



How Digital Transformation Creates Environmental, Social, and Governance Value: A Systematic Literature Review and Integrated Framework

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ABSTRACT

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digital transformation, Environmental, Social, and Governance value creation, Environmental, Social, and Governance value creation framework, sustainability, Systematic Literature Review

Understanding the role of Environmental, Social, and Governance (ESG) in sustainability value creation remains fragmented, even though various studies have reported the contribution of Digital Transformation (DT) to ESG performance. Therefore, this study aimed to develop a more integrated understanding of the ESG value creation process in the relationship between DT and sustainability outcomes. A Systematic Literature Review (SLR) following the PRISMA 2020 guidelines was used based on 99 Scopus-indexed articles from 2016 to August 2026 and analyzed through thematic synthesis with support from Watase, a research-support system for managing, documenting, and organizing the systematic review process. The synthesis results showed that digital technology contributed to sustainability through three groups of value creation mechanisms enabling organizations to convert digital capabilities into ESG value. The thematic synthesis identified four main themes comparing 25 subthemes, with Big Data and Digital Platforms (47 articles), ESG Performance Enhancement (57 articles), Green Innovation and Sustainable Development (40 articles), and Sustainable Value Creation (45 articles) emerging as the most frequently identified subthemes. Different organizational and institutional conditions influenced the effectiveness of the process and produced various sustainability outcomes. The main contribution was to reconceptualize ESG as an intermediate value-creation process that bridged the relationship between digital technology and sustainability outcomes. Based on the results, this study developed an Integrated ESG Value Creation Framework that explained the relationship between digital technology, value creation mechanisms, ESG value, boundary conditions, and sustainability outcomes. The literature on DT and sustainability was expanded to provide a conceptual foundation for future empirical analysis. Overall, the findings indicate that ESG value was created not directly through digital technology, but through value creation mechanisms that translated digital capabilities into sustainability outcomes under specific contextual conditions.

1. INTRODUCTION

Digital transformation (DT) and Environmental, Social, and Governance (ESG) have become strategic agendas that determine the sustainability and competitiveness of modern organizations. Increasing regulatory pressures, investor demands, and stakeholder expectations are pushing organizations to focus on creating economic value and sustainable ESG value [1-6]. In this context, DT is reported as a strategic capability that enables organizations to improve operational efficiency, transparency of information, innovation, and adaptability to various sustainability challenges [7, 8]. Various digital technologies, such as Artificial Intelligence (AI), Big Data Analytics, blockchain, the Internet of Things (IoT), fintech, cloud computing, digital platforms, and Industry 4.0 technology, have transformed the management of information, coordination of business activities, and support for effective decision-making. Numerous studies have shown that digitalization positively

contributes to improving ESG through increased innovation, governance, transparency, and organizational efficiency [9-23]. DT is understood as a technology adoption and strategic capability that supports the achievement of organizational sustainability goals [7, 24-26].

Even though the positive relationship between DT and ESG has received extensive empirical support [9, 27-30], most studies focus on examining the direct influence of DT on ESG or sustainability performance. Several studies have identified various mechanisms that mediate the relationship, such as green innovation, information transparency, governance enhancement, stakeholder engagement, organizational capability development, financing accessibility, and sustainability investment [3, 9-11, 20, 21, 31-34]. The relationship between DT and ESG is influenced by contextual factors, namely institutional quality, industry characteristics, ownership structure, resource capacity, governance quality, digital maturity, regulatory pressure, and leadership quality [5, 11, 12, 35, 36]. However, these two aspects are studied

separately, resulting in a lack of an integrated understanding of the ESG value-creation process.

Another limitation relates to the conceptualization of ESG in the DT–ESG literature. Most studies position ESG as an outcome of DT, reflected in scores, disclosures, ratings, or sustainability performance [28, 37–40]. ESG enhancement is often accompanied by green innovation, sustainable value creation, business model transformation, organizational resilience, stakeholder trust, and long-term competitive advantage [10–12, 31, 33, 34, 41–45]. Even though ESG disclosure, fintech and sustainability, AI-enabled sustainability, green innovation, and digital governance have been addressed, these studies are developing in relatively separate streams [10, 11, 32]. Therefore, there is no conceptual framework that explains how the relationship between DT, ESG, and sustainability outcomes can be understood in an integrated manner. Most studies conceptualize ESG as an outcome of DT, leaving the position in the process of sustainable value creation unclear. A major gap in the current literature is related to the enhancement of ESG and the role of the concept in the relationship between digital capabilities and various sustainability outcomes.

Although several SLR have examined the relationship between DT and ESG, previous reviews primarily focused on specific digital technologies such as Fin-Tech [32], Artificial Intelligence ([46, 47], Digital Twins [48], or particular applications domains including smart agrifood systems [7] and international trade [2]. Other reviews have mainly mapped ESG research trends and identified future research agendas without providing an integrated explanation of how DT creates ESG values [49, 50]. Consequently, literature still lacks a comprehensive conceptual framework explaining how digital capabilities are transformed into ESG value and subsequently generate sustainability outcomes. Addressing this gap, the present study extends previous SLRs by reconceptualizing ESG value as an intermediate value creation framework that systematically links digital technologies, value creation mechanisms, boundary conditions, ESG value and sustainability outcomes within a unified sustainability value pathway. To achieve the objective, this study answers four questions: (1) how studies on the relationship between DT and ESG have developed, (2) what are the mechanisms used by DT to create ESG value, (3) what conditions shape the relationship between DT and ESG, and (4) what sustainability outcomes result from the integration.

This study has three main contributions to DT, ESG, and sustainability literature. First, a synthesis of the mechanisms that explain how DT creates ESG value is provided. Second, a new conceptual perspective is developed on ESG's position in the relationship between DT and sustainability outcomes. Third, this study develops an Integrated ESG Value Creation Framework that integrates the relationships among digital technology, value-creation mechanisms, contextual conditions, and sustainability outcomes. Therefore, the understanding of the relationship is broadened to offer a more integrated conceptual foundation for explaining the process of sustainable value creation in the digital era.

2. METHOD

This study used a Systematic Literature Review (SLR) to synthesize the literature on the relationship between DT and ESG. The approach was selected for the ability to

systematically and transparently identify, evaluate, and synthesize existing literature, improving replicability, generating a more comprehensive conceptual understanding than traditional narrative reviews, and supporting the development of an integrated conceptual framework [51]. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines were used to document the entire process of article identification, screening, eligibility evaluation, and inclusion to ensure reporting transparency [52, 53].

2.1 Literature search management and review support tools

The entire review process was supported by Watase, a study support system designed to facilitate the integrated management, documentation, and traceability of SLR [54]. In the initial phase, the Keyword Identification feature was used to explore dominant terms and themes in the DT–ESG literature as well as to support the development of a systematic literature search strategy [54].

Even though Watase provided support in data management and organization, all conceptual interpretation, theme development, and final synthesis remained the responsibility of the study. Determination of inclusion and exclusion criteria, evaluation of article eligibility, validation of extraction results, development of categories, interpretation of results, and conceptual synthesis were conducted through academic judgment. Therefore, Watase served as a study support tool, while conceptual validation and interpretation of results remained under control to maintain the validity and credibility of the review process.

2.2 Literature search strategy

The search strategy was developed iteratively using the Keyword Identification feature in Watase. The initial literature exploration identified three main conceptual clusters in the DT–ESG study, namely DT and ESG integration, ESG-driven digital innovation, and ESG practice adoption through digital technologies. These clusters provided the initial conceptual basis for the literature search.

To improve search recall and address variations in terminology across the literature, targeted supplementary searches were subsequently conducted within Scopus using closely related terms, including digitalization, digitization, ESG performance, ESG disclosure, digital innovation, AI, and FinTech. The supplementary searches were intended to identify relevant studies that might not have been captured using the terminology of the initial conceptual clusters. All articles identified through the initial and supplementary searches were subject to the same predefined screening, eligibility, and quality assessment criteria.

The initial search covered publications from 2016 through March 2026. Following the refinement of the search strategy, the search was rerun on 16 August 2026 using the expanded terminology. The updated search identified 479 records from Scopus. Before screening, 80 records were removed, comprising 62 duplicate records, 2 records marked as ineligible by automation, 15 records removed based on the predefined Q1–Q4 journal-tier criteria, and 1 record without an abstract, leaving 399 records for screening. Following screening, 244 records were excluded, leaving 155 records sought for retrieval. Of these, 54 records were not retrieved,

and 101 reports were assessed for eligibility. Two reports were subsequently excluded, resulting in 99 studies included in the review. No additional studies were included from other sources. Verification of publication dates showed that the newly identified studies were predominantly published before March 2026, with only one additional study published in May 2026. Backward and forward citation tracking was also used as a supplementary check to identify potentially relevant studies that might not have been captured through keyword searches [55]. Based on the identification results, the keywords used in the literature search strategy are presented in Table 1.

Table 1. Search clusters and keywords expansion

Search Cluster	Core Search Keyword	Expanded Related Keywords
DT-ESG Integration	Digital Transformation ESG Integration	Digitalization, Digitization, ESG Performance, ESG Disclosure
ESG-Driven Innovation	ESG Driven Digital Innovation	Digital Innovation, Artificial Intelligence (AI), FinTech
ESG Practice Adoption	ESG Practice Digital Adoption	Digitalization, Digitization, ESG Performance, ESG Disclosure

The expanded keywords were used in targeted supplementary searches within Scopus to improve search recall and capture relevant studies using alternative terminology. All articles identified through the core and supplementary searches were subjected to the same predefined screening, eligibility, and quality assessment criteria.

2.3 Article selection and inclusion criteria

The article selection process followed the PRISMA stages (Figure 1), namely identification, screening, eligibility, and inclusion [52, 53]. All searched articles were managed in Watase to support the selection process and review documentation. Articles that did not meet the publication year limit or were irrelevant to the study focus were eliminated at an early stage.

A screening process was conducted on the article's title, abstract, and keywords to assess the relevance to the topic of the relationship between DT and ESG. Articles that passed the screening were evaluated through full-text reading to ensure suitability for the objectives. As this review was conducted by a single author, the screening, eligibility assessment, quality assessment, data extraction, and thematic coding were performed by the author using the predefined procedures and criteria described in Section 2.3 – 2.6. No second reviewer was involved, and therefore inter-rater reliability statistics such as Cohen’s kappa were not calculated. Articles were included in the study after meeting the following criteria:

- published in a peer-reviewed scientific journal,
- published between 2016 and August 2026,
- discusses the relationship between DT and ESG or organizational sustainability,
- available in full-text form,
- provides relevant empirical, conceptual, or theoretical contributions.

In contrast, editorials, proceedings, book reviews, study

notes, and other non-scholarly publications were excluded from the analysis.

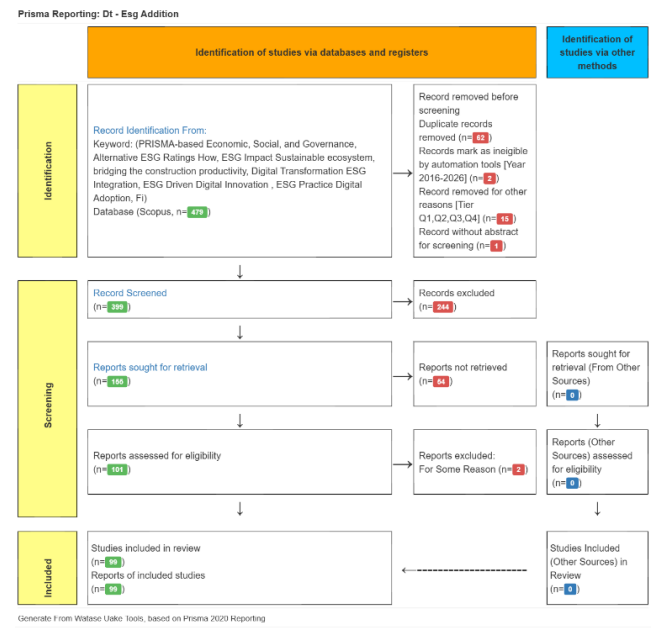


Figure 1. PRISMA flow diagram of the article selection process

2.4 Quality assessment

Each of the 99 included studies was evaluated using five quality assessment criteria available in Watase to assess quality and relevance (Table 2). The evaluation showed that the included articles had adequate methodological quality and relevance to the study's focus [51].

Table 2. Quality assessment criteria

Criteria	Description
Clarity of study objectives	The article has a clear objective.
Suitability of study design	The method aligns with the objective.
Transparency of methodology	The procedure is adequately explained.
Clarity of findings	The results are presented systematically.
Relevance to the study focus	Directly discusses the relationship between DT and ESG.

In Watase, each quality criterion is evaluated using a binary Yes/No decision. To maintain the quality of the synthesis, only articles that meet at least four of the five criteria are included in the analysis. Quality assessment is performed after the screening stage and before data extraction. The process is maintained to ensure methodological rigor and to verify that all included studies meet a minimum quality threshold before synthesis.

2.5 Data extraction

The extracted variables were selected to address all study questions. The extraction process used a structured data template [51] configured in Watase. The information collected included publication characteristics, context, theoretical basis, methods, digital technology, mechanisms of the DT-ESG

relationship, boundary conditions, sustainability outcomes, key results, study limitations, and future agendas.

2.6 Thematic synthesis

Data analysis was conducted using a thematic synthesis, which allows the integration of results from diverse study designs while supporting the development of a conceptual understanding of the relationship between DT and ESG. The synthesis process was carried out through open coding to identify key concepts, axial coding to group concepts into interrelated categories, theme development to build themes, and cross-theme integration to examine relationships between themes into a conceptual framework. The coding process allowed multiple codes to be assigned to a single article when the article substantively addressed more than one category. Therefore, the frequencies reported for themes and subthemes are not mutually exclusive and are not expected to sum to the total of 99 included articles. Coding was based on the substantive content of each article and applied using

predefined category definitions. All stages of the synthesis were supported by documentation and categorization features in Watase [56]. This study aims to meet the main principles of high-quality SLR, namely transparency, traceability, auditability, and replicability, with support from an audit trail in Watase.

3. RESULT

3.1 The evolution of digital transformation and Environmental, Social, and Governance study

A total of 99 articles meeting the inclusion criteria formed the basis for the analysis. Figure 2 shows that publications related to DT and ESG increased substantially in recent years, with the number of identified records increasing from 38 in 2024 to 200 in 2025 and 213 in August 2026. The continued increase in identified records through 2026 indicates growing academic attention to the DT-ESG relationship.

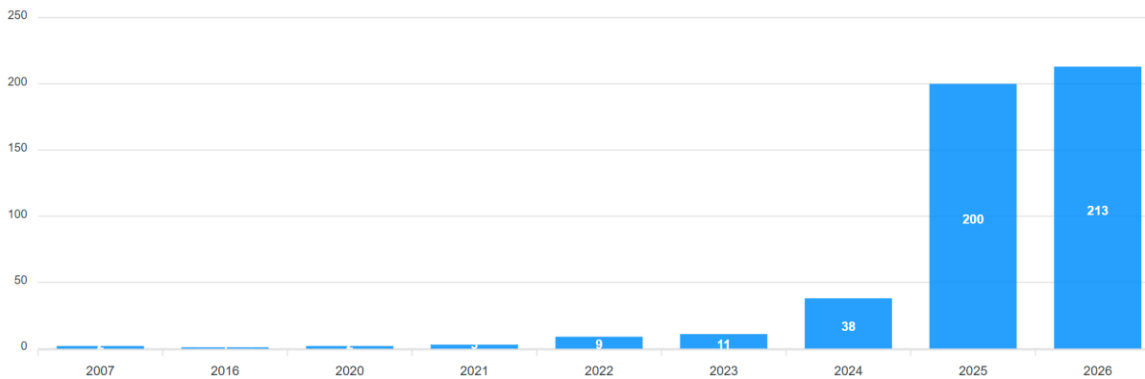


Figure 2. Growth of Digital Transformation- Environmental, Social, and Governance (DT-ESG)

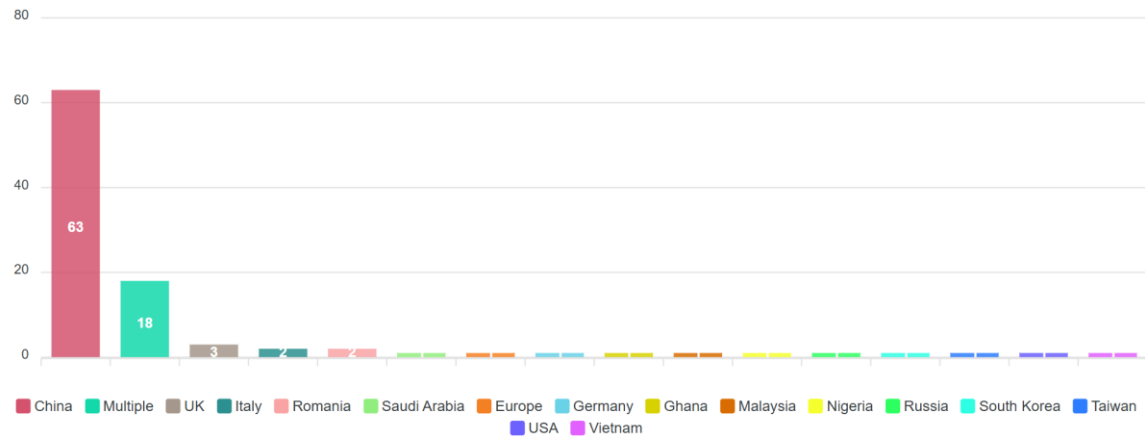


Figure 3. Country/Region classification

The analyzed literature also covers a wide range of topics in addition to showing an increasing number of publications. The distribution of study themes is further explained in Section 3.2. The analyzed literature spans various regions, including China, Europe, the Middle East, Southeast Asia, and Africa. Figure 3 shows the predominance of studies conducted in China (63 articles), followed by studies covering multiple countries or region (18 articles), while other countries and regions are relatively limited and dispersed across the literature [10, 12, 32, 57, 58].

3.2 Distribution of themes

The thematic synthesis of 99 articles reported four themes that represented the conceptual structure of the DT-ESG literature namely Digital Technology Enabling ESG Transformation, Mechanisms Linking DT and ESG, Boundary Conditions of the DT-ESG Relationship, and Sustainability Outcomes of DT-ESG Integration. Figure 4 presents the thematic structure and the subthemes, while the frequency distributions are presented in Figures 5 to 8. These four themes

comprise five, seven, seven, and six subthemes, respectively, and serve as the basis for the presentation of the results. The themes serve as the basis for conceptualizing ESG value as a value-creation process that connects digital technology, value-creation mechanisms, and sustainability outcomes.

3.3 Digital technology enabling Environmental, Social, and Governance transformation

As shown in Figure 5, Big Data and Digital Platforms and Artificial Intelligence and Analytics are the most dominant technology categories in the DT–ESG literature (47 articles), followed by AI and Analytics (31 articles). These technologies

groups are widely used for ESG reporting, sustainability information management, environmental and governance monitoring, supply chain monitoring, and sustainable financing through digital platforms and fintech [10, 11, 27, 32, 40, 57, 59-74]. Furthermore, the literature identifies Smart Manufacturing and Industry 4.0 Technology (5 articles), Cloud Computing and Digital Structure (5 articles), and ESG Monitoring and Reporting Technologies (6 articles). This group includes the IoT, smart manufacturing, blockchain, cloud computing, digital twins, and advanced analytics used to support resource management, production processes, ESG data integration, traceability, accountability, and sustainability information management [64, 66, 75-79].

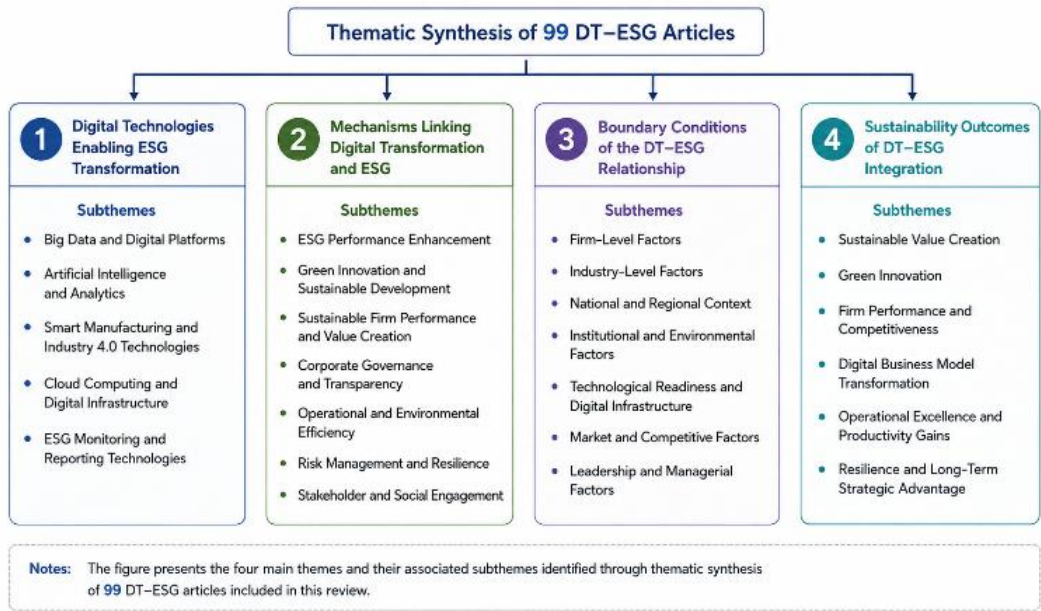


Figure 4. Thematic structure of the Digital Transformation–Environmental, Social, and Governance (DT–ESG) literature
Note: Frequencies are based on article-level thematic coding. Multiple coding was permitted; therefore, categories are not mutually exclusive and frequencies may exceed the total number of included articles (N= 99)

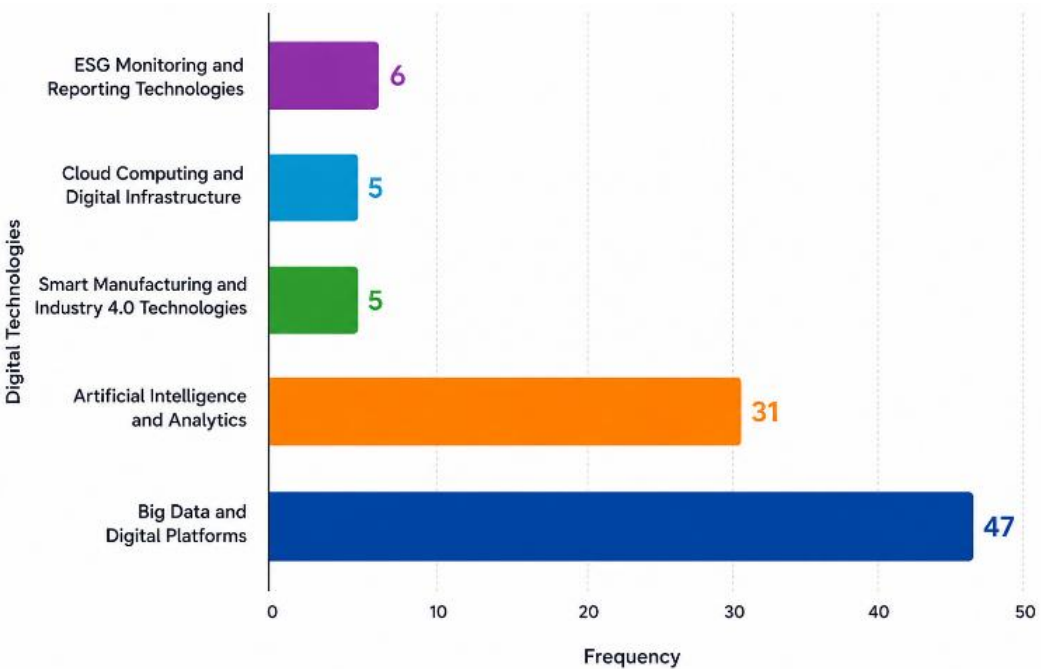


Figure 5. Digital technology enabling Environmental, Social, and Governance (ESG) transformation

3.4 Mechanisms linking digital transformation and Environmental, Social, and Governance

The relationship between DT and ESG occurs through organizational and governance mechanisms, innovation and operational mechanisms, as well as financial and institutional mechanisms (Figure 6). The first group is dominated by issues related to organizational capability, knowledge management, ESG engagement, and decision-making capability [9, 31, 37, 58, 61, 67, 80-85]. In this category, ESG performance Enhancement is the most dominant subtheme (57 articles), followed by Corporate Governance and Transparency (23 articles).

The innovation and operational mechanisms group includes green innovation, process and product innovation, energy efficiency, resource optimization, supply chain integration, environmental management, and sustainable production processes [64, 66, 71, 74-77, 79, 86-91]. This category consists of Green Innovation and Sustainable Development (40 articles) and Operational and Environmental Efficiency (13 articles). The financial institution mechanisms group include digital finance, sustainable finance, green investment, access to capital, institutional support, policy incentives, and stakeholder legitimacy [27, 32, 35, 40, 45, 57, 67, 69, 70, 73, 92]. This category includes Sustainable Firm Performance and Value Creation (19 articles), Risk Management and Resilience (7 articles), and Stakeholder and Social Engagement (6 articles), as well as Stakeholder and Social Engagement (6

articles).

3.5 Boundary conditions of the Digital Transformation-Environmental, Social, and Governance relationship

As shown in Figure 7, the relationship between DT and ESG is influenced by various boundary conditions at organizational and external environmental levels. Organization-Level Factors are the most dominant category (40 articles), including organization size, ownership structure, resource capacity, digital maturity, governance quality, innovation capability, human capital quality, information resources, organizational readiness, and digital capability [9-11, 30, 31, 58, 60, 71, 82, 83, 93].

At the external level, National and Regional Context is the most frequently found category (16 articles), followed by Industry-Level Factors (11 articles), Institutional and Environmental Factors (4 articles), Technological Readiness and Digital Infrastructure (6 articles), Leadership and Managerial Factors (4 articles), and Market and Competitive Factors (3 articles). These categories reflect the influence of economic, institutional, and regulatory conditions, industry characteristics, technological readiness and digital infrastructure, market dynamics, as well as leadership and managerial quality [10, 12, 28, 29, 59, 65, 69, 70, 74, 76, 77, 87, 91, 94].

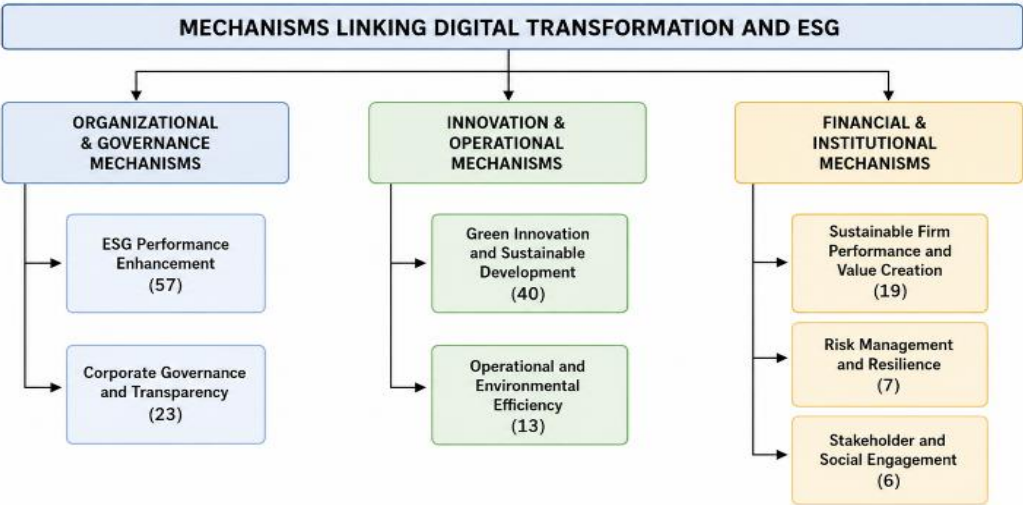


Figure 6. Mechanism linking digital transformation and Environmental, Social, and Governance (ESG)



Figure 7. Boundary conditions of the Digital Transformation-Environmental, Social, and Governance (DT-ESG) relationship

3.6 Sustainability outcomes of Digital Transformation-Environmental, Social, and Governance integration

As shown in Figure 8, integrating DT and ESG yields various sustainability outcomes. Sustainable value creation was the most frequently found outcome, appearing in 45 articles, followed by Green Innovation with 14 articles. These two categories reflect various forms of innovation and sustainable value creation, including environmental business innovation, sustainable export performance, ecosystem development, and initiative [10, 12, 31, 59, 63, 67, 75, 76, 78,

87-90].

Other outcomes include Organizational Performance and Competitiveness (5 articles), Operational Excellence and Productivity Gains (2 articles), and Resilience and Long-Term Strategic Advantage (2 articles). These categories relate to organizational performance, competitiveness, stakeholder trust, reputation, digital supply chains, business model transformation, operational efficiency, productivity, automation, resilience, long-term performance, and sustainability strategy [18, 20, 22, 32, 35, 39, 41, 42, 66, 72, 89, 90, 95-97].

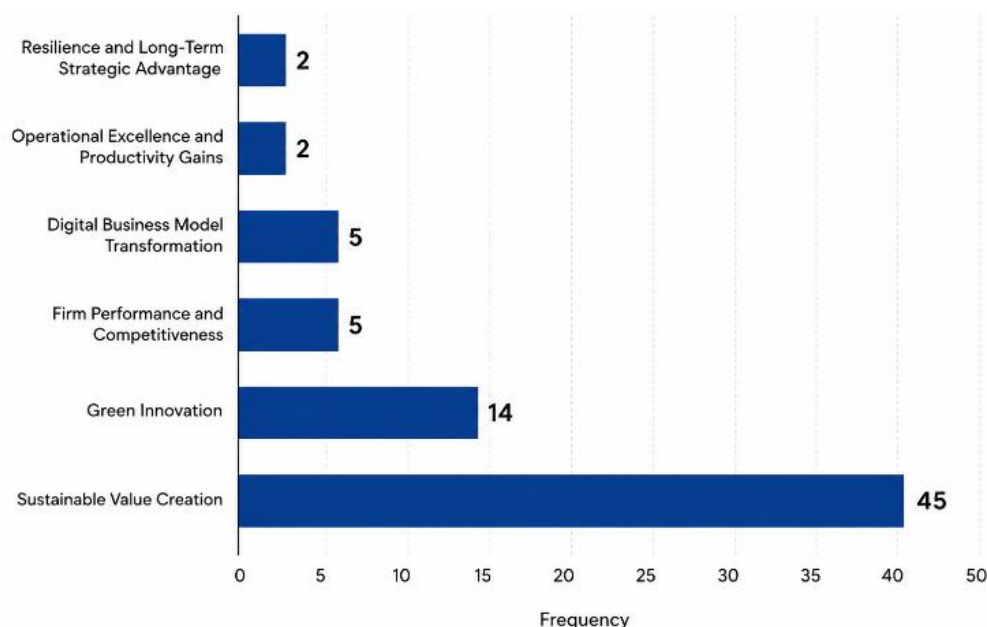


Figure 8. Sustainability outcomes of Digital Transformation-Environmental, Social, and Governance (DT-ESG) integration

4. DISCUSSION

4.1 Emerging patterns across literature

A synthesis of 99 articles reported four key patterns that shaped the understanding of the relationship between DT and ESG. The literature suggests that the relationship between technology adoption and increased sustainability occurs through a value creation process including digital technology, organizational mechanisms, contextual conditions, and various sustainability outcomes.

The first pattern suggests that digital technology functions as an enabling infrastructure, providing the information, analytics, and coordination capabilities necessary for ESG implementation. Technology's contribution to sustainability comes from the ability to support ESG-relevant organizational processes [10, 11, 60, 65, 66, 71, 77].

The second pattern shows that DT's influence occurs through various organizational mechanisms transforming digital capabilities into sustainability practices. This result indicates that ESG value is obtained from the ability to integrate technology into governance, innovation, and decision-making processes [9, 27, 31, 40, 80, 84].

The effectiveness of the DT-ESG relationship is shaped by various boundary conditions at the organizational and external levels. These results confirm that the relationship is contextual since the successful conversion of digital capabilities into ESG value depends on the organization's characteristics and the

environment [9, 10, 31, 48, 60, 73, 83].

The fourth pattern shows that integrating DT and ESG generates various forms of value beyond improving ESG performance. ESG functions as a compliance instrument and source of strategic value creation, supporting organizational innovation, competitiveness, and resilience [10-12, 45, 59, 75, 76, 86, 87]. These four patterns report a consistent path in the DT-ESG literature, from digital technology as a source of capabilities to value creation mechanisms that shape ESG value, influenced by boundary conditions, and produce various sustainability outcomes.

4.2 Evolution of digital transformation-Environmental, Social, and Governance analysis

Section 3.1 indicates that the literature on the relationship between DT and ESG has experienced significant growth in terms of publication volume and conceptual orientation. In the early stages of development, most studies focused on testing the direct relationship, positioning ESG performance, disclosure, or sustainability as the primary outcomes of digitalization [28, 37-39]. This perspective reflects an approach that views digital technology as a determinant of improved sustainability performance.

The development of literature reflects a transition from assessing the existence of a relationship between DT and ESG performance to exploring the processes, mechanisms, and boundary conditions. This shift is reflected in increased

attention to the role of various digital technologies, the organizational mechanisms connecting DT and ESG, the contextual factors influencing the effectiveness, and the resulting sustainability outcomes [9-12, 31, 32]. This development shows a shift from an outcome-centric to a more process-centric approach. In this newer perspective, the DT–ESG relationship is understood as a process of interaction among digital technology, organizational mechanisms, and specific contextual conditions. Therefore, attention is no longer limited to improving ESG, but also to the processes enabling ESG value to be formed and translated into sustainability outcomes.

DT–ESG analysis is increasingly multidisciplinary, integrating perspectives from information systems, strategic management, innovation, corporate governance, sustainable finance, and sustainability management [10, 11]. The integration of perspectives broadens the view of the relationship from addressing technology adoption to including sustainability issues relating to organizational, institutional, and external environmental factors.

The evolution of the DT–ESG literature reports a shift from a straightforward relationship model to a more holistic understanding of DT, ESG, and organizational sustainability. This shift indicates that study attention is focused on how ESG functions within the relationship between digital capabilities and various sustainability outcomes. The DT–ESG literature has moved from an outcome-centric to a process-centric approach, opening the need for a conceptual perspective that explains the role of ESG in the relationship between digital capabilities and sustainability outcomes. This perspective serves as the basis for further discussion of the roles of digital technology, value creation mechanisms, boundary conditions, and sustainability outcomes.

4.3 Through what mechanisms does digital transformation create Environmental, Social, and Governance value?

The synthesis results show that DT does not directly generate ESG value. This relationship occurs through a series of value creation mechanisms that enable organizations to convert digital capabilities into practices, processes, and decisions supporting sustainability. Therefore, digital technology acts as an enabler, while ESG value is created through organizational mechanisms that translate technological potential into ESG value.

The literature identifies three main groups of mechanisms, namely organizational and governance mechanisms, innovation and operational mechanisms, and financial and institutional mechanisms. ESG value creation occurs primarily through improved governance quality, information transparency, and sustainability-oriented innovation [6, 9, 25, 31, 69, 71, 74, 80, 84, 90, 98]. Organizations can improve the quality of ESG disclosure, strengthen internal controls, develop capabilities, and support more transparent and accountable decision-making through the integrated use of data, analytics, and digital systems [6, 9, 80, 81, 84]. In this context, the contribution of digital technology is in the ability to strengthen governance processes and relationships with various stakeholders [9, 31, 58].

A similar role is evident in innovation and operational mechanisms. Various studies show that DT supports the development of green innovation, increased resource efficiency, strengthened environmental management, and the implementation of sustainable development practices [63, 75,

76, 86]. Digital technology enables organizations to optimize operational processes, increase resource efficiency, and enhance the development of sustainability-oriented innovation [75, 76, 87, 89]. ESG value is created through the ability to integrate digital technology into innovation and operational processes supporting sustainability goals.

Financial and institutional mechanisms play a crucial role in addition to organizational and operational mechanisms. Digital finance, sustainability investment, sustainable firm performance and value creation, and institutional support expand an organization's capacity to implement ESG practices and develop sustainability initiatives on a broader scale [27, 40, 57, 69, 91, 96, 98]. These results suggest that ESG value creation depends on financial resources, institutional support, and the ability of firms to translate digital capabilities into sustainable performance and value creation.

The synthesis indicates that the relationship between DT and ESG is better understood as a value conversion process rather than a direct cause-and-effect. ESG value is obtained when an organization integrates digital technology into governance, innovation, operations, finance, and institutional mechanisms that support sustainability [10, 31, 70, 72, 73, 95]. ESG value originates from an organization's ability to convert and use digital capabilities through various processes. These results serve as a conceptual foundation for the Integrated framework developed in the next section, which explains the translation of digital capabilities through various value-creation mechanisms before producing sustainability outcomes.

4.4 What factors shape the relationship between digital transformation and Environmental, Social, and Governance?

The synthesis results show that the effectiveness of the DT–ESG relationship is shaped by various organizational and external environmental conditions. In contrast to mechanisms, which explain how DT generates ESG value, boundary conditions account for variations in the outcomes of the relationship across organizations and contexts.

At the organizational level, company size, resource capacity, governance quality, managerial capabilities, digital maturity, and organizational readiness contribute to the ability to integrate DT and ESG [5, 9, 10, 31]. Firm-level Factors represent the most frequently identified boundary condition in the literature (40 articles), indicating that the effectiveness of digital technologies in supporting ESG implementation tends to be greater in organizations characterized by adequate resources, robust governance systems, and high levels of digital capability. At the external environmental level, institutional quality, regulatory pressures, industry characteristics, market conditions, and national and regional contexts shape the DT–ESG relationship [9-12, 26, 31, 35, 70, 71, 74, 91]. National and Regional Context (16 articles) and Industry-Level Factors (11 articles) are the most frequently identified external boundary conditions, followed by technological readiness and digital infrastructure, institutional and environmental factors, leadership and managerial factors, and market and competitive factors. These factors determine the level of support, incentives, and pressures that allow organizations to integrate DT with ESG practices.

Digital technology does not automatically generate ESG value. The effectiveness of the relationship depends on the fit of internal capabilities and external conditions. These results

extend the DT–ESG literature, which has emphasized the role of digital technology and organizational mechanisms. In this context, the success of ESG value creation is also determined by the conditions surrounding the process. Therefore, boundary conditions act as enabling and constraining factors that determine the conversion of digital capabilities into ESG value.

4.5 What sustainability outcomes resulted?

The literature shows that DT and ESG integration produce various sustainability outcomes to improve performance. Green innovation and sustainable value creation are the most dominant outcomes, followed by increased corporate competitiveness, business model transformation, operational excellence, and organizational resilience [10-12, 14, 59, 75, 76, 86, 87, 89, 90]. The integration is related to achieving sustainability indicators and generating various forms of strategic value [10, 11, 31, 95].

Green innovation, improved governance, and transparency show that ESG value strengthens sustainability performance and creates the capacity to adapt, innovate, and build stakeholder trust [10, 72, 73, 75, 86, 87]. DT–ESG integration also contributes to increased productivity, organizational adaptability, and long-term resilience [12, 45, 59, 70, 82]. Therefore, sustainability outcomes and organizational performance are developed because ESG value is internalized into the strategy, processes, and stakeholder relationships of an organization [11, 59, 76].

The various outcomes identified in the literature can be understood as consequences of ESG values internalized in organizational activities [4, 10-12, 31]. These results serve as the conceptual foundations for the Integrated ESG Value Creation Framework developed in the next section, which explains how digital capabilities are translated into ESG value.

4.6 Environmental, Social, and Governance as an Intermediate value creation process: Theoretical contributions and framework development

Based on the synthesis, ESG value is an intermediate value-

creation process that bridges the relationship between digital technology and the creation of sustainability value [97]. Most previous studies position ESG as a dependent variable measured through performance, disclosure, ratings, or sustainability performance. In this context, DT is viewed as an antecedent that directly improves ESG or sustainability performance [4-6, 9-12, 25, 36, 90]. However, the synthesis results show that the relationship is not direct. ESG value creation occurs through various organizational processes. This variable refers to the environmental, social, and governance benefits created by integrating digital capabilities into organizational processes. ESG value is reflected in increased environmental, social, and governance value, as well as strengthened stakeholder legitimacy and sustainability integration. The five elements collectively represent a multidimensional construct that bridges the relationship between digital capabilities and sustainability outcomes. Therefore, ESG functions as a value-creation process used to translate digital capabilities into sustainability outcomes.

The relationship between DT and sustainability is better understood as a sustainability value pathway rather than a direct cause-and-effect. The most frequently identified technologies, particularly Big Data and Digital Platforms and Artificial Intelligence and Analytics, together with fintech, blockchain, IoT, and Industry 4.0 technology, do not automatically produce sustainability outcomes. These technologies strengthen various value-creation mechanisms, including increased information transparency, high-quality ESG disclosure, effective governance, enhanced organizational capabilities, green innovation, operational efficiency, sustainable investment, and access to sustainable financing [9, 25, 27, 40, 57, 65, 71, 72, 75, 77, 80, 84, 89, 97, 99, 100]. Organizations build environmental value, social value, governance value, stakeholder legitimacy, and sustainability integration through the mechanism [10, 31, 73, 91]. The resulting value is translated into sustainable value creation, green innovation, increased competitiveness, business model transformation, organizational resilience, and long-term value creation. The evolution of the relationship between DT, ESG, and sustainability is summarized in Figure 9.

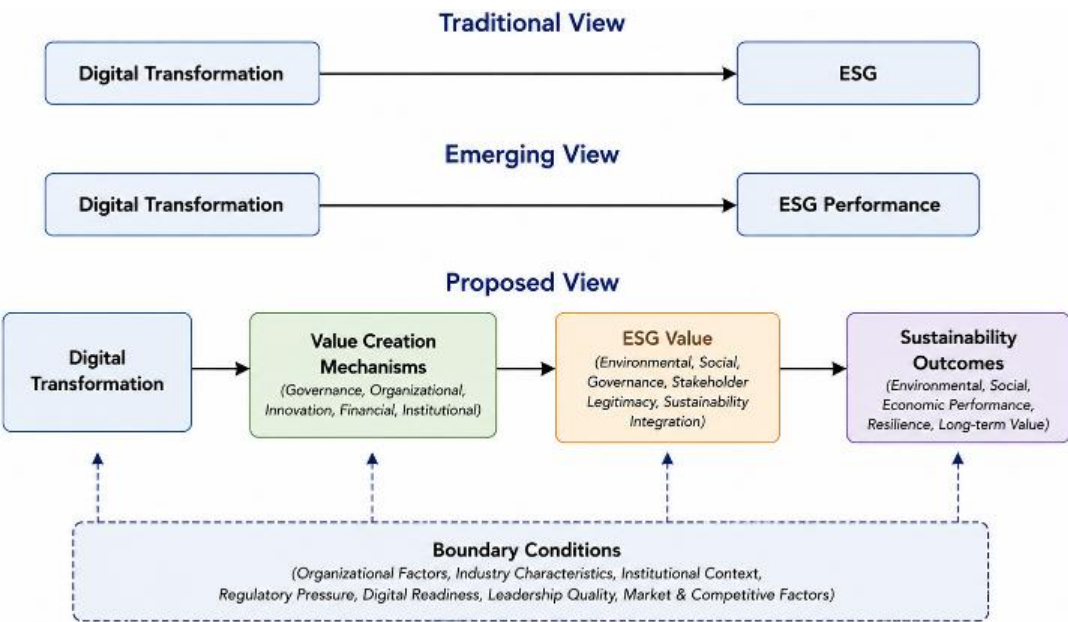


Figure 9. Evolution of perspectives on the relationship between digital transformation and sustainability

The effectiveness of the sustainability value pathway is not universal. The synthesis results show that the relationship between digital technology, value creation mechanisms, ESG value, and sustainability outcomes is influenced by various boundary conditions, including organizational factors, industry characteristics, institutional quality, regulatory pressure, digital readiness, and leadership quality [9, 10, 12, 13, 29, 77, 82, 83, 87]. ESG value results from organizational processes within a specific institutional context. Therefore, success in converting digital capabilities into sustainability outcomes is determined by the technology and the ability to develop value creation mechanisms appropriate to the internal and external conditions faced [9-12, 26, 31, 82].

Based on the conceptual relationship, this study developed an Integrated ESG Value Creation Framework, as presented in Figure 10. The framework positions ESG value as the core of the sustainability value pathway, connecting digital technology to various sustainability outcomes. In this context, digital technology acts as a source of capabilities. ESG value is at the core of the value-creation process, sustainability outcomes represent the results, and boundary conditions influence the effectiveness of the relationships. Therefore, the proposed framework integrates the results scattered across the DT–ESG literature and provides a more comprehensive explanation of how sustainability value is created by converting digital capabilities into ESG value.

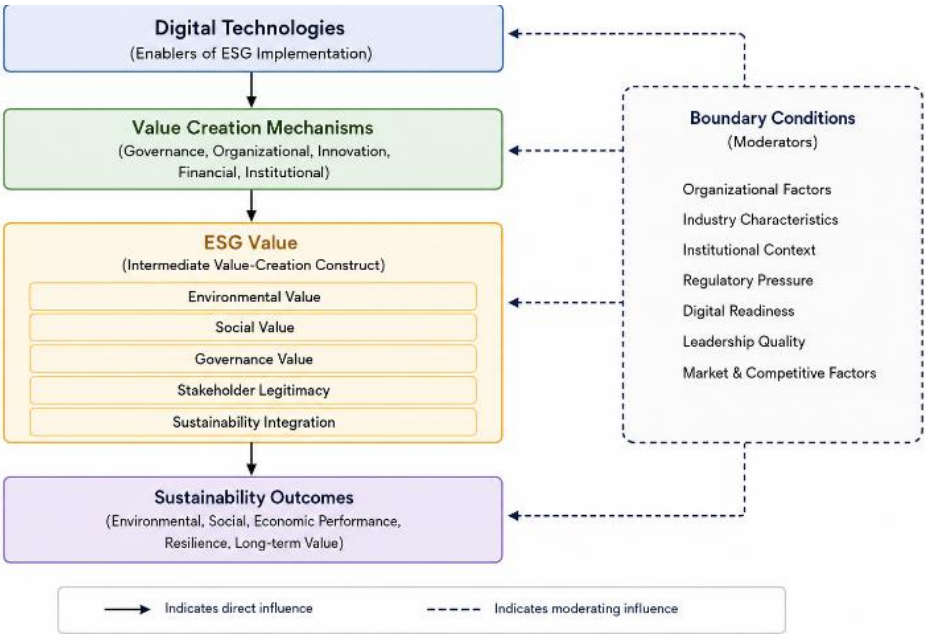


Figure 10. Integrated Environmental, Social, and Governance (ESG) value creation framework

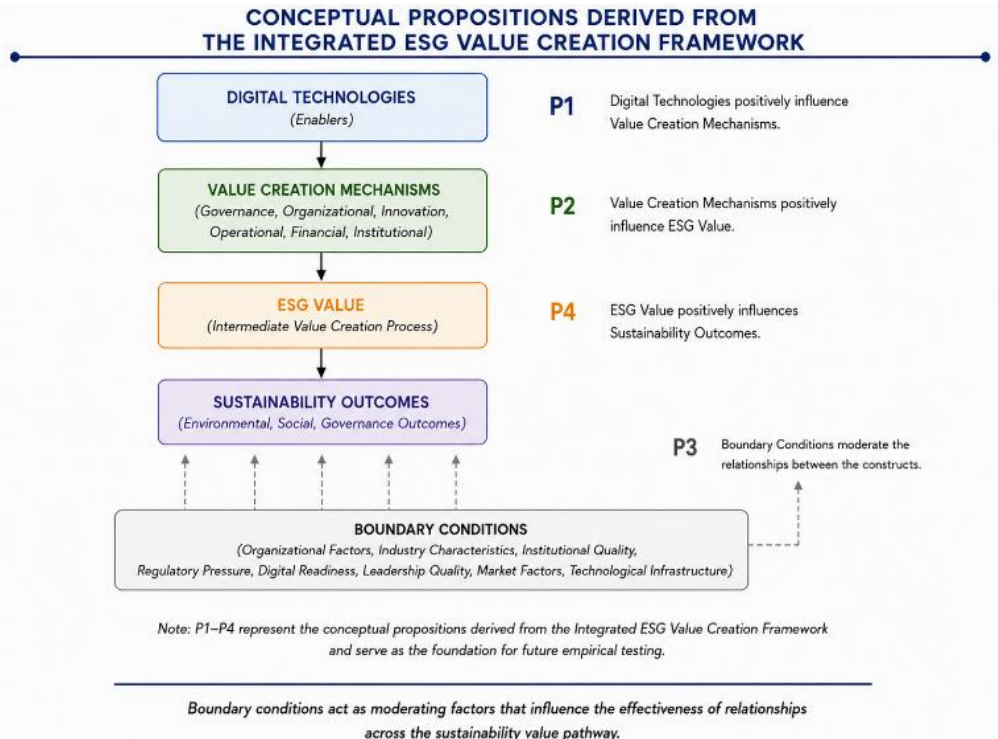


Figure 11. Conceptual propositions derived from the integrated Environmental, Social, and Governance (ESG) value creation framework

The proposed framework extends the DT–ESG literature by reporting that sustainability value creation occurs through a pathway that connects digital technology, value creation mechanisms, ESG value, and sustainability outcomes. This perspective shifts the focus from a direct relationship to a more process-oriented understanding of how digital capabilities translate into sustainability value.

Based on the proposed framework, this study formulates four propositions as the basis for empirical testing, as shown in Figure 11. Proposition 1 (P1) states that digital technology strengthens value creation mechanisms. In Proposition 2 (P2), value creation mechanisms contribute to the formation of ESG values. Proposition 3 (P3) shows that various boundary conditions moderate the relationship between digital technology, value creation mechanisms, ESG values, and sustainability outcomes. Proposition 4 (P4) reports that ESG values contribute to the formation of various sustainability outcomes.

In the proposed framework, digital technology is a strategic resource described in the Resource-Based View [101]. Value creation mechanisms represent the process of developing and reconfiguring capabilities in Dynamic Capability Theory [91, 102]. ESG reflects the creation of value for various stakeholders as described in Stakeholder Theory [74, 103], which emphasizes the importance of fulfilling the interests of various groups. In contrast, boundary conditions represent the influence of the institutional environment emphasized in Institutional Theory [104, 105]. Therefore, the Integrated ESG Value Creation Framework provides a more comprehensive

conceptual foundation to explain the conversion of digital capabilities into various forms of sustainability value. This framework provides a basis for theory development and empirical testing as well as broadening the understanding of the process of creating ESG value in the era of DT.

4.7 Practical implications

For managers and organizational leaders, the results indicate that digital technology investments do not automatically generate ESG benefits or sustainability outcomes. Organizations need to view ESG not only as a reporting or compliance objective but also as a value-creating process connecting digital capabilities to various sustainability outcomes. Therefore, organizations must build effective governance, strengthen digital capabilities, improve the quality of ESG reporting, and develop a culture of innovation to translate digital technology into tangible ESG value [9, 10, 31, 84].

At the policy level, the results emphasize the importance of a conducive institutional environment for integrating DT and ESG. Policies that promote transparency, digital infrastructure development, access to green financing, and incentives for sustainable innovation strengthen the boundary conditions supporting ESG value creation [10, 12, 29, 76]. For investors and other stakeholders, evaluating performance should extend beyond ESG scores or disclosures to include the organization's ability to build value-creation mechanisms that connect digital investments to concrete sustainability practices [10, 11, 31].

Table 3. Future studies

Study Area	Identified Gap	Future Study Opportunities
ESG Value Creation Process	Most studies still view ESG as a DT outcome.	Develop and test a mediation model that explains how value creation mechanisms translate digital technology into ESG value.
ESG as Intermediate Value	The role of ESG as a mediating mechanism is rarely empirically tested.	Examine the mediating role of ESG value in the relationship between digital technology and sustainability outcomes.
Organizational Mechanisms	ESG value creation mechanisms are still studied separately.	Develop a multi-mediator model that simultaneously integrates governance, transparency, organizational capability, innovation, and financial mechanisms.
Boundary Conditions	Most studies only test one moderator in a specific context.	Develop a multilevel model that simultaneously integrates organizational, industry, and institutional factors.
Cross-Country/region Context	The dominance of studies in China limits the generalizability of the findings.	Conduct a cross-country/region study to compare the influence of DT on ESG across different institutional environments.
SMEs and Emerging Economies	Most studies focus on large corporations and public companies.	Examine ESG value creation in SMEs, family businesses, nonprofits, and the public sector.
Emerging Digital Technology	The study is still dominated by AI, Big Data, and fintech.	Examine the role of Generative AI, Digital Twins, Metaverse, Blockchain Ecosystems, and Industry 5.0 technology in ESG.
Sustainability Outcomes	The outcomes studied are still dominated by ESG performance and green innovation.	Explore other outcomes, such as circular-economy performance, social value creation, stakeholder trust, organizational resilience, and sustainable competitiveness.
Longitudinal Dynamics	Most studies use short-term cross-sectional or panel data.	Develop a longitudinal study to understand the long-term evolution of the relationship between DT, ESG, and sustainability outcomes.
Theoretical Integration	Literature still utilizes theories separately.	Develop a conceptual model that integrates Resource-Based View, Dynamic Capability Theory, Stakeholder Theory, and Institutional Theory in one analytical framework.

4.8 Limitations and future study agenda

This study has several limitations. First, the synthesis used only articles indexed in the Scopus database since relevant studies from other sources may not have been included. Second, since most articles in the dataset focused on the Chinese context, caution should be exercised when generalizing the results to other countries and regions. Third, this study used a thematic synthesis to identify patterns and

conceptual relationships in literature. Even though the approach allows for the development of an integrated understanding of the relationship between DT and ESG, the strength or the magnitude of influence cannot be quantified. The developed Integrated ESG Value Creation Framework is conceptual and built on a literature synthesis. Therefore, the relationships between digital technology, value creation mechanisms, ESG value, boundary conditions, and sustainability outcomes require empirical testing across

various organizational, industry, and country/region contexts [52]. Fourth, the review was conducted by a single author, who performed the screening, eligibility assessment, quality assessment, data extraction, and thematic coding. Consequently, no independent duplicate screening or inter-rater reliability assessment was conducted. Although predefined criteria and procedures were applied throughout the review, the single-author design may increase the risk of selection, assessment, and coding bias. Future reviews should involve multiple independent reviewers and report appropriate inter-rater reliability measures to strengthen the robustness and reproducibility of the synthesis. Fifth, predominance of quantitative analysis indicates that understanding the formation of ESG value remains relatively limited. In this context, qualitative and longitudinal analysis are still needed. Another limitation concerns the single-author design of the review.

The future study agenda presented in Table 3 is derived directly from the Integrated ESG Value Creation Framework to test the reconceptualization of ESG as an intermediate value-creation process. Empirical testing of the propositions in Figure 11 regarding the role of ESG value in bridging the relationship between digital technology and sustainability outcomes is an important direction. Future studies must validate ESG value as a higher-order construct representing environmental value, social value, governance value, stakeholder legitimacy, and sustainability integration. Studies across countries/regions, industries, and various organizations are needed to evaluate the validity of the framework at different levels of digital maturity and ESG regulation. Literature needs to be expanded to the context of SMEs, public sector organizations, and developing economies, which are relatively underrepresented [10, 12, 57]. Furthermore, the development of new-generation digital technology, such as generative AI, digital twins, blockchain, and platform ecosystems, opens opportunities to understand new forms of ESG value creation [10, 11, 48, 57]. This agenda is expected to expand the validity, generalizability, and theoretical development of the proposed framework.

The relationship between DT, ESG value, and sustainability outcomes offers theory development and empirical testing across organizational, industrial, and institutional contexts.

5. CONCLUSION

In conclusion, this study aimed to develop a more comprehensive understanding of ESG value using DT by synthesizing the literature on relationships. The analysis of 99 articles published between 2016, and August 2026 showed that the relationship between DT and sustainability operated through a series of value-creation mechanisms allowing organizations to convert digital capabilities into ESG value. The effectiveness of the process was influenced by various organizational and institutional conditions.

The primary contribution was in reconceptualizing the position of ESG in the DT–ESG literature. The results showed that ESG value translated digital capabilities into various sustainability outcomes. An Integrated ESG Value Creation Framework was developed to explain the relationships among digital technology, value creation mechanisms, ESG value, boundary conditions, and sustainability outcomes within an integrated sustainability value pathway.

This study had limitations related to the database's scope,

the geographic distribution, and the conceptual nature of the framework. Therefore, future studies should test the propositions across various organizational, industry, and country/region contexts to evaluate the validity and generalizability of the framework.

The relationship between DT and sustainability is better understood as a value creation process rather than a direct cause-and-effect. This study reports that sustainability value creation in the digital era depends on the ability to convert digital capabilities into ESG value through various mechanisms, influenced by boundary conditions. The perspective is embodied in the Integrated ESG Value Creation Framework, which provides a more comprehensive explanation regarding the creation of sustainability outcomes in the era of DT.

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