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Building resilience through digital transformation: a systematic literature review and comprehensive framework for large enterprises

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Abstract: Large enterprises face significant challenges in building organisational resilience (OR) through digital transformation (DT), with 70% of DT initiatives failing to achieve their intended outcomes. This study conducted a systematic literature review following PRISMA guidelines, analysing 49 peer-reviewed articles (2020–2024) from the Scopus database. The review uniquely combined three theoretical lenses – the digital maturity model, Industry 4.0 framework, and dynamic capabilities theory – to understand the DT-OR relationship in large enterprises. The findings reveal three critical pathways through which DT enhances OR: operational flexibility (40–50% improvement), data-driven decision-making (30–35%), and stakeholder engagement (25–30%). Counter to traditional assumptions, knowledge management systems amplify DT's impact on OR by 1.5–2 times, suggesting organisational learning capabilities are more crucial than technological sophistication. The proposed framework introduces continuous feedback loops and evaluation mechanisms, offering a structured yet flexible approach for navigating DT complexities in large enterprises.

Keywords: digital transformation; organisational resilience; implementation framework; large enterprises.

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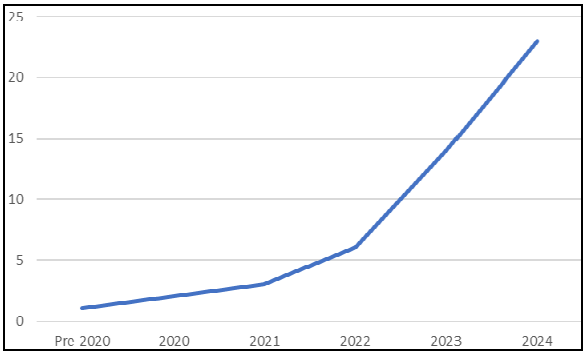
1 Introduction

The rapid advancement of digital technologies and increasing market volatility, coupled with the unprecedented disruptions caused by the COVID-19 pandemic, have exposed vulnerabilities in supply chains and operations worldwide. These challenges have created a pressing need for enhanced organisational resilience (OR), which is successfully achieved through digital transformation (DT) initiatives, highlighting the importance of leadership effectiveness, digital-first cultures, and technological readiness as critical enablers of success (Wang et al., 2024; Liu et al., 2024; Trieu et al., 2024; He et al., 2023). As a result of these drivers, firms are increasingly adopting DT initiatives to build organisational resilience. Leveraging technologies such as artificial intelligence, cloud computing, and the internet of things (IoT), DT enables businesses to improve their operational efficiency, adaptability, and supply chain visibility while fostering an overall readiness to anticipate, respond to, and recover from disruptions (Zhang et al., 2021; Sobczak, 2022; Xu et al., 2024). The benefits of these efforts are significant. Studies show that DT improves response capabilities during crises by 30–40%, reduces operational vulnerabilities, and enables firms with digitally savvy leadership and robust infrastructure to achieve superior outcomes. By aligning technological investments with organisational readiness, businesses are better equipped to maximise the benefits of DT and navigate future challenges effectively (Dong and Xing, 2023; Liang et al., 2024).

The growing interest in the relationship between DT and OR has also been reflected in the academic discourse, which has expanded significantly in recent years. Between 2022 and 2024, there has been a sharp rise in studies published on this topic, with 46.9% con-ducted in 2024 and 28.6% in 2023, highlighting a post-pandemic focus on leveraging DT to address disruptions and build resilience (Sobczak, 2022; Trieu et al., 2024; Ghrbeia and Alzubi, 2024). In contrast, earlier years, such as 2021 and 2022, accounted for only 6.1% and 12.2% of studies, while pre-2020 research was minimal (Butler and Brooks, 2021). This surge reflects a growing recognition that DT offers practical solutions to critical challenges, such as enhancing supply chain visibility, improving operational efficiency, and fostering organisational agility (Wang et al., 2024; He et al., 2023). The rapid pace of technological advancements, combined with their proven effectiveness in mitigating crises, has shifted DT from an optional enhancement to an essential strategy

for sustaining competitiveness in volatile environments (Zhan and Li, 2024; Su et al., 2023). As illustrated in Figure 1, this shift underscores the increasing emphasis on using DT to enhance organisational adaptability and performance, further highlighting the need to explore the multifaceted relationship between DT and OR (Hoang and Teo, 2023; Zhang et al., 2021).

Figure 1 Documents by year (see online version for colours)



This expanding body of research has produced a variety of frameworks exploring the link between DT and OR, though each has limitations and leaves specific gaps. For instance, Nadkarni and Prügl (2021) highlighted DT's transformative impact on business models but underrepresented the role of external stakeholders in adapting to and leveraging digital technologies. Similarly, Gomez-Trujillo and Gonzalez-Perez (2022) positioned DT as both a driver and predecessor of sustainability but focused primarily on specific departments, limiting their broader organisational relevance. Loonam et al. (2018) proposed frameworks for aligning business models with IoT adoption, but their narrow focus on traditional firms lacked general applicability across diverse organisational types. These limitations underscore the need for more comprehensive and integrative frameworks to address the complexities of DT and OR across varied organisational contexts.

Nkomo and Kalisz (2023) developed a strategic roadmap for leveraging DT to enhance OR by integrating people, processes, and technological infrastructure, emphasising workforce culture, skills, and well-being as prerequisites for adopting technologies like cloud computing and analytics, with agility and digital governance as key enablers. However, the framework is limited by its focus on South Africa's socio-economic context, restricting its broader applicability, and it offers few strategies for managing technostress or ensuring sustainable implementation. Additionally, brief mentions of emerging technologies like blockchain and AI highlight gaps in their strategic integration. Expanding this framework's applicability to diverse contexts is essential.

With their complexity, scale, and global reach, large enterprises provide a compelling context for developing a broader framework connecting DT and OR, addressing limitations in prior research. Unlike SMEs, which focus on basic digitalisation, large firms navigate multi-layered DT initiatives, requiring sophisticated strategies for resource allocation, stakeholder engagement, and structural integration (Ismail et al., 2023; Chonsawat and Sopadang, 2020; Putritamara et al., 2023; Tung, 2023). This complexity

necessitates frameworks integrating both internal and external resilience dimensions like adaptive governance, technological readiness, and innovation ecosystems (Baublys, 2020; Giustiniano and Cantoni, 2017), along with holistic approaches that include built environments, socio-technical systems, and sustainable practices (Fiksel, 2016). Multi-level models that capture the interplay of leadership, workforce capabilities, infrastructure maturity, and operational resilience are crucial for managing disruptions and fostering innovation (Oladimeji et al., 2025; Keathley et al., 2023). Research on large enterprises will bridge these gaps, offering actionable insights for developing adaptive frameworks for resilience in the digital era.

The rapid advancement of digital technologies has forced large enterprises to accelerate their DT initiatives to maintain competitiveness. However, many large firms struggle to build OR through DT, with 70% of DT initiatives failing to achieve their intended outcomes (McKinsey, 2023). This challenge is particularly evident in large businesses due to their complex organisational structures, legacy systems, and the need to coordinate transformation across multiple business units.

Previous research has used various theoretical frameworks to explore the relationship between DT and OR. For example, Sobczak (2022) employed the dynamic capabilities theory (DCT) and technological adoption to investigate how robotic process automation (RPA) enhances resilience, while Trieu et al. (2024) applied the resource-based view (RBV), ambidexterity, and paradoxical leadership to examine a leadership's impact on OR in volatile environments. Ghrbeia and Alzubi (2024) focused on RBV and the DCT to emphasise digital literacy, readiness, and organisational agility, and Wang et al. (2024) combined new structural economics and dynamic capabilities to understand the role of DT in corporate resilience. Additionally, He et al. (2023), Zhan and Li (2024) and Liu et al. (2024) linked the digital maturity model and the DCT to enhance OR through adaptive capabilities in uncertain environments.

Despite these contributions, there are three critical gaps in the current understanding. First, the existing frameworks primarily focus on isolated aspects of DT or OR, failing to capture how different elements of DT collectively contribute to building OR in large enterprises. Second, the current research lacks practical guidance on how large firms can integrate technological capabilities, organisational systems, and external factors to enhance resilience through DT. Third, there is a limited understanding of how the unique characteristics of large enterprises – such as organisational complexity, resource abundance, and stakeholder diversity – influence the relationship between DT and OR.

This study addresses these gaps by developing an integrated framework that combines the digital maturity model, Industry 4.0 framework, and DCT. This integration aims to provide large enterprises with a comprehensive approach to building OR through DT while considering their specific organisational context and challenges. The relevance of this research lies in its potential to offer a strategic framework that not only addresses existing gaps in the literature but also provides practical insights for businesses in navigating the complexities of DT. This research will be valuable for academic discourse and practitioners, especially in large enterprises, by equipping them with the necessary tools to respond effectively to disruptions and ensure they have a sustained competitive advantage in an increasingly digital and volatile business environment.

2 Building resilience

Building OR represents a systematic process of developing and strengthening a firm's capacity to anticipate, respond to, and adapt to disruptions. Unlike traditional approaches that view resilience as a static characteristic, a contemporary understanding emphasises resilience as a dynamic capability that enterprises must continuously develop and maintain. Research shows that resilience building encompasses three core dimensions: preventive resilience in anticipating and preparing for potential disruptions, adaptive resilience in responding to changes in real-time, and transformative resilience in fundamentally reinventing business models when necessary (Wang et al., 2024; Zhang et al., 2021). These dimensions work together to create what He et al. (2023) de-scribed as an 'integrated resilience capacity' that enables enterprises to survive disruptions and potentially emerge stronger.

Building resilience extends beyond mere risk management to include the development of organisational capabilities that foster stability and flexibility. This dual focus is particularly evident in how organisations approach resource allocation, technology adoption, and capability development. For instance, studies have shown that effective resilience building requires firms to maintain operational efficiency while developing the flexibility to reconfigure resources and processes rapidly (Liu et al., 2024; Trieu et al., 2024). This paradoxical requirement highlights why building resilience is increasingly viewed as a strategic capability that must be embedded within an enterprise's core operational and cultural fabric rather than treated as a separate organisational function or initiative (Chen et al., 2024; Zhan and Li, 2024).

3 Reviewing the linkage between DT and OR

3.1 Definitions and dimensions of DT

DT represents a comprehensive organisational transformation integrating digital technologies at its core, fundamentally redefining how businesses operate, create value, and engage with stakeholders. It is strategically defined as the application of digital technologies across business functions to enhance operational efficiency, drive innovation, and create new business opportunities by addressing technological, organisational, and cultural dimensions (Ghrbeia and Alzubi, 2024; Wang et al., 2024). Unlike mere digitalisation, which focuses on digitising existing processes, DT entails a transformative shift in business processes, organisational structures, and customer engagement models through the adoption of advanced technologies such as artificial intelligence, cloud computing, and the IoT (Sobczak, 2022; Zhang et al., 2021). This holistic transformation necessitates changes in mindset, leadership approaches, and operational practices, integrating digital infrastructure, advanced data analytics, and customer-centric solutions to achieve sustained growth and adaptability (Liu et al., 2024; Trieu et al., 2024).

Table 1 Theoretical frameworks linking DT dimensions to OR outcomes

Dimensions of DT	*Sub-framework*	*Organisational areas*	*Alignment with OR dimensions*	*How the theory captures the link*
Data-driven insights	Digital maturity model (DMM) (Teichert, 2019)	Information systems management	Preparedness	Emphasises readiness by integrating data-driven insights into digital transformation strategies, ensuring enterprises are culturally prepared to anticipate disruptions and maintain continuity.
Customer-centric innovations and cultural readiness	Digital maturity model (DMM) (Teichert, 2019)	Marketing management	Adaptive capacity	Captures customer-centric and cultural dimensions of DT, fostering adaptability and aligning operational readiness with evolving market demands to enhance the adaptive capacity.
Integration of IoT, AI, and big data analytics	Industry 4.0 (I4.0) framework (Wichmann et al., 2019)	Operations management	Response capability	Integrates IoT, AI, and analytics to address supply chain vulnerabilities, ensuring responsiveness and optimisation for improved operational continuity.
Creation of cyber-physical systems for real-time responses and supply chain optimisation	Industry 4.0 (I4.0) framework (Wichmann et al., 2019)	Operations management	Efficiency	Links cyber-physical systems to OR outcomes like efficiency through predictive maintenance, real-time optimisation, and decentralised decision-making.
Resource sensing, seizing, and reconfiguration	Dynamic capabilities theory (DCT)	Strategic management (Teece, 2010, 2014)	Recovery	Highlights the strategic role of resource reconfiguration and managerial innovation in sensing and seizing opportunities, ensuring recovery and resilience during disruptions.
Fostering innovation and restructuring models to adapt to market disruptions	Dynamic capabilities theory (DCT)	Innovation management (Teece, 2010, 2014)	Strategic flexibility (Teece, 2010, 2014)	Aligns innovation and resource allocation processes to foster flexibility, enabling organisations to adapt to dynamic markets and maintain sustainable resilience.

3.2 OR definitions and dimensions

OR is the capacity to anticipate, prepare for, and adapt to incremental change and sudden disruptions, ensuring survival and prosperity (Wang et al., 2024; Liu et al., 2024). It includes operational, financial, and strategic resilience dimensions, with measurement frameworks assessing adaptive capacity, efficiency, and flexibility (Trieu et al., 2024; Chen et al., 2024). These indicators help firms evaluate resilience levels, particularly in the context of DT and emerging business challenges (Zhang et al., 2021; Wang and Tang, 2022).

In large enterprises, resilience-building necessitates sophisticated approaches, integrating technological capabilities, organisational structures, and human factors (Ghrbeia and Alzubi, 2024; Zhan and Li, 2024). Dynamic capabilities enable resource reconfiguration and process adaptation in response to changing conditions, while cross-functional coordination and supply chain integration enhance preparedness (Liu and Qi, 2024; Dong and Xing, 2023). These elements improve the operational performance, competitive advantage, and disruption readiness (Xu et al., 2024; Tang and Huang, 2023).

3.3 Theoretical foundations linking DT and OR

This research aims to develop a comprehensive framework linking DT and OR, specifically tailored for large enterprises facing unique challenges such as complex structures, multi-layered DT initiatives, and the need for advanced strategies to navigate internal and external disruptions. The study addresses these challenges by integrating three key foundational frameworks: the digital maturity model (DMM) (Teichert, 2019), the Industry 4.0 (I4.0) framework (Wichmann et al., 2019), and the DCT (Teece, 2010, 2014) (Table 1). These frameworks were chosen for their ability to address distinct yet interconnected aspects of DT and OR, providing valuable insights into adopting advanced technologies, operational strategies, and adaptive capabilities that enhance OR.

DMM focuses on organisational progression through digital maturity stages, emphasising the integration of advanced technologies and fostering cultural adaptability, which is essential for building resilience over time (Teichert, 2019). The Industry 4.0 framework offers a comprehensive view of how emerging technologies like IoT, AI, and automation contribute to operational efficiency and resilience by aligning processes and technologies across complex organisational systems (Wichmann et al., 2019). DCT highlights a firm's ability to sense opportunities and threats, seize them, and reconfigure resources to maintain adaptability and sustainability in disruptions (Teece, 2010, 2014). Together, these frameworks provide a robust theoretical foundation for understanding how digital integration, technological adoption, and resource reconfiguration contribute to resilience in dynamic environments.

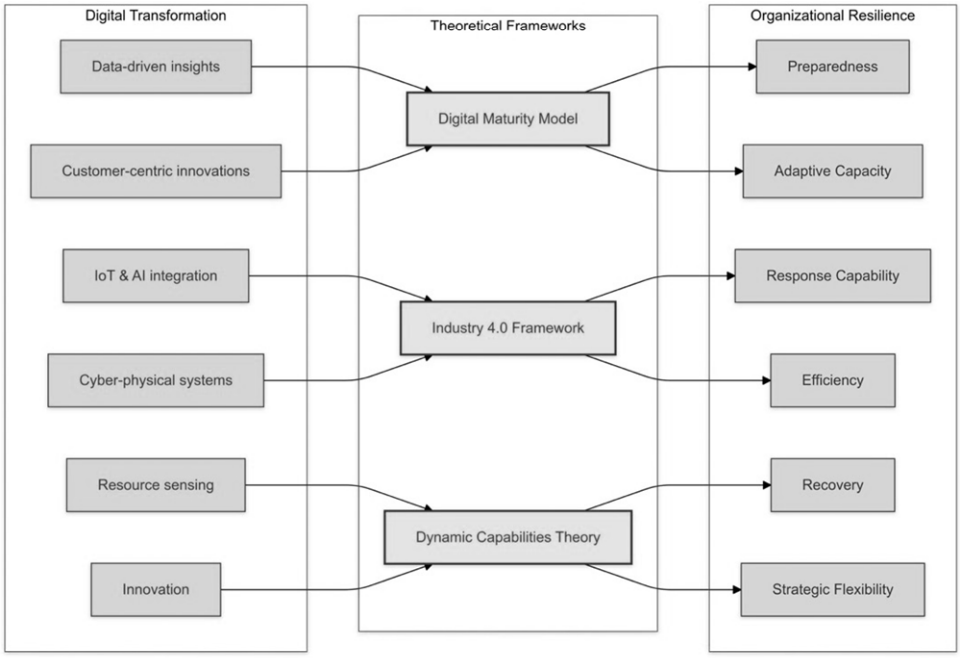
These frameworks were chosen for their complementary contributions to linking DT dimensions with OR outcomes. DMM is essential for assessing digital readiness, a key factor in large enterprises' successful implementation of DT, aligning with OR dimensions such as preparedness and adaptive capacity (Teichert, 2019). It helps businesses anticipate and respond to disruptions by integrating cultural, operational, and technological factors. The Industry 4.0 framework addresses OR dimensions like operational efficiency and response capability, particularly in large enterprises with intricate supply chains, enabling real-time optimisation and predictive maintenance

(Wichmann et al., 2019). DCT emphasises the importance of recovery and strategic flexibility, focusing on resource reallocation, process reconfiguration, and innovation-driven leadership (Teece, 2010, 2014). Collectively, these frameworks offer a comprehensive understanding of how DT can enhance OR in large, complex systems.

3.4 Empirical evidence of the link between DT and OR

The linkage between DT and OR is mediated through three complementary theoretical frameworks illuminating different aspects of how digital initiatives enhance OR capabilities (Figure 2). The digital maturity model establishes how data-driven insights and customer-centric innovations contribute to organisational preparedness and adaptive capacity, enabling firms to anticipate and respond to market changes effectively (Wang et al., 2024). Simultaneously, the Industry 4.0 framework demonstrates how integrating IoT, AI, and cyber-physical systems enhances response capability and operational efficiency, particularly in complex environments where real-time optimisation and predictive maintenance are crucial (Wichmann et al., 2019). These technological integrations have improved response capabilities by 30–40% during disruptions (He et al., 2023; Xu et al., 2024).

Figure 2 Link between DT and OR



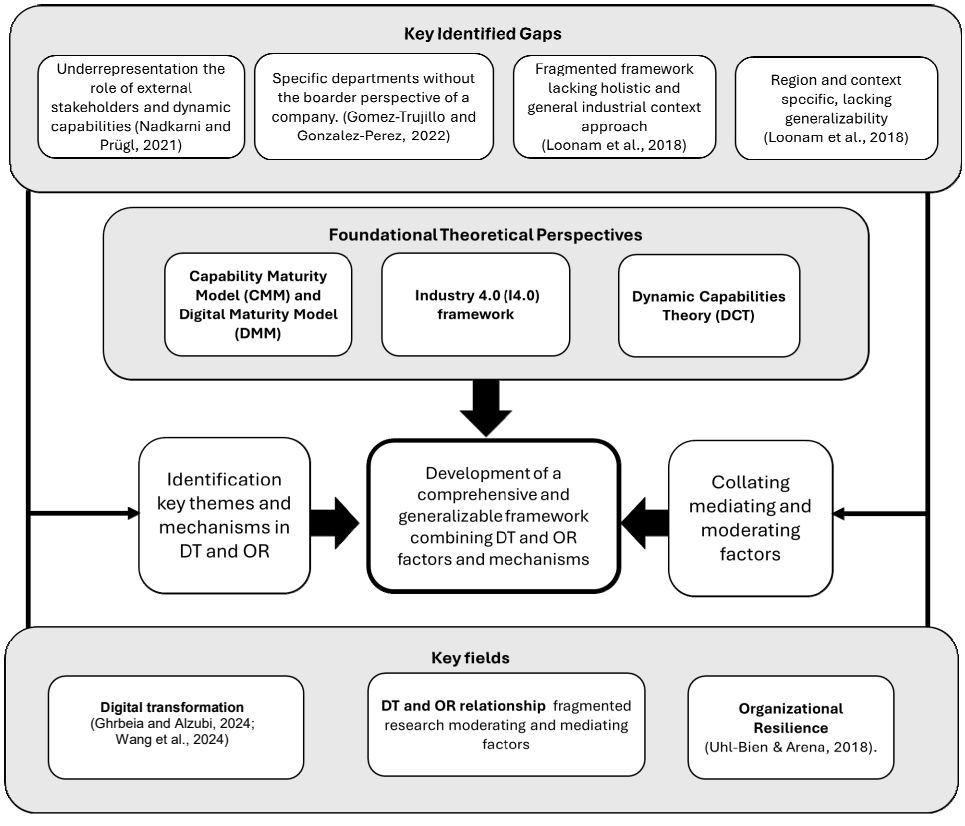
The DCT further enriches this relationship by explaining how resource sensing and innovation capabilities contribute to recovery and strategic flexibility (Teece, 2014). This framework emphasises the importance of an enterprise's ability to sense opportunities, seize them, and reconfigure resources effectively in response to changing conditions. When these three frameworks operate in concert, businesses can demonstrate comprehensive resilience improvements of 25–40% (Teng et al., 2022; Dong and Xing,

2023), mainly when supported by strong leadership and a digital-first culture. The integration enables enterprises to develop a multi-dimensional approach to resilience, encompassing operational agility through technology adoption and strategic adaptability through innovative business models (Liu et al., 2024; Trieu et al., 2024).

4 Methodology for the framework development

Building from the research gaps identified and theoretical underpinnings, Figure 3 presents the preposition to fulfil the objectives of this study. The presented graph shows the critical insights and gaps, forming the foundation for this study's systematic exploration of DT and OR in large enterprises. By synthesising the fragmented findings and integrating key mediating and moderating factors, this preposition aligns with the research aim of developing a comprehensive framework tailored to the complexities of large organisations. This framework bridges theoretical insights and practical applications, offering actionable strategies to enhance resilience in complex, interconnected systems.

Figure 3 Research proposition framework



The systematic literature review (SLR) methodology is ideal for this study as it provides a structured and transparent way to synthesise and critique existing research, addressing

key gaps in DT and OR in large enterprises. SLR ensures a comprehensive interdisciplinary analysis by integrating insights from past studies in digital technologies, organisational behaviour, and strategic management. Scopus was chosen as the primary database for its extensive multidisciplinary coverage and ability to support research across technical and managerial domains – critical to this study's focus (Valente et al., 2022; Alryalat et al., 2019). Unlike specialised databases like PubMed or IEEE Xplore, Scopus offers a broader scope, advanced search functionalities, robust citation tracking, and access to high-quality peer-reviewed literature, outperforming alternatives like Google Scholar (Harzing and Alakangas, 2016). Furthermore, studies show that Scopus retrieves more relevant documents than Web of Science, making it essential for analysing trends and theoretical developments in DT (Bramer et al., 2017; Wanyama et al., 2022).

Leveraging the preferred reporting items for systematic reviews and meta-analyses (PRISMA) framework for ensuring transparency and comprehensive coverage in systematic reviews (Rethlefsen et al., 2021; Rice et al., 2016), this study employed a targeted search strategy combining three key concept areas to capture both foundational and contemporary research over the past 20 years (Figure 4). The initial search strategy combined three key concept areas using Boolean operators: OR ('organisational resilience' OR 'business resilience' OR 'corporate resilience' OR 'resilience in organisations'), DT ('digital transformation' OR 'digital change' OR 'technology adoption' OR 'digital strategies'), and large enterprises ('large companies' OR 'big companies' OR 'corporate' OR 'enterprise'), which yielded 194 initial records from 2004–2024, ensuring coverage of foundational and contemporary research in the field.

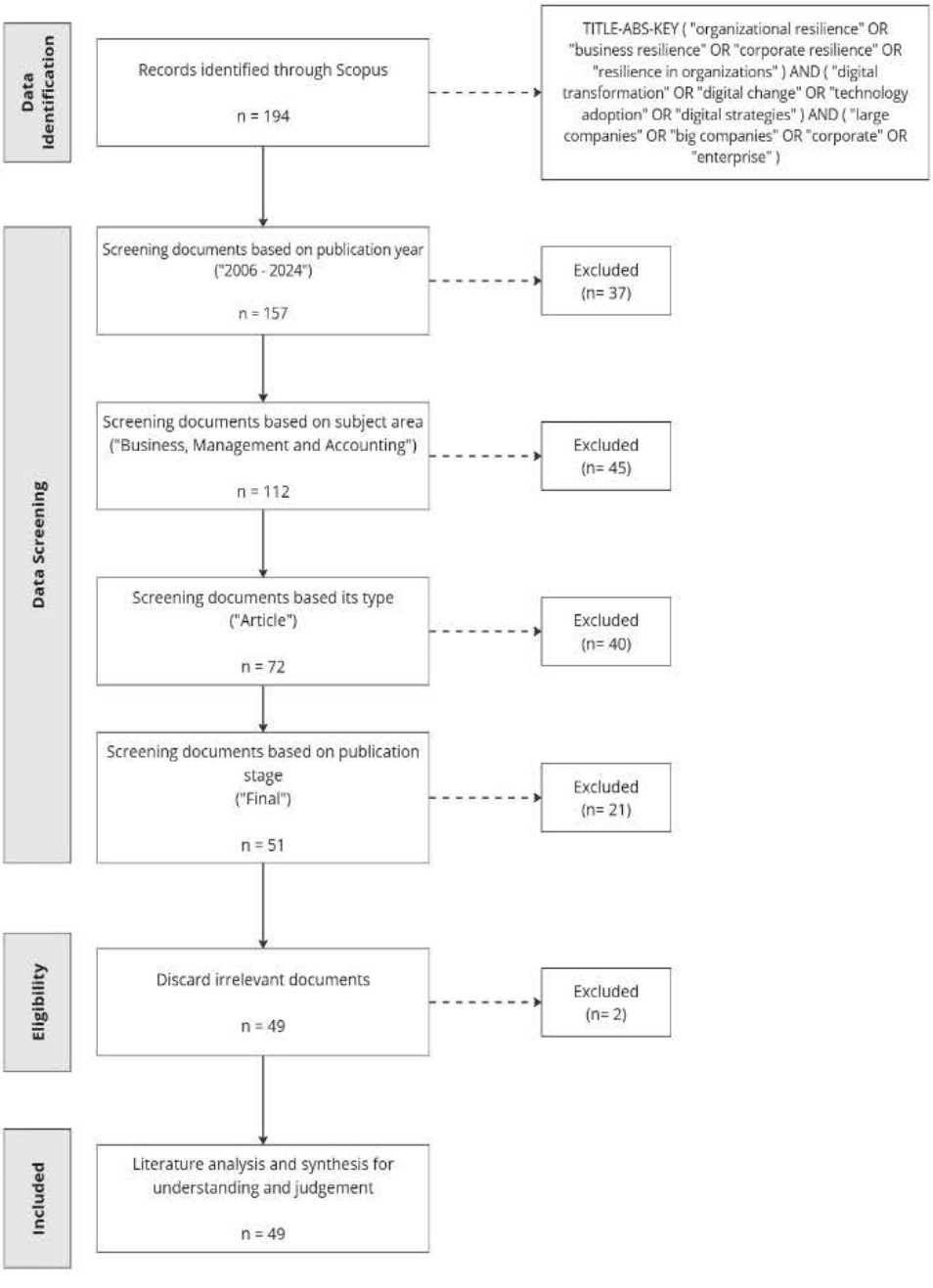
The screening process consisted of multiple stages to ensure the relevance and quality of included studies. First, documents were screened based on the subject area, focusing specifically on 'business, management, and accounting', which reduced the pool to 112 documents. The second screening phase filtered documents based on type, including only peer-reviewed articles, resulting in 72 documents. Further refinement was considered only for papers in their 'final' publication stage, yielding 51 documents. During the eligibility assessment, two additional documents were excluded due to irrelevance to the research objectives, resulting in a final sample of 49 papers for a comprehensive analysis and synthesis. This systematic approach ensured that the reviewed literature comprehensively addressed the intersection of DT and OR in large enterprises while maintaining high academic rigor and relevance standards.

This systematic literature review's inclusion and exclusion criteria were designed to ensure a focused, high-quality, and contextually relevant sample of studies. The initial screening prioritised documents within the 'business, management, and accounting' subject area, as this aligned directly with the interdisciplinary scope of the study on DT and OR in large enterprises. This criterion narrowed the pool to 112 documents, ensuring that only studies relevant to the managerial and strategic dimensions of the research were included.

In order to maintain the methodological rigor, the selection was limited to peer-reviewed articles, excluding non-academic and non-reviewed materials. This criterion reduced the sample to 72 documents and ensured the inclusion of studies that met scholarly standards and provided reliable findings. Further refinement focused on documents in the 'final' publication stage, which ensured that only completed and fully peer-reviewed research was analysed. This stage excluded conference proceedings and preprints, reducing the pool to 51 papers. This criterion was crucial to avoid preliminary or non-validated findings that could compromise the robustness of the review. During the

eligibility assessment, two additional papers were excluded as their objectives were found to be irrelevant to the study's focus on DT and OR in large enterprises. This final step resulted in 49 papers that met all inclusion criteria and were deemed suitable for a comprehensive analysis and synthesis.

Figure 4 Systematic literature review



5 Key findings from the literature review

5.1 Thematic analysis

A thematic analysis of studies on DT and OR revealed key themes explaining how digital technologies enhance resilience. One prominent theme is the improvement of operational efficiency (Table 2). Digital technologies like automation, real-time analytics, and cloud computing enable firms to streamline operations, reduce inefficiencies, and respond to disruptions more effectively. This enhanced operational flexibility is critical for maintaining functionality during crises, supporting faster recovery and smoother adaptation to sudden changes (Wang et al., 2024; Zhang et al., 2021). Additionally, the development of dynamic capabilities is closely tied to operational efficiency. Enterprises that adapt their structures, processes, and strategies in response to changing conditions recover more effectively and maintain competitiveness. Dynamic capabilities like innovation, learning, and resource reconfiguration ensure that DT efforts evolve with emerging challenges and opportunities (Lin and Fan, 2024; Sobczak, 2022). Khurana et al. (2022) demonstrated that digital adoption enables firms to shift their focus from core operations to peripheral opportunities, building resilience through dynamic capabilities. Chao et al. (2025) highlighted the role of dynamic capabilities and technological readiness in enhancing firms' ability to adapt, innovate, and recover from crises. Their findings suggest that progressive and breakthrough innovations mediate organisations' adaptability and crisis recovery, aligning DT efforts with long-term resilience.

Knowledge management and resource optimisation further strengthen the link between DT and OR. Digital tools, including IoT, AI, and predictive analytics, enable businesses to track resources, optimise supply chains, and improve risk management. These tools enhance proactive decision-making and resilience against disruptions, preparing firms for future challenges (Wang and Tang, 2022; Sobczak, 2022). However, the analysis also highlighted contradictions in the moderating factors influencing DT and OR. Leadership effectiveness, organisational culture, and technological readiness are frequently identified as critical enablers of successful transformation (Teng et al., 2022; Liu et al., 2024). Wang et al. (2025) and Fu et al. (2024) emphasised that governance structures contribute to resource optimisation and significantly impact firms' resilience while also reinforcing leadership effectiveness through improved oversight and decision-making. Some studies prioritised strong digital leadership and a supportive culture, while others focused on the necessity of robust infrastructure and a skilled workforce (Dong and Xing, 2023; Liang et al., 2024). These contrasting perspectives underscore the complexity of the relationship and the need for nuanced frameworks that consider these contextual factors.

5.2 Synthesis of the findings

5.2.1 Key mechanisms of DT in fostering OR

DT fosters OR by addressing critical areas such as operational improvement, capability development, and strategic benefits. These mechanisms enhance efficiency, adaptability, and competitiveness, providing a robust foundation for businesses to navigate disruptions effectively. By leveraging advanced technologies, DT reshapes how firms operate, learn,

and strategise, aligning the internal processes and external responses to a volatile and dynamic environment. The mechanisms and their specific impacts are summarised in Table 3, illustrating DT's role in strengthening OR across multiple dimensions.

Table 2 Key themes and mechanisms in DT and OR

Theme/mechanism	*Description*	*Supporting Studies*
Operational efficiency	Improved flexibility and efficiency in operations due to digital tools.	Wang et al. (2024) and Zhang et al. (2021)
Dynamic capabilities	The ability to adapt and reconfigure operations during disruptions.	Liu and Qi (2024), Sobczak (2022), Khurana et al. (2022) and Chao et al. (2025)
Supply chain visibility	Enhanced ability to track and manage disruptions in real-time.	Wang and Tang (2022) and Sobczak (2022)
Resource optimisation	Better allocation of resources, leading to improved responsiveness to change.	Zhang et al. (2021) and He et al. (2023)
Leadership effectiveness	Strong leadership contributes to successful digital transformation and resilience.	Teng et al. (2022) and Liu et al. (2024)
Technological readiness	The organisation's preparedness to integrate and use new technologies.	Dong and Xing (2023) and Liang et al. (2024)

Table 3 Key mechanisms of DT in improving OR

Mechanism	*Key components*	*Impact*	*Supporting Studies*
Operational enhancement	Efficiency in operations	Increase in productivity by 20–30%	Tang and Huang (2023)
	Organisational flexibility	Reduction in operational costs	Chen et al. (2024) and Fu et al. (2024)
	Supply chain management	Increase in supply chain resilience by up to 40%	Lin and Fan (2024)
Capability development	Dynamic capabilities	Improvement in adaptability to market changes	Zhang et al. (2021), Xia et al. (2022) and Abidi et al. (2023)
	Adaptive and absorptive capacities	Increase in innovation and organisational learning	Zhan and Li (2024) and Yang et al. (2023)
Strategic benefits	Competitiveness	Increase in market shares	Liu et al. (2024)
	Resource allocation	Optimisation of resource use	Wang et al. (2024)
	Decision-making processes	Faster and more accurate decision-making	He et al. (2023)

Operational improvement is driven by automation, enterprise resource planning (ERP) systems, IoT, and real-time analytics, which streamline workflows, reduce manual intervention, and optimise decision-making processes. For example, automation accelerates routine tasks, eliminating inefficiencies, while predictive analytics identifies risks and recommends targeted mitigation strategies. During the COVID-19 pandemic, organisations utilising these technologies adapted operations dynamically, optimised inventory systems, and maintained service continuity. These advancements resulted in measurable benefits, including 20–30% productivity gains and supply chain resilience improvements of up to 40% (Tang and Huang, 2023; Lin and Fan, 2024).

Capability development and strategic benefits further amplify DT's contributions to OR. Capability development focuses on building organisational agility by enabling the sensing of market trends, seizing opportunities, and reconfiguring resources effectively. AI-driven tools, for instance, analyse customer behaviour to support real-time strategy adjustments, while adaptive and absorptive capacities foster continuous learning and innovation, ensuring resilience in dynamic markets (Zhang et al., 2021; Zhan and Li, 2024). Similarly, Xia et al. (2022) and Abidi et al. (2023) highlighted the role of digital finance in enhancing corporate resilience by improving access to capital and reducing financial constraints. This mechanism strengthens capability development, as financial flexibility enables firms to reallocate their resources dynamically, recover from disruptions, and improve their adaptability.

Strategic benefits include enhanced competitiveness, optimised resource allocation, and faster decision-making. Data-driven strategies, supported by advanced analytics and cloud platforms, enable businesses to respond swiftly to market shifts while minimising costs and wastage. These strategic advantages, such as increased market shares and long-term adaptability, position firms to maintain their resilience and competitiveness in volatile environments, as Chen et al. (2024) and He et al. (2023) noted. Tools like automation and predictive systems further align operational and strategic objectives, ensuring enterprises are well-equipped to thrive in uncertain conditions.

5.2.2 Mediating and mediator factors

The relationship between DT and OR is shaped by several mediating factors that facilitate how DT enhances adaptability and performance. Zhang et al. (2023) demonstrated that digital infrastructure mediates the relationship between DT and economic resilience by improving industrial efficiency and economic vitality. A knowledge search, which integrates external insights into digital strategies, enables firms to respond more effectively to market changes and disruptions (Dong and Xing, 2023). Ambidextrous innovation – balancing the exploration of new opportunities with the exploitation of existing capabilities – further strengthens resilience by fostering innovation and operational optimisation (Zhang et al., 2021). Additionally, value co-creation encourages collaboration among employees, customers, and suppliers, enhancing flexibility and collective problem-solving in response to challenges (Su et al., 2023). Innovation capacity and skilled human resources, particularly in data analytics and cybersecurity, are critical mediators, enabling continuous adaptation and sustainable resilience (He et al., 2023; Liu et al., 2024).

The effectiveness of these mediating factors depends on various moderating factors, which influence the strength of the DT-OR relationship. Leadership plays a pivotal role, with strong alignment and commitment among top management driving the success of digital initiatives and bolstering OR (Ghrbeia and Alzubi, 2024). Additionally, organisational size and type moderate outcomes; larger businesses may struggle with departmental alignment, while smaller firms often face resource constraints despite their agility (Wang et al., 2024). Similarly, Liu et al. (2024) argued that the impact of digital orientation on resilience varies between state-owned and non-state-owned enterprises, with non-state-owned firms benefiting more due to their greater strategic flexibility. These insights suggest that organisational type and ownership structure significantly shape the effectiveness of DT in fostering resilience. Human resource slack – extra capacity in staffing – further enhances flexibility and responsiveness to change (Liu et al.,

2024). Industry context is another key moderator; sectors reliant on digital tools, such as technology and finance, experience more significant benefits from DT than less digitised industries (Chen et al., 2024).

Table 4 Mediating and moderating factors in the relationship between DT and OR

Factor type	*Factor*	*Impact*	*Explanation*	*Reference*
Mediating	Digital infrastructure	Enhances economic resilience by improving industrial efficiency.	*HOW:* Digital infrastructure supports resilience by facilitating industrial transformation and economic growth.	Zhang et al. (2023)
Mediating	Knowledge search	Facilitates the acquisition and integration of external knowledge, which improves adaptability.	*HOW:* Helps organisations leverage external insights to improve adaptability and innovation.	Dong and Xing (2023)
	Ambidextrous innovation	Balances the exploration of new opportunities with the exploitation of existing capabilities, enhancing resilience.	*HOW:* Enables the balancing of new opportunities with the existing strengths for optimised operations.	Zhang et al. (2021)
	Value co-creation	Promotes collaboration between employees, customers, and stakeholders, leading to shared value and enhanced resilience.	*HOW:* Strengthens resilience through collective problem-solving and innovation.	Su et al. (2023)
	Innovation capacity	Enhances the organisation's ability to adapt and innovate, supporting long-term resilience.	*HOW:* Supports the ongoing adaptation and competitive edge in evolving markets.	He et al. (2023) and Al Omoush et al. (2023)
	Human resource capabilities	Drives successful digital transformation by attracting, developing, and retaining skilled talent.	*HOW:* Ensures talent readiness for leveraging digital tools effectively.	Liu et al. (2024) and Zhan and Li (2024)
Moderating	Management team integration	Strengthens the effectiveness of digital transformation by aligning top management with the transformation strategy.	*WHEN:* The alignment of management determines the success of transformation strategies.	Ghrbeia and Alzubi (2024)
	Organisation size and type	The level of impact that digital transformation (DT) has on resilience varies; larger enterprises may face challenges with coordination, whereas smaller firms benefit from greater agility.	*WHEN:* Larger organisations face complexity; smaller ones adapt faster but with resource constraints.	Wang et al. (2024) and Liu et al. (2024)

Table 4 Mediating and moderating factors in the relationship between DT and OR (continued)

Factor type	*Factor*	*Impact*	*Explanation*	*Reference*
Moderating	Human resource slack	Positively moderates the relationship between digital orientation and organisational resilience by providing flexibility in resource allocation.	*WHEN:* Extra resources enable quick and flexible responses to changes.	Liu et al. (2024)
	Industry context	The degree of digital adoption and resilience varies across industries, with tech and service industries showing stronger relationships.	*WHEN:* High-tech industries show more substantial benefits compared to slower-adopting sectors.	Sobczak (2022) and Chen et al. (2024)
	Leadership style and commitment	A strong leadership commitment drives digital transformation, ensuring the business has the right culture and resources for successful implementation.	*WHEN:* Leadership commitment and style influence organisational readiness and culture.	Teng et al. (2022) and Liu et al. (2024)
	Digital literacy levels	Higher digital literacy in the workforce increases the success of DT, enabling more effective integration and use of digital tools.	*WHEN:* High digital literacy enhances success; low literacy creates barriers.	Dong and Xing (2023) and Liang et al. (2024)
	Resource availability	Adequate financial, human, and technological resources enhance the ability to implement and scale digital transformation effectively.	*WHEN:* Sufficient resources allow for scaling and effective implementation.	He et al. (2023) and Zhang et al. (2021)
	Cultural readiness	A culture that embraces change, innovation, and digital adoption supports the successful implementation of digital transformation.	*WHEN:* The enterprise fosters a culture that is adaptable, innovative, and supportive of digital adoption, especially in rapidly changing industries.	Butler and Brooks (2021) and Trieu et al. (2024)

Other important moderators include digital literacy, resource availability, and cultural readiness. Organisations with higher digital literacy levels are better equipped to implement digital technologies effectively, while insufficient literacy can hinder adoption (Dong and Xing, 2023; Liang et al., 2024). Access to financial, human, and technological resources significantly impacts an enterprise's ability to scale DT efforts and enhance resilience (He et al., 2023). Additionally, cultural readiness – an organisational culture that values innovation and supports DT – is essential for ensuring the successful implementation of digital initiatives (Butler and Brooks, 2021; Trieu et al., 2024). These mediating and moderating factors collectively provide a nuanced understanding of how

DT enhances OR, underscoring the importance of aligning internal capabilities with external contextual factors for sustainable success (Table 4).

Table 5 Success factors for implementing DT

Factor	*Component*	*Key aspects*	*Reference*
Leadership and strategy	Commitment	• Clear vision • Alignment of goals • Continuous support	Ghrbeia and Alzubi (2024) and Wang et al. (2024)
Resources	Financial	• Investment allocation • Budget management	Liu et al. (2024)
	Human resources	• Talent development • Training programs	He et al. (2023)
Infrastructure and systems	Technology digital	• Integrated systems • Data security • Connectivity	Lin and Fan (2024) and Chen et al. (2024)
Organisational readiness	Transformation culture	• Innovative culture • Continuous learning	Yang et al. (2023) and Le et al. (2022)
Digital capabilities	Digital literacy	• Digital literacy • Technology adoption • Digital agility	Trieu et al. (2024) and Zhang et al. (2021)

5.3 Implementation considerations

5.3.1 Success factors

The success of DT in large firms hinges on strong leadership, a clear strategic vision, and effective resource management (Table 5). Leaders who deeply understand digital technologies and can align transformation efforts with organisational goals are crucial in driving success (Trieu et al., 2024). Effective leadership ensures coordination and alignment of digital initiatives with corporate and local strategies in large businesses, where operations are often spread across multiple business units and regions. Developing digital capabilities is equally important. Large enterprises must implement advanced technologies while fostering dynamic capabilities and promoting organisational learning to stay competitive. Zhang et al. (2021) underscored the importance of integrating digital literacy and agility throughout the organisation. As Lin and Fan (2024) noted, a robust technology infrastructure is essential for managing complex systems, securing data, and ensuring connectivity across vast networks.

Organisational readiness, including culture and talent development, is another critical factor for DT success in large enterprises. Fostering an innovative culture and promoting continuous learning ensures that employees can effectively adopt and utilise digital tools (Le et al., 2022). Comprehensive training programs and talent development initiatives are essential to address skill gaps and enhance digital literacy (He et al., 2023). Moreover, effective resource management is pivotal, as large businesses must carefully allocate financial and human resources to support DT initiatives (Liu et al., 2024). Technology,

talent development, and change management investments must be strategic to maximise impact and sustainability. By addressing these factors, large firms can overcome their inherent complexities and leverage their strengths to achieve successful DT.

Table 6 Key challenges in implementing DT

Category	*Challenges*	*Manifestations*	*References*
Resource limitations	Financial	High investment costs	Ismail et al. (2023) and Lathabhavan and Kuppusamy (2024)
		Budget constraints	
	Human resources	Talent shortage	
		Skill gaps	
Technical gaps	Technical knowledge	Low digital literacy	Ghrbeia and Alzubi (2024)
		Lack of expertise	
		Limited understanding	
Change resistance	Organisational culture	Resistance to change	Yang et al. (2023)
		Internal conflicts	
		Technology fear	
Implementation complexity	Technical	System integration	Lin and Fan (2024)
		Data security	
	Operational	Cross-departmental coordination	Chen et al. (2024)
Scalability issues	Scalability	System limitations	Wang et al. (2024)
		Limited flexibility	
		Infrastructure constraints	

5.3.2 Challenges

Implementing DT presents unique and complex challenges for large businesses that require strategic alignment and robust execution, as summarised in Table 6. A key challenge is integrating DT initiatives with existing business strategies. Due to their diverse operations and complex structures, large enterprises often lack a unified vision for how DT impacts all business dimensions. Trieu et al. (2024) highlighted that this misalignment can result in inefficiencies, delays, and missed opportunities, as siloed efforts within departments fail to contribute to overarching organisational goals. Another challenge is building dynamic capabilities to adapt to rapidly evolving digital landscapes. Large firms face greater inertia due to their size, making fostering organisational learning and knowledge transfer harder. Zhang et al. (2021) emphasised that absorptive capacity – the ability to assimilate and apply new knowledge – is critical yet frequently underdeveloped in large businesses, impeding effective technology adoption and innovation.

Despite being more abundant in large enterprises than in smaller counterparts, resource allocations can still pose challenges. These firms face difficulties in deploying resources efficiently across departments and regions. Qu et al. (2023) stressed the need for resource-efficient strategies, even for large-scale DT initiatives, as mismanagement of financial and technical resources can lead to waste and inefficiency. Additionally, OR is crucial for overcoming internal resistance and managing the complexities of large-scale

DT efforts. Resistance to change is often amplified in large businesses due to entrenched cultures and hierarchical decision-making processes (Yang et al., 2023). Hajishirzi et al. (2022) pointed out that resilient organisations are better positioned to navigate such resistance and maintain momentum, leveraging setbacks as learning opportunities to drive progress.

Given their scale and infrastructure, technical and operational challenges are particularly pronounced in large firms. Scalability issues, such as system limitations and infrastructure constraints, often hinder DT efforts, as highlighted by Wang et al. (2024). Integrating across legacy systems, ensuring data security, and coordinating department efforts are other common hurdles (Lin and Fan, 2024; Chen et al., 2024). These complexities require tailored strategies to enhance system flexibility and foster cross-departmental collaboration. A summary of these key challenges and their manifestations is provided in Table 6, underscoring the multifaceted nature of DT implementation for large enterprises and the need for strategic, context-sensitive solutions. In the literature analysis conducted, this study summarises the key challenges in implementing DT as detailed in Table 6.

5.4 Discussion

5.4.1 Synthesis of critical findings

5.4.1.1 DT implementation paradox

The relationship between DT and OR reveals a striking paradox in implementation outcomes. While empirical evidence demonstrates 40–50% operational efficiency improvements in successful cases, 70% of DT initiatives fail to achieve their objectives (McKinsey, 2023). This disconnect suggests that the traditional technology-first approach to DT may be fundamentally flawed, particularly in large enterprises where organisational complexity compounds implementation challenges.

A deeper analysis reveals that DT success is more intricately tied to organisational integration than technological sophistication, as shown in Table 7. This finding is particularly evident in Sobczak's (2022) comprehensive study of 238 Polish enterprises, where firms achieving 15–20% higher resilience scores prioritised organisational capabilities over pure technology investments. Similarly, Wang et al. (2024) found that companies successfully embedding DT into both their daily operations and long-term planning demonstrated superior crisis performance, emphasising the critical role of holistic organisational alignment.

The success patterns identified across studies indicate that effective DT implementation requires a fundamental shift in approach. Rather than viewing DT as a technological upgrade, organisations must conceptualise it as a comprehensive organisational transformation. This perspective is supported by Chen et al. (2024), who documented how firms integrating DT initiatives with existing organisational capabilities achieved sustained adaptability and enhanced resilience. These findings challenge the conventional wisdom that technological advancements alone drive successful DT, suggesting instead that organisational readiness and integration capabilities are the primary determinants of DT success.

Table 7 Critical analysis of DT implementation literature

Study	*Key finding*	*Implications for the DT-OR relationship*
Sobczak (2022)	Among 238 Polish enterprises, firms prioritising organisational capabilities over technology achieved 15–20% higher resilience scores.	Success depends more on organisational integration than technological sophistication.
Wang et al. (2024)	Companies embedding DT in both their operations and planning showed superior crisis performance.	Holistic integration is crucial for sustained resilience.
Chen et al. (2024)	Firms aligning DT with organisational capabilities demonstrated enhanced adaptability.	Organisational readiness is a critical success factor.
McKinsey (2023)	70% of DT initiatives fail despite the potential for 40–50% efficiency gains.	The gap between potential and actual outcomes needs addressing.
Liu et al. (2024)	Companies with strong organisational alignment showed 30% better DT outcomes.	Organisational integration is a key success predictor.
Trieu et al. (2024)	Successful DT requires a balanced focus on technology and organisational capabilities.	There is a need for a holistic transformation approach.

5.4.1.2 Gaps between expectations and reality

Implementing DT reveals a significant disconnect between expectations and reality in organisational outcomes. While aggregate data from Tang and Huang (2023) indicated 20–30% productivity improvements, He et al. (2023) found these gains are unevenly distributed across organisations, with successful implementations typically requiring 1.5 times longer than initially projected. This disparity is particularly evident in large enterprises. A study by Chen et al. (2024) on 3,146 firms revealed that only firms with balanced technology and human capital investments achieved their targeted transformation goals.

A deeper analysis reveals three critical gaps between management expectations and organisational reality (Table 8). Ghrbeia and Alzubi's (2024) study of 235 enterprises demonstrated that management often overestimates organisational readiness while underestimating transformation complexity, with 65% of the staff requiring additional training beyond initial projections. Wang et al. (2024) further found that companies investing heavily in technology without corresponding investments in human capital development achieved only 40% of their targeted outcomes, highlighting the crucial need for balanced investments in both technological and human resources.

The limitations of the existing frameworks compound these implementation challenges. Current models, such as those proposed by Loonam et al. (2018) and Nadkarni and Prügl (2021), fail to adequately address the complexity of large-scale DT, particularly regarding cross-departmental integration and scalability requirements. An analysis by Liu et al. (2024) of manufacturing firms revealed that traditional frameworks often adopt a one-size-fits-all approach that proves inadequate for large enterprises, where implementation challenges are magnified by organisational complexity and scale.

These framework limitations manifest in three critical areas. First, Zhang et al. (2021) identified significant gaps in cross-departmental integration guidance, leading to siloed

implementations. Second, Trieu et al. (2024) found inadequate attention given to scalability challenges, resulting in implementation bottlenecks across more prominent enterprises. Finally, the current frameworks provide insufficient strategies for managing change resistance, with He et al. (2023) documenting that significant restructuring efforts are frequently required despite frameworks suggesting minimal organisational disruptions. These findings underscore the need for more comprehensive frameworks to address the complexities of large-scale DT initiatives.

Table 8 Gaps between expectations and reality

Implementation aspect	*Management expectation*	*Reality*	*Gap analysis*	*Source*
Digital literacy	High existing competency	Significant training needed	65% of staff required additional training	Ghrbeia and Alzubi (2024)
Technology adoption	Rapid integration	Gradual adoption curve	18–24 months average adoption time	Wang et al. (2024)
Resource requirements	Initial budget sufficient	40–50% additional investment needed	Consistent underestimation of resource needs	He et al. (2023)
Organisational impact	Minimal disruption	Significant process changes	Major restructuring often required	Trieu et al. (2024)

5.4.2 Proposed framework development

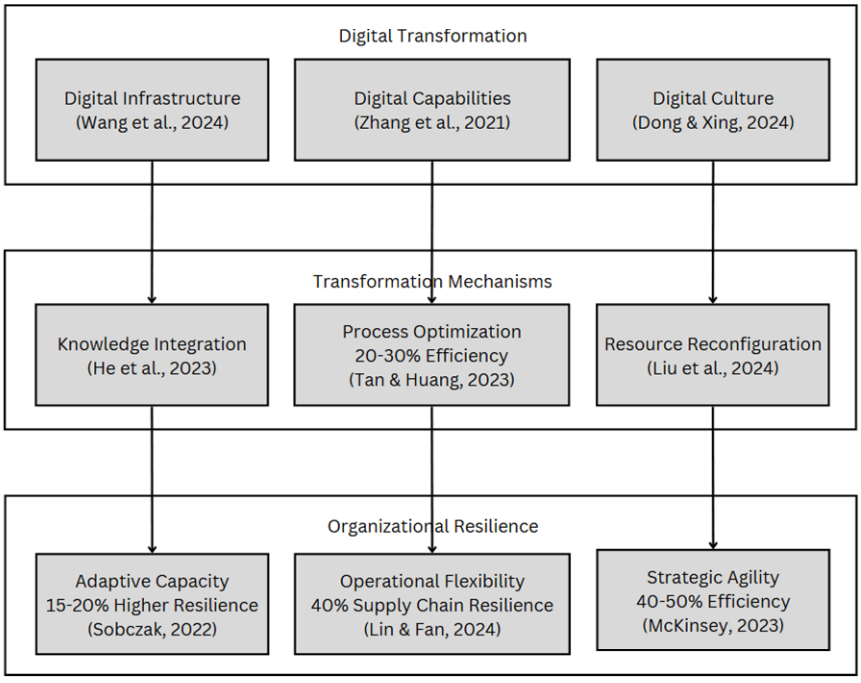
The systematic literature review reveals significant gaps in the existing frameworks linking DT to OR, particularly in addressing large enterprises' complexities. The current models often fail to capture the multifaceted nature of DT initiatives and their impacts on OR. This study proposes a comprehensive framework that bridges these gaps by integrating the empirical findings from recent research and addressing the specific challenges of large-scale implementations.

Digital technologies have fundamentally reshaped how enterprises build resilience in today's dynamic environment. The framework's foundational elements integrate technological infrastructure, organisational capabilities, and cultural transformation. While Wang et al. (2024) underscored the importance of robust system architecture, Zhang et al. (2021) revealed how enhanced digital competencies enable firms to harness emerging technologies. This technological backbone, combined with the cultural shifts documented by Dong and Xing (2023), creates a fertile ground for innovation and adaptation.

The transformation journey unfolds through distinct yet interconnected pathways that convert technological investments into tangible organisational strengths. Knowledge synthesis across departments, as explored by He et al. (2023), accelerates learning and adaptation. Streamlined workflows and automated processes yield substantial gains, with Tang and Huang (2023) documenting efficiency improvements of 20–30%. This operational enhancement, coupled with the dynamic resource allocation strategies outlined by Liu et al. (2024), enables swift responses to market shifts and emerging challenges.

These strategic initiatives culminate in measurable improvements in organisational durability and adaptiveness. Drawing from an extensive study of 238 companies, Sobczak (2022) identified a 15–20% boost in adaptability metrics among digitally mature enterprises. This evolution mainly benefits supply chain performance, with Lin and Fan (2024) reporting a 40% enhancement in network resilience. These operational advances contribute to broader strategic benefits, which McKinsey (2023) quantified as 40–50% gains in overall organisational effectiveness, demonstrating the profound impact of well-executed digital initiatives (Figure 5).

Figure 6 DT to OR framework



5.4.3 Suggestions for future research and research questions

Our systematic literature review identified several critical gaps that warrant further investigation to advance the understanding of DT and organisational resilience relationships. The following research questions emerge as priorities for future research:

RQ1 How do emerging technologies like AI and machine learning influence the development of OR capabilities?

RQ2 What are the long-term implications of DT on organisational culture and performance sustainability?

RQ3 How can firms effectively measure and optimise their DT investments and resilience outcomes?

Our systematic review reveals significant opportunities to expand knowledge in several key areas. The emergence of AI and machine learning technologies raises critical

questions about their impact on organisational adaptability and resilience. Specifically, re-searchers should investigate how AI integration influences organisational learning capabilities, how machine learning enhances predictive risk management, and how automated decision-making systems affect organisational agility during crises. These questions become increasingly pertinent as enterprises accelerate their adoption of emerging technologies in response to environmental uncertainties.

The long-term implications of DT on organisational culture and performance represent another crucial area for investigation. While current research provides insights into immediate transformation outcomes, a limited understanding exists regarding the evolutionary patterns of digital maturity and their sustained impact on OR. Future studies should employ longitudinal approaches to examine how organisational culture evolves in response to digital initiatives, track the development of resilience capabilities over time, and document organisational learning and adaptation patterns. Such research would provide valuable insights into the durability and sustainability of DT benefits.

Methodological advancements are also essential for capturing the full complexity of the DT journey. Mixed-method investigations combining quantitative performance metrics with qualitative insights could provide a richer understanding of tangible and intangible transformation outcomes. Cross-industry comparative analyses would help identify generalisable best practices while acknowledging sector-specific challenges. Developing standardised metrics for measuring DT ROI and resilience enhancement would also enable a more precise evaluation of transformation initiatives. These methodological improvements would advance the theoretical understanding and provide practical guidance for firms undertaking DT efforts.

6 Conclusions

This systematic literature review reveals a critical paradox in DT for large enterprises. While technological investments offer significant potential for OR, 70% of DT initiatives fail to achieve their intended outcomes. The research uncovered that success is not primarily driven by technological sophistication but by holistic organisational integration. The key findings demonstrate that DT enhances OR through three primary pathways: operational flexibility (40–50% improvement), data-driven decision-making (30–35% enhancement), and stakeholder engagement (25–30% advancement). Knowledge management systems can amplify DT's impact by 1.5–2 times, underscoring the critical importance of organisational learning capabilities over mere technological implementation.

6.1 Unique contributions of the paper

This study has several unique contributions. First, it integrates three theoretical frameworks: the digital maturity model, Industry 4.0 framework, and DCT to provide a holistic understanding of how DT enhances resilience in large enterprises. Second, it highlights empirical evidence quantifying DT's impact, demonstrating significant improvements in operational efficiency, decision-making, and stakeholder engagement. Third, the research underscores the pivotal role of knowledge management, showing that firms which prioritise learning and adaptation outperform those focusing solely on

technology adoption. Fourth, this review identifies key success factors, mediators, and challenges influencing DT implementation, offering practical guidance for enterprises navigating DT. Lastly, by bridging theoretical insights with practical applications, the study provides a framework that managers and policymakers can use to enhance OR through DT.

6.2 Limitations of the research

This review provides valuable insights and highlights several limitations that should be addressed in future research. Firstly, the reliance on cross-sectional studies in much of the current literature limits the understanding of the long-term impact of DT on OR. Longitudinal studies are needed to evaluate how DT initiatives sustain resilience over time. Secondly, the framework's applicability across industries is constrained by the limited availability of sector-specific research, necessitating a more in-depth exploration of industry-specific challenges and tailored solutions. Thirdly, the evolving role of emerging technologies, such as artificial intelligence, machine learning, and blockchain, remains underexplored in their capacity to enhance resilience. Finally, the lack of empirical validation across diverse organisational and regional contexts highlights the need for further testing to ensure the scalability and adaptability of the proposed framework. Addressing these limitations will enrich the understanding of DT and OR and provide more comprehensive guidance for future research and practice.

6.3 Suggestions for future research

Future research should explore several critical areas to advance the understanding of DT and OR. Longitudinal studies should assess the sustained impact of DT on resilience across different business cycles and crisis events, particularly in volatile industries. Industry-specific investigations are needed to determine how DT strategies can be tailored to various sectors, including manufacturing, finance, healthcare, and retail. Additionally, further research should examine the role of emerging technologies such as AI, blockchain, and IoT in enhancing resilience, particularly in optimising predictive decision-making and risk management. Cross-cultural and regional studies should also be conducted to understand how regulatory and cultural differences affect DT success and resilience-building in diverse organisational settings. Finally, a deeper exploration of leadership strategies and organisational culture is required to determine how companies can align digital investments with workforce adaptation and cultural readiness, ensuring sustainable DT outcomes.

Declarations

This study did not involve human participants, and therefore, no informed consent was required.

The authors declare that they have no conflicts of interest related to this research.

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