



## Strategic Evolution Of Digital Transformation And Information Technology Governance: A Systematic Literature Review

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### ABSTRACT

Digital transformation and information technology (IT) strategy have become critical pillars of contemporary organizational management. This article presents a systematic literature review of 80 articles published between 2020 and 2025 in reputable international journals indexed in Scopus and/or Web of Science. The review examines digital transformation and IT strategy within business and organizational management using the PRISMA protocol and a structured thematic synthesis approach. The analysis covers digital transformation strategy, IT governance and strategic alignment, cloud computing and IT infrastructure, big data analytics and business intelligence, artificial intelligence, digital leadership and change management, cybersecurity, e-business and digital innovation, and enterprise resource planning and system integration. A systematic coding process was used to extract and synthesize bibliographic information, research methods, organizational contexts, key constructs, and major findings. The review shows that digital transformation is a multidimensional process of organizational change that extends beyond technology adoption and depends on the interaction of strategy, leadership, culture, governance, and the broader business ecosystem. It also highlights research gaps concerning developing-country contexts, integration across research themes, and sustainability. These findings provide an integrated overview of the field and inform a future research agenda for scholars and practitioners.

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### 1. INTRODUCTION

The wave of digital transformation that has swept across nearly every industrial sector over the past decade has prompted academics and management practitioners to re-evaluate the foundations of conventional business strategies. Digital transformation is no longer merely a tactical choice, but rather a strategic imperative that determines the competitiveness and sustainability of organizations amidst an increasingly complex and

digitally connected business ecosystem [1], [2]. This phenomenon has been further accelerated by the disruption of the COVID-19 pandemic, which has forced organizations of all sizes and industries to adopt digital technologies on a massive scale in a very short timeframe.

Information technology (IT) strategy plays an increasingly central role as a bridge between digital transformation vision and operational execution. Alignment between business and IT strategies, known as business-IT alignment, has been empirically proven to positively correlate with organizational performance [3], [4]. Achieving this alignment is inseparable from effective IT governance, digital leadership capabilities, and the readiness of technology infrastructure such as cloud computing and large-scale data analytics.

The complexity of the research landscape in this field is reflected in the rapidly growing volume of scientific publications. Several previous literature reviews have made important contributions, although they generally focus on narrower aspects or themes. Most existing reviews are limited to a single dimension, such as digital transformation strategy [5], artificial intelligence [6], or the strategic use of AI [7], thus failing to provide a comprehensive and integrated overview of the entire digital transformation and IT strategy research ecosystem.

This article is written to fill this gap by presenting a systematic literature review (SLR) of 80 reputable international journal articles published between 2020 and 2025. The four research objectives to be achieved are: (1) mapping the dominant research themes in the digital transformation and IT strategy literature during this period; (2) identifying the methodologies, theoretical frameworks, and key constructs used; (3) synthesizing key findings and research gaps from each theme; and (4) formulating an integrative conceptual framework and a relevant future research agenda.

This article's contribution is two-dimensional. Theoretically, it enhances understanding of the multidimensional and interdisciplinary nature of digital transformation by integrating nine themes that have been studied separately. Practically, the resulting evidence-based synthesis provides guidance for managers, executives, and policymakers in designing and executing their organizations' digital transformation agendas.

## **2. METHOD**

The research workflow applied in this study is presented in Figure 1. It summarizes the sequential stages of the systematic literature review, including review planning, literature searching, study screening, full-text review, methodological quality assessment, data extraction and coding, thematic synthesis, and results reporting.

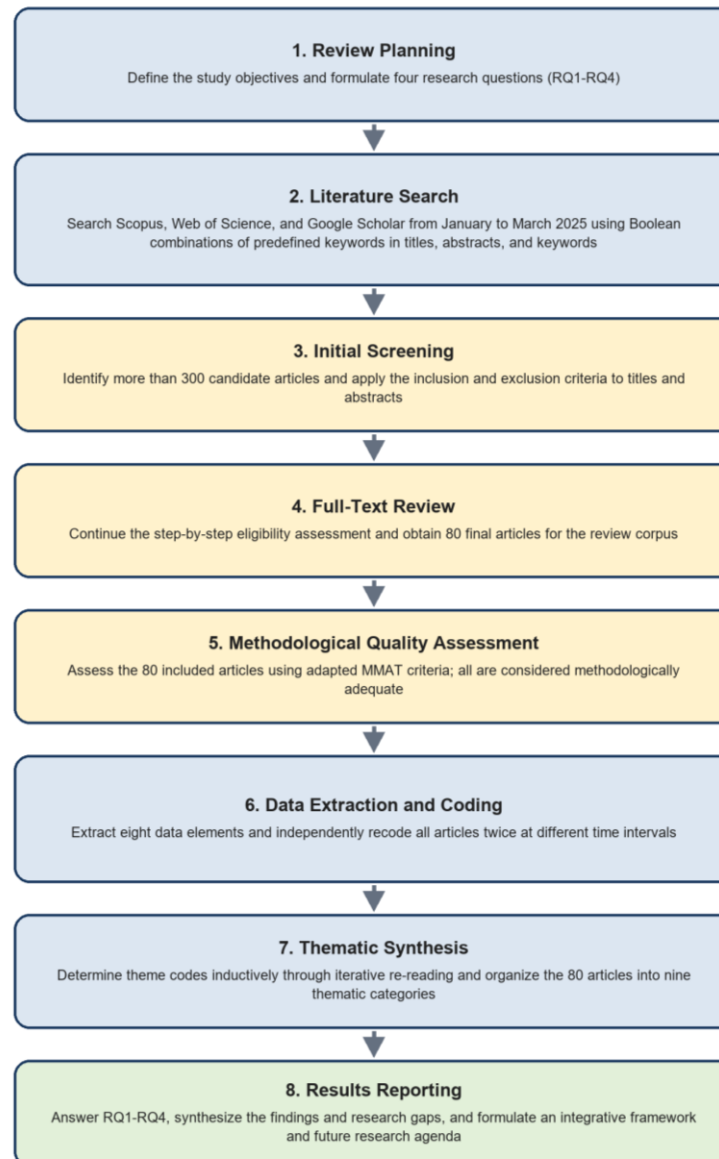


Figure 1. Systematic literature review research workflow

### Research Design

This study employed the Systematic Literature Review (SLR) method, which refers to the Kitchenham and Charters (2007) guidelines and the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol. The SLR method was chosen for its ability to systematically, transparently, and replicably identify, evaluate, and synthesize all relevant empirical and conceptual evidence. The SLR process in this study consisted of three main stages: review planning, review implementation, and reporting of results.

### Research Questions

Four research questions (RQ) were formulated to guide the entire SLR process, as listed below.

**RQ1: What dominant research themes can be identified from the digital transformation and IT strategy literature published in the period 2020-2025?**

**RQ2: What research methodologies and theoretical frameworks are most commonly used in the literature?**

**RQ3: What key empirical and conceptual findings emerge from each research theme?**

**RQ4: What research gaps are still open and what research agendas are relevant to develop in the future?**

### Literature Search Protocol

A systematic literature search was conducted through three major databases, namely Scopus, Web of Science (WoS), and Google Scholar, from January to March 2025. The search string was constructed using a combination of primary keywords with the Boolean operators AND/OR. The keywords used included: "digital

transformation", "IT strategy", "IT governance", "digital leadership", "cloud computing", "big data analytics", "artificial intelligence", "cybersecurity", "e-business", "digital innovation", and "enterprise resource planning". The search was conducted on the title, abstract, and keywords of the articles.

### Inclusion and Exclusion Criteria

The inclusion criteria included: (a) articles published between 2020 and 2025; (b) articles published in reputable international journals indexed by Scopus Q1/Q2 or Web of Science; (c) articles in English with accessible full-text; and (d) articles explicitly discussing digital transformation or IT strategy in the context of business and organizational management. Exclusion criteria included: (a) articles published before 2020; (b) conference articles, technical reports, or textbooks; (c) articles focusing on purely technical aspects without managerial relevance; and (d) duplicate entries from different databases.

The initial screening process yielded over 300 candidate articles. After a step-by-step application of inclusion and exclusion criteria, starting with title and abstract screening and continuing through full-text review, 80 final articles were obtained, which became the corpus for analysis in this study.

### Coding and Data Extraction Procedures

Each article in the corpus was coded using a systematically designed data extraction sheet, encompassing eight main elements: (1) bibliographic identity (author, year, title, journal); (2) journal index and quartiles; (3) research methodology; (4) context and country of study; (5) main constructs or variables; (6) key findings; (7) identified research gaps; and (8) theme codes. Theme codes were determined inductively through an iterative re-reading process of all 80 articles, resulting in nine thematic categories presented in Table 2. To ensure coding reliability, all articles were independently recoded twice at different time intervals (inter-rater reliability method).

### Article Quality Assessment

Each article's methodological quality was assessed using criteria adapted from the Mixed Methods Appraisal Tool (MMAT). Criteria included: clarity of the research question or objective, appropriateness of the methodological design, transparency of data collection and analysis procedures, and validity and reliability of the findings. Articles scoring below the minimum threshold were excluded from the corpus. All 80 articles included in the final analysis were deemed to have adequate methodological quality for the purposes of this review.

## 3. RESULT AND DISCUSSIONS

### Overview of the Literature Corpus

Of the 80 articles that make up this research corpus, the distribution by publisher shows a dominance of Elsevier (34%), Springer Nature (20%), Emerald Publishing (14%), Wiley (9%), Taylor & Francis (8%), MDPI (6%), IEEE (4%), and other reputable publishers (5%). From a methodological perspective, 31% of the articles used quantitative approaches (including SEM, regression, and meta-analysis), 28% used SLR or conceptual review approaches, 18% used mixed methods, 13% used qualitative case studies, and 10% used other approaches such as Delphi studies, bibliometrics, and mathematical modeling. Table 1 presents the distribution of articles by main themes.

Table 1. Distribution of articles based on theme, number, and answered research questions

Code	Research Theme	Amount	% Corpus	Main RQ
A	Digital Transformation Strategy	10	12.5%	RQ1, RQ3
B	IT Governance and Strategic Alignment	10	12.5%	RQ1, RQ3
C	Cloud Computing and IT Infrastructure	8	10.0%	RQ1, RQ3
D	Big Data Analytics and Business Intelligence	10	12.5%	RQ1, RQ3
E	Artificial Intelligence in Business Management	10	12.5%	RQ1, RQ3
F	Digital Leadership and Change Management	8	10.0%	RQ1, RQ3
G	Cyber Security and Information Security Management	8	10.0%	RQ1, RQ3
H	E-Business and Digital Innovation	8	10.0%	RQ1, RQ3
I	ERP and System Integration	8	10.0%	RQ1, RQ3
Total		80	100%	RQ1-RQ4

### Systematic Coding Table

Table 2 presents the results of systematic coding of all 80 articles reviewed. This table serves as the primary instrument for answering RQ1 (theme identification), RQ2 (methodology and theoretical framework), and RQ3 (key findings) in an integrated manner. Each row represents a single article with the following attributes: author and year, journal name, quality index, research methodology, study context or country, main

construct, key findings, and theme code. The "Key Findings" column summarizes one to two of the most important findings from each study as reported in the abstract and conclusion of the article.

Table 2. Systematic coding table: Data extraction results of 80 articles (2020-2025)

No.	Author & Year	Journal	Index	Methodology	Context	Main Construct	Key Findings	Theme
1	Al-Jumaili et al. (2023) [8]	Sensors	Scopus/WoS	Systematic Review	International / Power Systems	Cloud frameworks, big data analytics, energy	BDA-based cloud framework is effective for power system management; scalability requires further research.	C
2	Al-Omoush et al. (2024) [9]	Technological Forecasting & Social Change	Scopus Q1/WoS	Quantitative (SEM)	Jordan / International	BDA, frugal innovation, competitive agility, organizational learning	Organizational learning mediates the relationship between BDA and competitive agility	D
3	AlMuhayfith & Shaiti (2020) [10]	J. Open Innovation: Technology, Market & Complexity	Scopus	Mixed methods	Saudi Arabia	ERP, open innovation, business performance	The impact of ERP on business performance is strengthened through the integration of open innovation.	I
4	AlNuaimi et al. (2022) [11]	J. Business Research	Scopus Q1/WoS	Quantitative (SEM)	UAE	Digital leadership, organizational agility, digital strategy	Organizational agility mediates the relationship between digital leadership and DT strategy success.	A
5	Ancillai et al. (2023) [12]	Technological Forecasting & Social Change	Scopus Q1/WoS	SLR	International	Digital technology, business model innovation (BMI)	Four mechanisms of digital BMI: value proposition, value architecture, market, resource reconfiguration	H
6	Ashrafi et al. (2025) [13]	Information Systems Journal	Scopus Q1/WoS	Problematization review	International	DT research frontier, problematization, research	Unresolved conceptual tensions define new frontiers of DT research.	A
7	Baalbaki et al. (2025) [14]	VINE J. Information & Knowledge Management Systems	Scopus	Qualitative (TOE)	the middle East	Cloud adoption, disruptive context, TOE	Environmental factors dominate cloud adoption decisions in disruptive contexts	C
8	Bandara et al. (2023) [15]	Information Systems Frontiers	Scopus Q1/WoS	Quantitative (SEM)	International	ERP responsiveness, big data, system integration	Big data integration significantly improves the responsiveness and analytical capabilities of ERP systems.	I
9	Bican & Brem (2020) [16]	Sustainability	Scopus/WoS	Conceptual	International	Digital business model, DT, digital entrepreneurship	Defining the conceptual boundaries between digital BM, digital transformation, and digital entrepreneurship	H
10	Bin Hammad et al. (2024) [17]	Heliyon	Scopus/WoS	Mixed methods	Saudi Arabia / Public Sector	ERP implementation, public sector, CSF	Top management support and change management are critical CSFs of public sector	I

11	Booyse & Scheepers (2024) [18]	Management Research Review	Scopus/WoS	Qualitative (interview)	South Africa	Barriers to AI adoption, automated decision making	ERP implementation. Ethical concerns and trust deficits are major barriers to AI adoption in decision-making.	E
12	Borges et al. (2021) [7]	Int'l J. Information Management	Scopus Q1/WoS	SLR	International	Strategic use of AI, digital era	The strategic value of AI comes from process automation, decision augmentation, and driving innovation.	E
13	Braojos et al. (2024) [19]	Information Systems Journal	Scopus Q1/WoS	Quantitative (SEM)	Spanish	Digital leadership, DT capabilities, organizational commitment	Digital leadership and continuous learning environments together build DT capabilities.	F
14	Brem et al. (2023) [20]	IEEE Trans. Engineering Management	Scopus Q1/WoS	Conceptual	International	AI, innovation management, conceptual framework	AI produces three categories of innovation impact: incremental, architectural, and radical.	E
15	Brunner et al. (2023) [21]	Frontiers in Psychology	Scopus/WoS	Quantitative (SEM)	German	Digital leadership, service innovation, change management	Digital leadership has a positive influence on service innovation capacity in the context of technological change.	F
16	Butarbutar et al. (2023) [22]	Cogent Business & Management	Scopus	SLR	Indonesia / International	ERP post-implementation, CSFs, system success	Top management support, data quality, and user training are the most consistent CSFs across contexts.	I
17	Capurro et al. (2022) [23]	European J. Innovation Management	Scopus Q2/WoS	Mixed methods	Italy	BDA, dynamic capabilities, digitization	Sensing, seizing, and reconfiguring capabilities mediate the relationship between BDA and innovation performance.	D
18	Caputo et al. (2023) [24]	J. Knowledge Management	Scopus Q1/WoS	Conceptual + empirical	International	Big data, decision making, managerial interpretation	Human interpretation remains essential in big data-based managerial decision making.	D
19	Chau et al. (2020) [3]	MIS Quarterly	Scopus Q1/WoS	Quantitative (polynomial regression)	International	Business-IT alignment, IT governance, company performance	High alignment between business-IT strategy and mature IT governance results in superior performance.	B
20	Chatterjee et al. (2023) [25]	Technological Forecasting & Social Change	Scopus Q1/WoS	Quantitative (SEM)	India	BDA, decision making, forecasting,	BDA has a positive impact on decision quality,	D

21	Chen & Kim (2023) [26]	Heliyon	Scopus/WoS	Quantitative (SEM)	China	company performance, DT, innovation performance, knowledge absorption, R&D investment	forecasting accuracy, and overall performance. DT improves innovation performance through the mediation channel of knowledge absorption and R&D investment.	H
22	Correani et al. (2020) [27]	California Management Review	Scopus Q1/WoS	Case studies (3 cases)	Italy	Implementation of digital strategies, project-based learning	Project-based adaptive learning accelerates the implementation of successful digital strategies.	A
23	Cosa (2024) [28]	J. Strategy and Management	Scopus	Conceptual	International	DT strategy, communication, research agenda	Stakeholder communication and alignment are under-researched dimensions in the DT strategy literature.	A
24	Cremer et al. (2022) [29]	Geneva Papers on Risk and Insurance	Scopus Q2/WoS	SLR	International	Cyber risks, cybersecurity data availability	Significant fragmentation of cyber risk data hampers evidence-based policy formulation.	G
25	Dalal et al. (2022) [30]	J. Business and Psychology	Scopus Q1/WoS	Conceptual / review	United States of America	Organizational science, cybersecurity, behavioral factors	Behavioral and organizational sciences offer untapped contributions to the cybersecurity domain.	G
26	Devi et al. (2022) [31]	J. Industrial Engineering & Management	Scopus	Case study	Indonesia	Digital service maturity, IT capabilities	The capability assessment framework increases the maturity level of the digital service creation process.	B
27	Dwivedi et al. (2021) [32]	Int'l J. Information Management	Scopus Q1/WoS	Multidisciplinary review	International	AI, challenges, opportunities, policy implications	AI presents cross-disciplinary challenges that require a coordinated governance response.	E
28	Egwuonwu et al. (2024) [33]	IEEE Trans. Engineering Management	Scopus Q1/WoS	Mixed methods	Nigeria / Emerging Markets	BDA adoption, firm performance, manufacturing sector	BDA adoption results in greater performance improvements in the manufacturing sector than in services.	D
29	Ellström et al. (2022) [34]	J. Strategy and Management	Scopus	Conceptual + case study	Sweden	Dynamic capabilities, DT strategy	Dynamic capabilities are a necessary but not sufficient condition without explicit strategic intent.	A
30	Enholm et al. (2022) [35]	Information Systems Frontiers	Scopus Q1/WoS	SLR	International	AI, business value, value creation mechanisms	The business value of AI is realized through three channels: operational efficiency,	E

31	Fernandez De Arroyabe et al. (2023) [36]	Computers & Security	Scopus Q1/WoS	Quantitative (survey)	English	Cybersecurity capabilities, cyber attacks, investment decisions	product innovation, business model transformation. Cyber attack capabilities and frequency simultaneously drive security investment decisions	G
32	Fosso Wamba et al. (2024) [37]	Information Systems Frontiers	Scopus Q1/WoS	Quantitative (SEM)	International	AI capabilities, data-driven culture, sustainable performance	A data-driven culture mediates the relationship between AI capabilities and sustainable corporate performance.	E
33	Gellweiler & Krishnamurthi (2022) [38]	Information Systems Management	Scopus/WoS	Conceptual	United States of America	IT business value, competitive advantage, customer perspective	A customer-based perspective enriches the conceptualization of IT value beyond cost efficiency.	B
34	Georgiadou et al. (2022) [39]	J. Computer Information Systems	Scopus Q2/WoS	Case study	Greece	Cybersecurity culture framework, organizational readiness	A four-dimensional framework of cybersecurity culture for assessing organizational security readiness	G
35	Golightly et al. (2022) [40]	Int'l J. Engineering Business Management	Scopus	Mixed methods	International	Cloud adoption, organizational innovation	Cloud computing facilitates simultaneous innovation of processes, products, and business models.	C
36	Gundu et al. (2020) [41]	SN Computer Science	Scopus	Review	India	Hybrid IT, multi-cloud architecture	Multi-cloud architecture offers resilience and flexibility that goes beyond single-cloud solutions.	C
37	Hanelt et al. (2021) [2]	J. Management Studies	Scopus Q1/WoS	SLR	International	DT literature cluster, strategy, organizational change	Four DT research clusters: technology effects, response strategies, managerial implications, digital ecosystems	A
38	Hashim et al. (2022) [42]	Education and Information Technologies	Scopus Q2/WoS	Case study	Malaysia / International	Higher education, DT strategy, digital maturity	Higher education DT strategy requires alignment of leadership, culture, and infrastructure	A
39	Huang (2024) [43]	J. Knowledge Economy	Scopus/WoS	Quantitative (survey)	Taiwan	KM-IT alignment maturity, scale development	A validated six-dimensional scale to measure the strategic alignment maturity of KM and IT	B
40	Imran et al. (2021) [44]	J. Change Management	Scopus Q2/WoS	Mixed methods	Pakistan	DT industry, change	An integrated DT framework	F

						management framework	requires synchronization of technological change and human resource change.	
41	Jarrahi et al. (2023) [45]	J. Business Strategy	Scopus/WoS	Conceptual	United States of America	AI strategy, organizational learning, knowledge management	Organizational learning is a prerequisite for capturing strategic value from AI investments.	E
42	Jauhar et al. (2024) [46]	J. Enterprise Information Management	Scopus Q2/WoS	Mixed methods	International	DT technology, e-commerce, product returns	IoT and blockchain integration optimizes the product return process in the e-commerce industry	H
43	Jawad & Balázs (2024) [47]	Beni-Suef Univ. J. Basic & Applied Sciences	Scopus	Review	International	Machine learning, ERP optimization, intelligent systems	ML applications in ERP cover six domains: demand, inventory, fraud, HR, maintenance, SCM	I
44	Joshi et al. (2022) [4]	Decision Support Systems	Scopus Q1/WoS	Quantitative (SEM)	International	IT governance process capabilities, business performance	IT governance process capabilities, not just formal structures, drive organizational performance.	B
45	Karaboga et al. (2023) [48]	Review of Managerial Science	Scopus Q2/WoS	Quantitative (SEM)	Türkiye	BDA management capabilities, data-driven culture, performance	Data-driven culture fully mediates the relationship between BDA capabilities and firm performance.	D
46	Katuu (2020) [49]	New Review of Information Networking	Scopus	Historical review	International	ERP history, system evolution, future directions	The evolution of ERP from MRP to AI-ERP reflects the broader digital transformation trajectory of organizations.	I
47	Kempeneer & Heylen (2023) [50]	Big Data & Society	Scopus Q1/WoS	SLR	Belgium / International	DT failure, digital government, virtual state	The failure of digital transformation in the public sector is a topic that is systematically under-researched.	B
48	Khando et al. (2021) [51]	Computers & Security	Scopus Q1/WoS	SLR	International	Information security awareness, training, behavior	The effectiveness of information security training depends on the relevance of the content and the method of delivery.	G
49	Khayer et al. (2020) [52]	Technology in Society	Scopus Q2/WoS	Mixed (PLS-SEM + fsQCA)	Bangladesh	Cloud adoption, SME performance, determinant factors	Relative advantage, security, and top management support predict cloud adoption in SMEs	C

50	Krakowski et al. (2023) [53]	Strategic Management Journal	Scopus Q1/WoS	Conceptual + empirical	International	AI, source of competitive advantage, strategic imitation	AI accelerates capability imitation and intensifies pressure for continuous innovation.	E
51	Kreiterling (2023) [54]	J. Innovation & Entrepreneurship	Scopus	Literature review	International	Digital innovation, entrepreneurship, competitive markets	Digital innovation ecosystems require cooperation strategies for sustainable competitive positions.	H
52	Kretschmer & Khashabi (2020) [55]	California Management Review	Scopus Q1/WoS	Conceptual	International	DT, organizational design, structural evolution	Organizational design must evolve alongside digital initiatives to avoid structural misalignment.	A
53	Lacombe & Jarboui (2023) [56]	Int'l J. Innovation Science	Scopus Q2	Qualitative (interview)	France / Financial Sector	IT governance, DT projects, financial services	IT governance maturity is a prerequisite for the success of digital transformation projects.	B
54	Li (2020) [57]	Int'l J. Operations & Production Management	Scopus Q1/WoS	Conceptual	International	DT Leadership, a transition management approach	Ecosystem-oriented leadership produces the most comprehensive DT transition outcomes	F
55	Loureiro et al. (2021) [6]	J. Business Research	Scopus Q1/WoS	SLR + bibliometrics	International	AI in business, consumer behavior, operations, strategy	Three business AI research clusters: consumer AI, operational AI, strategic AI	E
56	Merlo et al. (2025) [58]	Sustainability	Scopus/WoS	Mixed methods	United States of America	Cloud computing, enterprise DT, digital maturity	The impact of cloud on DT is nonlinear and moderated by the digital maturity of the organization.	C
57	Naguib et al. (2024) [59]	Future Business Journal	Scopus	Quantitative (SEM)	Egypt	IT governance, data governance, financial and non-financial performance	The synergy of IT governance and data governance improves financial and non-financial performance simultaneously.	B
58	Oesterreich et al. (2022) [60]	Information & Management	Scopus Q1/WoS	Meta-analysis	International	Business analytics, company performance, moderator	Data quality and leadership commitment moderate the relationship between business analytics and firm performance.	D
59	Oredo & Dennehy (2023) [61]	Information Systems Frontiers	Scopus Q1/WoS	Quantitative (SEM)	Kenya	Cloud computing, organizational mindfulness, performance	Organizational mindfulness mediates the relationship between cloud	C

60	Paiola et al. (2021) [62]	J. Business Research	Scopus Q1/WoS	Qualitative (multiple case study)	Italy	Digital servitization, IoT, sustainability, network	computing and firm performance. Network capabilities enable sustainable IoT-based digital servitization	H
61	Pan et al. (2022) [63]	Int'l J. Human Resource Management	Scopus Q1/WoS	Mixed methods	China	AI in HR, recruitment, contextual factors	National regulatory and cultural contexts significantly moderate the effectiveness of AI adoption in recruitment	E
62	Pancić et al. (2023) [64]	Economies	Scopus	Quantitative (SEM)	Croatia	Business intelligence, BDA, blockchain, performance	The integration of BI and blockchain produces multiplicative, not simply additive, performance effects.	D
63	Philip et al. (2023) [65]	Leadership & Organization Development J.	Scopus Q2/WoS	Delphi Study	International	DT leadership competencies, digital fluency	Five critical competencies: digital literacy, strategic agility, empathy, network leadership, data-driven decisions	F
64	Plekhanov et al. (2023) [5]	European Management Journal	Scopus Q2/WoS	SLR	International	Definition of DT, antecedents, outcomes, moderators	The DT literature lacks a definitional consensus; a process-based conceptualization is needed.	A
65	Porfirio et al. (2021) [66]	J. Business Research	Scopus Q1/WoS	Mixed methods	Portugal	Leadership characteristics, DT success factors	Visionary and ambidextrous leadership predicts the success of digital transformation.	F
66	Qureshi (2022) [67]	Sustainability	Scopus/WoS	Case study	Pakistan	ERP, sustainable SCM, system implementation	ERP enables sustainable SCM through real-time visibility and process standardization.	I
67	Ranjan & Foropon (2021) [68]	Int'l J. Information Management	Scopus Q1/WoS	Conceptual + empirical	International	BDA, competitive intelligence development	BDA transforms raw data into competitive intelligence through three layers of analytics	D
68	Shaikh & Siponen (2023) [69]	Computers & Security	Scopus Q1/WoS	Quantitative (survey)	International	Security risk assessment, top management concerns, cyber breaches	Top management attention to cybersecurity mediates the quality of post-breach risk assessments.	G
69	Shaikh & Siponen (2024) [70]	Information Systems Frontiers	Scopus Q1/WoS	Quantitative (longitudinal)	International	Organizational learning, cybersecurity performance, investment decisions	Learning from cybersecurity performance data improves the quality of future investment decisions.	G

70	Sieber et al. (2022) [71]	SN Business & Economics	Scopus	SLR	Czech / International	Organizational culture, business-IT alignment	A digital-adaptive culture is a critical mediator of achieving business-IT strategic alignment.	B
71	Sivarajah et al. (2024) [72]	Technological Forecasting & Social Change	Scopus Q1/WoS	Mixed methods	International	BDA, innovation, technology and business cycles	BDA adoption aligns with the Kondratiev technology wave, with peak values at cycle transition points.	D
72	Tavoletti et al. (2022) [73]	European J. Innovation Management	Scopus Q2/WoS	Qualitative (case study)	Italy	Business model innovation, DT, consulting firm	DT consulting firm requires internal BMI innovation and simultaneous client service redesign	H
73	Uchendu et al. (2021) [74]	Computers & Security	Scopus Q1/WoS	SLR	International	Cybersecurity culture, organizational security behavior	Cybersecurity is positively correlated with a decrease in the frequency of security incidents.	G
74	Verhoef et al. (2021) [1]	J. Business Research	Scopus Q1/WoS	Conceptual	International	DT levels, multidisciplinary perspective, research agenda	Distinguishing digitization, digitalization, and digital transformation as three levels of organizational change	A
75	Weber, Büttgen, & Bartsch (2022) [75]	J. Business Research	Scopus Q1/WoS	Experimental	German	Complementary leadership behavior, DT change management	The combination of task- and relationship-oriented leadership behaviors has proven to be most effective in DT change management.	F
76	Weber, Krehl, & Büttgen (2022) [76]	J. Leadership Studies	Scopus Q2/WoS	Mixed methods	German	DT leadership roles, framework, technological environment	Three DT leadership roles: vision setting, human resource empowerment, operational change management	F
77	Weritz et al. (2024) [77]	European J. Information Systems	Scopus Q1/WoS	Quantitative (SEM)	Spanish	Strategic capabilities, DT success, company performance	IT agility and analytics capability mediate the relationship between IT governance and DT success.	B
78	Xie, Han, Anderson, & Ribeiro-Navarrete (2022) [78]	Int'l J. Information Management	Scopus Q1/WoS	Quantitative (SEM)	China	Digital platforms, BMI SMEs, capability reconfiguration	Reconfiguration of capabilities mediates the relationship between digital platforms and SME business model innovation.	H

79	Xie, Allen, & Ali (2022) [79]	Heliyon	Scopus/WoS	Quantitative (nonlinear programming)	International	ERP implementation, CSF, resource allocation	Nonlinear programming model optimizes resource allocation based on CSF priorities of ERP implementation	I
80	Yao & Azma (2022) [80]	Kybernetes	Scopus Q2/WoS	Quantitative (SEM)	International	Cloud ERP, HR productivity, remote work	Cloud ERP system significantly increases HR productivity during the COVID-19 pandemic	C

Note: AI theme codes correspond to the categories in Table 1. SEM = Structural Equation Modeling; SLR = Systematic Literature Review; BDA = Big Data Analytics; DT = Digital Transformation; ERP = Enterprise Resource Planning; CSF = Critical Success Factors; BMI = Business Model Innovation; SCM = Supply Chain Management; IoT = Internet of Things.

## DISCUSSION

This section presents a synthesis of findings from 80 articles organized into nine main themes, answering RQ3 in depth. Each subsection identifies patterns of findings across studies, relevant research gaps, and theoretical implications of the themes discussed.

### Digital Transformation Strategy (Theme A)

Ten articles on the theme of digital transformation strategy present a spectrum of complementary perspectives, ranging from the conceptual-fundamental level to practical strategic implementation. Verhoef et al. (2021) [1] provide an important taxonomic foundation by distinguishing three levels of digital change: digitization (conversion from analog to digital), digitalization (the use of digital technologies in existing processes), and digital transformation (a comprehensive change in business and organizational models). This three-level framework has been widely adopted as a conceptual reference in subsequent research. Hanelt et al. (2021) [2], in a comprehensive systematic review published in the *Journal of Management Studies*, identified four clusters of DT research that reflect the evolving scientific discourse: the effects of technology on business entities, organizational response strategies, managerial implications, and digital ecosystems.

At the strategy implementation level, Correani et al. (2020) [27] found through three case studies in Italy that successful digital strategy implementation requires project-based adaptive learning, where each iteration of a digital project generates accumulated knowledge for subsequent strategy refinement. Kretschmer and Khashabi (2020) [55] argue that organizational design must evolve synergistically with digital initiatives to prevent structural misalignment that could hinder strategy execution. Ellström et al. (2022) [34] complement this understanding by asserting that dynamic capabilities, consisting of sensing, seizing, and reconfiguring capabilities, are a necessary prerequisite for a digital transformation strategy, although they are insufficient without explicit strategic intent from top management.

AlNuaimi et al. (2022) [11] introduced the nexus of leadership, organizational agility, and digital strategy as a triad that determines the success of digital transformation. Hashim et al. (2022) [42] contextualized these findings within the higher education sector, where alignment between institutional leadership, academic culture, and technological infrastructure is a critical prerequisite for DT strategies. Plekhanov et al. (2023) [5] highlighted the fragmentation of DT definitions in the literature and proposed a process-based conceptualization as a more accurate approach. Cosa (2024) [28] identified the communication and stakeholder alignment dimensions as aspects that have received less attention in DT strategies. Ashrafi et al. (2025) [13] concluded this theme by identifying unresolved conceptual tensions in DT research as future research frontiers.

### IT Governance and Strategic Alignment (Theme B)

Ten articles on the topic of IT governance consistently confirm that IT governance and business-IT strategy alignment are structural prerequisites for successful digital transformation. Chau et al. (2020) [3], in a landmark study published in *MIS Quarterly*, demonstrated through moderated polynomial regression analysis that the combination of high business-IT strategy alignment and mature IT governance results in significantly superior organizational performance. Joshi et al. (2022) [4] deepened these findings by demonstrating that IT governance process capabilities, not simply the existence of a formal governance structure, are the factors that truly drive business performance.

Sieber et al. (2022) [71] fill this conceptual gap by presenting a systematic review of the relationship between organizational culture and business-IT alignment, concluding that a digitally adaptive culture is a

critical mediator for achieving alignment. Gellweiler and Krishnamurthi (2022) [38] enrich the conceptualization of IT value by integrating a customer-based perspective, arguing that IT value goes beyond cost efficiency and includes direct customer value creation. Lacombe and Jarboui (2023) [56] contextualize IT governance in the French financial sector, finding that IT governance maturity is a critical prerequisite for the success of DT projects in a highly regulated environment.

Kempeneer and Heylen (2023) [50] provide a critical perspective rarely found in the literature by examining digital transformation failures in the public sector, finding that this phenomenon is systematically under-researched despite its high incidence. Naguib et al. (2024) [59] demonstrate that the synergy between IT governance and data governance simultaneously improves an organization's financial and non-financial performance. Huang (2024) [43] develops and validates a six-dimensional scale to measure the maturity of strategic alignment between knowledge management and IT. Weritz et al. (2024) [77] find that IT agility and analytics capability mediate the relationship between IT governance and digital transformation success. Devi et al. (2022) [31], in the Indonesian context, confirms the relevance of a capability assessment framework in improving an organization's digital service maturity.

### **Cloud Computing and IT Infrastructure (Theme C)**

Eight articles in the cloud computing theme describe cloud computing as a fundamental infrastructure enabler for digital transformation. Khayer et al. (2020) [52], using a two-stage PLS-SEM and fsQCA analysis approach in the Bangladeshi context, found that relative advantage, security, and top management support were the strongest predictors of cloud adoption among SMEs. Gundu et al. (2020) [41] reviewed hybrid IT and multi-cloud architectures, concluding that multi-cloud approaches offer resilience and flexibility unattainable by conventional single-cloud solutions.

Golightly et al. (2022) [40] demonstrated that cloud computing facilitates simultaneous process, product, and business model innovation, not just operational efficiency. Yao and Azma (2022) [80] provided relevant findings from a human resources perspective: cloud ERP systems were shown to significantly improve HR productivity during the COVID-19 pandemic, confirming the cloud's strategic role in organizational operational continuity amidst the crisis. Oredo and Dennehy (2023) [61] introduced organizational mindfulness as a significant mediator between cloud adoption and organizational performance in the Kenyan context, opening a new perspective on cognitive-organizational factors in cloud utilization.

Al-Jumaili et al. (2023) [8] identified that a cloud-based framework for big data analytics is effective in power system management, although scalability remains a challenge that requires further research. Merlo et al. (2025) [58], using a mixed-methods approach, found that the impact of cloud on digital transformation is nonlinear and moderated by the organization's digital maturity level. Baalbaki et al. (2025) [14] applied the TOE framework and found that environmental factors, particularly competitive and regulatory pressures, are more dominant in driving cloud adoption than the technology itself.

### **Big Data Analytics and Business Intelligence (Theme D)**

The ten articles in the big data analytics theme reflect the evolution of research from the simple question of whether BDA impacts performance to the more complex question of how, when, and under what conditions that impact occurs. Ranjan and Foropon (2021) [68] show that BDA contributes to the development of competitive intelligence through three interlocking layers of analytics. Oesterreich et al. (2022) [60], through a comprehensive meta-analysis, confirmed that data quality and leadership commitment act as critical moderators in the relationship between business analytics and firm performance.

Capurro et al. (2022) [23] demonstrated that dynamic capabilities mediate the relationship between BDA and innovation performance, highlighting the need for a capability approach to data analytics utilization. Chatterjee et al. (2023) [25] quantified the impact of BDA on decision-making quality, forecasting accuracy, and overall organizational performance in the context of Indian firms. Karaboga et al. (2023) [48] introduced big data analytics management capability as a multidimensional construct and found that a data-driven culture fully mediated the relationship between that capability and firm performance.

Pancić et al. (2023) [64] found a multiplicative synergy between business intelligence, big data analytics, and blockchain technology in improving company performance. Caputo et al. (2023) [24] emphasized the importance of human interpretation, which remains essential in big data-based managerial decision-making, avoiding excessive technical reductionism. Sivarajah et al. (2024) [72] linked BDA adoption to the Kondratiev wave of technology, finding that peak BDA value is realized at transition points in technology and business cycles. Al-Omouh et al. (2024) [9] demonstrated that organizational learning mediates the relationship between BDA and competitive agility. Egwuonwu et al. (2024) [33], in the Nigerian context, found that BDA adoption resulted in greater performance improvements in the manufacturing sector than in the service sector.

### **Artificial Intelligence in Business Management (Theme E)**

The ten articles in the artificial intelligence theme cover the spectrum from conceptual foundations to specific applications of AI in various management domains. Borges et al. (2021) [7] identify three sources of strategic value from AI: process automation, decision augmentation, and innovation promotion. Dwivedi et al. (2021) [32], in a highly influential multidisciplinary review, assert that AI presents cross-disciplinary challenges that require coordinated governance responses between government, industry, and academia. Loureiro et al. (2021) [6], through a bibliometric-based SLR, identify three clusters of business AI research: consumer AI, operational AI, and strategic AI.

Enholm et al. (2022) [35] synthesized the literature on the business value of AI and found that it manifests through three main pathways: operational efficiency, the creation of new products and services, and business model transformation. Pan et al. (2022) [63] examined the adoption of AI in human resource recruitment and found that regulatory context and national culture significantly moderate the effectiveness of AI adoption in the HR domain. Brem et al. (2023) [20] developed a conceptual framework that classifies the impact of AI on innovation into three categories: incremental, architectural, and radical. Krakowski et al. (2023) [53] critically argued that AI accelerates the imitation of strategic capabilities, forcing companies to continuously innovate as a basis for competitive advantage.

Jarrahi et al. (2023) [45] argue that organizational learning is a prerequisite for capturing strategic value from AI investments. Booyse and Scheepers (2024) [18] identify ethical concerns and trust deficits as key barriers to AI adoption in organizational decision-making, particularly in the South African context. Fosso Wamba et al. (2024) [37] integrate a sustainable development perspective and find that a data-driven culture mediates the relationship between AI capabilities and sustainable firm performance.

### **Digital Leadership and Change Management (Theme F)**

Eight articles on the topic of digital leadership collectively argue that leadership is the most important determinant of the success or failure of digital transformation. Li (2020) [57] identified three primary approaches to digital transformation leadership: technology-oriented, people-oriented, and ecosystem-oriented, concluding that the ecosystemic approach yields the most comprehensive transition outcomes. Imran et al. (2021) [44], in the context of Pakistani industrial firms, formulated an integrated DT framework that emphasizes the need for synchronization between technological change and changes in the human resource dimension.

Porfirio et al. (2021) [66] found that visionary and ambidextrous leadership characteristics significantly predict digital transformation success. Weber et al. (2022) [75] developed the Digital Transformation Leadership Framework, which distinguishes three leadership roles: vision setting, empowering organizational members, and managing operational change. Weber et al. (2022) [76], through an experimental study, found that a combination of complementary task-oriented and relationship-oriented leadership behaviors proved most effective in guiding employees through the digital transformation journey.

Philip et al. (2023) [65], through a global, cross-sector Delphi study, identified five critical leadership competencies for digital transformation: digital literacy, strategic agility, empathy, network leadership, and data-driven decision-making. Brunner et al. (2023) [21] demonstrated that digital leadership positively impacts an organization's service innovation capacity in the context of accelerating technological change. Braojos et al. (2024) [19] concluded this theme by finding that digital leadership and a continuous learning environment together build digital transformation capabilities, which in turn increases employee organizational commitment.

### **Cyber Security and Information Security Management (Theme G)**

Eight articles on the topic of cybersecurity reflect the growing awareness that information security is a managerial and strategic challenge, not merely a technical issue. Khando et al. (2021) [51], through a comprehensive SLR, found that the effectiveness of information security awareness training critically depends on the relevance of the content and the delivery method used. Uchendu et al. (2021) [74] highlighted the urgency of building a cybersecurity culture as a soft infrastructure that complements security technology investments, finding a positive correlation between the strength of a cybersecurity culture and a reduction in the frequency of security incidents.

Dalal et al. (2022) [30] enrich this perspective by integrating organizational science and behavioral psychology into the cybersecurity domain, opening up a highly potential interdisciplinary research space. Cremer et al. (2022) [29] identify significant fragmentation in cyber risk data that hinders evidence-based policy formulation and research. Georgiadou et al. (2022) [39] develop a four-dimensional framework of cybersecurity culture for assessing organizational security readiness in the Greek context.

Shaikh and Siponen (2023) [69] found that top management's attention to cybersecurity mediated the relationship between security breach incidents and the quality of information security risk assessments. Fernandez De Arroyabe et al. (2023) [36] showed that cybersecurity capabilities and the frequency of

cyberattacks simultaneously drive security investment decisions in the context of a survey of UK companies. Shaikh and Siponen (2024) [70], in a longitudinal study that follows their previous research, found that organizational learning from cybersecurity performance data significantly improves the quality of future security investment decisions.

### **E-Business and Digital Innovation (Theme H)**

Eight articles on the theme of e-business and digital innovation reflect the convergence between business model transformation, digital platforms, and innovation ecosystems. Bican and Brem (2020) [16] provide essential conceptual clarification by distinguishing three often-interchangeable constructs: digital business model, digital transformation, and digital entrepreneurship. Paiola et al. (2021) [62], through multiple case studies in Italy, demonstrate that network capabilities enable sustainable IoT-based digital servitization in the manufacturing industry.

Tavoletti et al. (2022) [73] identified that the digital transformation of global consulting firms requires simultaneous internal business model innovation and client service redesign. Xie et al. (2022) [79] found that capability reconfiguration mediates the relationship between digital platforms and the success of business model innovation in Chinese SMEs. Ancillai et al. (2023) [12], through a comprehensive SLR, identified four key mechanisms through which digital technology enables BMI: the creation of new value propositions, the transformation of value architectures, the redefinition of target markets, and the reconfiguration of resources.

Chen and Kim (2023) [26] quantified the impact of digital transformation on innovation performance and found that knowledge absorption and R&D investment mediate the relationship. Kreiterling (2023) [81] argued that digital innovation ecosystems require a coopetition strategy, a combination of cooperation and competition, to maintain a sustainable competitive position. Jauhar et al. (2024) [46] concluded this theme by showing that the integration of IoT and blockchain optimizes the product returns process in the e-commerce industry, providing concrete evidence of the value of digital technologies in supply chain efficiency.

### **Enterprise Resource Planning (ERP) and System Integration (Theme I)**

Eight articles in the ERP and systems integration theme reflect the evolution of research from a focus on initial implementation to optimization, integration with new technologies, and enhancing system adaptive capabilities. Katuu (2020) [49] presents a comprehensive historical perspective on the evolution of ERP from Material Requirements Planning in the 1970s to contemporary AI-based ERP systems, confirming that ERP remains the backbone of management information systems in nearly all large-scale organizations. AlMuhayfith and Shaiti (2020) [10] found that the impact of ERP on business performance is significantly amplified through integration with open innovation initiatives.

Xie et al. (2022b) [82] developed a nonlinear programming model to optimize resource allocation in ERP implementation based on prioritizing critical success factors. Qureshi (2022) [67] demonstrated that ERP enables sustainable supply chain management through real-time visibility and process standardization in the Pakistani context. Butarbutar et al. (2023) [22], in the only article with Indonesian researcher affiliation in this corpus, presented a SLR on post-ERP implementation critical success factors and found that top management support, data quality, and user training were the most consistent CSFs across various organizational contexts.

Bandara et al. (2023) [15] revealed the synergy between ERP and big data, showing that the integration of big data technologies significantly improves the responsiveness and analytical capabilities of ERP systems. Jawad and Balázs (2024) [47] identified six application domains of machine learning in ERP optimization: demand forecasting, inventory management, fraud detection, workforce planning, predictive maintenance, and adaptive supply chain management. Bin Hammad et al. (2024) [17] concluded this theme by examining ERP implementation in the Saudi Arabian public sector, finding that top management support and change management were critical factors determining the success of ERP projects in bureaucratic environments.

A synthesis of the 80 reviewed articles yielded an integrative conceptual framework that depicts digital transformation as a layered phenomenon operating at three dynamically interacting levels. This framework addresses RQ3 and RQ4 by integrating findings from the nine themes into a coherent architecture.

The first level is the Governance and Infrastructure Foundation. At this level, IT governance and strategic alignment (Theme B) serve as the managerial infrastructure that determines the quality of digital decision-making. Effective governance not only ensures the responsible and efficient use of technology but also enables the strategic flexibility needed to adapt to rapid technological change. Technology infrastructure in the form of cloud computing (Theme C) provides the technical foundation that determines the speed, scalability, and resilience of digital initiatives. ERP and systems integration (Theme I) complement this foundation by providing integrated data and process management as a prerequisite for analytical capabilities.

The second level is Digital Capabilities. At this level, four themes operate synergistically. Big data analytics (Theme D) transforms data collected by foundation systems into actionable insights. Artificial

intelligence (Theme E) automates and empowers this knowledge-based decision-making. Digital innovation and e-business (Theme H) leverage analytics and AI capabilities to create new value propositions and explore innovative business models. Cybersecurity (Theme G) serves as a protective capability that safeguards the integrity of the entire digital ecosystem from increasingly complex threats.

The third level is Strategic Value and Leadership. At this level, the digital transformation strategy (Theme A) serves as a navigational guide that integrates all elements from the previous two levels into a coherent and directed strategic direction. Digital leadership (Theme F) is the catalyst that drives the organization's transition from its current state to its desired transformational state. The resulting strategic value manifests itself in three dimensions: higher operational performance, stronger innovative capabilities, and greater strategic agility in responding to changes in the business environment.

This three-level conceptual framework has important managerial implications: digital transformation cannot be managed through fragmented initiatives. Investments in analytics and AI capabilities without a strong governance foundation will result in uncoordinated capabilities that are vulnerable to risk. Conversely, mature governance without adequate analytics and AI capabilities will create a rigid digital bureaucracy that is unresponsive to business opportunities.

#### 4. CONCLUSION

Simulation results and analysis confirm that the Novelty Half-Bridge LLC Resonant Converter with Magnetizing Inductor and Hybrid Rectifier (NHB-LLCRC-MIHR) achieves significant improvements in efficiency, output voltage stability, and reductions in both switching and conduction losses compared to conventional converters. Operation at the resonant frequency (around 97.9 kHz) produces minimum impedance and maximum efficiency, reflecting the essential characteristics of LLC converters. The addition of  $L_m$  and a hybrid rectifier keeps the output voltage stable across a wide switching frequency range (50 kHz to 1 MHz). The resonant tank design and synchronous secondary MOSFET control support optimal energy transfer and minimize dead time during rectification. High DC conversion ratio efficiency persists due to low voltage drop in the hybrid rectifier and an optimized  $L_m$ , especially at high current levels. The proposed converter produces higher output voltage, lower voltage ripple, and a faster time to reach steady-state compared to the conventional converter. A larger  $L_m$  serves as a natural filter. Secondary MOSFETs deliver rapid and efficient rectification. The NHB-LLCRC-MIHR topology offers promising potential for precision power supplies, electric vehicle systems, and renewable energy sources requiring high efficiency and power stability. Recommended future work includes adaptive digital control for the hybrid rectifier and further transformer optimization to reduce physical size without sacrificing efficiency. Higher power testing and analysis of disturbance resilience in industrial environments remain essential. Experimental validation using a physical prototype and investigation of dynamic load effects on long-term performance remain important aspects for improvement.

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