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Critical success factors in digital transformation of firms: A proposed model

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Abstract

Purpose: Digital transformation has become a strategic imperative for organizations seeking to enhance competitiveness and adaptability in dynamic digital environments**.** Despite extensive scholarly attention, many digital transformation initiatives fail due to the lack of integrated frameworks that systematically consolidate critical success factors (CSFs). The purpose of this study is to identify and synthesize the most influential CSFs of digital transformation and to propose a comprehensive, phase-based model that addresses this gap in existing literature.

Design/methodology/approach: The study employs a PRISMA-guided structured conceptual systematic review to ensure methodological transparency and consistency in the identification and synthesis of relevant studies. A total of 50 peer-reviewed journal articles and conference papers published between 2010 and 2024 were selected using explicit inclusion and exclusion criteria focused on digital transformation and CSFs. The selected studies were analyzed using thematic analysis to identify recurring patterns, relationships, and dominant success factors across multiple industries.

Findings: The findings indicate that leadership commitment and strategic alignment are the most consistently cited critical success factors (CSFs) for successful digital transformation. The analysis further reveals that the relevance of these factors evolves across transformation phases, demonstrating phase-specific salience and dynamic interaction among strategic, technological, organizational, and regulatory dimensions. Additional key factors include technological readiness, user-centric design, regulatory compliance, and continuous improvement. Based on these findings, the study proposes the Comprehensive digital transformation Success Model (CDTSM), which integrates these CSFs into a structured framework encompassing the initiation, planning, execution, monitoring, and sustainability phases of digital transformation

Research limitations/implications: This study is conceptual and based on a structured systematic literature review of existing scholarly work. Although the review follows PRISMA-guided procedures to ensure transparency, the proposed model remains theoretically grounded and requires empirical validation across different organizational and industry contexts.

Practical implications: The proposed model offers a structured and actionable guide for managers and decision-makers to systematically plan, implement, and sustain digital transformation initiatives. By emphasizing strategic alignment, leadership commitment, and regulatory considerations, the model supports organizations in reducing transformation risks and improving implementation outcomes.

Social Implications: Being aware of main critical factors in digital transformation at firms can facilitate the change in the way human resources collaborate and socialize in firm's teams and networks.

Originality/value: This study contributes to the digital transformation literature by consolidating fragmented critical success factors (CSFs) into a single, coherent, and holistic model. The CDTSM extends existing frameworks by integrating technological, organizational, human, and regulatory dimensions, and introduces a lifecycle-oriented and temporally structured perspective that explains how critical success factors (CSFs) factors evolve and interact across distinct transformation phases, extending RBV, Dynamic Capabilities, and TOE-based models. thereby providing both theoretical advancement and practical value for organizations navigating complex digital transformation processes.

Keywords: Digital transformation, Critical success factors (CSFs), Systematic literature review, PRISMA, Conceptual model

Jel Codes: M21, M15, M20

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1. Introduction

Digital transformation has become a central strategic priority for organizations seeking to sustain competitiveness, agility, and innovation in rapidly evolving digital environment (Ancillai et al., 2023; Hanelt et al., 2021). The pervasive integration of digital technologies has fundamentally reshaped organizational processes, business models, and value creation mechanisms across industries (Troise et al., 2022; Verhoef et al., 2021). Rather than representing a purely technological shift, digital transformation constitutes a complex socio-technical process that requires coordinated changes in strategy, organizational structures, human capabilities, and governance mechanisms (AlNuaimi et al., 2022; Leso et al., 2023).

Despite the growing number of digital transformation initiatives, failure rates remain high, with many organizations struggling to translate digital investments into sustained performance improvements (Teng et al., 2022). Prior research identifies several recurring challenges, including insufficient leadership commitment, lack of strategic alignment, technological readiness gaps, resistance to change, and limited organizational capabilities (Matt et al., 2015; Kane et al., 2018; Horváth & Szabó, 2019). These challenges highlight that successful digital transformation depends not only on technology adoption but also on a set of interrelated critical success factors (CSFs) that must be managed holistically (Alojail & Khan, 2023; Martínez-Peláez et al., 2023).

Although the literature on digital transformation and CSFs has expanded significantly in recent years, existing studies remain fragmented and largely sector-specific (Chirumalla et al., 2025; Zhang et al., 2022). Many contributions focus on isolated factors such as leadership, technology, or culture or propose frameworks tailored to specific industries, such as healthcare, construction, or SMEs (Kitsios & Kapetaneas, 2022; Bajpai & Misra, 2024; Palade & Møller, 2023). Prior studies indicate that successful digital transformation, particularly in ERP-based initiatives, depends not only on technological capabilities but also on ethical considerations and structured methodological approaches (Costa-Melo et al., 2023; Zhang et al., 2022). Addressing these factors strategically enhances governance and enables organizations to fully realize the benefits of ERP systems (Cosa & Torelli, 2024). As a result, there is a lack of integrated, cross-industry models that systematically consolidate CSFs into a coherent and actionable framework capable of guiding organizations throughout the entire digital transformation process (Leso et al., 2023). This gap limits both theoretical advancement and practical applicability, as managers often lack comprehensive guidance on how different CSFs interact across transformation phases.

Addressing this gap, the present study aims to identify, synthesize, and structure the most salient critical success factors (CSFs) for digital transformation and to develop a comprehensive, phase-based model applicable across industries. Drawing on a systematic review of 50 peer-reviewed studies, this research consolidates dispersed insights into a unified framework the Comprehensive digital transformation Success Model (CDTSM). The

proposed model integrates technological, organizational, human, strategic, and regulatory dimensions, offering a holistic perspective that extends beyond existing digital transformation frameworks (Omrani et al., 2024; Senna et al., 2023).

The main contribution of this study is twofold. First, it advances digital transformation theory by providing a structured synthesis of CSFs grounded in a cross-industry perspective, thereby addressing fragmentation in prior research. Second, it offers practical value by proposing an actionable model that supports decision-makers in planning, implementing, monitoring, and sustaining digital transformation initiatives. By bridging theoretical insights and managerial relevance, this study responds directly to the need for more integrative and implementation-oriented digital transformation frameworks (Hanelt et al., 2021).

The remainder of this paper is structured as follows. Section 2 presents a critical synthesis of the literature on digital transformation and CSFs, building the conceptual foundation for the proposed model. Section 3 outlines the research methodology and systematic literature review process. Section 4 reports the results of the analysis and introduces the proposed model. Section 5 discusses the findings in relation to established theoretical frameworks. Finally, Section 6 concludes the study by summarizing key contributions, outlining limitations, and suggesting directions for future research.

2. Literature Review

2.1. Digital Transformation and Critical Success Factors (CSFs)

Digital transformation is widely recognized as a multidimensional phenomenon that extends beyond the adoption of digital technologies to encompass fundamental changes in organizational strategy, structure, culture, and value creation (Angelopoulos et al., 2023; Zhang et al., 2022). Prior studies emphasize that digital transformation requires coordinated technological, organizational, and human adaptations to achieve sustainable outcomes (Vial, 2019; Westerman et al., 2014). As a result, research increasingly focuses on identifying critical success factors (CSFs) that determine the success or failure of digital transformation initiatives.

However, despite the growing volume of research, the literature remains fragmented, with CSFs often examined in isolation or within specific sectoral contexts. This fragmentation limits the development of integrative frameworks capable of guiding organizations across different phases of digital transformation (Martínez-Peláez et al., 2024).

2.1.1. Strategic and Leadership-Related Critical Success Factors (CSFs)

Leadership commitment and strategic alignment consistently emerge as the most influential CSFs across industries (AlNuaimi et al., 2022; Canhoto et al., 2021). Numerous studies highlight the role of top management in articulating a clear digital vision, allocating resources, and fostering organizational commitment to transformation initiatives (AlNuaimi et al., 2022; Braojos et al., 2024; Fernandez-Vidal et al., 2022). Strategic alignment ensures that digital initiatives support organizational objectives rather than functioning as isolated technological projects (AlNuaimi et al., 2022).

Empirical evidence from multiple sectors including manufacturing, public administration, healthcare, and SMEs demonstrates that insufficient leadership engagement often results in fragmented implementation, resistance to change, and unrealized digital value (Pacolli, 2022; Palade & Møller, 2023). These findings indicate that leadership-related CSFs serve as foundational enablers that influence the effectiveness of other success factors (Canhoto et al., 2021).

2.1.2. Technological Critical Success Factors (CSFs)

Technological readiness and integration represent other core dimensions of digital transformation success (Senna et al., 2023). Studies consistently emphasize the importance of robust IT infrastructure, interoperability, data integration, and cybersecurity in supporting digital initiatives (Frank et al., 2019; Tortorella et al., 2022). Organizations lacking technological maturity often face disruptions, implementation delays, and increased operational risk (Senna et al., 2023).

Emerging technologies such as artificial intelligence, cloud computing, big data analytics, and the Internet of Things are frequently identified as key enablers of digital transformation (Kitsios & Kapetaneas, 2022; Waqar et

al., 2023). However, the literature also highlights that technology alone is insufficient unless complemented by appropriate organizational capabilities and governance mechanisms (Zhang et al., 2022).

2.1.3. Organizational and Human Critical Success Factors (CSFs)

Human and organizational factors play a central role in shaping digital transformation outcomes (Leso et al., 2023; Zhang et al., 2022). Employee engagement, digital skills, organizational culture, and change management practices are repeatedly identified as decisive CSFs (Westerman et al., 2014; Sony et al., 2021). Resistance to change, skills shortages, and limited training opportunities are among the most frequently reported barriers to successful transformation (Sousa & Rocha, 2019; Trenerry et al., 2021).

Recent studies underscore the importance of continuous learning, cross-functional collaboration, and adaptive organizational structures in sustaining digital initiatives (Diaz Schery et al., 2024; Jing et al., 2023). These findings reinforce the view that digital transformation is fundamentally a human-centered process rather than a purely technical endeavor (Leso et al., 2023).

2.1.4. Regulatory and Environmental Critical Success Factors (CSFs)

Regulatory compliance and external environmental factors have gained increasing attention, particularly in highly regulated industries such as healthcare, finance, and public administration (Omrani et al., 2024; Yang & Han, 2023). Compliance with data protection regulations, ethical standards, and industry-specific policies is critical for maintaining legitimacy and trust (Schramm & Carbon, 2024; Kitsios & Kapetaneas, 2022).

Additionally, external pressures such as market competition, customer expectations, and technological turbulence influence digital transformation strategies and success (Horváth & Szabó, 2019). These factors highlight the need for transformation models that incorporate both internal capabilities and external constraints.

Prevous literature reveals that while a broad range of CSFs has been identified, existing studies lack an integrated, phase-oriented framework that systematically consolidates these factors across industries (Alojail & Khan, 2023; Zhang et al., 2022). Most prior models focus on specific dimensions such as technology adoption, organizational readiness, or digital maturity without capturing the dynamic interactions among CSFs throughout the transformation lifecycle (Zhang et al., 2022).

This gap underscores the need for a comprehensive and actionable model that integrates strategic, technological, organizational, human, and regulatory CSFs into a coherent framework (Zhang et al., 2022). Addressing this gap, the present study proposes the Comprehensive digital transformation Success Model (CDTSM), which structures CSFs across distinct transformation phases and provides practical guidance for implementation and sustainability (Guandalini, 2022; Zhang et al., 2022).

2.2. Theoretical Foundations

2.2.1. Resource-Based View (RBV)

The Resource-Based View posits that sustained competitive advantage derives from the effective deployment of valuable, rare, and difficult-to-imitate organizational resources and capabilities (D'Oria et al., 2021; Lubis, 2022). In the context of digital transformation, this perspective highlights why leadership commitment, strategic alignment, and managerial capabilities consistently emerge as critical success factors (CSFs) (AlNuaimi et al., 2022; Heubeck, 2023). While digital technologies are often accessible and replicable, the ability to strategically mobilize and orchestrate these assets differentiates successful organizations from unsuccessful ones (Calderon-Monge & Ribeiro-Soriano, 2024; Cuthbertson & Furseth, 2022).

2.2.2. Technology–Organization–Environment (TOE) Framework

The Technology–Organization–Environment framework provides a structured lens for categorizing digital transformation CSFs into technological, organizational, and environmental dimensions (Wang & Zhang, 2025). This framework aligns closely with the literature reviewed in Section 2.1, which emphasizes the joint influence of technological readiness, organizational capabilities, and external regulatory and market conditions on transformation outcomes. TOE thus offers a coherent foundation for organizing the diverse and fragmented CSF literature (Wang & Zhang, 2025).

2.2.3. Dynamic Capabilities Perspective

The Dynamic Capabilities perspective extends RBV by emphasizing an organization's ability to sense opportunities, seize them through appropriate investments, and reconfigure resources over time (Pitelis et al., 2023). Digital transformation is inherently evolutionary, unfolding across multiple phases rather than through a single implementation effort (Canhoto et al., 2021; Urbinati et al., 2022). This perspective provides the theoretical rationale for examining how the relevance of CSFs changes across different stages of the transformation process and supports the development of a lifecycle-oriented success model (Hanelt et al., 2021; Nadkarni & Prügl, 2021). To further contextualize the positioning of the proposed model within existing digital transformation frameworks, Table 1 provides a comparative overview of prominent approaches and highlights their key characteristics and limitations.

Framework / Study	Core Focus	Phase-Based Structure	Theoretical Foundation	Regulatory / Environmental Integration	Dynamic Interaction of CSFs	Key Limitation
TOE-Based Adoption Models (Qi et al., 2023; Zhong et al., 2025)	Technology adoption determinants	No	TOE	Yes (Environmental context)	No (static categorizatio n)	Do not explain temporal evolution of CSFs
Digital Maturity Models (Aras & Büyüközkan, 2023; Martínez-Peláez et al., 2023)	Readiness / maturity assessment	Limited	Mixed	Rare	No	Focus on assessment rather than implementation sequencing
Industry 4.0 CSF Frameworks (Sony et al., 2021; Tortorella et al., 2022)	Operational and technological readiness	No	RBV / Operational strategy	Limited	Limited	Sector-specific and technology-centric
Integrative Digital Transformation Reviews (Zhang et al., 2022; Guandalini, 2022)	Aggregation of CSFs	No	Multi-theoretical	Limited	No	Lack structured lifecycle perspective
CDTSM (This Study)	Integrated lifecycle-based CSF model	Yes (Initiation – Execution – Monitoring – Sustainability)	RBV + Dynamic Capabilities + TOE	Yes (Explicit and embedded)	Yes (Phase-dependent relevance)	Requires empirical validation

Table 1. Comparative Overview of Digital Transformation Frameworks

As shown in Table 1, while existing frameworks contribute valuable insights into specific dimensions such as contextual determinants or maturity assessment, they often lack a lifecycle-oriented structure that captures the temporal evolution and interaction of critical success factors (CSFs). The CDTSM addresses this limitation by integrating multidimensional CSFs within a sequenced transformation architecture, thereby offering both explanatory depth and practical implementation guidance.

3. Materials and Methods

3.1. Research Design

This study adopts a qualitative research design based on a PRISMA-guided structured conceptual systematic review to identify and synthesize critical success factors (CSFs) for digital transformation (Guandalini, 2022; Hanelt et al., 2021). The review follows PRISMA-guided search and screening procedures to ensure methodological transparency and replicability. However, rather than conducting a statistical meta-analysis, the primary objective is conceptual synthesis and theory-informed model development. Therefore, the study should be understood as a rigorously structured conceptual systematic review aimed at developing a comprehensive integrative framework.

3.2. Data Sources and Search Strategy

The literature search was conducted across multiple academic databases, including Scopus and Web of Science, to ensure comprehensive coverage of high-quality peer-reviewed studies. The search focused on publications released between 2010 and 2024, reflecting the accelerated evolution of digital transformation research during this period.

A combination of predefined keywords and Boolean operators was used, including: *"digital transformation"*, *"critical success factors"*, *"digital strategy"*, *"organizational readiness"*, and *"digital maturity"*. These keywords were applied to titles, abstracts, and keywords to capture both conceptual and empirical studies relevant to the research objective.

3.3. Inclusion and Exclusion Criteria

Explicit inclusion and exclusion criteria were defined to enhance transparency and consistency in study selection. Studies were included if they:

- Focused explicitly on digital transformation or closely related concepts
- Identified, analyzed, or discussed critical success factors (CSFs)
- Were peer-reviewed journal articles or conference papers
- Were published in English

Studies were excluded if they:

- Addressed digitalization or IT adoption without a transformation perspective
- Lacked discussion of success factors
- Were non-academic sources such as blogs, opinion pieces, or practitioner reports
- Were duplicate publications

3.4. Screening and Selection Process

The screening process followed PRISMA guidelines and was conducted in multiple stages. Initially, duplicate records were removed. Titles and abstracts were then screened to assess relevance based on the inclusion criteria. Subsequently, full-text screening was performed to ensure methodological and thematic alignment with the research objectives.

The screening logic follows established PRISMA stages to ensure systematic and transparent selection.

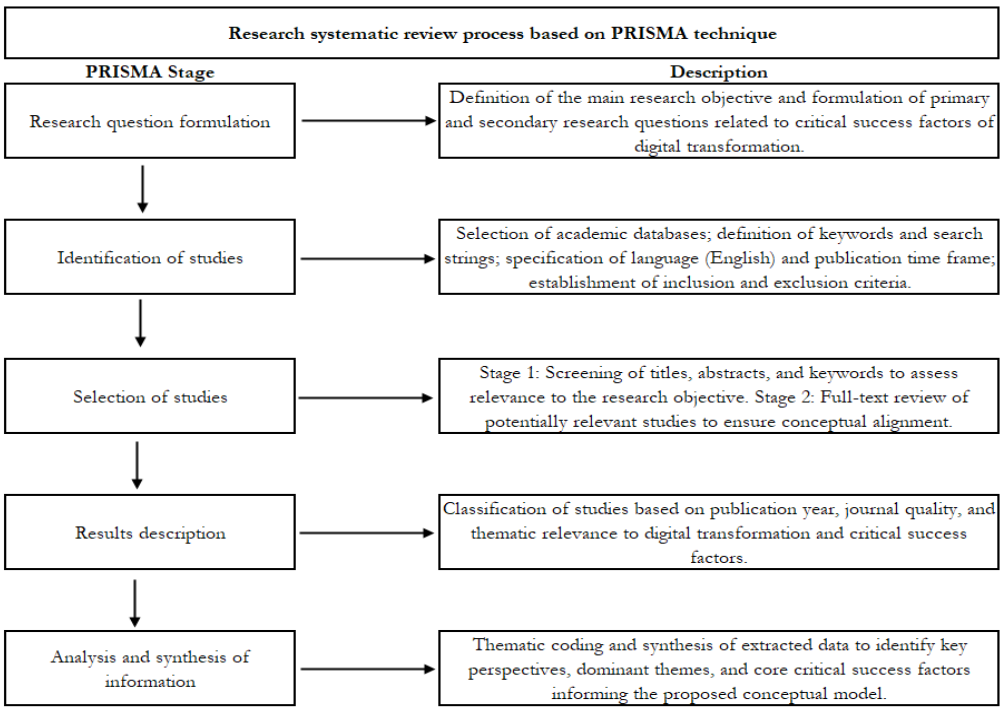

Figure 1. PRISMA stages (Moher et al., 2009)

The diagram outlines the identification, screening, eligibility, and inclusion stages applied in accordance with the PRISMA guidelines, detailing the number of records retrieved from selected databases, duplicates removed, studies excluded based on title and abstract screening, full-text articles assessed for eligibility, and the final set of studies included in the qualitative synthesis.

3.5. Data Analysis and Coding Procedure

Following the PRISMA-guided screening and final selection of relevant studies, the retained articles were subjected to a structured thematic coding procedure to enable systematic synthesis and conceptual integration of the identified critical success factors (CSFs). The selected studies were analyzed using thematic analysis to identify recurring patterns and dominant themes related to digital transformation success. An open coding process was first applied to extract relevant CSFs from each study. These codes were then iteratively refined and grouped into higher-order categories through axial coding.

This process resulted in the classification of CSFs into strategic, technological, organizational, human, and regulatory dimensions. The frequency and co-occurrence of these factors were analyzed to identify the most influential CSFs across industries. This structured coding procedure provided the analytical foundation for the development of the proposed model.

Following the final selection of studies, a structured thematic analysis was conducted. An open coding process was first applied to extract critical success factors (CSFs) reported across the selected studies. Similar codes were then grouped through axial coding to form higher-order categories. Finally, selective coding was used to aggregate these categories into core dimensions aligned with the stages of digital transformation. This systematic coding procedure ensured analytical rigor and supported the development of the proposed conceptual model.

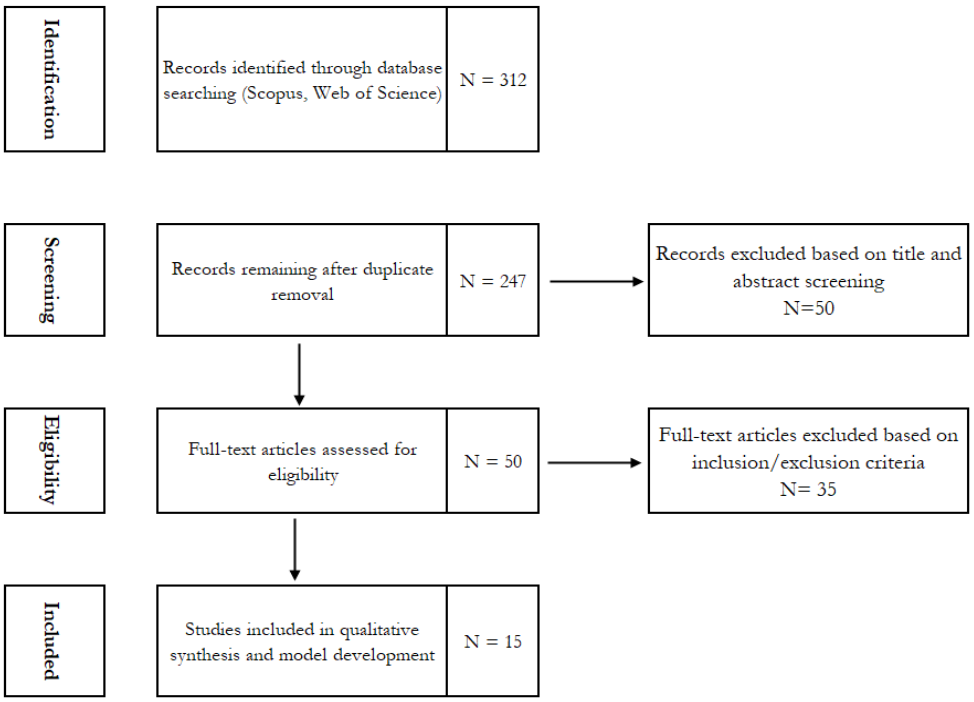

Figure 2. Results based on PRISMA guidelines

As a result of this process, from 50 articles assessed for eligibility, 15 were included in qualitative synthesis and model evelopment (Table 2).

Table 2 presents the main papers identified from the literature. The studies included in Table 2 were selected based on their conceptual relevance to digital transformation success factors, methodological rigor, frequency of citation within the literature, and their contribution to the development of integrative digital transformation frameworks.

No.	Title	Main critical success factors Identified	Authors	Year
1	Toward the role of organizational culture in data-driven digital transformation	Organizational Culture, Leadership, Data-Driven Decision Making	Ghafoori et al.	2024
2	Critical success factors for creating sustainable digital health applications	User-Centric Design, Regulatory Compliance, Interoperability, Security	Schramm & Carbon	2024
3	Exploring critical success factors for digital transformation in construction industry (TOE-based)	Technological Infrastructure, Organizational Readiness, External Environment	Zhong et al.	2025
4	Paths to BIM-based digital transformation	Leadership, Stakeholder Engagement, Technology Adoption, Training	Diaz Schery et al.	2025
5	Identifying the critical success factors of the Digital Transformation	Leadership, Communication, Change Management, Employee Involvement	Hernández-García et al.	2023
6	Critical success factors for Implementing Cloud ERP in SMEs	Top Management Support, User Training, Data Migration, Integration	Barbieri et al.	2024
7	Digital Transformation Journey Guidance: A Holistic Digital Maturity Model	Digital Maturity, Leadership, Technological Infrastructure, Change Management	Aras & Büyüközkan	2023
8	Operationalization of CSFs to Manage Industry 4.0 Transformation	Leadership, Technological Capabilities, Employee Engagement	Brodeur et al.	2022
9	Evaluation of success factors to implement digitalization in construction industry	Leadership, Technological Innovation, Employee Training	Bajpai & Misra	2022
10	Importance of Change Management in Digital Transformation Sustainability	Leadership, Change Management, Organizational Culture	Pacolli	2022
11	Research on Successful Factors of Digital Transformation in SMEs	Leadership, Technology Adoption, Organizational Culture	Zhang et al.	2022
12	Industry 4.0: relationship between strategies, CSFs and technology adoption	Leadership, Technology, Process Improvement	Tortorella et al.	2022
13	Critical success factors for Digitalization Projects	Leadership, Change Management, Technology Adoption	Leyh et al.	2021
14	Digital transformation success under Industry 4.0	Leadership, Technology, Innovation, Employee Training	Ghobakhloo & Iranmanesh	2021
15	Analyzing Success Factors of Digital Transformation in Aviation Industry	Leadership, Technological Infrastructure, Data Utilization	Büyüközkan et al.	2019

Table 2. Main critical success factors identified by literature review

4. Results

The selected studies cover a wide range of industries, including manufacturing, healthcare, public administration, finance, construction, and small and medium-sized enterprises. The diversity of sectors enhances the generalizability of the identified critical success factors (CSFs) across different organizational contexts.

The thematic analysis revealed a set of recurring CSFs that were consistently emphasized across the reviewed studies (Table 3). Leadership commitment and strategic alignment emerged as the most frequently cited factors, appearing in the majority of the analyzed publications. Technological readiness, including IT infrastructure, system integration, and data capabilities, was also highly prevalent. Organizational and human-related factors, such as employee skills, change management, and organizational culture, were repeatedly identified as critical enablers of digital transformation success. Regulatory compliance and external environmental factors, although less frequently discussed, were particularly prominent in studies focusing on regulated industries.

The analysis further indicates that the relevance of CSFs varies across different phases of digital transformation. Leadership commitment and strategic vision were particularly dominant during the initiation and planning phases. Technological readiness and system integration were most critical during the execution phase, whereas monitoring mechanisms, continuous improvement, and regulatory compliance gained importance during the monitoring and sustainability phases.

Critical Success Factor	Number of Studies (N = 15)
Leadership commitment	13
Strategic alignment	12
Technological readiness	11
Change management	10
Employee training and skills	9
Organizational culture	8
Data integration and quality	7
Governance and compliance	6

Table 3. Frequency of critical success factors (CSFs) across selected studies

This phase-based distribution of CSFs provides empirical support for structuring digital transformation success factors within a lifecycle-oriented framework.

Based on the coding process, the identified CSFs were grouped into five dominant dimensions (Table 4):

- Strategic and leadership-related factors
- Technological factors
- Organizational factors
- Human factors
- Regulatory and environmental factors

Strategic and leadership-related factors were found to exert a cross-cutting influence on all other dimensions, particularly by shaping decision-making processes and resource allocation. Technological factors primarily influenced the execution and scalability of digital initiatives, while organizational and human factors played a central role in adoption, acceptance, and sustainability.

No.	Study (Short Title)	Year	S&L	Tech	Org	Human	Reg/Env
1	Organizational Culture in Digital Transformation	2024	✔	✔	✔	–	–
2	Sustainable Digital Health Applications	2024	–	✔	–	✔	✔
3	Digital Transformation in Construction (TOE)	2024	–	✔	✔	–	✔
4	BIM-Based Digital Transformation	2024	✔	✔	–	✔	–
5	CSFs of Digital Transformation	2023	✔	–	✔	✔	–
6	Cloud ERP in SMEs	2023	✔	✔	–	✔	–
7	Digital Maturity Model	2023	✔	✔	✔	✔	–
8	Industry 4.0 Transformation	2022	✔	✔	–	✔	–
9	Digitalization in Construction	2022	✔	✔	–	✔	–
10	Change Management Sustainability	2022	✔	–	✔	✔	–
11	Digital Transformation in SMEs	2022	✔	✔	✔	✔	–
12	Manufacturing Strategies and CSFs	2022	✔	✔	✔	–	–
13	Digitalization Projects	2021	✔	✔	–	✔	–
14	Digital Transformation Under Industry 4.0	2021	✔	✔	–	✔	–
15	Digital Transformation in Aviation	2019	✔	✔	–	–	–

Note: S&L = Strategic and Leadership; Tech = Technological; Org = Organizational; Reg/Env = Regulatory and Environmental.

Table 4. Alignment of key studies with the dimensions of the proposed model

The analysis confirms that strategic and leadership factors are consistently emphasized across the literature, while technological, organizational, human, and regulatory dimensions emerge with varying degrees of prominence. This cross-check further validates that the proposed model is firmly grounded in prior empirical and conceptual research. Results demonstrate that successful digital transformation depends on a balanced combination of strategic, technological, organizational, human, and regulatory factors. No single CSF was sufficient in isolation;

rather, success emerged from the interaction of multiple factors across transformation phases. These findings form the empirical foundation for the development of the proposed Comprehensive digital transformation Success Model (CDTSM) (Figure 3).

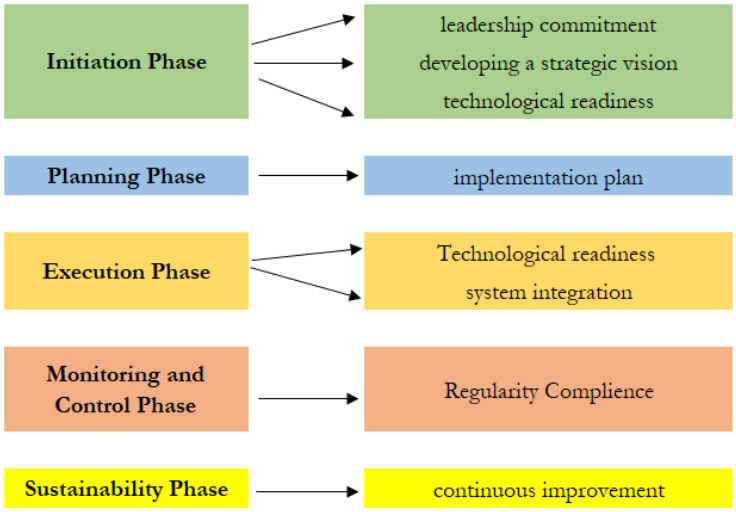

Figure 3. Comprehensive Digital Transformation Success Model (CDTSM). The proposed model

The Comprehensive digital transformation Success Model (CDTSM) integrates the critical success factors (CSFs) influencing digital transformation initiatives at the organizational level. The model conceptualizes digital transformation success as a multidimensional phenomenon shaped by five interrelated categories of factors.

1. **Strategic and Leadership Factors:**

   Strategic and leadership factors emphasize the role of top management commitment, digital vision, strategic alignment, and governance structures in guiding digital transformation initiatives. The literature consistently highlights leadership support and a clear transformation roadmap as foundational elements for successful digital transformation.

2. **Technological Factors**

   Technological factors refer to the availability, integration, and scalability of digital technologies, including digital infrastructure, data analytics capabilities, and interoperability of systems. These factors enable organizations to operationalize digital strategies and support innovation-driven transformation.

3. **Organizational Factors**

   Organizational factors encompass structural flexibility, process redesign, organizational culture, and change management practices. These elements facilitate the alignment of internal processes and structures with digital objectives, ensuring organizational readiness for transformation.

4. **Human Factors**

   Human factors highlight the importance of employee skills, digital competencies, training, and engagement. The literature underscores that digital transformation is not solely a technological endeavor but also a human-centered process requiring continuous learning and cultural adaptation.

5. **Regulatory and Environmental Factors**

   Regulatory and environmental factors capture the influence of external conditions such as regulatory frameworks, industry standards, market dynamics, and institutional pressures. These contextual elements shape the scope and pace of digital transformation initiatives across industries.

The proposed model illustrates that digital transformation success emerges from the **synergistic interaction** of strategic, technological, organizational, human, and environmental factors rather than from isolated initiatives. Accordingly, organizations must adopt a holistic and integrated approach to digital transformation.

CDTSM Phase	Illustrative Managerial Actions
Initiation	Define digital vision, assess organizational readiness, identify strategic priorities
Planning	Allocate resources, establish governance structures, develop digital strategy
Execution	Implement digital technologies, provide employee training, support change management
Monitoring	Track KPIs, evaluate performance, identify implementation gaps
Sustainability	Promote continuous improvement, strengthen innovation culture, ensure long-term adaptability

Table 5. Illustrative managerial actions associated with the phases of the CDTSM

The operationalization presented in Table 5 illustrates how organizations may translate the proposed framework into practical managerial actions across different stages of digital transformation. The table does not prescribe a universal implementation sequence but rather provides an indicative roadmap that can be adapted according to organizational context, industry characteristics, and digital maturity levels.

5. Discussion

This study set out to address the fragmentation in the digital transformation literature by synthesizing critical success factors (CSFs) into an integrated and phase-based framework. Based on the findings, the Comprehensive digital transformation Success Model (CDTSM) was developed. The model adopts a phase-based structure encompassing initiation, planning, execution, monitoring, and sustainability (Soares et al., 2024). Each phase integrates the identified CSFs to reflect their dynamic interactions throughout the digital transformation lifecycle (Nadkarni & Prügl, 2021). This section discusses these findings in relation to established theoretical frameworks and highlights how the proposed Comprehensive digital transformation Success Model (CDTSM) advances existing knowledge**.** Unlike prior integrative attempts that primarily categorize success factors, the CDTSM introduces a structured phase-based architecture that explicates how the relative salience of critical success factors (CSFs) shifts across different stages of the transformation lifecycle. This lifecycle logic constitutes a central theoretical advancement of the study.

5.1. Theoretical Interpretation of the Findings

The prominence of leadership commitment and strategic alignment aligns closely with the Resource-Based View (RBV), which emphasizes the role of valuable, rare, and inimitable managerial capabilities in achieving sustained competitive advantage (Civelek et al., 2023; Vrontis et al., 2022).From this perspective, leadership vision and strategic coherence function as higher-order organizational resources that enable the effective deployment of digital technologies (Hanelt et al., 2021; Omrani et al., 2024). The findings suggest that digital transformation success depends not merely on technological assets but on the strategic capabilities required to mobilize and orchestrate those assets (Matt et al., 2015; Vial, 2019).

Similarly, the phase-dependent importance of CSFs supports the Dynamic Capabilities framework. Dynamic capabilities emphasize an organization's ability to sense opportunities, seize them through appropriate investments, and reconfigure resources over time (Kane et al., 2018; Vial, 2019). The observed shift in CSF relevance from strategic vision in early phases to continuous improvement and monitoring in later phases reflects the dynamic and evolving nature of digital transformation processes (Vial, 2019). By explicitly mapping these dynamic capability processes onto identifiable transformation phases, the CDTSM operationalizes the dynamic capabilities perspective in a more structured manner than prior conceptual discussions, which often remain abstract and non-sequential.

5.2. Alignment with the TOE Framework

The categorization of CSFs into technological, organizational, and environmental dimensions resonates strongly with the Technology–Organization–Environment (TOE) framework (Qi et al., 2023; Zhong et al., 2025). Technological readiness corresponds to the technological context, organizational culture and skills align with the organizational context, and regulatory compliance reflects the environmental context. However, unlike traditional TOE applications that often adopt a static perspective, the CDTSM introduces a temporal and phase-based interpretation of these dimensions (Qi et al., 2023; Zhong et al., 2025).

By embedding TOE dimensions within a lifecycle-oriented structure, the proposed model captures how contextual factors interact and evolve throughout the digital transformation process (Qi et al., 2023; Zhong et al., 2025). This dynamic interpretation addresses a key limitation of existing TOE-based models, which often fail to explain how success factors change over time (Zhong et al., 2025).

Beyond integrating previously identified CSFs, the CDTSM contributes additional explanatory value by emphasizing the dynamic interdependence of success factors across different transformation phases. The model proposes that the relevance and interaction of CSFs are not static but evolve throughout the digital transformation lifecycle. For example, leadership commitment and strategic vision play a dominant role during the initiation and planning phases, whereas employee engagement, continuous learning, and process integration become more critical during execution and sustainability phases. This phase-specific interpretation extends beyond traditional TOE-based and digital maturity models, which generally classify determinants within static organizational dimensions without explaining how their influence changes over time. In this regard, the CDTSM introduces a lifecycle-oriented logic that helps explain why certain digital transformation initiatives succeed or fail at different stages despite having similar technological capabilities.

In doing so, the CDTSM extends the TOE framework from a static contextual classification tool to a temporally embedded explanatory model, thereby clarifying not only what factors matter, but when and how their relevance evolves throughout the transformation journey.

5.3. Advancing Beyond Existing Digital Transformation Frameworks

Existing digital transformation and digital maturity models primarily assess organizational readiness or maturity levels without explicitly linking CSFs to specific transformation phases (Aras & Büyüközkan, 2023). While such models provide diagnostic value, they offer limited guidance on implementation sequencing and long-term sustainability. The CDTSM advances these frameworks by explicitly mapping CSFs to distinct phases initiation, planning, execution, monitoring, and sustainability thereby translating abstract success factors into actionable guidance (Martínez-Peláez et al., 2023; Zhang et al., 2022). This phase-specific structuring moves beyond maturity-level diagnostics by proposing an implementation-sensitive logic that connects strategic intent, technological deployment, organizational adaptation, and sustainability mechanisms in a coherent sequence.

Furthermore, the integration of regulatory and environmental factors represents a notable extension beyond many prior models Zhong et al. (2025). As digital transformation increasingly intersects with data protection, cybersecurity, and ethical considerations, the inclusion of regulatory CSFs enhances the model's relevance for organizaotions operating in highly regulated environments.

5.4. Implications for Theory and Research

From a theoretical standpoint, this study contributes to digital transformation research by offering a holistic and integrative framework that bridges multiple theoretical lenses (Hanelt et al., 2021; Zhang et al., 2022). More specifically, the model contributes by (1) introducing a lifecycle-based structuring of CSFs, (2) integrating regulatory and environmental dynamics more explicitly than many prior frameworks, and (3) clarifying cross-dimensional interactions across transformation phases. By combining insights from RBV, Dynamic Capabilities, and TOE, the CDTSM provides a more comprehensive explanation of digital transformation success than single-theory approaches (Civelek et al., 2023; Vrontis et al., 2022). This integration helps address the conceptual fragmentation observed in prior studies and offers a foundation for cumulative theory development. At the same time, the findings also reveal important contextual variations and tensions within the digital transformation literature. While some studies emphasize technological readiness as the primary driver of transformation success, others identify leadership commitment, organizational culture, or employee capabilities as more decisive factors. These inconsistencies suggest that the relevance of specific CSFs may vary depending on organizational size, industry characteristics, regulatory intensity, and digital maturity levels. For example, regulatory compliance appears significantly more critical in highly regulated sectors such as healthcare and finance, whereas flexibility and innovation capabilities may play a stronger role in technology-intensive or entrepreneurial environments. Such boundary conditions indicate that digital transformation success cannot be

fully explained through universal or static models alone, reinforcing the importance of the lifecycle-oriented and context-sensitive perspective proposed in the CDTSM.

The findings also open avenues for future research to empirically test the proposed relationships between CSFs and transformation outcomes. Longitudinal and cross-industry studies could further examine how CSFs evolve over time and how their interactions influence performance.

6. Conclusion

This study aimed to address the fragmentation in digital transformation research by identifying and synthesizing critical success factors (CSFs) and proposing an integrated, phase-based framework. Through a PRISMA-guided structured conceptual systematic review of 50 peer-reviewed studies the research identified a set of recurring strategic, technological, organizational, human, and regulatory factors that collectively influence digital transformation success. The findings confirm that successful digital transformation is a dynamic and multi-dimensional process that requires the coordinated management of these factors across different transformation phases.

The primary contribution of this study lies in the development of the Comprehensive digital transformation Success Model (CDTSM). Unlike existing digital transformation or maturity models that emphasize readiness assessment or isolated dimensions, the CDTSM integrates critical success factors (CSFs) within a lifecycle-oriented structure encompassing initiation, planning, execution, monitoring, and sustainability. By consolidating dispersed insights into a coherent framework, the model also bridges RBV, Dynamic Capabilities, and TOE perspectives by explaining how strategic capabilities and contextual factors interact dynamically throughout the transformation lifecycle. By consolidating dispersed insights into a coherent framework, the model also bridges RBV, Dynamic Capabilities, and TOE perspectives by explaining how strategic capabilities and contextual factors interact dynamically throughout the transformation lifecycle. In doing so, this study advances digital transformation theory while offering a practical tool to support decision-makers in managing complex transformation initiatives.

Unlike established frameworks such as the Technology–Organization–Environment (TOE) model or generic digital maturity models, which primarily classify determinants at a static organizational level, the proposed model adopts a phase-oriented perspective. It explicitly captures the dynamic relevance of critical success factors (CSFs) across different stages of digital transformation. This temporal structuring enables a more actionable interpretation of success factors, addressing a key limitation of prior models that overlook the evolving nature of transformation processes.

Despite its contributions, this study has several limitations. Although the review follows PRISMA-guided procedures to enhance transparency and replicability, it does not include a formal quantitative meta-analysis or standardized quality scoring of individual studies. First, the review focused exclusively on peer-reviewed journal articles, potentially excluding relevant insights from practitioner-oriented or grey literature. Second, while a structured thematic analysis was applied, no formal quantitative risk-of-bias assessment was conducted. These limitations provide opportunities for future research to empirically test and refine the proposed model across different organizational and industry contexts.

Future research could address these limitations by incorporating mixed-method approaches and empirically validating the proposed model across different industries and contexts.

Future research is also encouraged to empirically test and refine the CDTSM through quantitative, qualitative, or mixed-method approaches. Longitudinal studies could explore how critical success factors (CSFs) evolve over time, while sector-specific investigations may assess the applicability of the model in different regulatory and technological environments. Such efforts would further strengthen the generalizability and practical relevance of the proposed framework.

The CDTSM provides a structured foundation for advancing cumulative research on digital transformation success while offering implementation-oriented guidance for practitioners.

Declaration of Conflicting Interests

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Authors' contributions

Behzad Salavati Tehrani: conceptualization, data processing research.

Carmen de Pablos Heredero: formal analysis, acquisition of funds, revision.

Data availability

Data available upon request

Use of Artificial Intelligence

Authors have not used Artificial Intelligence to do this article.

References

AlNuaimi, B. K., Kumar-Singh, S., Ren, S., Budhwar, P., & Vorobyev, D. (2022). Mastering digital transformation: The nexus between leadership, agility, and digital strategy. *Journal of Business Research*, *145*, 636–648. https://doi.org/10.1016/j.jbusres.2022.03.038

Alojail, M., & Khan, S. B. (2023). Impact of Digital Transformation toward Sustainable Development. *Sustainability*, *15*(20), 14697. https://doi.org/10.3390/su152014697

Ancillai, C., Sabatini, A., Gatti, M., & Perna, A. (2023). Digital technology and business model innovation: A systematic literature review and future research agenda. *Technological Forecasting and Social Change*, *188*, 122307. https://doi.org/10.1016/j.techfore.2022.122307

Angelopoulos, S., Bendoly, E., Fransoo, J., Hoberg, K., Ou, C., & Tenhiälä, A. (2023). Digital transformation in operations management: Fundamental change through agency reversal. *Journal of Operations Management*, *69*(6), 876–889. https://doi.org/10.1002/joom.1271

Aras, A., & Büyüközkan, G. (2023). Digital Transformation Journey Guidance: A Holistic Digital Maturity Model Based on a Systematic Literature Review. *Systems, 11*(4), 213. https://doi.org/10.3390/systems11040213

Bajpai, A., & Misra, S. C. (2024). Evaluation of success factors to implement digitalization in the construction industry. *Construction Innovation, 24*(4), 865–891. https://doi.org/10.1108/CI-02-2022-0042

Barbieri, L. M., Sott, M. K., & Monticelli, J. M. (2024). Critical Success Factors for Implementing Cloud ERP in SMEs: A Systematic Review. *International Journal of Innovation and Technology Management, 21*(02), 2430003. https://doi.org/10.1142/S0219877024300039

Braojos, J., Weritz, P., & Matute, J. (2024). Empowering organisational commitment through digital transformation capabilities: The role of digital leadership and a continuous learning environment. *Information Systems Journal*, *34*(5), 1466–1492. https://doi.org/10.1111/isj.12501

Brodeur, J., Pellerin, R., & Deschamps, I. (2022). Operationalization of Critical Success Factors to Manage the Industry 4.0 Transformation of Manufacturing SMEs. *Sustainability, 14*(14), 8954. https://doi.org/10.3390/su14148954

Büyüközkan, G., Feyzioglu, O., & Havle, C. A. (2019). Analyzing Success Factors of Digital Transformation in Aviation Industry Using Fuzzy Cognitive Map Approach. 2019 3rd International Conference on Data Science and Business Analytics (ICDSBA), 124–128. https://doi.org/10.1109/ICDSBA48748.2019.00035

Calderon-Monge, E., & Ribeiro-Soriano, D. (2024). The role of digitalization in business and management: A systematic literature review. *Review of Managerial Science*, *18*(2), 449–491. https://doi.org/10.1007/s11846-023-00647-8

Canhoto, A. I., Quinton, S., Pera, R., Molinillo, S., & Simkin, L. (2021). Digital strategy aligning in SMEs: A dynamic capabilities perspective. *The Journal of Strategic Information Systems*, *30*(3), 101682. https://doi.org/10.1016/j.jsis.2021.101682

Chirumalla, K., Oghazi, P., Nnewuku, R. E., Tuncay, H., & Yahyapour, N. (2025). Critical factors affecting digital transformation in manufacturing companies. *International Entrepreneurship and Management Journal*, *21*(1), 54. https://doi.org/10.1007/s11365-024-01056-3

Civelek, M., Krajčík, V., & Ključnikov, A. (2023). The impacts of dynamic capabilities on SMEs' digital transformation process: The resource-based view perspective. *Oeconomia Copernicana*, *14*(Online), 1367–1392. https://doi.org/10.24136/oc.2023.019

Cosa, M., & Torelli, R. (2024). Digital Transformation and Flexible Performance Management: A Systematic Literature Review of the Evolution of Performance Measurement Systems. *Global Journal of Flexible Systems Management*, *25*(3), 445–466. https://doi.org/10.1007/s40171-024-00409-9

Costa-Melo, I., Queiroz, G. A., Alves-Junior, P. N., Sousa, T. B. D., Yushimito, W. F., & Pereira, J. (2023). Sustainable digital transformation in small and medium enterprises (SMEs): A review on performance. *Heliyon*, *9*(3), e13908. https://doi.org/10.1016/j.heliyon.2023.e13908

Cuthbertson, R. W., & Furseth, P. I. (2022). Digital services and competitive advantage: Strengthening the links between RBV, KBV, and innovation. *Journal of Business Research*, *152*, 168–176. https://doi.org/10.1016/j.jbusres.2022.07.030

D'Oria, L., Crook, T. R., Ketchen, D. J., Sirmon, D. G., & Wright, M. (2021). The Evolution of Resource-Based Inquiry: A Review and Meta-Analytic Integration of the Strategic Resources–Actions–Performance Pathway. *Journal of Management*, *47*(6), 1383–1429. https://doi.org/10.1177/0149206321994182

Diaz Schery, C. A., Caiado, R. G. G., Aguilar Vargas, S., & Rodriguez Vignon, Y. (2025). Paths to BIM-based digital transformation: A bibliometric and systematic review of critical factors. *Engineering, Construction and Architectural Management, 32*(7), 4357–4383. https://doi.org/10.1108/ECAM-12-2023-1230

Fernandez-Vidal, J., Antonio-Perotti, F., Gonzalez, R., & Gasco, J. (2022). Managing digital transformation: The view from the top. *Journal of Business Research*, *152*, 29–41. https://doi.org/10.1016/j.jbusres.2022.07.020

Frank, A. G., Dalenogare, L. S., & Ayala, N. F. (2019). Industry 4.0 technologies: Implementation patterns in manufacturing companies. *International Journal of Production Eco*nomics, 210, 15–26. https://doi.org/10.1016/j.ijpe.2019.01.004

Ghafoori, A., Gupta, M., Merhi, M. I., Gupta, S., & Shore, A. P. (2024). Toward the role of organizational culture in data-driven digital transformation. *International Journal of Production Economics, 271,* 109205. https://doi.org/10.1016/j.ijpe.2024.109205

Ghobakhloo, M., & Iranmanesh, M. (2021). Digital transformation success under Industry 4.0: A strategic guideline for manufacturing SMEs. *Journal of Manufacturing Technology Management, 32*(8), 1533–1556. https://doi.org/10.1108/JMTM-11-2020-0455

Guandalini, I. (2022). Sustainability through digital transformation: A systematic literature review for research guidance. *Journal of Business Research*, *148*, 456–471. https://doi.org/10.1016/j.jbusres.2022.05.003

Hanelt, A., Bohnsack, R., Marz, D., & Antunes-Marante, C. (2021). A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies*, *58*(5), 1159–1197. https://doi.org/10.1111/joms.12639

Hernández-García, Á., Cuenca-Enrique, C., Jarabo-Valdivieso, P., & Chaparro-Peláez, J. (2023). Identifying the Critical Success Factors of the Digital Transformation. In F. P. García Márquez, I. Segovia Ramírez, P. J.

Bernalte Sánchez, & A. Muñoz Del Río (Eds.), *IoT and Data Science in Engineering Management* (Vol. 160, pp. 77–81). Springer International Publishing. https://doi.org/10.1007/978-3-031-27915-7_15

Heubeck, T. (2023). Managerial capabilities as facilitators of digital transformation? Dynamic managerial capabilities as antecedents to digital business model transformation and firm performance. *Digital Business*, *3*(1), 100053. https://doi.org/10.1016/j.digbus.2023.100053

Horváth, D., & Szabó, R. Zs. (2019). Driving forces and barriers of Industry 4.0: Do multinational and small and medium-sized companies have equal opportunities? *Technological Forecasting and Social Change, 146,* 119–132. https://doi.org/10.1016/j.techfore.2019.05.021

Jing, Z., Zheng, Y., & Guo, H. (2023). A Study of the Impact of Digital Competence and Organizational Agility on Green Innovation Performance of Manufacturing Firms—The Moderating Effect Based on Knowledge Inertia. *Administrative Sciences, 13*(12), 250. https://doi.org/10.3390/admsci13120250

Kane, C.G.; Palmer, D. Phillips, A. N. Kiron, D. & Buckley, N (2018). Coming of Age Digitally. *MIT Sloan Management Review and Deloitte Insights*, June 2018.

Kitsios, F., & Kapetaneas, N. (2022). Digital Transformation in Healthcare 4.0: Critical Factors for Business Intelligence Systems. *Information, 13*(5), 247. https://doi.org/10.3390/info13050247

Leso, B. H., Cortimiglia, M. N., & Ghezzi, A. (2023). The contribution of organizational culture, structure, and leadership factors in the digital transformation of SMEs: A mixed-methods approach. *Cognition, Technology & Work*, *25*(1), 151–179. https://doi.org/10.1007/s10111-022-00714-2

Leyh, C., Köppel, K., Neuschl, S., & Pentrack, M. (2021). Critical Success Factors for Digitalization Projects. Proccedings of the *16th Conference om Computer Science and Intelligence Systems*. M. Ganzha, L. Maciaszek, M.Paprzycki, D. Slezak (eds.). ACSIS, 25, 427–436. https://doi.org/10.15439/2021F122

Lubis, N. W. (2022). Resource Based View (RBV) in Improving Company Strategic Capacity. *Research Horizon*, *2*(6), 587–596. https://doi.org/10.54518/rh.2.6.2022.587-596

Martínez-Peláez, R., Escobar, M. A., Félix, V. G., Ostos, R., Parra-Michel, J., García, V., Ochoa-Brust, A., Velarde-Alvarado, P., Félix, R. A., Olivares-Bautista, S., Flores, V., & Mena, L. J. (2024). Sustainable Digital Transformation for SMEs: A Comprehensive Framework for Informed Decision-Making. *Sustainability*, *16*(11), 4447. https://doi.org/10.3390/su16114447

Martínez-Peláez, R., Ochoa-Brust, A., Rivera, S., Félix, V. G., Ostos, R., Brito, H., Félix, R. A., & Mena, L. J. (2023). Role of Digital Transformation for Achieving Sustainability: Mediated Role of Stakeholders, Key Capabilities, and Technology. *Sustainability*, *15*(14), 11221. https://doi.org/10.3390/su151411221

Matt, C., Hess, T., & Benlian, A. (2015). Digital Transformation Strategies. *Business & Information Systems Engineering, 57*(5), 339–343. https://doi.org/10.1007/s12599-015-0401-5

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *Journal of Clinical Epidemiology,* 62(10), 1006–1012. https://doi.org/10.1016/j.jclinepi.2009.06.005

Nadkarni, S., & Prügl, R. (2021). Digital transformation: A review, synthesis and opportunities for future research. *Management Review Quarterly*, *71*(2), 233–341. https://doi.org/10.1007/s11301-020-00185-7

Omrani, N., Rejeb, N., Maalaoui, A., Dabić, M., & Kraus, S. (2024). Drivers of Digital Transformation in SMEs. *IEEE Transactions on Engineering Management*, *71*, 5030–5043. https://doi.org/10.1109/TEM.2022.3215727

Pacolli, M. (2022). Importance of Change Management in Digital Transformation Sustainability. *IFAC-PapersOnLine, 55*(39), 276–280. https://doi.org/10.1016/j.ifacol.2022.12.034

Palade, D., & Møller, C. (2023). Guiding Digital Transformation in SMEs. *Management and Production Engineering Review,* 105–117. https://doi.org/10.24425/mper.2023.145369

Pitelis, C. N., Teece, D. J., & Yang, H. (2023). Dynamic Capabilities and MNE Global Strategy: A Systematic Literature Review-Based Novel Conceptual Framework. *Journal of Management Studies*, *61,* 3295–3326 . https://doi.org/10.1111/joms.13021

Qi, P., Xu, C., & Wang, Q. (2023). What Determines the Digital Transformation of SRDI Enterprises?—A Study of the TOE Framework-Based Configuration. *Sustainability, 15*(18), 13607. https://doi.org/10.3390/su151813607

Schramm, L., & Carbon, C.-C. (2024). Critical success factors for creating sustainable digital health applications: A systematic review of the German case. *Digital Health, 10,* 20552076241249604. https://doi.org/10.1177/20552076241249604

Senna, P. P., Barros, A. C., Bonnin-Roca, J., & Azevedo, A. (2023). Development of a digital maturity model for Industry 4.0 based on the technology-organization-environment framework. *Computers & Industrial Engineering*, *185*, 109645. https://doi.org/10.1016/j.cie.2023.109645

Soares, I., Fernandes, G., & Santos, J. M. R. C. A. (2024). Sustainability in Project Management Practices. *Sustainability*, *16*(10), 4275. https://doi.org/10.3390/su16104275

Sony, M., Antony, J., Mc Dermott, O., & Garza-Reyes, J. A. (2021). An empirical examination of benefits, challenges, and critical success factors of industry 4.0 in manufacturing and service sector. *Technology in Society, 67,* 101754. https://doi.org/10.1016/j.techsoc.2021.101754

Sousa, M. J., & Rocha, Á. (2019). Digital learning: Developing skills for digital transformation of organizations. *Future Generation Computer Systems*, *91*, 327–334. https://doi.org/10.1016/j.future.2018.08.048

Teng, X., Wu, Z., & Yang, F. (2022). Research on the Relationship between Digital Transformation and Performance of SMEs. *Sustainability*, *14*(10), 6012. https://doi.org/10.3390/su14106012

Tortorella, G., Kurnia, S., Trentin, M., Oliveira, G. A., & Setti, D. (2022). Industry 4.0: What is the relationship between manufacturing strategies, critical success factors and technology adoption? *Journal of Manufacturing Technology Management, 33*(8), 1407–1428. https://doi.org/10.1108/JMTM-02-2022-0088

Trenerry, B., Chng, S., Wang, Y., Suhaila, Z. S., Lim, S. S., Lu, H. Y., & Oh, P. H. (2021). Preparing Workplaces for Digital Transformation: An Integrative Review and Framework of Multi-Level Factors. *Frontiers in Psychology*, *12*, 620766. https://doi.org/10.3389/fpsyg.2021.620766

Troise, C., Corvello, V., Ghobadian, A., & O'Regan, N. (2022). How can SMEs successfully navigate VUCA environment: The role of agility in the digital transformation era. *Technological Forecasting and Social Change*, *174*, 121227. https://doi.org/10.1016/j.techfore.2021.121227

Urbinati, A., Manelli, L., Frattini, F., & Bogers, M. L. A. M. (2022). The digital transformation of the innovation process: Orchestration mechanisms and future research directions. *Innovation*, *24*(1), 65–85. https://doi.org/10.1080/14479338.2021.1963736

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi-Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, *122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems, 28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

Vrontis, D., Chaudhuri, R., & Chatterjee, S. (2022). Adoption of Digital Technologies by SMEs for Sustainability and Value Creation: Moderating Role of Entrepreneurial Orientation. *Sustainability*, *14*(13), 7949. https://doi.org/10.3390/su14137949

Wang, S., & Zhang, H. (2025). Enhancing SMEs sustainable innovation and performance through digital transformation: Insights from strategic technology, organizational dynamics, and environmental adaptation. *Socio-Economic Planning Sciences*, *98*, 102124. https://doi.org/10.1016/j.seps.2024.102124

Waqar, A., Andri, Qureshi, A. H., Almujibah, H. R., Tanjung, L. E., & Utami, C. (2023). Evaluation of success factors of utilizing AI in digital transformation of health and safety management systems in modern construction projects. *Ain Shams Engineering Journal, 14*(11), 102551. https://doi.org/10.1016/j.asej.2023.102551

Westerman, G., Bonnet, D. & Mcafee, A. (2014). The nine elements of digital transformation. *MIT Sloan Management Review, 7,* 1-6.

Yang, Y., & Han, J. (2023). Digital transformation, financing constraints, and corporate environmental, social, and governance performance. *Corporate Social Responsibility and Environmental Management*, *30*(6), 3189–3202. https://doi.org/10.1002/csr.2546

Zhang, X., Xu, Y., & Ma, L. (2022). Research on Successful Factors and Influencing Mechanism of the Digital Transformation in SMEs. *Sustainability*, *14*(5), 2549. https://doi.org/10.3390/su14052549

Zhong, Y., Chen, Z., Ye, J., & Zhang, N. (2025). Exploring critical success factors for digital transformation in construction industry–based on TOE framework. *Engineering, Construction and Architectural Management, 32*(6), 4227–4249. https://doi.org/10.1108/ECAM-08-2023-0782