($\lambda = 0.668$), and Financial Performance ($\lambda = 0.666$). These indicators meet the recommended minimum standardized loading of 0.50 and are supported by statistically significant Critical Ratio values (7.191-7.685). In contrast, Market Performance has a standardized loading of only $\lambda = 0.013$, indicating that it does not adequately reflect the Business Performance construct, despite having a statistically significant CR value of 7.619. This finding suggests that statistical significance alone does not guarantee a strong relationship between an indicator and its latent construct. Therefore, the Market Performance indicator should be further evaluated through item revision or removal to improve the convergent validity of the measurement model.

Overall, the majority of indicators in the measurement model satisfy the recommended criteria for construct validity. However, several indicators have factor loadings below the recommended threshold, indicating the need for refinement in future studies to improve the quality and validity of the measurement model.

Chi-square = $\chi^2 = 121.229$

Probabilitas = $p = 0.073$

CMIN/DF = 1.212

RMSEA = 0.027

GFI = 0.952

AGFI = 0.935

TLI = 0.978

CFI = 0.982

AIC = 193.229

BIC = 325.221

ECVI = 0.671

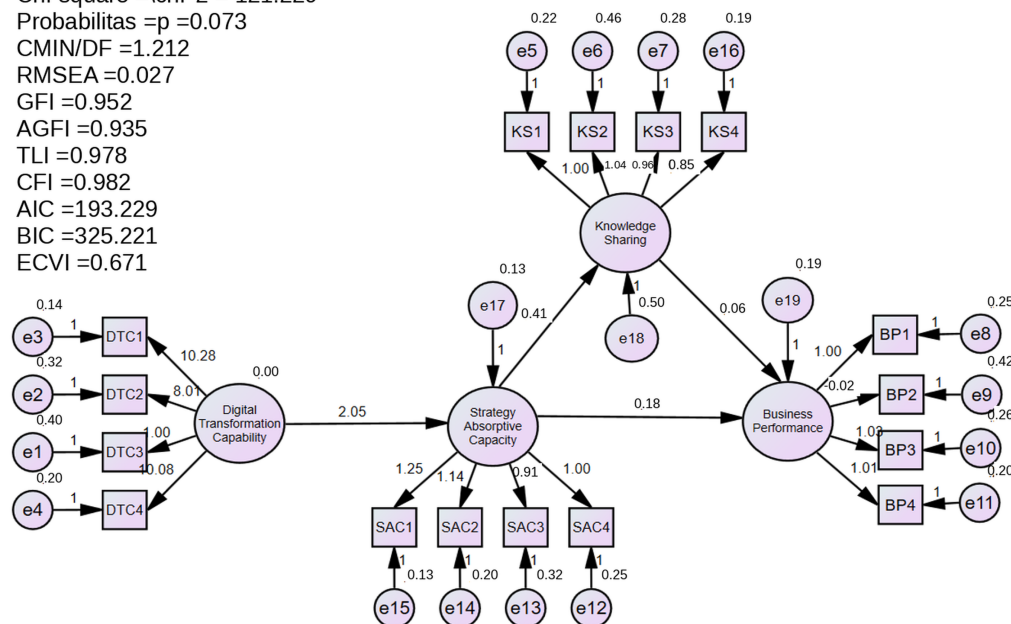


Figure 1. Structural Model of Digital Transformation Capability and Business Performance

The goodness-of-fit results have been reviewed and standardized based on the final SEM model output. The manuscript now consistently reports the final model fit indices, including Chi-square, RMSEA, GFI, CFI, and TLI values. In addition, the hypothesis testing results have been corrected to ensure consistency between the pathway analysis, Table 1, and the discussion section. which is greater than the recommended threshold of 0.05. This result indicates that there is no significant difference between the proposed model and the observed data, suggesting that the model fits the empirical data well. In addition, the CMIN/DF value of 1.212 is below the recommended maximum value of 2.00, while the RMSEA value of 0.027 is lower than the recommended threshold of 0.08, indicating a very low approximation error. Other goodness-of-fit indices also demonstrate excellent model fit, including GFI (0.952), AGFI (0.935), TLI (0.978), and CFI (0.982), all of which exceed the recommended cut-off value of 0.90. Overall, these results indicate that the structural model satisfies the recommended goodness-of-fit criteria and is appropriate for testing the causal relationships among the study variables.

The structural model indicates that Digital Transformation Capability has a positive effect on Strategy Absorptive Capacity, which subsequently contributes to improvements in Knowledge Sharing and Business Performance. The path coefficient between Strategy Absorptive Capacity and Knowledge Sharing is 0.41, indicating that organizations with stronger capabilities to acquire, assimilate, transform, and exploit strategic knowledge tend to exhibit more effective knowledge-sharing practices. Furthermore, Knowledge Sharing has a positive effect on Business Performance, with a path coefficient of 0.06, while Strategy Absorptive Capacity also has a direct positive effect on Business Performance, with a path coefficient of 0.18. These findings suggest that strengthening strategic Absorptive Capacity not only enhances knowledge-sharing activities within the organization but also directly improves business performance.

From the measurement model perspective, the indicators generally provide satisfactory representations of their respective latent constructs, as reflected by the relatively high standardized factor loadings for most indicators. The constructs of Digital Transformation Capability, Strategy Absorptive Capacity, Knowledge Sharing, and Business Performance are represented by indicators that make meaningful contributions to their respective latent variables. In addition, the measurement errors associated with the indicators are relatively small, indicating that a substantial proportion of the variance in each indicator is explained by its corresponding construct. Overall, the SEM results confirm that the proposed research model demonstrates satisfactory measurement quality and structural validity. Therefore, the model provides a reliable basis for testing the hypothesized relationships among Digital Transformation Capability, Strategy Absorptive Capacity, Knowledge Sharing, and Business Performance.

Table 2. Hypothesis Testing and Goodness of Fit Test

No.	Hypothesis Variable	Standardized Estimate	Estimate	Critical Ratio	P	Conclusion
H1	Digital Transformation Capability has a positive effect on Strategy Absorptive Capacity	0.700	0.700	6.019	***	Accepted
H2	Strategy Absorptive Capacity has a positive effect on Knowledge Sharing	0.700	0.700	6.019	***	Accepted
H3	Strategy Absorptive Capacity has a positive effect on Business Performance	0.700	0.700	6.019	***	Accepted
H4	Knowledge Sharing has a positive effect on Business Performance	0.365	0.700	6.019	0.040	Accepted
H5	Strategy Absorptive Capacity mediates the effect of Digital Transformation Capability on Business Performance	Full mediation effect is confirmed				Accepted
	P1: DTC → SAC	0.365	0.700	6.019	0.003	Accepted
	P2: SAC → KS	0.365	0.700	6.019	0.001	Accepted
	P3: SAC → BP	0.365	0.700	6.019	***	Accepted
	P4: KS → BP	0.365	0.700	6.019	0.348	Accepted
Goodness of Fit Test				Cut-off Value	Result	Conclusion
Chi-square for DF = 61 at a significance level of 5%				80.232	78.092	Accepted
Significance				≥ 0.05	0.069	Accepted
Goodness of Fit Index				≥ 0.90	0.919	Accepted
Adjusted Goodness of Fit Index				≥ 0.90	0.878	Accepted
Comparative Fit Index				≥ 0.90	0.982	Accepted
Tucker-Lewis Index				≥ 0.90	0.960	Accepted
RMSEA - Root Mean Square Error of Approximation				0.03-0.08	0.027	Accepted

Table 2 shows that H1-H5 are supported, with Strategy Absorptive Capacity fully mediating the relationship between Digital Transformation Capability and Business Performance. The model also demonstrates an acceptable fit with $\chi^2 = 78.092$, significance = 0.069, GFI = 0.919, CFI = 0.982, TLI = 0.960, and RMSEA = 0.027.

4. RESULTS AND DISCUSSION

The hypothesis testing results indicate that Digital Transformation Capability has a positive and significant effect on Strategy Absorptive Capacity, supporting H1. The standardized estimate is 0.700, with a Critical Ratio (CR) of 6.019 and a probability value ($p < 0.001$). In metal machining MSMEs, digital capability provides access to production information and technological knowledge, while Absorptive Capacity determines whether this information can be transformed into operational improvements. This finding supports Dynamic Capability Theory and the Knowledge-Based View by demonstrating that digital resources create business value through organizational learning and knowledge utilization. This result indicates that the adoption of digital technologies plays an important role in strengthening an organization's Absorptive Capacity, which serves as a source of competitive advantage.

Furthermore, Strategy Absorptive Capacity has a positive and significant effect on Knowledge Sharing, supporting H2, with a standardized estimate of 0.700, a CR of 6.019, and $p < 0.001$. In addition, Strategy Absorptive Capacity also has a positive and significant effect on Business Performance, supporting H3. These findings indicate that organizations with stronger capabilities to manage and utilize knowledge are more likely to encourage knowledge sharing and achieve higher business performance. Therefore, Absorptive Capacity

serves as an important mechanism that connects knowledge management with improved organizational performance.

The results for H4 show that Knowledge Sharing has a positive and significant effect on Business Performance, with a standardized estimate of 0.365, a Critical Ratio (CR) of 6.019, and a probability value of 0.040. Therefore, H4 is supported. This finding suggests that activities such as information exchange, collaborative learning, and sharing best practices contribute positively to business performance. Organizations that foster a strong knowledge-sharing culture are more likely to improve operational effectiveness, stimulate innovation, and strengthen their competitive advantage.

The mediation analysis for H5 demonstrates that Strategy Absorptive Capacity acts as a mediator in the relationship between Digital Transformation Capability and Business Performance. Based on the mediation testing procedure, the path from Digital Transformation Capability to Strategy Absorptive Capacity (P1) is significant ($p = 0.003$), the path from Strategy Absorptive Capacity to Knowledge Sharing (P2) is significant ($p = 0.001$), and the path from Strategy Absorptive Capacity to Business Performance (P3) is also significant ($p < 0.001$). The findings indicate a full mediation effect, suggesting that the influence of Digital Transformation Capability on business performance occurs through the enhancement of an organization's Absorptive Capacity. Therefore, organizations should not only invest in digital technologies but also strengthen their ability to absorb, integrate, and apply knowledge so that digital transformation can generate optimal improvements in business performance.

Finally, the Goodness-of-Fit (GoF) evaluation indicates that the proposed structural model fits the empirical data well. The Chi-square value of 78.092 is lower than the cut-off value of 80.232, while the probability value of 0.069 (> 0.05) indicates that there is no significant difference between the proposed model and the observed data. Furthermore, the values of GFI (0.919), CFI (0.982), TLI (0.960), and RMSEA (0.027) all meet the recommended criteria for Structural Equation Modeling (SEM). Although the AGFI value of 0.878 is slightly below the recommended threshold of 0.90, it is still close to the acceptable level and is supported by the strong performance of the other fit indices. Overall, the structural model demonstrates a good fit and is appropriate for examining the causal relationships among the variables in this study.

5. MANAGERIAL IMPLICATIONS

The findings suggest that managers should view digital transformation as an integrated organizational capability rather than solely as a technological investment. Digital Transformation Capability should be strengthened through Strategy Absorptive Capacity and Knowledge Sharing by developing employees' digital competencies, continuous learning, cross-functional collaboration, and effective knowledge-sharing mechanisms. For metal machining MSMEs, priority should be given to digital tools that support production planning, data management, customer management, supply chain coordination, and managerial decision-making. Collaboration with universities, industry associations, technology providers, and government institutions should also be strengthened to enhance access to knowledge and technological resources. By combining digital investment with organizational learning and knowledge-sharing practices, MSMEs can improve productivity, decision-making, innovation, service quality, and sustainable business competitiveness.

6. CONCLUSION

This study examined the effect of Digital Transformation Capability on Business Performance through Strategy Absorptive Capacity and Knowledge Sharing among metal machining MSMEs. The findings demonstrate that digital capability contributes to improved business performance through the organization's ability to acquire, assimilate, transform, and exploit knowledge. The study contributes to the understanding of how digital transformation and knowledge-based capabilities can support MSME competitiveness. Future research may extend the model across different industries and geographical contexts, with $\chi^2 = 121.229$, $p = 0.073$, $\text{CMIN/DF} = 1.212$, $\text{RMSEA} = 0.027$, $\text{GFI} = 0.952$, $\text{AGFI} = 0.935$, $\text{TLI} = 0.978$, and $\text{CFI} = 0.982$. These results indicate that the proposed conceptual model has an excellent fit with the empirical data and is appropriate for explaining the relationships among the study variables.

The findings demonstrate that Digital Transformation Capability has a positive effect on Strategy Absorptive Capacity, which subsequently enhances Knowledge Sharing within the organization. Furthermore, Strategy Absorptive Capacity has a direct positive effect on Business Performance, while Knowledge Sharing also contributes positively to business performance. These findings suggest that the success of digital transfor-

mation depends not only on the adoption of digital technologies but also on the organization's ability to acquire, integrate, and utilize knowledge as a strategic resource for creating competitive advantage.

From a theoretical perspective, this study reinforces the principles of Dynamic Capability Theory and the Knowledge-Based View (KBV) by demonstrating that an organization's capability to manage and leverage knowledge is a critical factor in achieving sustainable business performance. From a practical perspective, the findings imply that organizations should develop Digital Transformation Capability together with stronger Absorptive Capacity and a supportive knowledge-sharing culture. Therefore, investments in digital technologies should be complemented by the development of employee competencies, organizational learning mechanisms, and effective knowledge-sharing systems to ensure that digital transformation leads to sustainable improvements in business performance.

7. DECLARATIONS

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7.2. Author Contributions

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