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Digital Transformation and Market Orientation: Mediating Roles of Organizational Learning and Agility in Organizational Performance

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Abstract. This study investigates the impact of digital transformation and market orientation on organizational performance, focusing on the mediating roles of organizational learning and agility within the dynamic context of foreign trade enterprises in Dongguan, China. Leveraging structural equation modeling (SEM) with data from 569 enterprises, the research establishes that digital transformation and market orientation significantly enhance organizational performance directly and indirectly. Organizational learning enables firms to integrate and apply knowledge effectively, while agility allows for rapid adaptation to environmental changes. Both mediators amplify the positive effects of digital strategies and market alignment. The findings emphasize the interplay between digital transformation and market orientation in fostering dynamic capabilities, aligning with previous literature on strategic management and organizational learning. By embedding a culture of continuous learning and promoting agile practices, organizations can enhance their adaptability and competitiveness in volatile environments. The study further provides actionable insights for enterprises to leverage digital tools and market intelligence to optimize operations, foster innovation, and improve customer satisfaction. Policy implications include encouraging investments in digital infrastructure, workforce development, and regulatory frameworks to support digital adoption and market-driven strategies. Additionally, this research highlights the need for longitudinal studies to explore the evolving dynamics of these relationships over time and across diverse industries. Overall, this study contributes to theoretical and practical understanding, offering a comprehensive framework for leveraging digital transformation and market orientation to achieve sustained organizational success in the digital era.

Keywords: Digital transformation, Foreign trade enterprise, Market orientation, Organizational learning, Organizational agility, Organizational performance.

1. INTRODUCTION

The global economy is undergoing a profound transformation, driven by the rapid advancement of digital technologies and the ever-increasing importance of market orientation in achieving competitive advantages. These changes demand that organizations not only adopt digital strategies but also align closely with market dynamics to remain resilient and competitive in a volatile international trade environment. Digital transformation, characterized by the integration of advanced technologies into all aspects of business operations, has emerged as a critical pathway for enhancing efficiency, adaptability, and innovation. Simultaneously, market orientation, emphasizing a deep understanding of and responsiveness to customer needs and market conditions, has proven essential for organizations navigating the complexities of global competition (Sheng et al., 2022). Together, these forces create a pivotal intersection of strategic priorities for organizational performance, offering both theoretical and practical significance (Guo & Xu, 2021).

Theoretically, understanding how digital transformation and market orientation impact organizational performance bridges critical knowledge gaps in strategic management, organizational learning, and dynamic capability theories. Digital transformation is increasingly recognized as a driver of operational efficiency, cost optimization, and enhanced internal learning capabilities, all of which are crucial for fostering innovation and agility (Liu et al., 2024; Sri et al., 2024; Wang et al., 2024). For example, the implementation of digital technologies can lead to a more flexible and collaborative organizational structure, which enhances decision-making and innovation (Li et al., 2024). Moreover, research has highlighted the role of digital transformation in enabling organizations to respond effectively to market shifts, thereby fostering resilience and long-term sustainability (Sheng et al., 2022). Meanwhile, market orientation emphasizes responsiveness to external environments, improving adaptability, innovation, and customer satisfaction (Wang et al., 2024). This alignment with market needs fosters competitive agility, ensuring organizations can remain relevant and resilient in the face of rapid changes (Liu et al., 2024 Wang et al., 2024).

The intersection of digital transformation and market orientation underscores the importance of an integrated framework that elucidates the mediating roles of organizational learning and agility in enhancing performance. By fostering a learning-oriented culture, organizations can capitalize on the synergies between digital capabilities and market responsiveness (Liu et al., 2024; Wang et al., 2024). Research has shown that organizations that develop digital leadership and enhance employees' digital skills achieve better performance outcomes, as digital competence is a critical resource in turbulent markets. Theoretical discourse has increasingly highlighted these interactions, suggesting that the interplay of digital transformation and market orientation could redefine adaptive and competitive capabilities in the digital era (Hanelt et al., 2020).

Practically, the findings of this study offer actionable insights for organizations navigating the challenges of digital adoption and market responsiveness. For enterprises, particularly in dynamic industries such as international trade, cultivating a learning-oriented culture and enhancing organizational agility can lead to sustainable competitive advantages (Mulyana et al, 2024). Digital transformation enables enterprises to harness

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technological innovations to optimize operations, while market orientation enhances their ability to adapt to market fluctuations and customer needs (Masoud & Basahel, 2023). Studies have also demonstrated the potential of digital strategies to increase customer satisfaction and foster employee productivity, both of which are critical for achieving operational excellence (Deep, 2023).

Organizations that integrate digital transformation with market orientation can achieve dual benefits: immediate operational improvements and long-term resilience. For example, enterprises adopting digital strategies have reported enhanced customer satisfaction, improved decision-making capabilities, and the ability to anticipate market trends. These findings emphasize the need for organizations to invest not only in advanced technologies but also in leadership and employee development to sustain performance gains (Schönherr & Eller, 2023).

By investigating 826 foreign trade enterprises in Dongguan, this study provides empirical evidence and strategic recommendations for leveraging digital transformation and market orientation to improve organizational performance. The results not only affirm the theoretical frameworks connecting these strategies but also offer practical guidelines for enterprises aiming to navigate the complexities of digital transformation while maintaining market alignment. These findings are especially valuable for both scholars and practitioners seeking to enhance the mechanisms through which these critical factors contribute to organizational success in the digital age.

1.1. Theoretical Foundations and Hypothesis Development

The theoretical foundation of this study combines strategic management theory, organizational learning theory, and dynamic capability theory to explore the relationships between digital transformation, market orientation, and organizational performance. By examining these constructs through the mediating roles of organizational learning and organizational agility, the study provides a nuanced understanding of how organizations adapt and thrive in dynamic environments. This section reviews each theoretical perspective, linking them to the study's hypotheses.

Strategic management theory has evolved to address the changing dynamics of organizational strategy, from early models focused on external factors to modern frameworks emphasizing internal resources and capabilities. Early works highlighted the importance of aligning organizational structure with environmental conditions. The resource-based view (RBV) shifted this focus to internal competencies, proposing that unique, valuable, and inimitable resources are critical for achieving sustained competitive advantage.

In recent decades, the advent of digital transformation has fundamentally altered the strategic landscape. Digital transformation is no longer a peripheral concern but a central strategic imperative that enables firms to realign resources, innovate processes, and respond to market demands effectively (Vial, 2019; Sorescu, 2021). Studies show that digital transformation enhances operational efficiency, drives innovation, and provides firms with the flexibility to adapt to changing environments (Bresciani et al., 2021; Matarazzo et al., 2021).

Market orientation complements digital transformation by providing the external focus necessary to align internal capabilities with market demands. Rooted in customer-centric principles, market orientation emphasizes understanding customer needs, monitoring competitor actions, and responding to market trends (Narver & Slater, 1990; Kohli & Jaworski, 1990). When integrated with digital transformation, market orientation ensures that technological advancements are market-driven, improving customer satisfaction and competitive positioning (Kumar et al., 2022).

Given this synergy, we hypothesize:

H_1: Digital transformation has an impact on organizational performance.

H_2: Market orientation has an impact on organizational performance.

Organizational learning theory offers a vital framework for understanding how organizations adapt, innovate, and thrive in dynamic environments by acquiring and applying knowledge. Over the years, it has emerged as a cornerstone for analyzing how firms respond to changing conditions, foster innovation, and sustain competitiveness. Recent developments have emphasized the increasing importance of organizational learning in navigating the complexities of digital transformation and rapidly evolving market demands.

Organizational learning theory has seen significant growth in its scope and relevance, with contemporary research focusing on its role in enabling firms to process information, address environmental uncertainties, and align strategies with evolving realities. Organizations that prioritize learning have been shown to achieve greater adaptability, operational efficiency, and innovation outcomes (Berndt & Gomes, 2023). In the current era, characterized by unprecedented technological advancements, organizational learning is no longer an optional capability but a strategic necessity.

Digital transformation profoundly influences organizational learning by providing tools and platforms that enable firms to acquire, process, and disseminate knowledge more effectively. Technologies such as big data analytics, cloud-based systems, and artificial intelligence have enhanced organizations' ability to interpret complex information, enabling real-time decision-making and fostering a culture of continuous improvement (Schönherr & Eller, 2023; Fang & Liu, 2023). Digital transformation allows firms to restructure their workflows, improve collaboration, and integrate learning practices into their operational processes.

Moreover, organizational learning significantly contributes to firm performance by enabling the systematic integration of knowledge into decision-making and strategic initiatives. Recent studies demonstrate that organizations with strong learning capabilities are better equipped to manage challenges, explore innovative opportunities, and align resources with strategic objectives (Khalid & Abdul Hamid, 2023; Karttunen & Lintukangas, 2023). Empirical evidence underscores the importance of learning-driven strategies in enhancing

operational efficiency and innovation capacity, both of which are critical drivers of organizational performance (Brodeur & Deschamps, 2023).

In the context of digital transformation, organizational learning serves as a vital mechanism for amplifying its impact on performance. Firms that successfully integrate learning processes into their digital transformation strategies report substantial improvements in productivity, innovation, and market responsiveness (Hauke-Lopes & Ratajczak-Mrozek, 2023). For instance, learning-oriented organizations can leverage digital tools to refine their strategies, develop new competencies, and adapt to market changes with agility. This underscores the dual role of organizational learning as both an enabler of digital transformation and a pathway to superior performance outcomes.

Recent studies also reveal that organizational learning mediates the relationship between digital transformation and performance by enhancing the ability of firms to utilize digital technologies effectively. Firms with strong learning cultures can better align digital tools with their strategic goals, ensuring that technological investments translate into tangible performance gains (Schlegel & Kraus, 2023; Mulyana & Rusu, 2024). For example, organizations with robust learning systems achieve greater success in implementing digital transformation initiatives by fostering knowledge-sharing practices and continuous skill development (Alkhatib, 2023). This mediating role highlights the strategic importance of learning as a bridge between technological advancements and organizational success.

Building on these insights, this study explores the interplay between digital transformation, organizational learning, and organizational performance. It posits that digital transformation enhances learning capabilities, which in turn improve performance outcomes. Furthermore, organizational learning is proposed as a mediator that strengthens the relationship between digital transformation and performance. These relationships are encapsulated in the following hypotheses:

H_3: Digital transformation has an impact on organizational learning.

H_4: Organizational learning has an impact on organizational performance.

H_5: Organizational learning mediates the relationship between digital transformation and organizational performance.

Digital transformation has emerged as a critical enabler of organizational learning in contemporary business environments. By leveraging advanced technologies such as big data analytics, machine learning, and cloud-based systems, organizations are able to enhance knowledge acquisition, sharing, and application, fostering a culture of continuous improvement and innovation (Karttunen & Lintukangas, 2023; Khalid & Abdul Hamid, 2023). These technologies facilitate the collection and analysis of vast amounts of data, providing actionable insights that enable firms to refine strategies, optimize operations, and develop innovative solutions. For example, organizations adopting cloud-based collaborative tools have reported significant improvements in decision-making speed and the flow of knowledge across departments, which in turn enhances their ability to respond to changing market conditions (Garzoni et al., 2020; Schönherr & Eller, 2023).

Big data analytics, in particular, has revolutionized how organizations interpret and utilize information. By extracting meaningful patterns from complex datasets, firms can identify emerging trends, predict customer needs, and develop proactive strategies (Mulyana et al, 2024). Similarly, machine learning technologies enable organizations to automate knowledge-intensive processes, such as demand forecasting and customer segmentation, thereby freeing up resources for higher-order strategic tasks (Schlegel & Kraus, 2023). These tools not only enhance individual and team learning but also contribute to systemic learning across the organization, fostering a holistic improvement in knowledge integration and application.

Digital transformation's role in facilitating organizational learning extends beyond technology to encompass cultural and structural changes. Firms undergoing digital transformation often adopt more agile structures, promoting cross-functional collaboration and knowledge sharing (Brodeur & Deschamps, 2023). This cultural shift enables organizations to institutionalize learning practices, ensuring that knowledge is retained and disseminated effectively. Studies have shown that organizations that embrace a digital learning culture achieve superior innovation outcomes and greater adaptability to environmental changes (Fang & Liu, 2023; Schönherr & Eller, 2023).

Market orientation complements digital transformation by reinforcing external knowledge acquisition processes, a critical component of organizational learning. Organizations with a strong market orientation actively engage with customers, competitors, and broader market dynamics to gather and apply external intelligence in their strategic and operational decisions (Ali et al., 2021). For example, firms that prioritize customer feedback loops and competitor analysis are better positioned to identify gaps in their offerings, innovate effectively, and adapt to industry shifts (Kwiotkowska, 2024).

Research suggests that market orientation drives organizational learning by facilitating the continuous flow of market-related information into the organization, which strengthens internal knowledge-processing mechanisms (Karttunen & Lintukangas, 2023; Khalid & Abdul Hamid, 2023). This dynamic ensures that organizations remain responsive to changing customer needs and competitive pressures while fostering a proactive approach to strategy development. For instance, firms that integrate market orientation into their digital strategies are more likely to develop innovative products and services tailored to evolving market demands, reinforcing their competitive positioning (Garzoni et al., 2020; Schönherr & Eller, 2023).

Dynamic capability theory, introduced by Teece et al. (1997), provides a robust framework for understanding how organizations adapt to rapidly changing environments by sensing opportunities, seizing them, and reconfiguring resources to maintain competitive advantages. Unlike static resource-based models, which emphasize

the possession of unique and inimitable resources, dynamic capability theory focuses on how firms continuously reconfigure these resources to adapt to new challenges and opportunities in volatile markets. This adaptability is particularly critical in the current era, where globalization, digital transformation, and shifting market dynamics demand unprecedented levels of organizational flexibility and innovation.

At the heart of dynamic capability theory is the recognition that organizations must be capable of not only reacting to changes but also shaping their environments to gain competitive advantages. The theory highlights three core activities: (1) Sensing, which involves identifying emerging opportunities and threats; (2) Seizing, which requires mobilizing resources and capabilities to exploit opportunities; and (3) Reconfiguring, which entails adjusting organizational structures and resource allocations to align with shifting demands (Teece et al., 1997). These capabilities are particularly valuable in industries characterized by rapid technological advancement, competitive pressures, and evolving customer expectations.

Digital transformation acts as a powerful enabler of dynamic capabilities by providing organizations with tools that enhance their ability to sense, seize, and reconfigure effectively. Technologies such as IoT, artificial intelligence, and big data analytics equip firms with real-time data collection capabilities, allowing them to monitor market trends, anticipate customer needs, and identify emerging opportunities with precision (Wamba et al., 2021; Günther et al., 2017). For example, organizations leveraging AI-powered analytics can develop predictive models to anticipate demand fluctuations, enabling them to adjust their supply chains proactively and minimize operational risks.

Beyond sensing, digital transformation enhances an organization's ability to seize opportunities by streamlining decision-making processes and enabling cross-functional collaboration. Cloud-based platforms and collaborative technologies foster communication across departments, ensuring that insights are shared and acted upon swiftly. Research shows that firms adopting digital tools report faster decision-making, improved resource allocation, and enhanced responsiveness to market shifts (Schönherr & Eller, 2023; Mulyana & Rusu, 2024).

Reconfiguration, the third component of dynamic capabilities, is also significantly improved through digital transformation. Firms equipped with digital technologies can reallocate resources, restructure teams, and redesign workflows with greater agility, ensuring alignment with evolving market demands. For instance, organizations that integrate advanced supply chain technologies report higher adaptability and resilience during disruptions, such as those experienced during the COVID-19 pandemic (Fang & Liu, 2023).

While digital transformation equips firms with technological tools, market orientation complements these capabilities by fostering an outward-looking perspective that aligns internal operations with customer needs and competitive dynamics. Market-oriented firms actively gather and interpret market intelligence, allowing them to align their sensing and seizing activities with external demands (Matarazzo et al., 2021; Ali et al., 2021). For example, firms prioritizing customer feedback loops and competitor analysis are better positioned to develop products and services that resonate with market needs.

Research underscores the synergistic relationship between market orientation and dynamic capabilities. Firms with strong market orientation exhibit higher levels of responsiveness and adaptability, as they integrate external insights into their strategic decision-making processes (Schlegel & Kraus, 2023; Karttunen & Lintukangas, 2023). This alignment enhances the firm's ability to not only react to changes but also proactively shape market trends, ensuring sustained competitive advantages.

Organizational agility, a central construct within dynamic capability theory, refers to a firm's ability to quickly and effectively adjust strategies, operations, and resource allocations in response to environmental changes. Agility encompasses both operational agility, which focuses on day-to-day adaptability, and strategic agility, which involves long-term adjustments to align with market trends (Kumar et al., 2022). Research highlights that firms with high agility are better equipped to navigate market turbulence, capitalize on emerging opportunities, and maintain competitive positioning (Fang & Liu, 2023; Liu et al., 2024).

Digital transformation plays a pivotal role in enhancing organizational agility. By integrating real-time analytics, automation, and collaborative technologies, firms can respond to changes with speed and precision. For instance, organizations using digital dashboards to monitor key performance indicators can identify inefficiencies and implement corrective actions immediately, ensuring continuous improvement and sustained performance (Schönherr & Eller, 2023).

Market orientation also drives organizational agility by ensuring that firms remain attuned to customer preferences and competitive pressures. Firms with strong market orientation are better able to adapt their strategies and operations to align with evolving market conditions, enhancing their responsiveness and adaptability (Matarazzo et al., 2021; Wang et al., 2024). Studies have shown that market-oriented firms often outperform their peers in volatile industries by leveraging their agility to deliver superior customer value and innovation (Karttunen & Lintukangas, 2023; Khalid & Abdul Hamid, 2023).

Building on the theoretical and empirical insights discussed, this study posits that digital transformation and market orientation significantly influence organizational agility, which in turn impacts organizational performance. Furthermore, organizational agility is proposed to mediate the relationships between digital transformation, market orientation, and performance outcomes. These relationships are encapsulated in the following hypotheses:

H_6: Digital transformation has an impact on organizational agility.

H_7: Organizational agility has an impact on organizational performance.

H_8: Organizational agility mediates the relationship between digital transformation and organizational performance.

Additionally, the interplay between digital transformation and market orientation creates synergies that

amplify the impact of organizational learning on performance outcomes. Digital transformation equips firms with the tools to collect and analyze external data effectively, while market orientation ensures that this data is relevant and actionable. Together, these forces enhance the organization's ability to integrate external insights with internal processes, fostering a learning-driven culture that is adaptive, innovative, and resilient (Hauke-Lopes & Ratajczak-Mrozek, 2023).

Empirical evidence supports the notion that market orientation contributes significantly to learning capabilities. Studies have shown that firms with high market orientation are more likely to engage in exploratory learning, where they experiment with new ideas and approaches to address emerging market challenges (Schlegel & Kraus, 2023). This proactive stance enhances the firm's ability to innovate and improves overall performance outcomes. Similarly, firms with strong market orientation often excel in exploitative learning, where they optimize existing processes and resources to maximize efficiency and productivity (Karttunen & Lintukangas, 2023).

Given the critical roles of digital transformation and market orientation in driving organizational learning, this study hypothesizes the following:

H_9: Market orientation has an impact on organizational learning.

H_{10}: Organizational learning mediates the relationship between market orientation and organizational performance.

H_{11}: Market orientation has an impact on organizational agility.

H_{12}: Organizational agility mediates the relationship between market orientation and organizational performance.

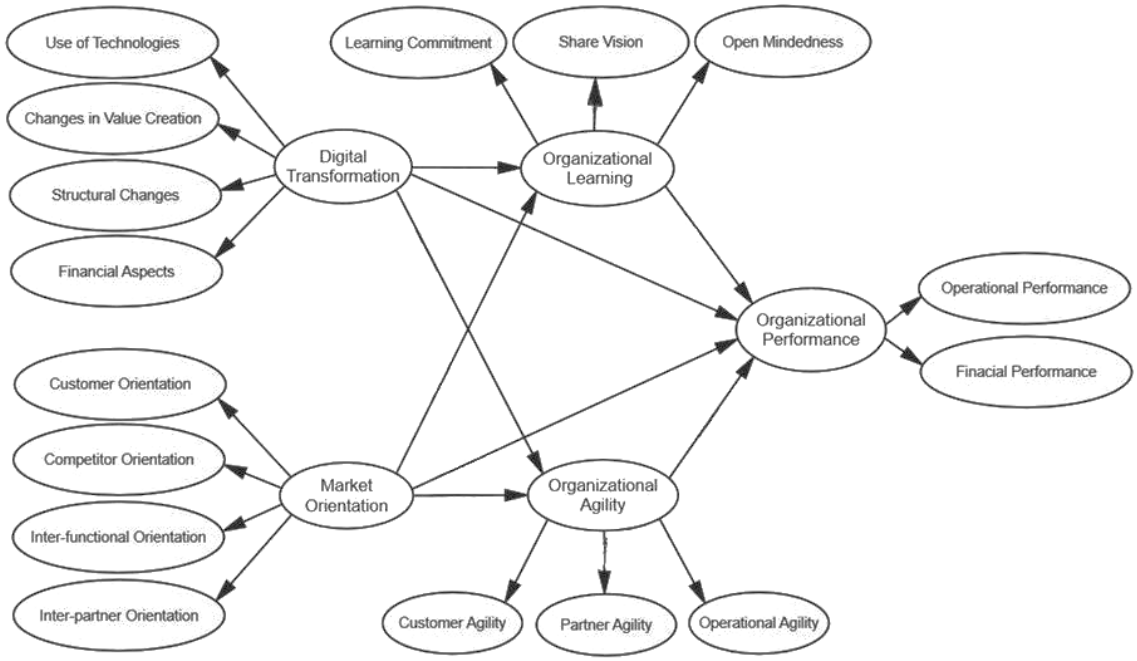

Figure 1: Conceptual Framework.

2. METHOD

2.1. Sample

The study received responses from 68.9% of the 826 enterprises approached, resulting in valid responses from 569 enterprises. Participants included middle-level managers (67.7%) and top-level managers (32.3%) from these enterprises. Company sizes in the sample were distributed as micro (44.9%), small (26.2%), medium (17.6%), and large enterprises (11.4%). The sample also represented diverse industries, with agriculture, forestry, animal husbandry, and fishery (15.1%) and manufacturing (24.9%) being the most prominent sectors. Companies in the sample varied in operational maturity, ranging from less than 1 year (19.6%) to more than 30 years (1.3%).

This study utilized a multi-stage sampling technique to ensure a representative and manageable sample of foreign trade enterprises in Dongguan, China. The population was first stratified geographically, focusing exclusively on enterprises in Dongguan, a key economic hub for digital transformation and trade. Next, the population was stratified by industry, including sectors such as manufacturing, agriculture, forestry, animal husbandry, and fishery, to capture diversity across business domains.

Further stratification was applied by company size, categorizing enterprises into micro, small, medium, and large to reflect operational scale differences. Within each stratum, enterprises were selected through random sampling to ensure equal representation and reduce potential biases. Following the selection of enterprises, middle and top-level managers were systematically chosen as respondents due to their direct involvement in strategic initiatives like digital transformation and market orientation.

Participants were not compensated financially for their involvement. All participants received detailed information about the study's objectives and provided informed consent before participation. Confidentiality agreements ensured voluntary participation and ethical compliance.

Kline (2015) suggests a general threshold of 200-400 participants for simpler SEM models. The achieved sample size of 569 participants exceeds this threshold, supporting the claim that the sample size is sufficient for less complex models.

2.2. Instrument

The Digital Transformation scale was adapted from the work of Hess et al. (2016) and Vial (2021), both of whom have contributed significantly to digital transformation research. This instrument assesses the integration and impact of digital technologies on organizational processes. Comprising 20 items, it employs a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale captures four dimensions: Use of Technology, Changes in Value Creation, Structural Changes, and Financial Aspects. Higher scores indicate a greater extent of digital transformation. Reliability was confirmed with a Cronbach's alpha of .89, while validity was established through confirmatory factor analysis (CFA), showing good model fit indices.

The Market Orientation instrument, developed by Narver and Slater (1990) and refined by Kohli and Jaworski (1990), evaluates an organization's focus on customer needs, competitor dynamics, and interfunctional coordination. It includes 15 items, rated on a 5-point Likert scale, and is divided into four dimensions: Customer Orientation, Competitor Orientation, Interfunctional Coordination, and Inter-partner Orientation. A high score reflects a stronger market-oriented strategy. Reliability measures yielded a Cronbach's alpha of .87, and validity was supported by robust CFA results.

The Organizational Learning scale, rooted in the theoretical work of Sinkula et al. (1997) and Jerez-Gómez et al. (2005), measures an organization's ability to acquire, share, and apply knowledge effectively. This 18-item scale uses a 5-point Likert format and covers three dimensions: Learning Commitment, Shared Vision, and Open-Mindedness. Higher scores denote a stronger organizational learning culture. Internal consistency was high (Cronbach's alpha = .91), and construct validity was confirmed via factor analysis.

Adapted from the framework proposed by Warner and Wäger (2019), the Organizational Agility scale assesses the flexibility and adaptability of organizations in dynamic environments. The scale consists of 15 items measured on a 5-point Likert scale, addressing three subdimensions: Customer Agility, Partner Agility, and Operational Agility. Higher scores signify greater agility in adapting to market changes. The scale demonstrated strong reliability (Cronbach's alpha = .88) and validity through comprehensive psychometric testing.

The Organizational Performance instrument, designed by Kaplan and Norton (1996), focuses on both operational and financial outcomes. It includes 12 items divided across two subscales: Operational Performance and Financial Performance. Responses are captured on a 5-point Likert scale, with higher scores indicating better performance relative to competitors. Reliability (Cronbach's alpha = .92) and validity measures were robust, with CFA results indicating excellent model fit.

All instruments underwent a rigorous pilot test with a sample of 116 participants to ensure clarity and appropriateness. Refinements were made based on expert feedback and statistical analyses. Reliability indices (Cronbach's alpha values) across all scales were above the .80 threshold, indicating strong internal consistency. Validity was established through a combination of content, convergent, and discriminant validity assessments, ensuring the instruments' robustness and alignment with the study objectives.

2.3. Data Analysis

The data analysis process was conducted in two stages utilizing IBM SPSS Statistics 27 and AMOS 26 (Arbuckle, 2019) to perform Covariance-Based Structural Equation Modeling (CB-SEM). The first stage involved preliminary data screening to identify and address any inconsistencies or missing values (Hair et al., 2019). Descriptive statistics, including means, standard deviations, and frequencies, were computed to summarize the demographic characteristics of the sample. Internal consistency reliability for the constructs was assessed using Cronbach's Alpha, ensuring that the items within each construct were sufficiently reliable (Nunnally & Bernstein, 1994).

In the second stage, Confirmatory Factor Analysis (CFA) was performed using AMOS 26 to validate the factor structure of the model and assess the constructs' convergent and discriminant validity. Hypothesis testing was conducted using CB-SEM with Maximum Likelihood Estimation (MLE). The structural model's fit was evaluated through multiple goodness-of-fit indices, including the chi-square to degrees of freedom ratio (x^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Path analysis was used to examine the relationships between constructs, with the results providing robust support for all hypothesized relationships. This rigorous analysis confirmed the validity and reliability of the measurement and structural models, as well as the strength of the proposed theoretical framework (Hair et al., 2019).

3. RESULTS

3.1. Common Method Bias

In this study, Harman's single-factor test was employed to assess the presence of potential common method bias. The analysis indicated that a single factor accounted for 38.13% of the total variance. Following established guidelines, common method bias is typically considered problematic when a single factor explains more than 50%

of the total variance (Podsakoff et al., 2003). Since the proportion of variance explained by a single factor in this study is significantly below the 50% threshold, it can be concluded that common method bias does not pose a substantial concern in this research.

3.2. Measurement Model

Reliability analysis uses cronbach's alpha reliability coefficient to check the consistency of research variables in the questionnaire on each measurement item. It is generally believed that the cronbach's alpha coefficient must be greater than .7 for variables to have good reliability. It can be seen from Table 1 that the cronbach's alpha coefficient of each variable is greater than the standard of .7, indicating that the variable has good internal consistency reliability. The CITC is greater than .5, indicating that the measurement items meet the research requirements. From deleting the cronbach's alpha value of the item, deleting any item will not cause the cronbach's alpha value to increase, which also shows that the variable has good reliability.

Table 1: Results of Measurement Model Analysis.

Variable	λ	α	CR	AVE
Use of Technologies (UOT)		0.898	0.900	0.642
UOT1	0.772			
UOT2	0.836			
UOT3	0.811			
UOT4	0.832			
UOT5	0.752			
Changes in Value Creation (CVC)		0.878	0.881	0.597
CVC1	0.863			
CVC2	0.803			
CVC3	0.697			
CVC4	0.762			
CVC5	0.729			
Structural Changes (SCG)		0.869	0.871	0.576
SCG1	0.826			
SCG2	0.758			
SCG3	0.701			
SCG4	0.777			
SCG5	0.726			
Financial Aspects (FAS)		0.811	0.814	0.594
FAS1	0.797			
FAS2	0.784			
FAS3	0.729			
Customer Orientation (CTO)		0.877	0.880	0.595
CTO1	0.806			
CTO2	0.776			
CTO3	0.733			
CTO4	0.796			
CTO5	0.743			
Competitor Orientation (CPO)		0.861	0.863	0.612
CPO1	0.818			
CPO2	0.760			
CPO3	0.766			
CPO4	0.783			
Interfunctional Coordination (IFC)		0.912	0.914	0.727
IFC1	0.807			
IFC2	0.807			
IFC3	0.867			
IFC4	0.925			
Interpartner Coordination (IPC)		0.897	0.899	0.691
IPC1	0.769			
IPC2	0.775			
IPC3	0.857			
IPC4	0.916			
Learning Commitment (LC)		0.903	0.904	0.654
LC1	0.819			
LC2	0.757			
LC3	0.798			
LC4	0.756			
LC5	0.904			
Shared Vision (SV)		0.876	0.879	0.592
SV1	0.812			
SV2	0.768			
SV3	0.734			
SV4	0.790			
SV5	0.739			
Open-Mindedness (OM)		0.900	0.901	0.646
OM1	0.783			
OM2	0.833			
OM3	0.820			
OM4	0.822			

OM5	0.759			
Customer Agility (CAG)		0.879	0.881	0.599
CAG1	0.863			
CAG2	0.802			
CAG3	0.689			
CAG4	0.767			
CAG5	0.736			
Partner Agility (PAG)		0.870	0.872	0.578
PAG1	0.819			
PAG2	0.761			
PAG3	0.699			
PAG4	0.789			
PAG5	0.728			
Operational Agility (OAG)		0.887	0.887	0.611
OAG1	0.799			
OAG2	0.790			
OAG3	0.756			
OAG4	0.763			
OAG5	0.800			
Operational Performance (OPM)		0.923	0.924	0.633
OPM1	0.812			
OPM2	0.807			
OPM3	0.746			
OPM4	0.787			
OPM5	0.796			
OPM6	0.770			
OPM7	0.849			
Financial Performance (FPM)		0.815	0.817	0.599
FPM1	0.785			
FPM2	0.803			
FPM3	0.732			

It can be seen from the above table that the standardized factor loading of each measurement index of each variable is greater than .6, the composition reliability (CR) is greater than .7, and the average variation extraction (AVE) is greater than .5, indicating that each variable has good convergent validity.

In this study, a more rigorous ave method was used to evaluate the discriminant validity (Fornell & Larcker, 1981), the open root of ave of each factor must be greater than the correlation coefficient of each paired variable, indicating that the factors have differential validity. The open root of ave of each factor is greater than the standardized correlation coefficient outside the diagonal, so this study still has differential validity, and the oblique lower triangle is the correlation coefficient (shown as in Table 2).

Table 2: Discriminant Validity (Fornell-Larcker criterion).

	M	**SD**	**1**	**2**	**3**	**4**	**5**
1. DT	3.678	1.144	0.791				
2. MO	3.618	1.178	0.428	0.791			
3. OL	3.643	1.181	0.462	0.447	0.800		
4. OA	3.644	1.119	0.472	0.449	0.423	0.790	
5. OP	3.608	1.254	0.552	0.539	0.597	0.601	0.825

3.3. Model Estimates and Hypothesis Testing

The structural equation model (SEM) was assessed to determine its suitability for exploring the relationships between digital transformation, market orientation, organizational learning, organizational agility, and organizational performance. The obtained fit indices indicated a satisfactory model fit: $\chi^2/df = 1.832$, GFI = .920, AGFI = .899, NFI = .950, IFI = .978, TLI = .975, CFI = .978, RMSEA = .048, SRMR = .036. These indices demonstrate an acceptable to excellent fit, affirming the adequacy of the model in representing the dataset.

The results of the hypothesis testing are depicted in Figure 2 and summarized in Table 3. The analysis provides strong support for the hypothesized relationships. Digital transformation significantly impacts organizational learning (H3: $\beta = .400$, $p < .001$) and organizational agility (H6: $\beta = .419$, $p < .001$), confirming its role as a driver of these constructs. Similarly, market orientation positively influences organizational learning (H9: $\beta = .355$, $p < .001$) and organizational agility (H11: $\beta = .350$, $p < .001$).

The direct impacts of digital transformation (H1: $\beta = .158$, $p < .001$) and market orientation (H2: $\beta = .154$, $p < .001$) on organizational performance are significant, underlining their foundational roles in performance enhancement. Furthermore, organizational learning positively affects organizational performance (H4: $\beta = .390$, $p < .001$), and organizational agility has a robust positive impact as well (H7: $\beta = .415$, $p < .001$).

Mediating effects were tested using bootstrapping, with 5,000 iterations confirming the significance of indirect paths. The mediation analyses reveal that organizational learning significantly mediates the effects of digital transformation (H5: $\beta = .156$, $p < .001$) and market orientation (H10: $\beta = .139$, $p < .001$) on organizational performance. Similarly, organizational agility mediates the influence of digital transformation (H8: $\beta = .174$, $p < .001$) and market orientation (H12: $\beta = .145$, $p < .001$) on organizational performance.

Overall, the findings emphasize the critical roles of organizational learning and agility as mediators, enhancing

the pathways through which digital transformation and market orientation contribute to organizational performance. These insights provide valuable implications for both academic research and practical applications.

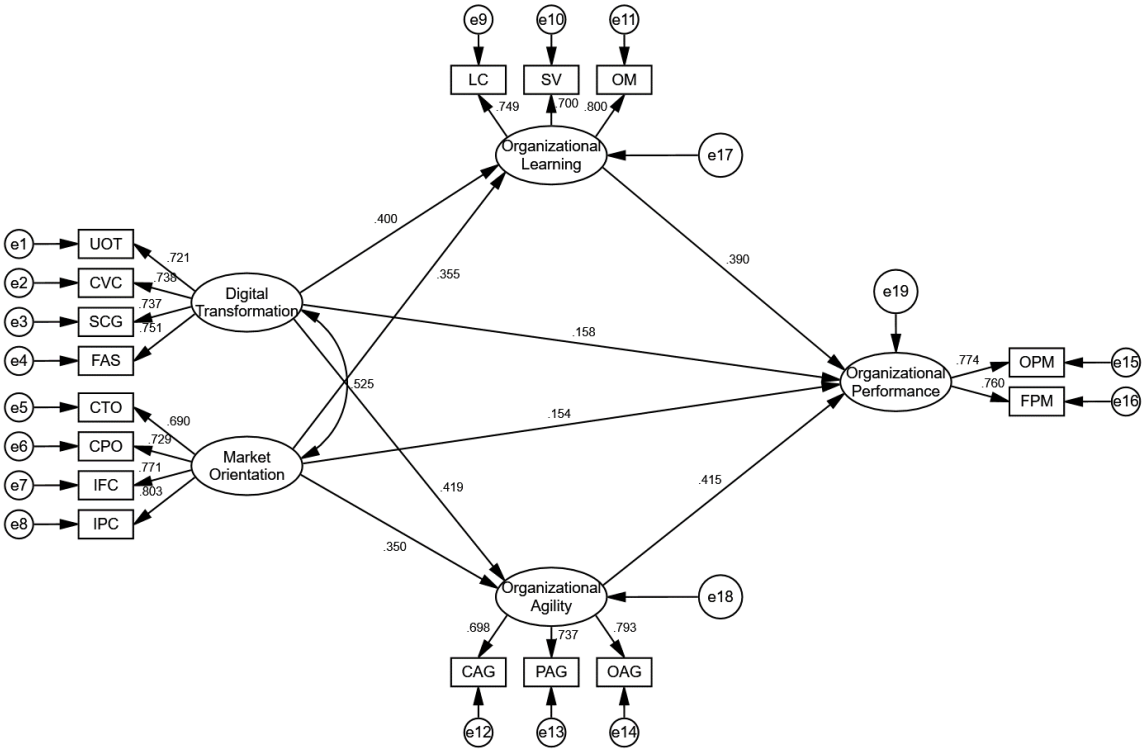

Figure 2: Path Coefficients of Hypothesis Testing.

Table 3: Results of Path Analysis.

	Path	SE	CR	β	p
H1	DT → OP	0.043	3.67	0.158	<0.001
H2	MO → OP	0.042	3.67	0.154	<0.001
H3	DT → OL	0.048	8.33	0.400	<0.001
H4	OL → OP	0.050	7.80	0.390	<0.001
H5	DT → OL → OP	0.045	6.40	0.156	<0.001
H6	DT → OA	0.046	9.11	0.419	<0.001
H7	OA → OP	0.049	8.47	0.415	<0.001
H8	DT → OA → OP	0.047	7.30	0.174	<0.001
H9	MO → OL	0.044	8.07	0.355	<0.001
H10	MO → OL → OP	0.046	6.32	0.139	<0.001
H11	MO → OA	0.045	7.78	0.350	<0.001
H12	MO → OA → OP	0.044	6.59	0.145	<0.001

4. DISCUSSION

This study confirms the primary hypotheses, demonstrating that digital transformation and market orientation significantly influence organizational performance, both directly and through the mediating effects of organizational learning and agility. These findings align with Vial (2021), who emphasized digital transformation as a critical enabler of operational efficiency and innovation. Similarly, the role of market orientation in fostering responsiveness and adaptability echoes the findings of Narver and Slater (1990) and Kohli and Jaworski (1990), who highlighted its significance in aligning organizational capabilities with market demands.

The secondary hypotheses further elucidate the mechanisms through which organizational learning and agility mediate these relationships. Organizational learning, as proposed by Sinkula et al. (1997), is pivotal in enabling firms to acquire, share, and apply knowledge effectively, which enhances their ability to respond to dynamic market environments. Organizational agility, supported by the work of Warner and Wäger (2019), enables rapid adaptation to environmental changes, providing firms with a competitive edge in volatile industries. These findings reinforce the theoretical foundation of dynamic capability theory (Teece et al., 1997), emphasizing the importance of sensing, seizing, and reconfiguring capabilities in achieving superior performance outcomes.

Exploratory analyses underscore the intricate interplay between digital transformation and market orientation in shaping organizational learning and agility. This interaction highlights the potential for firms to amplify their performance by integrating advanced digital tools with customer-centric strategies, as evidenced by the findings of Mulyana and Rusu (2024) and Schönherr and Eller (2023). While these insights provide valuable practical implications, they also warrant cautious interpretation due to the potential for uncontrolled error rates inherent in complex mediation models.

The findings of this study align closely with previous research, such as Hess et al. (2016) and Bresciani et al. (2021), which emphasized the transformative potential of digital technologies in enhancing organizational processes and innovation. Moreover, the significant impact of market orientation on learning and agility is consistent with the work of Fang and Liu (2023), who demonstrated the role of market intelligence in driving strategic adaptability. However, this study extends prior research by quantifying the mediating roles of organizational learning and agility, offering a more comprehensive framework for understanding how digital transformation and market orientation jointly enhance performance.

Notably, differences arise in the emphasis placed on specific mediators. While prior studies, such as those by Karttunen and Lintukangas (2023), focused on agility as a dynamic capability, this study equally highlights the critical role of organizational learning as a foundational element. Additionally, the nuanced exploration of indirect effects, as supported by bootstrapping analyses, contributes to a deeper understanding of the interdependencies between digital transformation, market orientation, and organizational performance.

In summary, this study provides robust evidence supporting the hypothesized relationships and offers actionable insights for organizations seeking to navigate the complexities of digital transformation and market alignment. By integrating the findings of this research with established theoretical frameworks, firms can better position themselves to achieve sustained competitive advantages in the digital era.

The results of this study provide strong evidence supporting the hypothesized relationships among digital transformation, market orientation, organizational learning, organizational agility, and organizational performance. However, potential biases and limitations in study design, measurement, and statistical analysis warrant careful interpretation.

5. LIMITATIONS

Potential bias may arise from common method bias, as data were collected through self-reported measures from organizational managers. Although Harman's single-factor test indicated no substantial concern, there remains the possibility of social desirability bias or retrospective rationalization influencing responses (Podsakoff et al., 2003). Measurement protocols, while demonstrating high reliability and validity, rely on Likert scales that may not capture the full complexity of constructs such as organizational agility and learning. Response biases, including tendencies toward agreement or neutrality, could affect the precision of these measures (Nunnally & Bernstein, 1994). Additionally, the overlap between constructs like organizational learning and agility presents a challenge, as their interconnectedness might inflate observed mediating effects. Multiple hypotheses tested within the same dataset, even with robust statistical controls like bootstrapping, increase the potential for Type I errors (Hair et al., 2019).

The sample of 569 managers from foreign trade enterprises in Dongguan represents a significant strength of the study. However, the specificity of the geographic and industrial context may limit the applicability of the findings to other regions or sectors. While Dongguan is an economic hub reflecting digital transformation trends in trade enterprises, organizations in other regions, particularly those in less technology-driven environments, may experience different dynamics. The cross-sectional nature of the study further constrains the interpretation, as the relationships observed at a single point in time cannot capture causality or temporal evolution (Kline, 2015).

The findings are generalizable to foreign trade enterprises in Dongguan, given the representative sampling across industries and organizational scales. However, the generalizability to broader contexts is limited. For instance, organizations in non-trade sectors or less digitally advanced regions may not experience similar interactions among digital transformation, market orientation, and organizational performance (Vial, 2021). Contextual differences, such as cultural factors or market maturity, may shape the applicability of these findings.

Ecological validity is influenced by the study's focus on a period of rapid technological change. The findings are particularly relevant for organizations in dynamic, technology-driven industries but may have limited applicability in more traditional or stable environments (Mulyana et al, 2024). The use of standardized scales enhances the comparability of findings with existing literature but may overlook cultural or contextual nuances in how constructs like market orientation or digital transformation are operationalized (Narver & Slater, 1990).

Temporal considerations also affect generalizability. As the study employs a cross-sectional design, it cannot account for how the observed relationships evolve over time. Longitudinal studies could provide richer insights into how digital transformation and market orientation influence performance over extended periods and under varying external conditions (Hair et al., 2019).

5.1. Implications For Future Research

This study underscores the need for more nuanced and longitudinal research to capture the evolving dynamics between digital transformation, market orientation, and organizational performance. While this research confirms the mediating roles of organizational learning and agility, future studies could explore additional mediators or moderators, such as organizational culture, leadership styles, or technological readiness (Teece et al., 1997; Warner & Wäger, 2019). Expanding research into different industries, geographic regions, and organizational scales would enhance the generalizability of findings and uncover context-specific insights (Vial, 2021; Mulyana & Rusu, 2024).

Future research could also integrate qualitative approaches, such as case studies or interviews, to complement quantitative findings. Such methods would provide richer narratives around how organizations implement digital transformation and align their strategies with market demands (Schönherr & Eller, 2023). Additionally, the role of emerging technologies, such as artificial intelligence, blockchain, and the Internet of Things (IoT), warrants

exploration to understand their unique contributions to organizational agility and performance (Fang & Liu, 2023).

5.2. Implications for Organizational Programs

Foreign trade enterprises can leverage these findings to design programs emphasizing the integration of digital transformation with market-driven strategies. Programs aimed at fostering a culture of continuous learning and adaptability are critical (Sinkula et al., 1997; Narver & Slater, 1990). For example, organizations could implement training initiatives to enhance employee digital literacy and establish cross-departmental collaboration mechanisms to promote agility. Investment in advanced technologies should be complemented by efforts to ensure these tools align with organizational goals and market needs (Hess et al., 2016; Schönherr & Eller, 2023).

Leadership development programs should emphasize the strategic importance of digital transformation and market orientation. Equipping leaders with skills to navigate technological change and market complexity can help sustain a competitive edge. Additionally, monitoring and evaluation frameworks should be established to assess the effectiveness of such programs, enabling organizations to refine approaches based on empirical feedback (Mulyana et al, 2024).

5.3. Implications for Policy

At the policy level, governments and regulatory bodies should prioritize creating ecosystems that support digital transformation and market orientation. Policies encouraging technological innovation, such as subsidies for digital infrastructure investments or tax incentives for research and development, can facilitate organizational advancements (Vial, 2021; Matarazzo et al., 2021). Regulatory frameworks should ensure equitable access to digital technologies across industries and regions, reducing barriers for smaller enterprises.

Policymakers should also invest in education and workforce development initiatives to align skill development with the demands of the digital economy. This includes supporting programs that promote digital literacy and technical skills at all levels of education (Schlegel & Kraus, 2023). Additionally, fostering public-private partnerships can accelerate knowledge sharing and innovation, benefiting businesses and the broader economy (Karttunen & Lintukangas, 2023).

Lastly, policies must consider the socio-economic implications of digital transformation, such as its impact on job markets and data privacy. Policymakers must ensure that regulations balance the benefits of digitalization with protections for employees and consumers, fostering a fair and inclusive digital ecosystem (Alkhatib, 2023; Hauke-Lopes & Ratajczak-Mrozek, 2023).

6. CONCLUSION

This study explores the interplay between digital transformation, market orientation, organizational learning, organizational agility, and organizational performance within the context of foreign trade enterprises. The findings reveal that digital transformation and market orientation are significant drivers of organizational performance, both directly and through the mediating roles of learning and agility. These results contribute to the understanding of how organizations can leverage technology and market responsiveness to achieve competitive advantages in dynamic environments.

Digital transformation enhances organizational learning by providing tools and platforms for acquiring and disseminating knowledge, fostering innovation and adaptability. Simultaneously, it promotes organizational agility, enabling firms to respond effectively to market changes. Similarly, market orientation aligns internal capabilities with external demands, reinforcing organizational learning and agility. Together, these constructs form a cohesive framework that links strategic priorities to superior performance outcomes.

The study extends prior research by quantifying the mediating effects of organizational learning and agility, highlighting their critical roles in maximizing the benefits of digital transformation and market orientation. This integrated perspective underscores the importance of fostering a learning-oriented culture and an agile operational structure to navigate technological and market complexities effectively.

While the findings offer robust theoretical and practical insights, they also highlight areas for future research. Longitudinal studies, diverse industry contexts, and the exploration of additional mediating or moderating factors could further enhance the understanding of these relationships. Furthermore, policymakers and organizations should consider strategies that integrate technological advancements with market-driven approaches, emphasizing employee development, innovation, and collaboration.

In conclusion, this study provides a comprehensive framework for understanding the pathways through which digital transformation and market orientation influence organizational performance. By adopting strategies that prioritize learning and agility, organizations can better position themselves for sustained success in the rapidly evolving digital economy. These findings offer valuable implications for academia, practitioners, and policymakers, supporting efforts to foster resilience and competitiveness in an increasingly complex global landscape.

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Investigation: ZL, CP, ST

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Software: ZL
Supervision: CP, ST
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Ethical Approval:

The study was conducted in accordance with the Declaration of Helsinki, and approved by Suan Sunandha Rajabhat University.

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