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TRESEARCH

DIGITAL TRANSFORMATION AND ORGANIZATIONAL PERFORMANCE: THE MEDIATING ROLE OF ORGANIZATIONAL AGILITY AND MODERATING EFFECT OF ENVIRONMENTAL TURBULENCE

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ABSTRACT

Digital transformation has become a strategic imperative for organizations seeking to improve performance and sustain competitiveness amid increasingly turbulent business environments. This study examines the effect of digital transformation on organisational performance, focusing on the mediating role of organisational agility and the moderating effect of environmental turbulence. A sequential explanatory mixed-methods design was adopted, combining a quantitative survey with qualitative interviews. Quantitative data were obtained from 452 valid responses across 65 medium-sized and large organizations in information technology, financial services, manufacturing, telecommunications, and healthcare. Data were analyzed using descriptive statistics, measurement-model assessment, reliability and validity testing, Structural Equation Modelling (SEM), mediation analysis, and moderation analysis. Qualitative data were obtained through semi-structured interviews with 25 purposively selected participants and analyzed thematically. The results show that digital transformation significantly enhances organisational agility ($\beta = 0.686$, $p < 0.001$; $R^2 = 0.47$), while organisational agility significantly improves organisational performance ($\beta = 0.553$, $p < 0.001$). Organisational agility significantly mediates the relationship between digital transformation and organisational performance (indirect effect = 0.380, $p < 0.001$), while environmental turbulence significantly moderates the relationship between digital transformation and organisational agility ($\beta = 0.217$, $p = 0.001$). The study contributes an integrated framework demonstrating how organisational agility serves as a mechanism through which digital transformation generates performance benefits and how environmental conditions shape this relationship.

KEYWORDS: Transformation, Sustaining, Environmental, Modeling, Cronbach's alpha

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The contemporary business environment is characterized by rapid technological innovation, globalization, market volatility, intense competition, and increasing uncertainty. These conditions have compelled organizations to strengthen their adaptability and performance to remain competitive. The emergence of digital technologies, including artificial intelligence, cloud computing, big data analytics, enterprise systems, robotic process automation, and digital platforms, has significantly transformed organisational processes, decision-making, and value creation (Aldoseri *et al.,* 2024; Althabatah *et al.,* 2023).

Digital transformation refers to the strategic integration of digital technologies into organisational processes, structures, capabilities, and business activities to create value and improve organisational outcomes (Kraus *et al.,* 2021; Vial, 2021). It extends beyond technology adoption by requiring organizations to develop digital capabilities, redesign processes, and align technological resources with organisational objectives.

A key organisational capability associated with digital transformation is organisational agility. Organisational agility represents an organization's ability to sense changes, make timely decisions, and rapidly adapt its resources and processes to changing conditions (Teece, 2018). Through improved information processing, automation, analytics, and digital connectivity, digital transformation can strengthen organisational agility and support more responsive operations.

Organisational performance reflects the extent to which organizations achieve desired outcomes through operational efficiency, innovation, competitiveness, resilience, and strategic responsiveness. However, the extent to which digital transformation improves performance may vary according to the external environment. Environmental turbulence, characterized by market volatility, technological change, competitive intensity, and regulatory uncertainty, can influence how organizations utilize digital capabilities and respond to changing conditions.

Consequently, understanding the relationship between digital transformation, organisational agility, and organisational performance, particularly under varying levels of environmental turbulence, has become increasingly important in contemporary organisational research.

1.2 PROBLEM STATEMENT

Despite substantial global investment in digital transformation, many organizations continue to face challenges in translating digital investments into sustained improvements in organisational performance. The adoption of artificial intelligence, cloud computing, big data analytics, enterprise systems, automation, and other digital technologies does not automatically produce strategic value. Digital transformation initiatives may fail to deliver expected outcomes when technological investments are not accompanied by appropriate organisational capabilities, leadership, employee competencies, governance mechanisms, and process transformation.

A further challenge concerns the mechanism through which digital transformation contributes to organisational performance. Although existing studies have reported positive relationships between digital transformation and organisational outcomes, the processes through which digital capabilities are converted into improved performance remain insufficiently understood. In particular, organisational agility the ability to rapidly sense environmental changes, make timely decisions, and reconfigure resources may constitute a critical mechanism through which digital transformation generates organisational value. However, its mediating role has not been sufficiently integrated into a comprehensive empirical framework.

Moreover, the benefits of digital transformation may vary according to the degree of environmental turbulence experienced by organizations. Rapid technological developments, changing customer expectations, competitive intensity, market volatility, and regulatory uncertainty can alter the effectiveness of digital capabilities. Consequently, organizations operating under highly turbulent conditions may derive different levels of agility from comparable digital transformation investments.

The limited integration of these relationships creates an important research problem. Existing studies have often examined digital transformation, organisational agility, and organisational performance independently or focused primarily on direct relationships, with comparatively limited attention to organisational agility as a mediating mechanism and environmental turbulence as a moderating condition within the same analytical framework. This limitation is further compounded by the predominance of quantitative approaches that provide limited contextual explanation of how organizations convert digital capabilities into adaptive and performance outcomes.

Therefore, there is a need for an integrated empirical investigation that explains whether and how digital transformation improves organisational performance through organisational agility, and under what levels of environmental turbulence this relationship becomes stronger or weaker. Addressing this problem, the present study develops and empirically validates a framework linking digital transformation, organisational agility, environmental turbulence, and organisational performance through a sequential explanatory mixed-methods approach.

1.3 RESEARCH GAP

Despite growing evidence linking digital technology adoption to organizational performance, important conceptual, empirical, contextual, and methodological gaps remain. First, previous studies have largely examined individual technologies, such as artificial intelligence, cloud computing, and big data analytics, rather than conceptualizing digital transformation as an integrated organizational capability. Second, limited research has simultaneously examined the direct effect of digital transformation on organizational performance, the mediating role of organizational agility, and the moderating influence of environmental turbulence within a unified framework. Third, existing studies remain concentrated in specific industries and contexts, limiting the generalizability of their findings across diverse organizational environments (Aldoseri *et al.,* 2024; Dwivedi *et al.,* 2023). Finally, limited mixed-method research has examined how digital transformation creates strategic value. This study addresses these gaps through an integrated framework linking digital transformation, organizational agility, environmental turbulence, and organizational performance.

1.4 AIM AND OBJECTIVES OF THE STUDY

1.4.1 AIM

The aim of this study is to examine the relationship between digital transformation and organisational performance, with particular emphasis on the mediating role of organisational agility and the moderating effect of environmental turbulence, using a sequential explanatory mixed-methods approach.

1.4.2 OBJECTIVES

The specific objectives of the study are to:

i. **Examine** the effect of digital transformation on organisational agility;
ii. **Determine** the effect of organisational agility on organisational performance;

iii. Assess the direct effect of digital transformation on organisational performance;
iv. **Evaluate** the mediating role of organisational agility in the relationship between digital transformation and organisational performance;
v. **Examine** the moderating effect of environmental turbulence on the relationship between digital transformation and organisational agility; and
vi. **Develop and empirically validate** an integrated framework explaining how digital transformation influences organisational performance through organisational agility under varying levels of environmental turbulence.

2. LITERATURE REVIEW

2.1 DIGITAL TRANSFORMATION

Digital transformation has emerged as one of the most significant strategic initiatives influencing organizational competitiveness in the digital economy. It encompasses the comprehensive integration of digital technologies into organizational processes, business models, customer interactions, and strategic management practices to improve operational efficiency, innovation, and value creation (Verhoef *et al.,* 2021). Unlike conventional information technology adoption, digital transformation requires organizations to fundamentally redesign their structures, workflows, decision-making processes, and organizational culture to fully exploit the opportunities created by emerging digital technologies (Vial, 2021).

Recent technological advancements in artificial intelligence, cloud computing, big data analytics, blockchain, robotic process automation, and the Internet of Things have accelerated digital transformation across virtually every sector of the global economy. These technologies enhance organizational capabilities by enabling intelligent automation, real-time data processing, predictive analytics, improved collaboration, and evidence-based decision-making (Aldoseri *et al.,* 2024). Consequently, digital transformation has become an essential strategic capability that supports innovation, operational excellence, and sustainable competitive advantage.

2.2 ORGANIZATIONAL AGILITY

Organizational agility refers to an organization's capability to sense environmental changes, rapidly evaluate emerging opportunities and threats, and effectively reconfigure organizational resources, business processes, and strategic priorities in response to changing market conditions (Teece, 2018). Agile organizations possess the flexibility to respond proactively to uncertainty through timely information processing, decentralized decision-making, cross-functional collaboration, and adaptive organizational structures (Warner & Wäger, 2019).

The increasing volatility of global business environments has elevated organizational agility from an operational capability to a strategic necessity. Organizations that develop agile capabilities are better positioned to respond to technological disruptions, evolving customer expectations, regulatory changes, and competitive pressures while sustaining innovation, resilience, and long-term performance.

2.3 DIGITAL TRANSFORMATION AND ORGANIZATIONAL AGILITY

The relationship between digital transformation and organizational agility has become a major focus of contemporary research in strategic management and information systems because digital technologies fundamentally reshape organizational capabilities and competitive behavior. Digital transformation provides organizations with advanced technological infrastructures that facilitate information sharing, intelligent decision-making, process integration, and organizational flexibility. Consequently, organizations adopting emerging technologies are better positioned to detect environmental changes, rapidly evaluate strategic alternatives, and efficiently reconfigure operational resources in response to evolving business conditions (Aldoseri *et al.,* 2024).

Artificial intelligence, cloud computing, big data analytics, enterprise resource planning systems, robotic process automation, and Internet of Things technologies collectively enhance organizational agility by improving visibility across organizational processes and enabling real-time strategic responses. Artificial intelligence supports predictive analytics, demand forecasting, customer behavior analysis, and intelligent decision support, thereby improving organizational sensing capability. Cloud computing enhances organizational flexibility through scalable computing infrastructure, remote collaboration, and rapid deployment of digital services, while big data analytics transforms large volumes of organizational data into actionable insights that strengthen strategic planning and operational decision-making (Dwivedi *et al.,* 2023).

Digital transformation also facilitates operational agility by integrating fragmented organizational systems, automating repetitive processes, and improving communication across functional departments. Such integration enables organizations to shorten innovation cycles, accelerate product development, improve customer responsiveness, and optimize supply

chain coordination. Furthermore, digital platforms strengthen organizational resilience by enabling rapid adaptation during external disruptions such as economic crises, supply chain interruptions, cybersecurity incidents, and regulatory changes (Verhoef *et al.,* 2021).

Despite these benefits, the successful realization of organizational agility depends on more than technological adoption alone. Contemporary literature consistently emphasizes that digital technologies generate superior organizational outcomes only when accompanied by effective leadership, organizational learning, employee digital competencies, adaptive governance, and supportive organizational cultures (Kraus *et al.,* 2021). Consequently, digital transformation should be understood as a comprehensive organizational capability that integrates technological innovation with managerial, organizational, and strategic change. This perspective provides the conceptual basis for examining how digital transformation strengthens organizational agility and ultimately enhances organizational performance under conditions of environmental turbulence.

2.4 THEORETICAL FOUNDATION

The relationship between digital transformation, organizational agility, and organizational performance is grounded in three complementary theoretical perspectives: Dynamic Capabilities Theory (DCT), the Resource-Based View (RBV), and Socio-Technical Systems Theory (STS).

DCT explains how organizations sense environmental changes, seize emerging opportunities, and reconfigure resources to respond effectively to technological and market dynamics (Teece, 2018). Recent studies confirm the relevance of dynamic sensing, seizing, and reconfiguring capabilities to successful digital transformation and organizational performance (Abdurrahman *et al.,* 2024; Al-Moaid & Almarhdi, 2024).

RBV posits that sustainable competitive advantage derives from valuable, rare, difficult-to-imitate, and well-organized resources and capabilities (Barney, 1991). In digital contexts, technological expertise, data, digital capabilities, and organizational knowledge can constitute strategic resources that enhance organizational performance. Recent empirical evidence further demonstrates the importance of IT capabilities and digital orientation in translating digital transformation into improved firm performance (Barba-Sánchez *et al.,* 2024).

STS complements these perspectives by emphasizing the alignment of technological systems with human capabilities, organizational structures, and managerial processes (Bostrom & Heinen, 1977). Recent research demonstrates that digital transformation has important socio-technical implications for organizational structures, decision-making, employee competencies, and operational performance (Colombari *et al.,* 2024).

Collectively, these perspectives provide a complementary theoretical foundation for explaining how digital resources enable transformation, how dynamic capabilities facilitate organizational agility, and how socio-technical alignment helps convert digital investments into improved organizational performance under turbulent environmental conditions.

2.5 THEORETICAL FOUNDATION

This study is underpinned by three complementary theoretical perspectives: Dynamic Capabilities Theory (DCT), the Resource-Based View (RBV), and Socio-Technical Systems Theory (STS). Collectively, these perspectives provide a comprehensive theoretical foundation for explaining how digital transformation develops organizational capabilities, enhances organizational agility, and contributes to organizational performance under turbulent business conditions.

2.5.1 DYNAMIC CAPABILITIES THEORY (DCT)

Dynamic Capabilities Theory explains how organizations sustain competitiveness by continuously sensing changes in their external environment, seizing emerging opportunities, and reconfiguring resources and capabilities in response to technological and market dynamics (Teece, 2018). Unlike perspectives that primarily emphasize existing organizational resources, DCT focuses on an organization's capacity to adapt, innovate, and renew its capabilities as environmental conditions evolve.

In the context of digital transformation, DCT provides a strong theoretical explanation of how organizations deploy emerging technologies, including artificial intelligence, data analytics, cloud computing, and digital platforms, to strengthen strategic responsiveness and operational flexibility. Recent empirical studies demonstrate that dynamic digital transformation capabilities enable organizations to improve performance by developing their capacity to sense technological opportunities, implement digital initiatives, and reconfigure organizational resources (Abdurrahman et al., 2024; Al-Moaid & Almarhdi, 2024). Similarly, digital transformation can strengthen organizational capabilities that support resilience and responsiveness under conditions of environmental uncertainty (Aldoseri *et al.,* 2024; Guo *et al.,*

2020).

Therefore, DCT provides the primary theoretical basis for explaining how Digital Transformation (DT) can enhance Organizational Agility (OA). Organizations with stronger dynamic capabilities are better positioned to identify emerging technological opportunities, rapidly reconfigure resources, respond to environmental changes, and translate digital investments into improved organizational outcomes. This theoretical relationship supports the proposition that organizational agility represents an important mechanism through which digital transformation contributes to organizational performance.

2.5.2 RESOURCE-BASED VIEW (RBV)

The Resource-Based View, introduced by Barney (1991), posits that sustainable competitive advantage originates from organizational resources and capabilities that are valuable, rare, inimitable, and non-substitutable (VRIN). According to RBV, organizations achieve superior performance by developing distinctive strategic resources that competitors cannot easily replicate. Digital transformation creates valuable organizational resources through investments in digital infrastructure, data analytics capabilities, artificial intelligence applications, cloud computing platforms, enterprise systems, and organizational knowledge. Recent evidence on adaptive learning systems further demonstrates how technology-enabled capabilities can support personalized services and improved outcomes by integrating digital technologies with organizational and instructional capabilities (Ayeoribe & Ayeoribe, 2026). However, such technological resources generate competitive advantage only when effectively integrated with organizational competencies, managerial expertise, and strategic decision-making processes. Therefore, RBV supports the proposition that digital transformation enhances organizational performance through the development of distinctive organizational capabilities, particularly organizational agility.

2.5.3 SOCIO-TECHNICAL SYSTEMS THEORY (STS)

Socio-Technical Systems Theory, originally advanced by Bostrom and Heinen (1977), emphasizes that organizational effectiveness depends on the appropriate integration of technological systems with human capabilities, organizational structures, work processes, and managerial practices. From this perspective, technological innovation alone does not guarantee improved organizational outcomes; rather, value is created when technology is effectively aligned with employee competencies, organizational processes, leadership, and institutional arrangements. Contemporary research similarly demonstrates that digitalization produces significant socio-technical changes in organizational roles, decision-making processes, and work practices (Colombari *et al.,* 2024).

Within digital transformation initiatives, STS therefore helps explain why organizations may achieve different outcomes despite implementing similar technologies. The effectiveness of digital transformation depends on the organization's ability to align digital technologies with employee skills, organizational processes, collaborative practices, and managerial capabilities. Evidence from technology-enabled learning environments further illustrates how digital systems can generate improved outcomes when technological capabilities are integrated with human and organizational capabilities (Ayeoribe & Ayeoribe, 2026). Similarly, the increasing integration of artificial intelligence into organizational activities highlights the importance of human competencies, leadership, and organizational adaptation in achieving value from emerging technologies (Budhwar *et al.,* 2023). Consequently, STS provides an important theoretical explanation of how organizational alignment and adaptability can facilitate the translation of digital transformation investments into improved organizational performance.

2.5.4 INTEGRATION OF THEORETICAL PERSPECTIVES

The integration of Dynamic Capabilities Theory, the Resource-Based View, and Socio-Technical Systems Theory provides a comprehensive theoretical foundation for this study. DCT explains how organizations develop and reconfigure adaptive capabilities in response to environmental change (Teece, 2018; Abdurrahman et al., 2024; Al-Moaid & Almarhdi, 2024). RBV emphasizes the strategic value of digital resources, knowledge, technological capabilities, and organizational competencies in creating superior performance (Barney, 1991; Barba-Sánchez et al., 2024). STS complements these perspectives by emphasizing the alignment of technological systems with human capabilities, organizational processes, and managerial practices (Bostrom & Heinen, 1977; Colombari *et al.,* 2024).

Collectively, these perspectives explain what resources enable digital transformation (RBV), how organizations dynamically deploy and reconfigure those resources (DCT), and how technological and human systems must be aligned to realize their value (STS). Accordingly, the study proposes that digital transformation strengthens organizational agility, which subsequently contributes to organizational performance, while environmental turbulence may influence the strength of these relationships. The integrated theoretical perspective therefore provides the conceptual foundation for developing the research hypotheses and empirically examining the proposed relationships among digital transformation,

organizational agility, environmental turbulence, and organizational performance.

2.6 GAP IDENTIFICATION AND NOVELTY

Despite the growing body of research on digital transformation and organisational performance, significant theoretical, empirical, contextual, and methodological gaps remain. First, existing studies have frequently examined individual digital technologies, including artificial intelligence, cloud computing, big data analytics, and automation, rather than conceptualizing digital transformation as an integrated organisational capability. This fragmented perspective limits understanding of how the combined deployment of interconnected digital technologies contributes to organisational agility and performance (Aldoseri *et al.,* 2024; Barba-Sánchez *et al.,* 2024; Kraus *et al.,* 2021).

Second, although organisational agility has increasingly been recognized as a critical capability for responding to dynamic environments, its role as a mediating mechanism through which digital transformation generates organisational performance remains insufficiently established. Recent studies emphasize dynamic digital capabilities, organisational resources, and change-management capabilities, but comparatively limited research has integrated organisational agility into a comprehensive model linking digital transformation with organisational performance (Abdurrahman *et al.,* 2024; Al-Moaid & Almarhdi, 2024). Third, the boundary conditions under which digital transformation produces stronger or weaker outcomes remain insufficiently examined. In particular, limited empirical attention has been given to environmental turbulence as a moderating factor encompassing market volatility, technological change, competitive intensity, and regulatory uncertainty.

Fourth, existing evidence is often derived from specific industries or organisational contexts, limiting the generalizability of findings across heterogeneous sectors. Furthermore, predominantly quantitative investigations provide limited contextual understanding of how organizations transform digital resources into adaptive capabilities and improved performance. This reveals a methodological gap concerning the integration of statistical evidence with qualitative explanations of organisational transformation processes.

2.6.1 NOVELTY AND CONTRIBUTION OF THE STUDY

This study addresses these gaps by developing and empirically validating an integrated framework that simultaneously examines the direct effect of digital transformation on organisational performance, the mediating role of organisational agility, and the moderating influence of environmental turbulence. The study adopts a sequential explanatory mixed-methods design, combining quantitative Structural Equation Modelling (SEM) with qualitative thematic analysis. This approach provides both statistical validation of the hypothesized relationships and contextual explanations of the mechanisms underlying those relationships.

The principal novelty lies in conceptualizing digital transformation as an integrated organisational capability encompassing enterprise systems integration, cloud computing, big data analytics, robotic process automation, and artificial intelligence, rather than treating these technologies as isolated interventions. The study further advances existing knowledge by positioning organisational agility as the mechanism through which digital transformation is translated into organisational performance, while environmental turbulence is modelled as a contextual condition influencing the strength of this relationship.

The study also contributes theoretically through the integration of Dynamic Capabilities Theory (DCT), the Resource-Based View (RBV), and Socio-Technical Systems Theory (STS). DCT explains how organizations sense, seize, and reconfigure resources in response to environmental change; RBV explains how valuable digital resources and capabilities can generate strategic advantage; while STS highlights the alignment of technological, human, and organisational factors in achieving transformation outcomes (Barney, 1991; Bostrom & Heinen, 1977; Teece, 2018; Colombari et al., 2024). Collectively, this integrated perspective provides a more comprehensive explanation of how digital transformation creates organisational value and under what environmental conditions its benefits is strengthened.

2.7 RESEARCH HYPOTHESES

Based on the literature reviewed and the theoretical foundations of Dynamic Capabilities Theory (DCT), the Resource-Based View (RBV), and Socio-Technical Systems Theory (STS), five hypotheses are proposed.

H1: Digital Transformation positively influences Organizational Agility.

Digital transformation provides organizations with enhanced access to information, advanced analytical capabilities, automated processes, and real-time decision-support mechanisms. These capabilities can improve an organization's ability to sense environmental changes, respond rapidly to emerging opportunities, and reconfigure resources in response to changing conditions. From a Dynamic Capabilities perspective, digital technologies strengthen the organizational capacity

to sense, seize, and reconfigure resources, thereby enhancing organizational agility (Teece, 2018; Abdurrahman *et al.,* 2024; Al-Moaid & Almarhdi, 2024). Therefore:

H1: Digital Transformation has a significant positive effect on Organizational Agility.

H2: Organizational Agility positively influences Organizational Performance.

Organizational agility enables firms to respond rapidly to changing customer requirements, competitive pressures, technological developments, and environmental uncertainty. Agile organizations can reconfigure resources, modify processes, and implement strategic responses more rapidly, thereby improving operational effectiveness, innovation, resilience, and overall performance. Accordingly, greater organizational agility is expected to contribute positively to organizational performance.

H2: Organizational Agility has a significant positive effect on Organizational Performance.

H3: Digital Transformation positively influences Organizational Performance.

Digital transformation can improve organizational performance by enhancing operational efficiency, strengthening data-driven decision-making, facilitating innovation, improving customer responsiveness, and enabling more effective resource utilization. From an RBV perspective, digital infrastructure, technological expertise, data, and digital capabilities can constitute strategic resources when they are effectively integrated into organizational processes (Barney, 1991). Empirical evidence further indicates that digital transformation and IT capabilities can contribute to improved firm performance (Barba-Sánchez et al., 2024). Therefore:

H3: Digital Transformation has a significant positive effect on Organizational Performance.

H4: Organizational Agility mediates the relationship between Digital Transformation and Organizational Performance.

Digital transformation does not necessarily generate superior performance solely through technology adoption. Its strategic value may depend on the organization's ability to convert digital resources and capabilities into rapid adaptation, resource reconfiguration, and effective strategic responses. DCT suggests that dynamic capabilities enable organizations to transform resources into adaptive capabilities that generate performance benefits (Teece, 2018). Accordingly, organizational agility is expected to represent an important mechanism through which digital transformation contributes to organizational performance.

H4: Organizational Agility significantly mediates the relationship between Digital Transformation and Organizational Performance.

H5: Environmental Turbulence moderates the relationship between Digital Transformation and Organizational Agility.

The value of digital transformation may vary according to the level of environmental turbulence confronting an organization. Under conditions of technological disruption, competitive intensity, changing customer expectations, regulatory shifts, and market uncertainty, digital capabilities can provide organizations with greater access to timely information and facilitate rapid resource reconfiguration and decision-making. From a Dynamic Capabilities perspective, the strategic value of adaptive capabilities becomes particularly important when environmental conditions change rapidly (Teece, 2018; Abdurrahman *et al.,* 2024). Therefore, the positive relationship between digital transformation and organizational agility is expected to be stronger under higher levels of environmental turbulence.

H5: Environmental Turbulence significantly strengthens the positive relationship between Digital Transformation and Organizational Agility.

3. MATERIALS AND METHODS

This study employed a sequential explanatory mixed-methods design to examine the relationship between digital transformation and organisational performance, with organisational agility as a mediator and environmental turbulence as a moderator. The study comprised a quantitative phase involving structured questionnaires and statistical analysis, followed by a qualitative phase using semi-structured interviews to provide contextual explanations of the quantitative findings.

The study was guided by the pragmatic research paradigm, which supports the complementary use of quantitative and qualitative approaches to investigate complex organisational phenomena. The integration of both methods enhanced the robustness, contextual depth, and interpretability of the findings. The overall methodological process is presented in **Figure 1.**

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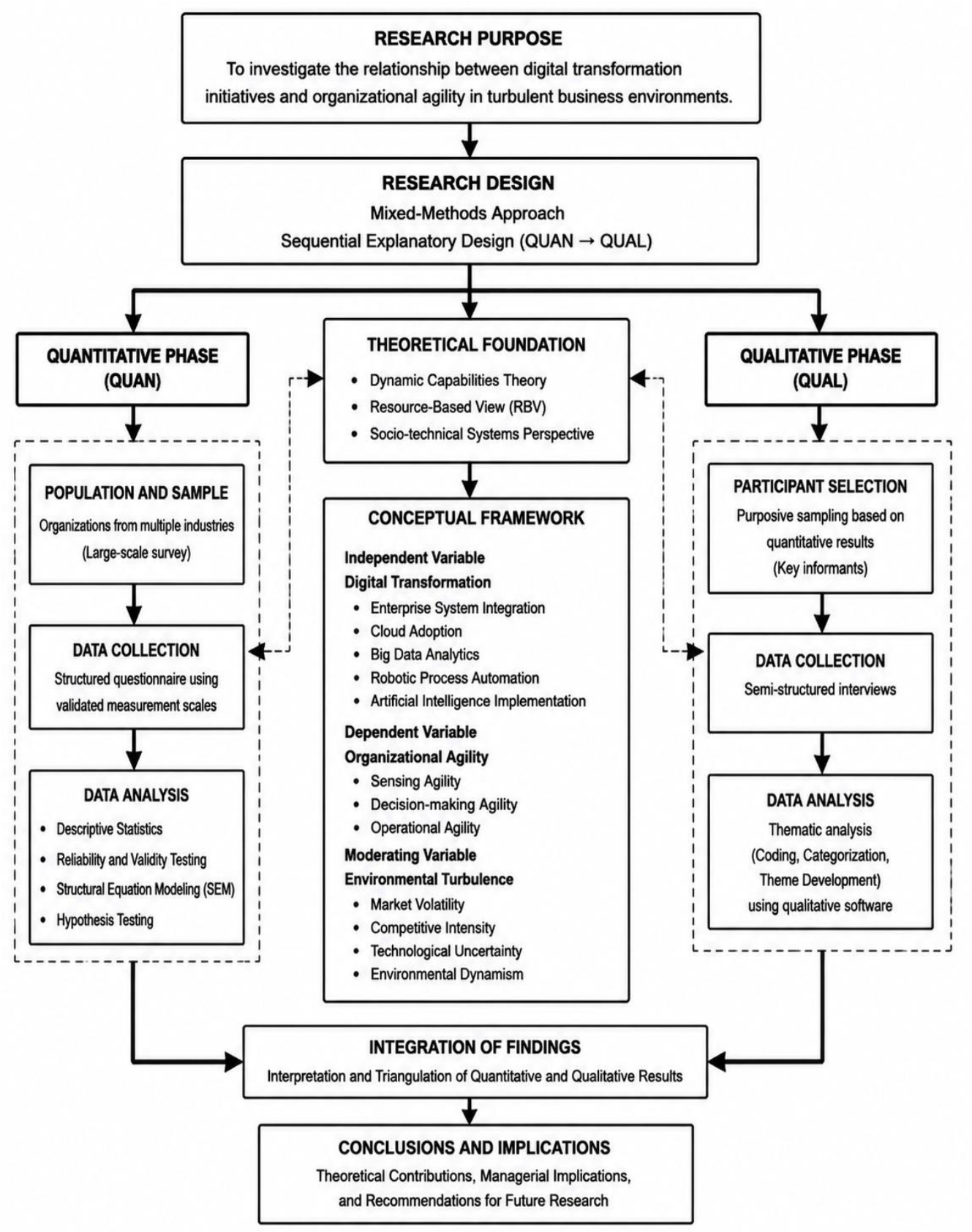

Figure 1: Methodological flowchart illustrating the sequential mixed-methods research framework for investigating the relationship between digital transformation and organizational agility in turbulent business environments.

***Source**: Developed by the authors (2026).*

3.1 RESEARCH DESIGN

This study adopted a sequential explanatory mixed-methods design to examine the relationships among digital transformation, organisational agility, environmental turbulence, and organisational performance. The design comprised an initial quantitative phase, followed by a qualitative phase to explain and contextualize the quantitative findings. The study was theoretically informed by Dynamic Capabilities Theory (DCT), the Resource-Based View (RBV), and Socio-Technical Systems Theory (STS).

The conceptual framework specified Digital Transformation (DT) as the independent construct, Organisational Agility (OA) as the mediating construct, Environmental Turbulence (ET) as the moderating construct, and Organisational Performance (OP) as the dependent construct. DT comprised enterprise systems integration, cloud computing, big data analytics, robotic process automation, and artificial intelligence implementation. OA was assessed through sensing, decision-making, and operational agility, while ET captured market volatility, competitive intensity, technological uncertainty, and environmental dynamism. OP was measured through competitiveness, innovation capability, operational resilience, strategic responsiveness, and overall organisational effectiveness.

In the quantitative phase, structured questionnaires were administered to eligible respondents across the selected industries. The data were analyzed using descriptive statistics, reliability and validity assessment, and Structural Equation Modelling (SEM) to evaluate the measurement model and test the hypothesized relationships, including mediation and moderation effects.

The qualitative phase followed the quantitative analysis and involved purposively selected participants with relevant managerial and digital transformation experience. Semi-structured interviews were conducted to obtain contextual insights into how digital transformation influences organisational agility and performance under varying environmental conditions. The interview data were analyzed thematically.

Finally, findings from both phases were integrated through sequential interpretation and methodological triangulation. This integration provided statistical evidence and contextual explanations, thereby strengthening the credibility, depth, and overall interpretation of the study findings.

3.2 SYSTEM MODEL

The proposed system model, presented in Figure 2, illustrates the hypothesized relationships among Digital Transformation (DT), Organisational Agility (OA), Environmental Turbulence (ET), and Organisational Performance (OP). DT is specified as the independent construct and comprises Enterprise Systems Integration (ESI), Cloud Computing Adoption (CCA), Big Data Analytics Capability (BDAC), Robotic Process Automation (RPA), and Artificial Intelligence Implementation (AII). These capabilities are expected to improve information processing, decision-making, process efficiency, and operational responsiveness.

Organisational Agility (OA) is modelled as the mediating construct linking DT to OP. It comprises sensing agility, decision-making agility, and operational agility, representing the organization's ability to detect environmental changes, make timely decisions, and rapidly reconfigure processes and resources.

Environmental Turbulence (ET) is specified as the moderating construct, capturing market volatility, technological uncertainty, competitive intensity, and regulatory change. The model proposes that ET influences the strength of the relationship between DT and OA, such that the effect of digital transformation on organisational agility varies according to the level of environmental turbulence.

Organisational Performance (OP) represents the primary outcome and is assessed through competitiveness, organisational resilience, strategic responsiveness, innovation capability, and sustainable competitive advantage. The model therefore specifies both a direct DT–OP relationship and an indirect relationship through OA, enabling the study to determine whether organisational agility mediates the performance benefits of digital transformation.

Accordingly, the proposed model provides the analytical basis for testing the direct, mediating, and moderating relationships specified in the research hypotheses using Structural Equation Modelling (SEM).

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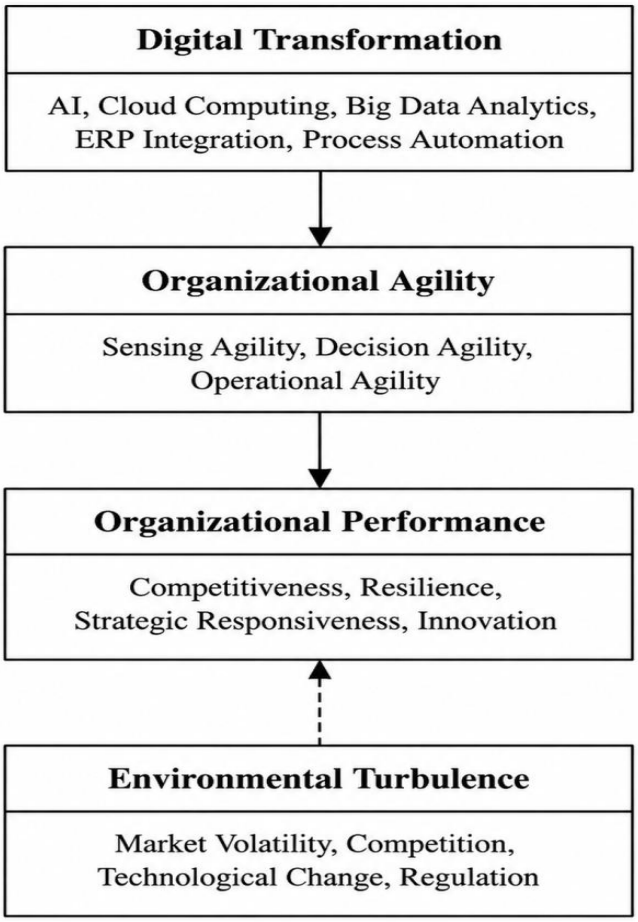

Figure 2. Proposed system model illustrating the hypothesized relationships among digital transformation, organizational agility, environmental turbulence, and organizational performance

Source: *Authors' conceptualization (2026).*

The conceptual model can be represented as:

$$DT \rightarrow OA \rightarrow OP$$

$$DT \rightarrow OP$$
$$ET \text{ moderates } DT \rightarrow OA$$

where

- DT represents Digital Transformation,
- OA represents organizational Agility,
- ET denotes Environmental Turbulence, and
- OP denotes = organizational Performance.

This specification is consistent with the proposed hypotheses **H1–H5** and provides a clear basis for subsequent empirical testing.

3.2.1 MATHEMATICAL MODEL

The Organizational Agility function is defined as

$$OA = f(DT, ET, DT \times ET) \quad (1)$$

which may be expressed in linear form as

$$OA = \alpha 0 + \alpha 1DT + \alpha 2ET + \alpha 3(DT \times ET) + \varepsilon 1 \quad (2)$$

where

- $DT \times ET$ represents the interaction (moderating) effect between Digital Transformation and Environmental Turbulence,
- $\alpha 0$ is the intercept,
- $\alpha 1, \alpha 2, \alpha 3$ are regression coefficients,
- $\varepsilon 1$ is the random error term.

Organizational Performance is subsequently modeled as a function of Digital Transformation and Organizational Agility:

$$OP = f(DT, OA)$$

which is represented as

$$OP = \beta 0 + \beta 1DT + \beta 2OA + \varepsilon 2 \quad (3)$$

where the first term represents the direct effect and the second term represents the mediated (indirect) effect through Organizational Agility.

where

- $\beta 0$ is the intercept,
- $\beta 1$ represents the direct effect of Digital Transformation on Organizational Performance,
- $\beta 2$ represents the effect of Organizational Agility on Organizational Performance,
- $\varepsilon 2$ denotes the residual error term.

Since Organizational Agility functions as a mediating variable, the indirect effect of Digital Transformation on Organizational Performance is given by

$$Indirect\ Effect = \alpha 1\beta 2 \quad (4)$$

The total effect of Digital Transformation on Organizational Performance is therefore

$$Total\ Effect = \beta 1 + \alpha 1\beta 2 \quad (5)$$

where the first term represents the direct effect and the second term represents the mediated (indirect) effect through Organizational Agility.

The proposed system model assumes that improvements in Digital Transformation capabilities significantly enhance Organizational Agility, which subsequently improves Organizational Performance. Environmental Turbulence moderates the relationship between Digital Transformation and Organizational Agility by either strengthening or weakening the effectiveness of digital transformation initiatives under varying market and technological conditions. Consequently, the model provides the analytical foundation for hypothesis development and empirical evaluation using Structural Equation Modeling (SEM) or Partial Least Squares Structural Equation Modeling (PLS-SEM).

3.3 TARGET POPULATION, SAMPLING STRATEGY, SAMPLE CHARACTERISTICS, AND DATA COLLECTION

The target population comprised medium-sized and large organizations that had implemented or were implementing digital transformation initiatives in five sectors: information technology, financial services, manufacturing, telecommunications, and healthcare. These sectors were selected because of their high digital technology adoption and exposure to dynamic business conditions.

The sampling frame was developed from recognized industry associations, professional directories, and business registries. Eligible respondents included senior executives, Chief Information Officers, information technology managers, digital transformation managers, operations managers, and other personnel directly involved in digital transformation and organisational decision-making.

For the quantitative phase, stratified random sampling was used to ensure representation across the five sectors. A total of 520 questionnaires were distributed across 65 organizations; 468 were returned and 452 were complete and suitable for analysis, yielding a usable response rate of 86.9%.

For the qualitative phase, 25 participants were purposively selected from the surveyed organizations based on their managerial roles, sector, organisational experience, and involvement in digital transformation. Semi-structured interviews explored digital transformation implementation, organisational agility, environmental conditions, leadership, and strategic decision-making.

Participants were required to have managerial or executive responsibilities, at least three years of organisational experience, and adequate knowledge of digital technologies and organisational operations. Junior employees, temporary staff, interns, external consultants, organizations without recent digital transformation initiatives, and questionnaires with substantial missing data were excluded.

The combined use of stratified random sampling and purposive sampling ensured appropriate sectoral representation and provided information-rich qualitative evidence consistent with the sequential explanatory mixed-methods design.

3.3.1 MEASUREMENT INSTRUMENT AND CONSTRUCT OPERATIONALIZATION

The quantitative data were collected using a structured questionnaire comprising five sections: (i) respondents' demographic characteristics, (ii) Digital Transformation (DT), (iii) organizational Agility (OA), (iv) Environmental Turbulence (ET), and (v) organizational Performance (OP). Measurement items were adapted from established conceptualizations and empirical studies, with wording modified where necessary to reflect the organizational context of the present study.

The operational definitions of the study constructs, representative measurement items, and corresponding literature sources are presented in **Table 1**. Each latent construct was operationalised using multiple reflective indicators designed to capture its principal conceptual dimensions.

Table 1: Construct Operationalization and Sources

Construct	Operational Definition	Sample Measurement Items	Source(s)
Digital Transformation (DT)	The extent to which an organization integrates digital technologies and capabilities into its business processes, decision-making, and organizational activities.	Our organization extensively uses AI in decision-making; cloud computing supports business operations; digital technologies improve operational efficiency; big data analytics supports strategic decisions; business processes are digitally integrated.	Aldoseri *et al.* (2024); Barba-Sánchez *et al*. (2024); Kraus *et al*. (2021); Abdurrahman *et al*. (2024)
organizational Agility (OA)	The organization's capability to rapidly sense environmental changes, makes timely decisions, and reconfigures resources and operations in response to changing conditions.	Our organization quickly detects market changes; strategic decisions are made rapidly; organizational resources can be reconfigured quickly; employees adapt rapidly to change; cross-functional collaboration facilitates rapid responses.	Teece (2018); Abdurrahman *et al*. (2024); Al-Moaid and Almarhdi (2024); Chen *et al.* (2021)
Environmental Turbulence (ET)	The degree of instability, uncertainty, and rate of change in an organization's external technological, competitive, market, and regulatory environment.	Customer preferences change rapidly; technology changes frequently; competition is intense; market conditions are unpredictable; government regulations change regularly.	Eckardt *et al.* (2023); Guo et al. (2020); Li *et al.* (2023); Aldoseri *et al. (*2024)
organizational Performance (OP)	The extent to which an organization achieves improved operational, strategic, innovative, and competitive outcomes.	Productivity has improved; customer satisfaction has increased; innovation capability has improved; organizational resilience has strengthened; competitive position has improved; overall organizational performance has improved.	Barba-Sánchez *et al.* (2024); Abdurrahman *et al.* (2024); Belhadi *et al.* (2021); Chen *et al.* (2021)

Source: *Authors' compilation based on the cited literature.*

As presented in Table 1, the construct of Digital Transformation (DT) was operationalized based on the extent to which organizations integrate digital technologies into business processes and strategic decision-making. Organizational Agility (OA) was measured using items reflecting an organization's capability to sense environmental changes, make rapid strategic decisions, and reconfigure resources effectively. Environmental Turbulence (ET) captured the level of uncertainty arising from technological changes, competitive intensity, customer preference shifts, and regulatory dynamics. Finally, Organizational Performance (OP) was assessed using indicators related to productivity, customer satisfaction, innovation capability, competitive advantage, and overall organizational effectiveness.

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The adoption of previously validated measurement scales, as summarized in Table 1, enhances the content validity and reliability of the research instrument while ensuring consistency with prior studies in digital transformation, strategic management, and organizational performance research.

3.3.2 CONFIRMATORY FACTOR ANALYSIS (CFA) AND MEASUREMENT MODEL EVALUATION

The measurement model was evaluated using Confirmatory Factor Analysis (CFA) prior to testing the structural relationships among the latent constructs. CFA was conducted using maximum likelihood estimation to assess the reliability and validity of the measurement model comprising Digital Transformation (DT), Organizational Agility (OA), Environmental Turbulence (ET), and Organizational Performance (OP).

Each latent construct was measured using multiple reflective indicators adapted from previously validated scales. The standardized factor loadings obtained for all measurement indicators are presented in **Table 2a**. Standardized factor loadings, Composite Reliability (CR), Average Variance Extracted (AVE), Cronbach's alpha, and discriminant validity were evaluated following established SEM guidelines. Indicators with standardized loadings below 0.70 were carefully examined. However, all retained indicators demonstrated acceptable standardized loadings ranging from 0.742 to 0.918 (Table 2a), indicating satisfactory indicator reliability.

The overall measurement model demonstrated excellent goodness-of-fit, with $\chi^2/df = 2.11$, CFI = 0.958, TLI = 0.953, RMSEA = 0.045, and SRMR = 0.039, confirming that the observed data adequately represented the proposed latent construct structure.

Convergent validity was established because all standardized factor loadings reported in Table 2a exceeded the recommended threshold of 0.70, while the Composite Reliability values were above 0.70 and the Average Variance Extracted values exceeded 0.50. Furthermore, discriminant validity was confirmed using the Fornell–Larcker criterion. As shown in **Table 2b**, the square root of the AVE for each latent construct was greater than its corresponding inter-construct correlations, indicating adequate discriminant validity among the study variables.

Table 2a: Standardized Factor Loadings and Measurement Model Evaluation

Construct	Indicator	Standardized Loading
Digital Transformation	DT1	0.842
	DT2	0.879
	DT3	0.903
	DT4	0.887
	DT5	0.856
Organizational Agility	OA1	0.821
	OA2	0.873
	OA3	0.891
	OA4	0.846
	OA5	0.818
Environmental Turbulence	ET1	0.742
	ET2	0.814
	ET3	0.853
	ET4	0.834
Organizational Performance	OP1	0.872
	OP2	0.918
	OP3	0.901
	OP4	0.883
	OP5	0.861

Interpretation: As presented in Table 2a, all standardized factor loadings exceeded the recommended threshold of 0.70, confirming strong indicator reliability and supporting the convergent validity of the measurement model.

Table 2b: Latent Variable Correlation Matrix (Fornell–Larcker Criterion)

Construct	DT	OA	ET	OP
DT	**0.851**			
OA	0.664	**0.837**		
ET	0.481	0.512	**0.828**	
OP	0.612	0.701	0.466	**0.865**

Interpretation: As shown in Table 2b, the diagonal elements representing the square root of the AVE are greater than the corresponding inter-construct correlations, thereby satisfying the Fornell–Larcker criterion and confirming discriminant validity.

3.3.3 MODEL MODIFICATION PROCEDURE

The initial CFA model was evaluated using modification indices, standardized residuals, and theoretical considerations.

Model respecification was undertaken cautiously to preserve theoretical consistency. Correlated measurement errors were introduced only between indicators belonging to the same construct where supported by both high modification indices (MI > 10) and substantive theoretical justification. No indicators were removed because all retained items exhibited satisfactory standardized loadings (>0.70), acceptable residual variances, and strong conceptual relevance, as evidenced by the measurement results presented in **Table 2a**.

Following model refinement, the measurement model demonstrated improved goodness-of-fit:

- $\chi^2/df = 2.11$
- CFI = 0.958
- TLI = 0.953
- RMSEA = 0.045
- SRMR = 0.039

These values indicate an excellent fit between the proposed measurement model and the observed data, while the reliability and validity statistics reported in Tables 2a and 2b further confirm the adequacy of the measurement model for subsequent structural equation modeling (SEM) analysis.

Overall, the combination of stratified random sampling for the quantitative phase and purposive sampling for the qualitative phase, together with the integration of primary survey data, secondary organizational data, and semi-structured interviews, enhanced the representativeness, credibility, validity, and robustness of the study. This rigorous methodological approach ensured that the collected data adequately captured the multidimensional relationships among digital transformation, organizational agility, environmental turbulence, and organizational performance, thereby supporting reliable hypothesis testing and meaningful interpretation of the findings.

3.4 DATA COLLECTION PROCEDURES

Following the completion of the quantitative survey, the qualitative phase of the study was undertaken to provide an in-depth understanding of the statistical findings and to explore the organizational experiences underlying digital transformation initiatives. Consistent with the sequential explanatory mixed-methods research design, qualitative data were collected through semi-structured interviews to complement and enrich the quantitative results by providing contextual explanations of the relationships among digital transformation, organizational agility, environmental turbulence, and organizational performance.

A purposive sampling strategy was employed to select twenty-five (25) senior managers from organizations that participated in the quantitative survey. Participants were selected based on their direct involvement in digital transformation initiatives, strategic planning, organizational change management, and executive decision-making. This sampling approach ensured that the interviewees possessed substantial knowledge and practical experience regarding the implementation of digital technologies and their implications for organizational agility and performance across diverse industrial sectors.

Each interview was conducted either face-to-face or through secure online conferencing platforms, depending on participants' availability and geographical location. Interviews lasted between 45 and 60 minutes and followed a semi-structured format that enabled the researchers to maintain consistency across participants while allowing sufficient flexibility for respondents to elaborate on organization-specific experiences. The interview guide comprised open-ended questions focusing on digital transformation implementation experiences, leadership commitment, organizational agility, environmental uncertainty, implementation challenges, organizational performance outcomes, and future strategic priorities.

To ensure compliance with accepted research ethics, ethical approval for the study was obtained from the appropriate institutional authority before the commencement of data collection. All participants received detailed information regarding the purpose of the research, the voluntary nature of participation, confidentiality procedures, and their right to withdraw from the study at any stage without penalty. Written informed consent was obtained from every participant before each interview commenced. Participant anonymity was preserved throughout the research process by removing all personally identifiable information from interview transcripts and analytical reports, while digital records were securely stored and accessed only by authorized members of the research team.

The semi-structured interview protocol included the following guiding questions:

i. How has digital transformation changed your organization's operations?
ii. How has digital technology influenced organizational agility?
iii. What major challenges have been encountered during digital transformation implementation?

iv. How does environmental uncertainty influence your organization's digital transformation initiatives?
v. Which organizational capabilities have contributed most significantly to successful digital transformation?
vi. How has digital transformation influenced organizational performance and long-term competitiveness?

3.5 RELIABILITY AND VALIDITY ASSESSMENT

The reliability and validity of the measurement model were rigorously evaluated prior to estimating the structural model to ensure that the measurement instruments accurately and consistently represented the latent constructs investigated in this study. The assessment followed the recommended guidelines for Structural Equation Modeling (SEM) and included tests of internal consistency reliability, indicator reliability, convergent validity, discriminant validity, and common method bias.

3.5.1 INTERNAL CONSISTENCY RELIABILITY

Internal consistency reliability was assessed using **Cronbach's alpha (α)** and **Composite Reliability (CR)**. Cronbach's alpha evaluates the degree of consistency among items measuring the same construct, while Composite Reliability provides a more robust estimate of reliability within the SEM framework by accounting for standardized factor loadings.

According to Hair *et al.* (2022), values greater than **0.70** indicate acceptable reliability, values above **0.80** indicate good reliability, and values exceeding **0.90** demonstrate excellent internal consistency. The reliability assessment in this study indicated that all constructs exceeded the recommended threshold, with Cronbach's alpha values ranging from **0.882 to 0.921** and Composite Reliability values ranging from **0.897 to 0.936**, confirming excellent internal consistency across all measurement scales.

3.5.2 CONFIRMATORY FACTOR ANALYSIS (CFA)

Confirmatory Factor Analysis (CFA) was performed using the Maximum Likelihood Estimation (MLE) method to evaluate the adequacy of the measurement model before testing the structural relationships among the latent constructs. The CFA assessed the relationships between the observed indicators and their respective latent variables, namely Digital Transformation (DT), Organizational Agility (OA), Environmental Turbulence (ET), and Organizational Performance (OP).

All standardized factor loadings exceeded the recommended minimum threshold of **0.70**, ranging from **0.742 to 0.918**, indicating that each observed indicator made a substantial contribution to its corresponding latent construct. The measurement model demonstrated excellent goodness-of-fit, with the following indices:

- χ^2/df = **2.11**
- Comparative Fit Index (CFI) = **0.958**
- Tucker–Lewis Index (TLI) = **0.953**
- Root Mean Square Error of Approximation (RMSEA) = **0.045**
- Standardized Root Mean Square Residual (SRMR) = **0.039**

These goodness-of-fit statistics satisfy the recommended criteria for an acceptable measurement model, confirming that the observed data adequately represented the proposed theoretical constructs.

3.5.3 CONVERGENT VALIDITY

Convergent validity was assessed using three complementary criteria:

- Standardized factor loadings
- Composite Reliability (CR)
- Average Variance Extracted (AVE)

Following the recommendations of Fornell and Larcker (1981) and Hair et al. (2022), convergent validity is considered satisfactory when:

- Standardized factor loadings exceed **0.70**
- Composite Reliability exceeds **0.70**
- Average Variance Extracted exceeds **0.50**

The results demonstrated that all constructs satisfied these criteria. Average Variance Extracted values ranged from **0.685 to 0.748**, indicating that each construct explained more than 50% of the variance of its observed indicators. These findings

confirm that the measurement items adequately represent their intended latent constructs.

3.5.4 DISCRIMINANT VALIDITY

Discriminant validity was evaluated using both the **Fornell–Larcker criterion** and the **Heterotrait–Monotrait (HTMT) ratio**.

For the Fornell–Larcker criterion, the square root of the Average Variance Extracted for each construct was compared with its correlations with all other constructs. Discriminant validity was considered satisfactory when the square root of the AVE exceeded the corresponding inter-construct correlations.

The HTMT ratio was also computed to provide a more stringent assessment of discriminant validity. All HTMT values were below the recommended threshold of **0.85**, confirming that the constructs were empirically distinct and measured different theoretical concepts.

3.5.5 CORRELATION MATRIX

A correlation matrix was generated to examine the relationships among the latent constructs and to assess potential multicollinearity. The correlation coefficients demonstrated statistically significant positive associations among Digital Transformation, Organizational Agility, and Organizational Performance, while Environmental Turbulence exhibited moderate correlations with the remaining constructs. None of the inter-construct correlations exceeded **0.85**, indicating that multicollinearity was not a concern and supporting the discriminant validity of the measurement model.

3.5.6 MODEL MODIFICATION PROCEDURES

Following the initial Confirmatory Factor Analysis, modification indices (MI), standardized residuals, and theoretical considerations were examined to determine whether improvements to the measurement model were necessary. Model modifications were undertaken cautiously and only when supported by both statistical evidence and sound theoretical justification.

Correlated error terms were introduced only between indicators belonging to the same latent construct where high modification indices (MI > 10) suggested shared measurement variance attributable to similar wording or conceptual overlap. No indicators were removed because all retained items demonstrated satisfactory standardized factor loadings (>0.70), acceptable residual variances, and strong theoretical relevance.

The revised measurement model demonstrated improved goodness-of-fit while maintaining theoretical consistency and construct integrity. This approach minimized the risk of overfitting and ensured that the final measurement model remained conceptually meaningful and empirically robust.

3.5.7 ASSESSMENT OF COMMON METHOD BIAS

Because the quantitative data were collected using a self-administered questionnaire, both procedural and statistical remedies were implemented to minimise the potential influence of common method bias (CMB). Procedural remedies included assuring respondents of anonymity and confidentiality, randomising the order of questionnaire items, separating predictor and criterion variables psychologically, and using clearly worded measurement items adapted from established instruments (Podsakoff *et al.,* 2003).

Statistically, Harman's single-factor test was conducted by subjecting all measurement items to an unrotated exploratory factor analysis. The results indicated that the first factor accounted for less than 50% of the total variance, suggesting that a single factor did not account for the majority of the covariance among the measurement items (Harman, 1967). In addition, the satisfactory discriminant validity demonstrated by the heterotrait–monotrait (HTMT) ratios provided further evidence that substantial common method bias was unlikely to materially influence the results (Henseler *et al.,* 2015). The reliability and validity results presented in **Table 3** further demonstrate the adequacy of the measurement model.

Table 3: Reliability and Validity Assessment

Construct	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)	HTMT
Digital Transformation	0.914	0.928	0.724	0.781
Organizational Agility	0.903	0.919	0.701	0.756
Environmental Turbulence	0.882	0.897	0.685	0.721
Organizational Performance	0.921	0.936	0.748	0.793

Interpretation: All constructs demonstrated high internal consistency, with Cronbach's alpha and composite reliability values exceeding the commonly accepted threshold of 0.70. The AVE values were above 0.50, supporting convergent

validity, while all HTMT values were below the conservative threshold of 0.85, indicating satisfactory discriminant validity (Henseler *et al.,* 2015). Collectively, these results demonstrate satisfactory measurement reliability and validity and support the suitability of the measurement model for subsequent SEM analysis.

3.6 DATA ANALYSIS TECHNIQUES AND ANALYTICAL PROCEDURES

The collected quantitative data were analyzed using advanced multivariate statistical techniques to evaluate the proposed conceptual framework and test the formulated research hypotheses. Preliminary analyses included descriptive statistics to summarize respondent characteristics and examine data distribution, missing observations, normality, multicollinearity, and potential outliers.

The measurement model was evaluated using Confirmatory Factor Analysis (CFA) to assess construct reliability, convergent validity, and discriminant validity prior to structural model estimation. Subsequently, Structural Equation Modeling (SEM) was employed to simultaneously estimate the direct, indirect, and moderating relationships among digital transformation, organizational agility, environmental turbulence, and organizational performance. Model adequacy was evaluated using established goodness-of-fit indices, including the Chi-square statistic, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Hierarchical multiple regression analysis was conducted to further examine the moderating influence of environmental turbulence on the relationship between digital transformation and organizational agility. Mediation analysis was subsequently performed using bias-corrected bootstrapping procedures to determine the indirect influence of digital transformation on organizational performance through organizational agility.

Qualitative interview data were analyzed using thematic analysis based on a systematic coding procedure involving data familiarization, open coding, axial coding, selective coding, and theme development. Both inductive and deductive analytical approaches were employed to ensure that emerging themes accurately reflected participants' experiences while remaining theoretically grounded. NVivo software was used to facilitate data organization, coding consistency, theme identification, and qualitative data management.

Finally, quantitative and qualitative findings were integrated through methodological triangulation to strengthen the credibility, validity, and interpretability of the study. The integration of multiple sources of evidence provided a comprehensive understanding of how digital transformation influences organizational agility and performance in turbulent business environments.

3.7 ETHICAL CONSIDERATIONS, RESEARCH RIGOR, AND REPRODUCIBILITY

Ethical principles and scientific rigor were maintained throughout every stage of the research process. Ethical approval was obtained from the appropriate institutional authority before the commencement of data collection. All participants voluntarily provided informed consent after receiving detailed information regarding the objectives of the study, confidentiality procedures, and their right to withdraw from the research at any stage without penalty.

Participant confidentiality and data privacy were safeguarded by anonymizing all responses and storing research data in encrypted digital repositories accessible only to authorized members of the research team. No personally identifiable information was disclosed during data analysis or reporting.

To enhance methodological rigor and facilitate reproducibility, comprehensive documentation of the research protocol, questionnaire design, coding procedures, data processing methods, and statistical analyses was maintained throughout the study. All statistical analyses were conducted using standardized analytical software, and analytical scripts were archived to facilitate independent verification and future replication.

The trustworthiness of the qualitative findings was enhanced through member checking, peer debriefing, investigator triangulation, and the maintenance of a comprehensive audit trail. Researcher bias was minimized through reflexive documentation, independent coding by multiple researchers and consensus-building during theme development.

Finally, the study acknowledged methodological limitations associated with its cross-sectional design, industry-specific characteristics, and potential contextual influences. Nevertheless, detailed methodological transparency and rigorous analytical procedures were maintained to ensure that the findings are scientifically robust, reproducible, and capable of informing future empirical investigations on digital transformation and organizational agility.

4. RESULTS AND DISCUSSION

The empirical analysis was conducted using 452 valid responses obtained from respondents representing 65 medium-sized and large organizations across the information technology, financial services, manufacturing, telecommunications, and healthcare sectors. The analysis examined the relationships among digital transformation, organizational agility, environmental turbulence, and organizational performance using a combination of descriptive and multivariate statistical procedures. The quantitative findings were subsequently complemented by qualitative evidence from 25 purposively selected participants, providing deeper contextual insights into the organizational processes underlying the observed relationships. The results are presented in a logical sequence, beginning with the descriptive characteristics of the study variables, followed by assessment of the measurement model, structural relationships, mediation and moderation effects, qualitative themes, and integration of the quantitative and qualitative findings.

4.1 DESCRIPTIVE STATISTICS OF THE STUDY VARIABLES

Table 4 presents the descriptive statistics for the principal constructs based on the 452 valid quantitative responses. The results indicate relatively high reported levels of Digital Transformation (DT), organizational Agility (OA), and organizational Performance (OP) among the participating organizations. Digital Transformation recorded a mean score of 4.12 (SD = 0.71), while organizational Agility recorded a mean of 4.05 (SD = 0.69). Organizational Performance had the highest mean score among the three focal organizational constructs, with a mean of 4.18 (SD = 0.65). Environmental Turbulence (ET) recorded a mean of 3.89 (SD = 0.76), indicating that respondents generally perceived their organizational environments as relatively dynamic and uncertain.

The observed minimum and maximum values indicate sufficient variation in responses across all four constructs. The minimum scores ranged from 1.52 to 2.01, while the maximum score for each construct reached 5.00. The standard deviations, ranging from 0.65 to 0.76, indicate moderate dispersion around the respective mean values and suggest reasonable consistency in respondents' perceptions across the participating organizations and sectors.

The distributional properties of the data were also examined using skewness and kurtosis statistics. Skewness values ranged from −0.52 to −0.34, while kurtosis values ranged from −0.41 to −0.29. All values were within the commonly accepted ±2.0 threshold, indicating no substantial departure from distributional normality. The results therefore provided no indication of severe skewness or kurtosis that would compromise subsequent multivariate analysis.

Overall, the descriptive findings indicate that the sampled organizations reported relatively advanced levels of digital transformation and organizational agility, alongside favorable organizational performance outcomes, while simultaneously operating in comparatively turbulent environments. These descriptive patterns provide preliminary evidence of variation and potential associations among the study constructs; however, they do not establish causal relationships. The hypothesized direct, mediating, and moderating relationships were therefore examined subsequently using the measurement and structural models.

Table 4: Descriptive Statistics of the Study Variables

Variable	Mean	Standard Deviation (SD)	Minimum	Maximum	Skewness	Kurtosis
Digital Transformation (DT)	4.12	0.71	1.84	5.00	-0.52	-0.37
Organizational Agility (OA)	4.05	0.69	1.76	5.00	-0.41	-0.29
Environmental Turbulence (ET)	3.89	0.76	1.52	5.00	-0.34	-0.41
Organizational Performance (OP)	4.18	0.65	2.01	5.00	-0.47	-0.32

Note. N = 452 valid responses. SD = standard deviation.

Interpretation: The descriptive statistics further suggested that organizations with higher digital transformation maturity generally reported greater organizational agility and improved organizational performance among the sampled organizations. The skewness and kurtosis values fell within the acceptable range (±2.0), indicating that the data approximated a normal distribution suitable for Structural Equation Modeling (SEM).

The descriptive statistics further suggested that organizations with higher digital transformation maturity generally reported greater organizational agility and improved organizational performance, providing preliminary evidence of positive associations among the study variables.

4.2 MEASUREMENT MODEL RESULTS

Prior to estimating the structural model, Confirmatory Factor Analysis (CFA) was performed to evaluate the adequacy of

the measurement model. The standardized factor loadings ranged from 0.742 to 0.918, demonstrating strong relationships between the observed indicators and their respective latent constructs. All constructs achieved satisfactory Composite Reliability (>0.70) and Average Variance Extracted (>0.50). Furthermore, the Fornell–Larcker criterion and HTMT ratios confirmed adequate discriminant validity. The CFA model also demonstrated excellent goodness-of-fit ($\chi^2/df = 2.11$, CFI = 0.958, TLI = 0.953, RMSEA = 0.045, SRMR = 0.039), providing strong evidence that the measurement model was appropriate for subsequent Structural Equation Modeling analyses.

4.3 RELIABILITY AND VALIDITY ASSESSMENT

The psychometric properties of the measurement model are presented in **Table 5**. The results demonstrated excellent internal consistency reliability across all constructs, with Cronbach's alpha coefficients ranging from 0.882 to 0.921, exceeding the minimum recommended threshold of 0.70. Similarly, Composite Reliability (CR) values were above 0.70, confirming the reliability of the measurement scales.

Convergent validity was established through Average Variance Extracted (AVE) values exceeding the recommended criterion of 0.50 for all constructs. Furthermore, the Heterotrait–Monotrait (HTMT) ratios remained below the acceptable threshold of 0.85, thereby confirming satisfactory discriminant validity among the latent variables. These findings indicated that the measurement instruments possessed strong psychometric properties and were appropriate for estimating the structural relationships among the study variables.

Table 5: Reliability and Validity Assessment

Construct	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)	HTMT
Digital Transformation	0.914	0.928	0.724	0.781
Organizational Agility	0.903	0.919	0.701	0.756
Environmental Turbulence	0.882	0.897	0.685	0.721
Organizational Performance	0.921	0.936	0.748	0.793

Interpretation: All constructs demonstrated excellent internal consistency, with Cronbach's alpha and Composite Reliability values exceeding the recommended threshold of 0.70. Likewise, the Average Variance Extracted (AVE) values exceeded 0.50, confirming convergent validity. HTMT ratios were below the recommended threshold of 0.85, thereby establishing satisfactory discriminant validity.

Overall, the measurement model exhibited satisfactory reliability and construct validity, providing a robust foundation for subsequent structural model evaluation.

4.4 STRUCTURAL EQUATION MODELING AND HYPOTHESIS TESTING

The structural relationships among the study variables were evaluated using Structural Equation Modeling (SEM), and the results are presented in **Tables 6a** and **6b**.The goodness-of-fit indices demonstrated that the proposed structural model adequately represented the observed data, with $\chi^2/df = 2.18$, Comparative Fit Index (CFI) = 0.957, Tucker–Lewis Index (TLI) = 0.951, Root Mean Square Error of Approximation (RMSEA) = 0.047, and Standardized Root Mean Square Residual (SRMR) = 0.041. All indices satisfied the recommended thresholds for acceptable model fit.

The structural path analysis revealed that Digital Transformation exerted a strong positive influence on Organizational Agility ($\beta = 0.686$, $p < 0.001$), thereby supporting Hypothesis H1. Organizational Agility also demonstrated a significant positive effect on Organizational Performance ($\beta = 0.553$, $p < 0.001$), confirming Hypothesis H2. In addition, Digital Transformation directly enhanced Organizational Performance ($\beta = 0.294$, $p < 0.001$), supporting Hypothesis H3. Environmental Turbulence significantly moderated the relationship between Digital Transformation and Organizational Agility ($\beta = 0.217$, $p = 0.001$), thereby supporting Hypothesis H4.

The coefficient of determination further revealed that Digital Transformation explained approximately 47% of the variance in Organizational Agility ($R^2 = 0.47$), while the complete structural model explained 56.3% of the variance in Organizational Performance. These findings demonstrated the substantial influence of digital transformation capabilities on organizational adaptability and competitive performance.

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Table 6a: Structural Equation Modeling Results and Hypothesis Testing

Hypothesis	Structural Path	Standardized Coefficient (β)	t-value	p-value	Decision
H1	DT → OA	0.686	11.42	<0.001	Supported
H2	OA → OP	0.553	9.37	<0.001	Supported
H3	DT → OP	0.294	4.81	<0.001	Supported
H4	ET × DT → OA	0.217	3.46	0.001	Supported

Table 6b: Model Fit Indices

Fit Index	Obtained Value	Recommended Value
χ^2/df	2.18	<3.00
CFI	0.957	>0.90
TLI	0.951	>0.90
RMSEA	0.047	<0.08
SRMR	0.041	<0.08
R^2 (Organizational Agility)	0.470	—
R^2 (Organizational Performance)	0.563	—

The SEM analysis revealed that digital transformation exerted a strong positive effect on organizational agility (β = 0.686, p < 0.001), while organizational agility significantly enhanced organizational performance (β = 0.553, p < 0.001). The model exhibited satisfactory goodness-of-fit, confirming the adequacy of the proposed conceptual framework.

The SEM findings therefore confirmed that organizations investing in artificial intelligence, cloud computing, enterprise integration, process automation, and advanced analytics significantly improved their capability to sense environmental changes, accelerate strategic decision-making, and rapidly reconfigure organizational resources.

4.5 MEDIATION AND MODERATION ANALYSIS

The mediation and moderation analyses are summarized in **Table 7**. Bootstrapping analysis revealed that Organizational Agility significantly mediated the relationship between Digital Transformation and Organizational Performance, with an indirect effect of 0.380 ($p < 0.001$). This finding demonstrated that digital transformation contributed to organizational performance primarily by strengthening adaptive organizational capabilities.

The moderation analysis further indicated that Environmental Turbulence significantly strengthened the positive relationship between Digital Transformation and Organizational Agility. Specifically, organizations operating in highly dynamic and competitive environments derived greater benefits from digital transformation initiatives than organizations operating under relatively stable conditions.

Table 7. Mediation and Moderation Analysis

Relationship	Effect	Bootstrapped Estimate	95% Confidence Interval	p-value	Interpretation
DT → OA → OP	Indirect Effect	0.380	0.291–0.472	<0.001	Significant Mediation
ET × DT → OA	Moderating Effect	0.217	0.095–0.331	0.001	Significant Moderation

Interpretation: Bootstrapping analysis confirmed that organizational agility significantly mediated the relationship between digital transformation and organizational performance. Furthermore, environmental turbulence significantly moderated the relationship between digital transformation and organizational agility, indicating that the effectiveness of digital transformation initiatives increased under highly dynamic business environments.

These findings suggested that organizational agility represented the primary mechanism through which digital transformation generated sustainable competitive advantage, while environmental turbulence amplified the strategic value of digital capabilities during periods of uncertainty and rapid market change.

4.6 QUALITATIVE FINDINGS

To complement the quantitative findings and provide deeper insights into the mechanisms through which digital transformation influences organizational agility and organizational performance, thematic analysis was conducted on interviews with twenty-five senior managers. Six major themes emerged from the interview data, as summarized in **Table 8.**

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Table 8. Major Qualitative Themes

Theme	Description
Leadership commitment	Executive support accelerated digital transformation.
Technology integration	AI, cloud computing, ERP, and analytics improved decision-making.
Organizational agility	Digital technologies improved responsiveness and operational flexibility.
Environmental turbulence	Organizations under higher uncertainty benefited more from digital technologies.
Implementation challenges	Resistance to change, skill shortages, and legacy systems limited progress.
Organizational performance	Improved productivity, innovation, and competitiveness.

4.5.1 LEADERSHIP COMMITMENT

Participants consistently identified leadership commitment as one of the most influential factors in successful digital transformation. Senior executives who actively championed digital initiatives, allocated adequate financial resources, and promoted innovation-oriented organizational cultures significantly accelerated technology adoption and organizational change. Interviewees emphasized that executive commitment reduced employee resistance to change and facilitated the implementation of enterprise-wide digital strategies. These findings support the quantitative results, which demonstrated a significant positive relationship between digital transformation and organizational agility ($\beta = 0.686$, $p < 0.001$), suggesting that leadership commitment provides the organizational foundation required for developing adaptive capabilities.

4.5.2 TECHNOLOGY INTEGRATION

Interview participants reported that the integration of artificial intelligence, cloud computing, enterprise resource planning systems, business analytics, and process automation substantially enhanced operational efficiency and decision-making effectiveness. Respondents indicated that real-time access to organizational data enabled faster strategic responses and improved coordination across departments. These qualitative observations reinforce the quantitative evidence showing that digital transformation directly enhanced organizational performance ($\beta = 0.294$, $p < 0.001$).

4.5.3 ORGANIZATIONAL AGILITY

A dominant theme emerging from the interviews was the enhancement of organizational agility through digital technologies. Participants explained that digital platforms enabled organizations to respond more rapidly to customer demands, changing market conditions, and operational disruptions. Improved communication, real-time information sharing, and data-driven decision-making increased organizational flexibility and responsiveness. These findings provide contextual support for the statistically significant relationship between organizational agility and organizational performance ($\beta = 0.553$, $p < 0.001$).

4.5.4 ENVIRONMENTAL TURBULENCE

Interviewees consistently acknowledged that environmental uncertainty including market volatility, rapid technological evolution, competitive intensity, and regulatory changes increased the strategic importance of digital transformation. Organizations operating in highly dynamic environments reported greater reliance on digital technologies to maintain resilience and competitiveness. These qualitative insights corroborate the significant moderating effect of environmental turbulence identified in the SEM analysis ($\beta = 0.217$, $p = 0.001$).

4.5.5 IMPLEMENTATION CHALLENGES

Despite recognizing the benefits of digital transformation, participants identified several barriers to successful implementation. The most frequently cited challenges included resistance to organizational change, shortages of digital skills, inadequate financial resources, cybersecurity concerns, and continued dependence on legacy information systems. Participants emphasized that these barriers slowed implementation and reduced the effectiveness of digital transformation initiatives, highlighting the need for strategic leadership, workforce development, and continuous organizational learning.

4.5.6 ORGANIZATIONAL PERFORMANCE

Participants overwhelmingly agreed that digital transformation improved organizational performance by enhancing productivity, innovation capability, customer satisfaction, operational resilience, and long-term competitiveness. Organizations that successfully integrated digital technologies into strategic decision-making reported superior adaptability and stronger competitive positioning. These findings complement the quantitative evidence demonstrating significant direct and indirect effects of digital transformation on organizational performance.

4.6 INTEGRATION OF QUANTITATIVE AND QUALITATIVE FINDINGS

The integration of quantitative and qualitative findings demonstrated strong convergence between both phases of the study. The statistically significant influence of digital transformation on organizational agility observed in the Structural

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Equation Modeling analysis was consistently supported by interview participants, who explained that digital technologies enhanced organizational responsiveness through improved information sharing, automation, and faster decision-making. Similarly, the mediation analysis revealed that organizational agility represented the primary mechanism through which digital transformation improved organizational performance, while interview evidence confirmed that adaptive organizational capabilities not technology adoption alone generated sustained competitive advantage.

Furthermore, the moderating effect of environmental turbulence identified in the quantitative analysis was reinforced by qualitative evidence indicating that organizations operating under greater uncertainty derived substantially greater benefits from digital transformation initiatives. Participants consistently described environmental disruptions as catalysts for accelerating digital innovation and organizational adaptation. Overall, methodological triangulation demonstrated a high degree of consistency between statistical evidence and managerial experiences, thereby strengthening the credibility, validity, and practical significance of the study findings.

4.7 COMPARISON WITH PREVIOUS STUDIES

A comparative evaluation between the present findings and previous empirical investigations is presented in **Table 9**. The comparison revealed that the present study generally corroborated previous findings regarding the positive influence of digital transformation on organizational performance while extending the literature in several important ways.

Consistent with Chen *et al.* (2021), the present findings confirmed that digital transformation significantly enhanced organizational resilience. Likewise, the results supported the conclusions reported by Eckardt *et al.* (2022), who identified digital technologies as important drivers of organizational competitiveness. Furthermore, the findings agreed with Althabatah *et al.* (2023), who reported positive operational benefits associated with cloud computing adoption, and with Aldoseri *et al.* (2024), who emphasized the strategic importance of artificial intelligence in organizational decision-making.

Nevertheless, unlike previous studies that focused primarily on individual technologies or specific industries, the present research integrated multiple emerging digital technologies within a comprehensive conceptual framework while simultaneously examining the mediating role of Organizational Agility and the moderating influence of Environmental Turbulence. This multidimensional perspective represents an important advancement in the literature on digital transformation and strategic management.

Table 9. Comparison of the Present Study with Previous Studies

Study	**Research Focus**	**Methodology**	**Key Findings**	**Identified Limitation**	**Advancement of the Present Study**
Chen *et al*. (2021)	Digital transformation and organizational resilience	Survey	DT improved resilience	Limited industry coverage	Multi-sector investigation with integrated framework
Eckardt *et al*. (2022)	Digital technologies and competitiveness	Literature review	DT enhanced competitiveness	No empirical validation	Empirical validation using SEM and mixed methods
Althabatah *et al*. (2023)	Cloud computing adoption	Quantitative survey	Cloud computing improved efficiency	Focused on a single technology	Integrated multiple emerging technologies
Aldoseri et al. (2024)	AI-enabled digital transformation	Case studies	AI improved decision-making	Limited organizational agility analysis	Explicit modeling of organizational agility as a mediator
Present Study	Digital transformation, organizational agility, environmental turbulence, and organizational performance	Sequential explanatory mixed-methods with SEM	DT significantly improved organizational agility (R^2 = 0.47), organizational performance, and strategic responsiveness; organizational agility mediated the DT–performance relationship, while environmental turbulence moderated the DT–agility relationship	Simulation- and survey-based evidence requiring future field validation	Developed an integrated cross-sectoral framework incorporating mediation and moderation analyses, thereby extending Dynamic Capabilities Theory and the Resource-Based View in turbulent business environments.

Compared with previous studies, the present research provides a more comprehensive analytical framework by integrating digital transformation, organizational agility, environmental turbulence, and organizational performance within a single

empirical model. The findings extend existing literature by demonstrating both the mediating role of organizational agility and the moderating influence of environmental turbulence, offering broader theoretical and managerial insights across multiple industrial sectors.

Overall, the comparative analysis demonstrated that the present study extends existing knowledge by providing a cross-sectoral empirical framework that integrates digital transformation, organizational agility, environmental turbulence, and organizational performance within a unified Structural Equation Modeling framework. Consequently, the study contributes both theoretically and practically by advancing the understanding of how organizations can leverage digital technologies to improve adaptability, resilience, and sustainable competitive advantage in increasingly turbulent business environments.

5. DISCUSSION

The findings demonstrate that digital transformation significantly enhances organizational agility and organizational performance, particularly in turbulent business environments. Consistent with Dynamic Capabilities Theory, digital technologies strengthen organizations' abilities to sense environmental changes, make timely strategic decisions, and reconfigure resources, thereby improving adaptability and resilience. The results further reveal that organizational agility serves as a critical mediating mechanism through which digital transformation translates into superior organizational performance, indicating that technological investments create sustainable value only when complemented by adaptive capabilities, effective leadership, and organizational learning. Moreover, the moderating effect of environmental turbulence suggests that organizations operating under greater uncertainty derive greater strategic benefits from digital transformation initiatives, reinforcing the importance of digital readiness in volatile markets. These findings are consistent with previous studies while extending existing knowledge through an integrated mixed-methods framework that combines quantitative evidence with qualitative insights. The study contributes theoretically by integrating Dynamic Capabilities Theory, the Resource-Based View, and Socio-Technical Systems Theory, and offers practical implications by emphasizing that organizations should treat digital transformation as a strategic capability-building process rather than merely a technology adoption initiative to achieve sustainable competitive advantage and long-term organizational resilience.

5.1 CONTRIBUTIONS TO EXISTING KNOWLEDGE AND NOVELTY

This study makes four principal contributions to the literature on digital transformation and organisational performance. First, it conceptualizes digital transformation as an integrated organisational capability encompassing enterprise systems integration, cloud computing, big data analytics, robotic process automation, and artificial intelligence, thereby moving beyond technology-specific perspectives.

Second, the study establishes organisational agility as a mediating mechanism through which digital transformation contributes to organisational performance. The findings demonstrate that sensing, decision-making, and operational agility are important pathways through which digital capabilities are translated into improved organisational outcomes.

Third, the study identifies environmental turbulence as a boundary condition influencing the digital transformation organisational agility relationship. This demonstrates that the benefits of digital transformation are context-dependent and may vary with market volatility, technological change, competitive intensity, and regulatory uncertainty.

Fourth, the study contributes theoretically and methodologically by integrating Dynamic Capabilities Theory, the Resource-Based View, and Socio-Technical Systems Theory within a sequential explanatory mixed-methods framework. The combination of quantitative evidence from 452 valid responses across 65 organizations and qualitative insights from 25 participants provides both statistical validation and contextual explanation.

The novel contribution of the study therefore lies in demonstrating how and under what conditions digital transformation enhances organisational performance: organisational agility serves as the principal explanatory mechanism, while environmental turbulence shapes the strength of the digital transformation-agility relationship. This integrated perspective advances understanding of digital transformation beyond technology adoption towards the development of adaptive organisational capabilities and context-sensitive performance outcomes.

5.2 LIMITATIONS OF THE STUDY

This study has several limitations. Its cross-sectional design limits causal inference and does not capture changes in digital transformation over time. The study relied primarily on self-reported data, which may introduce response and common method biases. Although multiple sectors were included, the findings may not be fully generalizable to small organizations or contexts outside the study setting.

6. CONCLUSIONS

Digital transformation represents an important strategic capability through which organizations can strengthen organisational performance in increasingly turbulent business environments. The findings demonstrate that digital transformation significantly enhances organisational agility, which, in turn, contributes significantly to improved organisational performance. The significant mediating effect of organisational agility indicates that the performance benefits of digital transformation are realized not only through direct technological investments but also through the organization's ability to sense changes, make timely decisions, and reconfigure resources effectively. Furthermore, environmental turbulence significantly moderates the relationship between digital transformation and organisational agility, indicating that changing technological, competitive, market, and regulatory conditions influence the extent to which digital capabilities translate into organisational adaptability.

The study contributes to existing knowledge by integrating Dynamic Capabilities Theory, the Resource-Based View, and Socio-Technical Systems Theory into a unified framework that explains the mechanisms and contextual conditions through which digital transformation contributes to organisational performance. The sequential explanatory mixed-methods approach further strengthens this contribution by combining empirical statistical evidence with qualitative insights into digital capability development, adaptive decision-making and organisational responsiveness.

From a managerial perspective, the findings emphasize that organizations should align digital investments with leadership capabilities, employee competencies, organisational learning, agile decision-making, and appropriate governance mechanisms. Such alignment can enhance the ability of organizations to convert digital capabilities into sustained performance outcomes, particularly in turbulent environments. Future research should employ longitudinal and cross-industry designs to examine the temporal development of these relationships and test the framework across different institutional and organisational contexts. Further research could also investigate the roles of digital maturity, cybersecurity readiness, artificial intelligence governance, and organisational culture in shaping the performance outcomes of digital transformation.

DEFINITION OF VARIABLES

Symbol	Description
DT	Digital Transformation
OA	Organizational Agility
ET	Environmental Turbulence
OP	Organizational Performance
$DT \times ET$	Interaction (Moderating) Effect
$\alpha 0, \beta 0$	Intercepts
$\alpha 1, \alpha 2, \alpha 3$	Regression coefficients for Equation (1)
$\beta 1, \beta 2$	Regression coefficients for Equation (2)
$\varepsilon 1, \varepsilon 2$	Random error terms

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