

**FROM DIGITAL DRIFT TO SUSTAINABLE DIRECTION –
REVIEWING THE INTERRELATION OF CORPORATE
SUSTAINABILITY AND DIGITALISATION**

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From Digital Drift to Sustainable Direction – Reviewing the Interrelation of Corporate Sustainability and Digitalisation

Abstract

The interplay between corporate sustainability and digitalisation is increasingly recognised as dual transformation, yet its strategic integration remains underexplored. This study systematically reviews quantitative and qualitative research on the corporate-level intersection of sustainability and digitalisation. Thematic clustering of their impacts led to the following five key insights: (1) research lacks integrated, multi-level approaches; (2) digitalisation is primarily framed as an enabler, rather than an independent goal of sustainability; (3) strategic alignment is crucial for integrating digitalisation and sustainability within corporate practices; (4) efficiency-driven perspectives dominate, focusing on ecological and economic benefits; (5) methodologies and topics are diversifying, with growing emphasis on social and governance dimensions. By systematically structuring existing knowledge and critically assessing key challenges and opportunities, this study provides a comprehensive foundation for future research on the strategic integration of dual transformation.

Word count: 6.726

1. Introduction

Digitalisation¹ and sustainability are two of the most powerful transformation drivers of our time (Flyverbom et al., 2019). Yet, too often, they unfold in parallel rather than in sync. Digitalisation risks becoming a digital drift when pursued in isolation - an adoption of digital technologies without a clear sustainability trajectory. By contrast, sustainability efforts that neglect digital capabilities may struggle to scale, remaining reactive rather than transformative. Not choosing one path over the other but aligning both to create a strategic direction is often referred to as dual or twin transformation (Barth et al., 2023; Epp et al., 2024). While some companies are beginning to explore these synergies, research remains fragmented, leaving open questions about how businesses can strategically align both forces for long-term impact (Broccardo et al., 2023).

To address challenges and potentials, digitalisation needs to be strategically aligned with the long-term objectives of sustainable development (Brenner & Hartl, 2021; Legner et al., 2017a). From a holistic economic perspective, this implies the preservation of ecological, social and economic capital stocks as complements rather than substitutes (Daly, 1995, 1996; DesJardins, 2007). This perspective conceptualises an interconnected system in which economic activities are embedded and constrained by ecological and social boundaries to achieve long-term sustainable development (Bansal & Song, 2017; Giddings et al., 2002; Raworth, 2017). For corporations, sustainability refers to actions that (when aggregated) contribute to this comprehensive goal. However, the existing literature remains fragmented, with limited emphasis on the strategic integration of sustainability and digitalisation at the corporate level. Accordingly, we pose the question: *What do we (need to) know about how corporate sustainability interrelates with digitalisation?* This study follows a structured approach closely aligned to the classical systematic review methodology as outlined by Denyer and Tranfield (2009).

Before analysing the interrelation between digitalisation and sustainability, each of these transformation drivers need to be examined individually. Management scholars have proposed partly overlapping conceptual approaches to describe firms' efforts towards sustainability. These comprise, but are not limited to, *Corporate Social Responsibility* (CSR, e.g., Garriga & Mele, 2004), which focuses on responsibilities and normative conduct; *Corporate Social Performance* (CSP, e.g., Waddock & Graves, 1997), an instrumental perspective examining the outcomes of social business practices; the *Triple Bottom Line* (TBL, Elkington, 1998), which adopts a long-term perspective on the interplay between economic, environmental and social dimensions; and *Stakeholder Theory*, emphasising the integration of those affected by or affecting the firm's activities (e.g., Parmar et al., 2010). Among these conceptual approaches, *Corporate Sustainability* (CS) has emerged as a widely used umbrella term that encompasses related concepts such as CSR and CSP (Montiel, 2008). However, its definition and concept remain fragmented and ambiguous, with no standardisation across disciplines² (Garriga & Mele, 2004; Van Marrewijk, 2003; Van Zanten & Van Tulder, 2021). In this study, we adopt CS as our focal concept describing organisations' contributions to long-term sustainable development through incorporating corresponding endeavours into corporate strategies and

¹ Terms like digitisation (or 'datafication'), digitalisation and digital transformation vary across and within disciplines. In this paper, we use the term digitalisation to describe how organisations and users generate and apply digitised data, utilise digital technologies, including artificial intelligence (AI), and drive innovation in business models, often disrupting markets (including through digital transformation, Brenner & Hartl, 2021; Legner et al., 2017).

² For an overview you may refer to Meurer (2020) who outlines 33 existing definitions of Corporate Sustainability or to Amini and Bienstock (2014) who derived a CS framework based on a focused review.

practices (Amini & Bienstock, 2014; Pranugrahaning et al., 2021). Scholars emphasise that effective CS requires strategies and practices tailored to a company's core business (Garriga & Mele, 2004; Van Marrewijk, 2003; Van Zanten & Van Tulder, 2021). Recent CS research differentiates between examining CS outcomes, for example, how specific actions and strategies contribute to sustainable development (e.g., Van Zanten & Van Tulder, 2021), and the study of CS approaches and knowledge, for example, how managers require competencies, implement and promote sustainability (strategies) in their organisation (Strand, 2023). Reviews on CS have mainly focused on specific domains like supply chain management (Chauhan et al., 2023; Strand, 2023), reporting/ auditing (Ferrante et al., 2024; Hina et al., 2022) and circular economy (Ferrante et al., 2024; Hina et al., 2022).

Only recently the intersection of sustainability and digitalisation has sparked scholarly interest (e.g., Del Río Castro et al., 2021; Isensee et al., 2020). Two main terms have been introduced in this context. First, *Digital Sustainability* (Del Río Castro, Gonzalez Fernandez, et al., 2021; Isensee et al., 2020) describes the synergy effect of digitalisation enabling the achievement of sustainability goals, such as circular economy and efficiency gains. Second, *Sustainable Digitalisation* refers to applying sustainability criteria and practices in creating digital environments while mitigating potential (ecological or social) rebound effects and managing changes in stakeholder dynamics (e.g., Barth et al., 2023; Epp et al., 2024; Feroz et al., 2023; Guandalini, 2022). Much as these concepts indicate a growing body of research, a critical review is essential to synthesise existing knowledge, identify gaps, and provide a coherent understanding and shared terminology for both scholars and practitioners.

This study contributes to management literature by systematically reviewing the intersection of CS and digitalisation, addressing the fragmentation in existing research and exploring how strategic and sustainability dimensions are conceptualised. It provides insights into dominant research perspectives and identifies prevailing thematic and methodological orientations and areas that require further investigation. Additionally, the study critically examines how digitalisation is positioned within sustainability discourses and assesses the role of corporate strategy in aligning these transformations. By synthesising existing knowledge, this review offers a structured foundation for future research and supports a more integrated perspective on corporate sustainability and digitalisation.

2. Research Process and Method

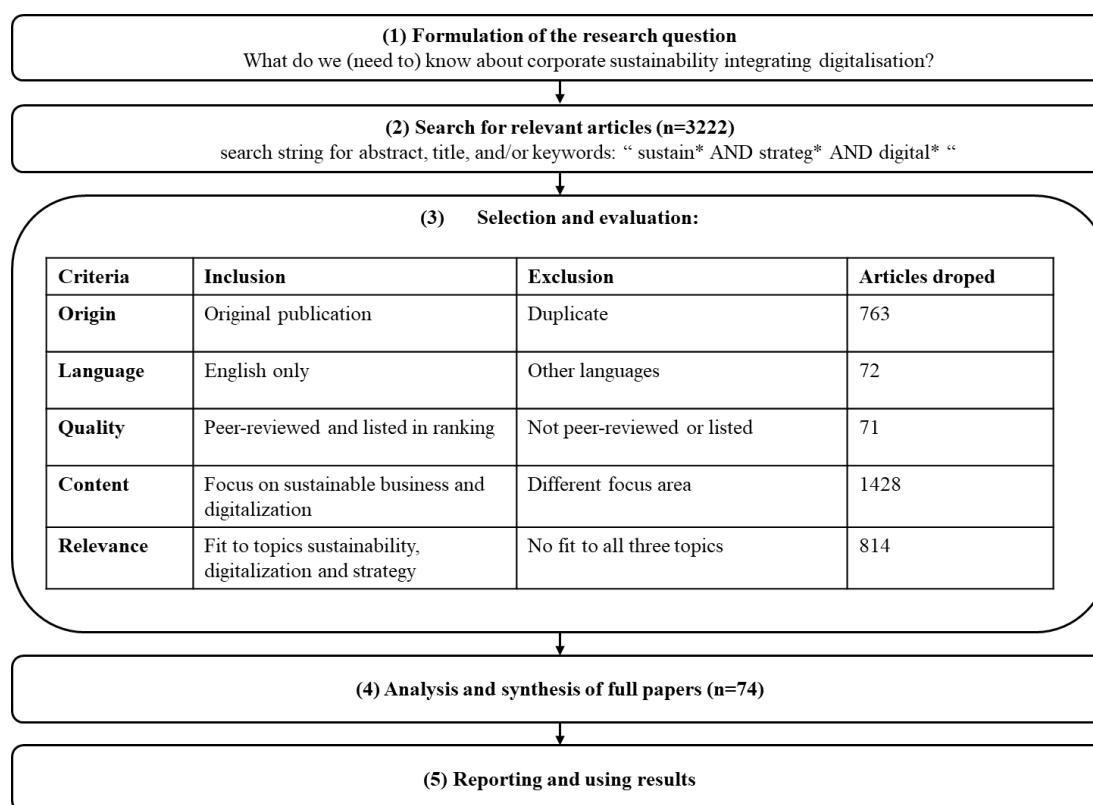
This study applies a systematic literature review and critically reflects on the current state of research regarding CS and its integration with digitalisation, providing insights for management research at the intersection of these megatrends. Our review follows the five step-approach by Denyer and Tranfield (2009). According to the classification by Krlev et al. (2025)³, our approach primarily qualifies as a taking stock review, as it systematically categorises fragmented research to provide a structured overview.

Figure 1 provides detailed information about the search, selection and evaluation process, starting with (1) *formulation of the research question*. The second step, (2) *search for relevant articles*, refers to the general search process conducted between June and August 2023 using the databases Scopus, Web of Science, and EBSCOhost. By applying the terms *sustain** and *digital** in the search string, we ensured the inclusion of all relevant corresponding terms, avoiding a narrow focus on specific concepts. Further, we included *strateg** in the search string

³ Recently, Krlev et al. (2025) have provided a systematic overview of ten different types of literature reviews locating review purposes on directional space for reviewing (degree of substantiveness and reflexivity).

to link findings to the strategic dimension of corporate sustainability rather than solely focusing on individual aspects, for example, product innovations or operational procedures⁴.

Figure 1: Search and Selection Process



In the third step, (3) *selection and evaluation*, we consecutively performed a formal screening, reviewing the titles and abstracts, before screening each paper in full. To ensure quality, we primarily considered papers published in journals listed in the VHB ranking (independent of their individual rating). Nevertheless, 18 articles from non-VHB-ranked journals were included if they fit the research topics and demonstrated the potential to considerably contribute to answering our research question.⁵ For example, Demir et al. (2023) provide a readiness and maturity model for sustainable supply chains, while Ghobakhloo, Asadi, et al. (2023) survey 207 multinational firms on the impact of intelligent automation on sustainability performance.

The retained papers were screened twice by a group of five reviewers, who worked independently, focusing on the papers' title and abstract. This process was repeated during the full paper screening step. Papers were excluded if their content considerably diverged from the research scope, particularly those focusing on sectors unrelated to corporate sustainability and digitalisation. Accordingly, we excluded studies that examined contexts beyond companies, such as education (Hashim et al., 2022), digitalised agriculture (Biró & Szalmáné Csete, 2022; Prihadyanti & Aziz, 2023), or underground hydrocarbon storage (Zhang et al. 2020). Articles missing at least one of the three core components of the search string (e.g., missing/weak focus

⁴ To ensure this, we further set a focus on relevant categories in the databases used: in Web of Science, we searched categories Environmental Studies, Environmental Sciences, Management, Business, and Economics; in Scopus the categories Business, Management and Accounting, Economics, Econometrics, and Finance; in EBSCOhost the database Business Source Complete.

⁵ These articles are marked in the reference list with two asterisks (**).

on sustainability, digitalisation, or no reference to corporate/industry) were excluded. Inclusion was based on the contextual alignment of sustainability, digitalisation and strategy with the research question.

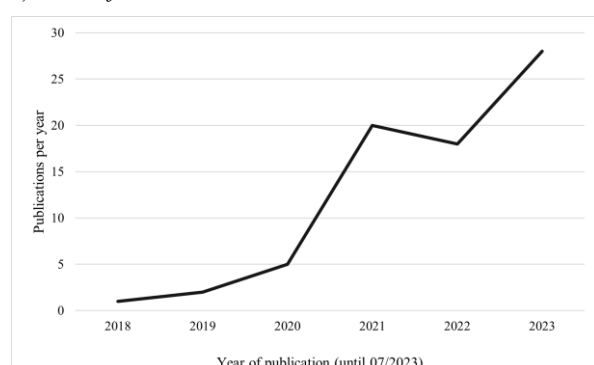
In (4) *analysis and synthesis*, the remaining 74 articles were analysed in two rounds of independent reviewing, whereby all the information from the articles was screened in full. The result is the systematic analysis of insights from research on CS and digitalisation. Step five, (5) *reporting and using results*, is presented in Sections 4 and 5.

3. Descriptive Review

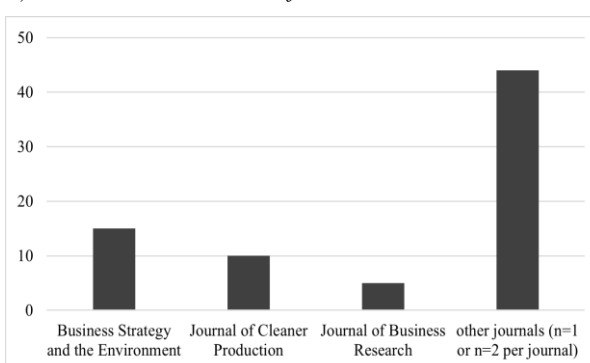
This section provides insights into publication trends, thematic focus areas, and methodological approaches of the 74 retained articles⁶. The most frequently represented journals include *Business Strategy and the Environment* (n=15), *Journal of Cleaner Production* (n=10), and *Journal of Business Research* (n=5), with other journals contributing one or two publications each, indicating a wide dispersion across different academic outlets (Figure 2b). The number of articles has increased significantly since 2021, reflecting a growing academic interest in corporate sustainability and digitalisation (Figure 2a).

Figure 2: Year of Publication and Most Common Journals of the 74 Sampled Articles

a) Year of Publication over Time



b) Journals and Number of Articles



A notable pattern in the dataset is the fragmented yet interdisciplinary nature of the research field, evident in the diversity of study scopes and themes. A large proportion of studies adopt a global perspective (n=33), particularly conceptual papers and literature reviews without regional or industry-specific constraints. Other studies focus on specific countries (n=25), with China, India, and Italy the most frequently represented. Additionally, 16 articles investigate specific industries, primarily manufacturing or logistics, while only three articles analyse individual company cases. In terms of thematic focus, Industry 4.0 (n=25) and circular economy (n=19) are the most frequent topics, with 12 articles explicitly examining their interrelation. Figure 3 presents the articles' keywords, highlighting thematic areas with at least three entries related to sustainability (e.g., sustainable manufacturing, circular economy), digitalisation (e.g., Industry 4.0, digital transformation), and related terms (e.g., economic performance or stakeholder engagement). It is worth noting that some terms, like strategy or supply chain, are not mentioned as keywords even though they are present in many articles.

⁶ For an overview of studies see online appendix: <https://t1p.de/jvy5i>.

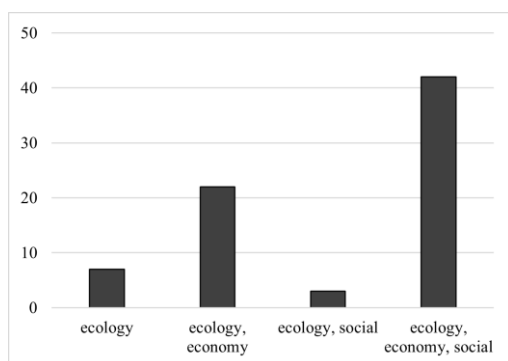
Figure 3: Word Cloud of Literature Keywords



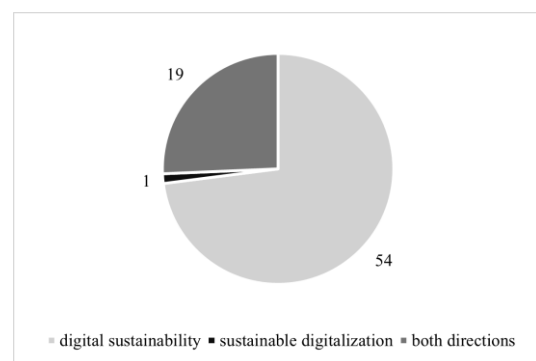
The conceptualisation of sustainability varies across studies, with most addressing all three sustainability dimensions (n=42; Figure 4a). However, the ecological dimension receives particular emphasis. Regarding the relationship between sustainability and digitalisation, 53 articles focus on digital sustainability (Figure 4b). In contrast, only one article addresses sustainable digitalisation, and 19 mention both directional relationships.

Figure 4: Thematical Coverage

a) Sustainability Dimensions covered



b) Relationship between Sustainability and Digitalisation



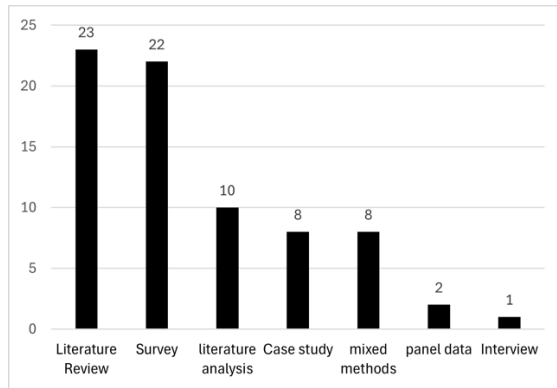
c) Thematic Focus over Publication Time

Year	Thematic Foci
2018–2020	Industry 4.0, circular economy, supply chains; initial conceptual discussions on digitalization & sustainability, limited empirical research.
2021	Digital transformation emerges as a key topic; increasing focus on business models, innovation, and strategy; Industry 4.0 and circular economy remain dominant.
2022	Growing attention to AI, Big Data, intelligent automation; early discussions on social sustainability & governance; supply chain sustainability remains relevant.
2023	Expansion to sustainable digitalization, twin transition, Net-Zero Manufacturing; increasing studies on strategic perspectives, stakeholder engagement, and organizational capabilities.

Regarding data collection methods (Figure 5a), empirical (n=35) and non-empirical (n=39) approaches are almost evenly distributed. The most frequently used methods are surveys (n=22) and various types of literature reviews (n=23), including 18 systematic literature reviews, four literature reviews and one integrated literature review. Furthermore, ten more articles conducted unstructured literature analyses. Additionally, out of the eight articles that employed a mixed-methods approach, three combined a literature analysis with expert opinions, three with surveys, and four with case studies. Moreover, eight articles conducted case studies, two used panel data and one interviews.

Figure 5: Methods of Data Collection

a) Methods of Data Collection of retained Articles



b) Methodical Focus over Publication Time

Year	Methodic Foci (of Data Collection)
2018–2020	Literature reviews, conceptual studies; limited empirical analyses.
2021	More surveys, case studies, early mixed-methods approaches (expert opinions & empirical data).
2022	Increasing use of quantitative models (e.g., SEM, regression); growing reliance on secondary firm data.
2023	Rise in Delphi studies, engaged scholarship, systematic combining; stronger integration of qualitative & longitudinal methods.

Our analysis shows that thematic and methodical foci have evolved over time (Figure 4c & 5b). Between 2018 and 2020, studies primarily focused on conceptualising the relationship between digitalisation and sustainability, emphasising technological enablers such as Industry 4.0, smart manufacturing, and big data analytics. Literature reviews dominated the methodological landscape, laying the theoretical groundwork for future empirical studies. From 2021 onwards, research expanded beyond technological drivers to include corporate sustainability perspectives, circular economy frameworks, and supply chain management, reflecting a broader scope of inquiry. The growing interest in the strategic and organisational dimensions of sustainability is mirrored in an increased use of survey-based studies and quantitative modelling approaches such as structural equation modelling (SEM) and regression analysis. Methodological shifts further intensified in 2022 and beyond, with a rising number of qualitative and mixed-methods studies. Case studies, expert interviews, and engaged scholarship approaches gained prominence, particularly in research focusing on corporate strategy, governance mechanisms, and sustainability transitions. This shift indicates the growing recognition that digitalisation and sustainability transformations cannot be understood through efficiency metrics alone, but require context-sensitive, interdisciplinary research designs.

4. Thematic Review

The following thematic analysis adopts an inductive approach. Initially, we coded all variables from 32 empirical articles according to the dominant thematic topic (Table 1). Subsequently, we derived five higher order thematical clusters based on content similarities⁷. The clusters depict the relationships between dependent and independent variables, as well as between potential mediators and moderators⁸ (Table 2). This approach provides a comprehensive overview of the empirical findings in the research field. In addition to the quantitative studies, we assign qualitative studies to the most thematically similar cluster.

Table 1: Assignment Criteria for Coding of Variables

Code	Topic	Assignment Criteria
DT	Digitalisation	Variables focusing on digital technologies, digital transformation, digital infrastructures, and digital tools. Includes elements like AI, big data, blockchain, digital strategies, and digital infrastructures.

⁷ The procedure systematically groups the sequences of variables according to similar characteristics, aligning with established methodologies for identifying overarching thematic clusters in systematic literature reviews (e.g., Guandalini, 2022).

⁸ Moderators appear only in a few cases (Zheng et al., 2023) and are marked accordingly.

EM	Economy	Variables addressing economic performance, profitability, cost-efficiency, market competitiveness, and financial outcomes.
EL	Ecology	Variables targeting environmental aspects, such as carbon reduction, resource efficiency, circular economy practices, and environmental sustainability.
SC	Social	Variables related to social sustainability, stakeholder relationships, employee engagement, customer collaboration, and broader social impacts.
ST	Strategy	Variables dealing with strategic planning, management approaches, leadership, strategic decision-making processes, and innovation.
SU	Sustainability (multidimensional)	Variables reflecting integrated sustainability aspects that encompass at least two or all three sustainability dimensions (economic, ecological, and social).

To ensure reliability, two researchers independently coded the variables and categorised them into clusters, refining the results through an iterative process. Although some thematical overlaps emerged, we coded and clustered each factor to the dominant theme to avoid redundancies. The ‘strategy’ topic often serves as a meta-component that complements the primary theme of a variable. To acknowledge this specific overlap, we marked such variables with an asterisk (*). In the subsequent paragraphs (4.1 - 4.5), each thematic cluster is described and its analysis introduced with an impact map (Figure 6 - 11), followed by a detailed profile (Table 3 - 7) that compiles key characteristics, to provide a structured foundation for the in-depth review.

Table 2: Thematic Clusters and Code Patterns

Cluster Title	Description	Code Patterns
Digitalisation as Enabler for Sustainability	Focuses on how digital technologies serve as drivers for achieving sustainability outcomes across multi-dimensional (and social) domains.	<i>DT</i> → <i>SU</i> (/SC)
(Digitally Driven) Economic Efficiency	Investigates how digital technologies improve economic efficiency through profitability, operational optimisation, and enhanced competitiveness.	<i>DT</i> → <i>EM</i> (ST/SC)
(Digitally Driven) Ecologic Efficiency	Focuses on how digital technologies contribute to ecological efficiency, particularly through resource optimisation, carbon reduction, and improved environmental performance.	<i>DT/ EL</i> → <i>EL</i>
Sustainability-Driven Business and Digitalisation	This cluster examines how sustainability considerations – including environmental, social, and multi-dimensional sustainability – serve as drivers for shaping business performance, digitalisation, and strategies.	<i>SU/SC/EL</i> → <i>EM/DT/ST</i>
Strategy as a Catalyst for Sustainable Development	This cluster focuses on the role of strategic approaches in driving sustainability-oriented transformations. Strategies serve as catalysts for improving social, multi-dimensional sustainability, and ecological outcomes.	<i>ST</i> → <i>SU/SC/EL</i>

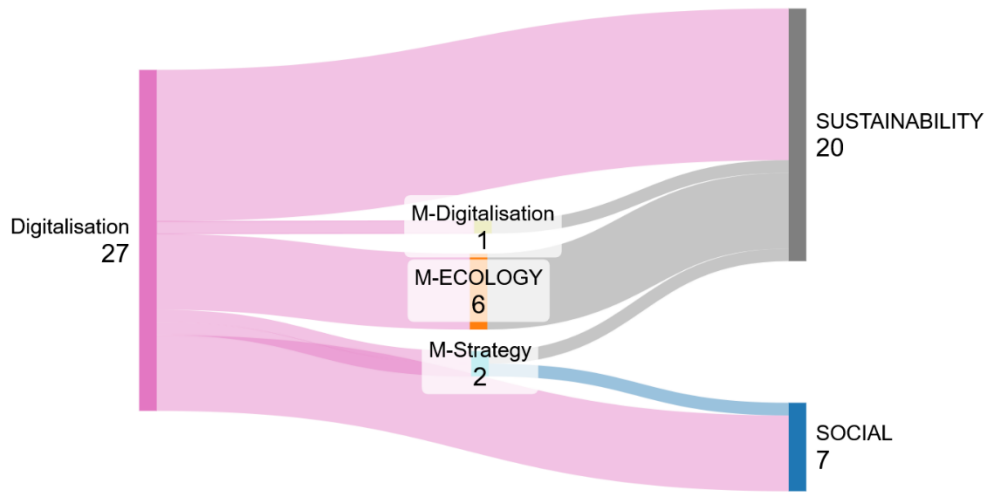
4.1. Digitalisation as Enabler for Sustainability

This cluster comprises 27 relationships that appear in nine quantitative empirical studies. These studies explore how independent variables in the context of digitalisation act as a primary driver for sustainable performance and implementation of sustainability (see Table 3). The Cluster Impact Map⁹ (Figure 6) illustrates the relationships between digitalisation impact category, mediators, and sustainability outcomes. Most pathways show a direct positive

⁹ The Cluster Impact Maps illustrate only statistically tested relationships, regardless of the direction or significance of the impact.

influence, with ecology-related mediators the most prominent. Though social outcomes are less studied, they remain a relevant dimension in this cluster.

Figure 6: Cluster Impact Map – Digitalisation as Enabler for Sustainability



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right (more detailed in the table below). "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Table 3: Cluster Profile – Digitalisation as Enabler for Sustainability

Source	Independent Variable	Mediator [MODerator]	Dependent Variable	Code Pattern
Ardito, 2023	Smart Devices (+)		SUSTAINABLE INNOVATION * (SOCIAL AND ENVIRONMENT)	$DT \rightarrow SU^*$
	Blockchain (+)			$DT \rightarrow SU^*$
	Big Data Analytics (+)			$DT \rightarrow SU^*$
	AI (+)			$DT \rightarrow SU^*$
	Robots (+)			$DT \rightarrow SU^*$
	High Speed Infrastructure (+)			$DT \rightarrow SU^*$
Pinzaru et al., 2022	Digitalization (+)		SUSTAINABILITY PRACTICES	$DT \rightarrow SU$
			ORGANIZATIONAL OUTCOMES (OF SUSTAINABILITY)	$DT \rightarrow SU$
Broccardo et al., 2023	Digitalization (+)		SUSTAINABILITY IMPLEMENTATION AND RELATED PERFORMANCE	$DT \rightarrow SU$
Belhadi et al., 2022	Industry 4.0 Capabilities (+)	Digital Business Transformation * (+)	SUSTAINABLE PERFORMANCE	$DT \rightarrow DT^* \rightarrow SU$
		Organizational Ambidexterity (+)		$DT \rightarrow ST \rightarrow SU$
	Digital Business Transformation (+)			$DT \rightarrow SU$
Xu et al., 2023	Digital Capability (+)	Eco-management Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$

	Digital Strategy (+)	Eco-process Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$
		Eco-product Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$
		Eco-management Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$
		Eco-process Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$
		Eco-product Innovation* (+)		$DT \rightarrow EL^* \rightarrow SU$
Zheng et al., 2023	Internal Digitalization (+)	[MOD: Ownership Diversification (+)]	CSR PERFORMANCE	$DT \rightarrow SU$
	External Digitalization (+)			$DT \rightarrow SU$
Al-Khatib, 2023	Industrial Internet of Things (+)	Supply Chain Visibility (+)	SOCIAL PERFORMANCE	$DT \rightarrow ST \rightarrow SC$
Ghobakhloo, Asadi, et al., 2023	Intelligent Automation Implementation (0)		SOCIAL SUSTAINABILITY PERFORMANCE	$DT \rightarrow SC$
Ferreira et al., 2023	Cloud Computing (+)		SOCIAL SUSTAINABILITY	$DT \rightarrow SC$
	Big Data Analytics (+)			$DT \rightarrow SC$
	Robotics (+)			$DT \rightarrow SC$
	AI (+)			$DT \rightarrow SC$
	Blockchain (+)			$DT \rightarrow SC$
Qualitative Insights (not statistically tested ¹⁰)				
Source	Impact Factor	Outcome Factor		
Santarius & Wagner, 2023	ICT	Sustainability		
Guandalini, 2022	Digitalization			
Acciarini et al., 2022		Sustainable Innovative Business Models		
George et al., 2021	Digital Solutions for Managerial Problems	Sustainable Firm Development		
Islam et al., 2022	Digital Performance	Smart Sustainable Business Growth Model		
Ghobakhloo, Iranmanesh, et al., 2023	Industry 5.0	Sustainable Industrial Transformation		
Bag et al., 2021	Industry 4.0 Enabler	Sustainable Supply Chain		
Patil et al., 2023	Big Data-Industry 4.0 Interaction			
Pan & Nishant, 2023	AI	SDG		
Ching et al., 2022	Industry 4.0 Applications	Sustainable Manufacturing		
Kumar et al., 2022	Industry 4.0			
Jamwal et al., 2022	Deep Learning			
Agrawal, Majumdar, et al., 2023	Integration of AI			

¹⁰ Our classification distinguishes between empirical and non-empirical studies, further subdividing empirical research into quantitative and qualitative categories. However, for the analysis of impact pathways, we focused on statistically tested relationships. Consequently, some studies categorised under ‘qualitative insights’ employ quantitative data collection methods but do not present statistically tested variable relationships (Feroz et al., 2023; Neligan et al., 2023).

Kumar et al., 2021	Strategic Factors for Application of Big Data Analytics	
Ghobakhloo et al., 2021	Industry 4.0 Functions	Sustainable Innovation in Manufacturing
Rejeb & Rejeb, 2020	Blockchain	Supply Chain Management
Sahu et al., 2023		
Contini et al., 2023	Monitoring through KPI and Sustainable Digital Twin	Sustainability Performance in Production
Sætra, 2023	AI ESG Protocol	

Note: The direction and quality of effects is indicated as follows: (+) positive effect; (-) negative effect; (0) not significant.

Digitalisation plays a pivotal role in embedding sustainability into business operations and fostering innovation that aligns with environmental, social, and economic objectives. Broccardo et al. (2023) demonstrate that digital technologies enable the more effective integration of sustainability into business operations, leading to improved sustainability outcomes. However, the adoption of digital tools for sustainability is often incremental, with many firms regarding them as supportive mechanisms rather than disruptive agents of change. This view is echoed by Pinzaru et al. (2022), who find that digitalisation promotes the adoption of SUSTAINABILITY PRACTICES, such as setting key performance indicators, fostering a sustainability-oriented culture, and encouraging employee participation. These findings highlight the instrumental dimension of digitalisation, where technologies are leveraged to embed sustainability into everyday operations.

Beyond implementation, studies point to performance improvements resulting from digital-driven sustainability efforts. Xu et al. (2023) highlight eco-innovation as a key mechanism linking digital transformation to SUSTAINABLE PERFORMANCE and demonstrating that firms with strong digital capabilities and a focus on eco-innovation are more likely to achieve enhanced environmental, economic, and social outcomes. Similarly, Zheng et al. (2023) reveal that internal and external digitalisation positively influence CSR PERFORMANCE, although the magnitude of this effect is shaped by governance factors such as ownership diversification. Ardito (2023) further examines the link between digitalisation and sustainability performance by investigating how technologies like smart devices or blockchain influence firms' SOCIAL AND ENVIRONMENTAL INNOVATIONS. Blockchain is notably associated with social innovations, whereas smart devices are linked to environmental innovations. Despite the generally positive influence of digital technologies on sustainable innovation, the effectiveness of this relationship can vary depending on organisational context and technology type. Belhadi et al. (2022) reinforce this narrative by highlighting the importance of organisational ambidexterity in translating digital capabilities into SUSTAINABLE PERFORMANCE improvements.

Extending this performance focus, Al-Khatib (2023) identifies a positive relationship between the adoption of industrial Internet of Things (IIoT) and SOCIAL PERFORMANCE, mediated by improved supply chain visibility, while Ghobakhloo, Asadi, et al. (2023) find no significant direct impact of intelligent automation implementation on SOCIAL SUSTAINABILITY PERFORMANCE. This contrast highlights that not all advanced technologies uniformly enhance social sustainability outcomes, suggesting that technology-specific capabilities and integration processes are critical determinants. Ferreira et al. (2023) support this notion by demonstrating that, among the five analysed technologies, cloud computing has the strongest impact on SOCIAL SUSTAINABILITY, while blockchain has the weakest.

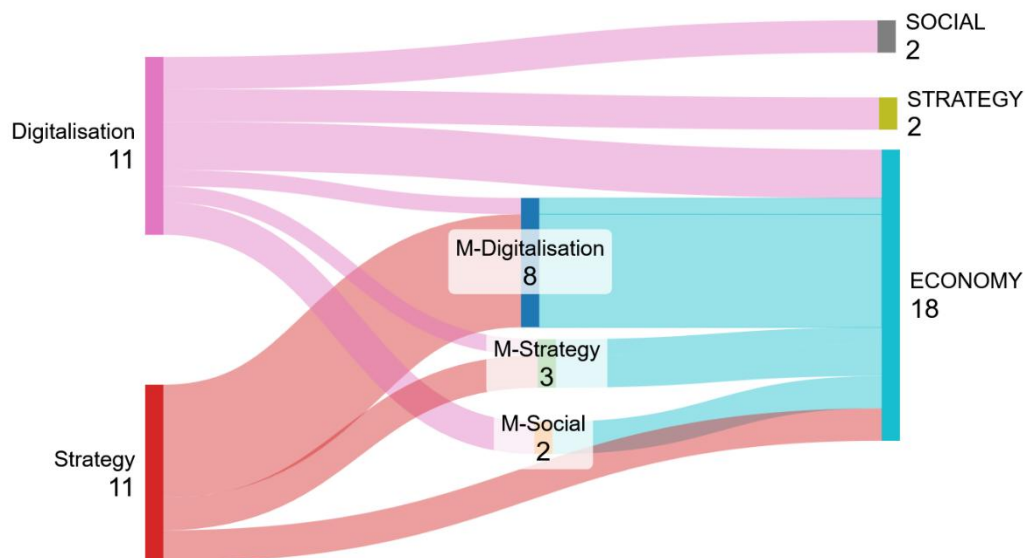
Qualitative studies complement the cluster by framing digitalisation on a meta-level and connecting it with sustainable development, business models, and systemic transformation (Acciarini et al., 2022; George et al., 2021). Performance is rarely central, appearing primarily

in sustainability performance monitoring (Contini et al., 2023). The outcome perspective connects digitalisation to broader development goals (Guandalini, 2022; Santarius & Wagner, 2023), while at the operational level, digital technologies shape sustainable manufacturing (Agrawal, Majumdar, et al., 2023; Ching et al., 2022) and supply chain management (Rejeb & Rejeb, 2020; A. K. Sahu et al., 2023). Developing sustainable capabilities, defined as balancing short-term financial objectives with long-term transformation in production systems, is one key aspect of this transition (Kumar et al., 2021) as is innovation (Ghobakhloo et al., 2021).

4.2. (Digitally driven) Economic Efficiency

This cluster includes 22 variables from ten studies investigating how digital technologies improve decision-making, resource efficiency, and firm performance. Figure 7 visualises the contribution of digitalisation and strategy to profitability, operational optimisation, and competitiveness, and their interaction with social and strategic sustainability dimensions through key social, strategic and digital mediating factors.

Figure 7: Cluster Impact Map – (Digitally driven) Economic Efficiency



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right (more detailed in the table below). "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Table 4: Cluster Profile – (Digitally driven) Economic Efficiency

Source	Independent Variable	Mediator [MODerator]	Dependent Variable	Code Pattern
Ghobakhloo, Asadi, et al., 2023	Intelligent Automation Implementation (+)		ECONOMIC SUSTAINABILITY PERFORMANCE	$DT \rightarrow EM$
Al-Khatib, 2023	Industrial Internet of Things (IIoT) (+)	Supply Chain Visibility (+)	ECONOMIC PERFORMANCE	$DT \rightarrow ST \rightarrow EM$
Li, 2022	Digital Transformation (+)	[MOD: Market Turbulence (+)]		$DT \rightarrow EM$
Li et al., 2022	Digital Technology Adoption (+)	Digital Technology Capability (+)		$DT \rightarrow DT \rightarrow EM$

		[MOD: Digital Strategy (+)]		
Wang et al., 2023	Digital Orientation (+)	Supply Chain Internal Collaboration* (+)		$DT \rightarrow SC^* \rightarrow EM$
		Supply Chain External Collaboration* (+)		$DT \rightarrow SC^* \rightarrow EM$
			SUPPLY CHAIN INTERNAL COLLABORATION	$DT \rightarrow SC^*$
			SUPPLY CHAIN EXTERNAL COLLABORATION	$DT \rightarrow SC^*$
Nayal et al., 2021 ¹¹	AI-IoT Adoption		SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow EM$
	Following factors are supply chain flexibility factors: Information Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Organisational Flexibility	AI-IoT Adoption (+)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Procurement Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Logistics Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Product Development Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Manufacturing Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
	Marketing Flexibility	AI-IoT Adoption (0)	SUPPLY CHAIN FIRM PERFORMANCE (SCFP)	$DT \rightarrow DT \rightarrow EM$
Kristoffersen et al., 2021	Business Analytics Capability (+)	Resource Orchestration Capability (+)	FIRM PERFORMANCE*	$DT \rightarrow ST \rightarrow EM$
		Circular Economy Implementation (+)		$DT \rightarrow ST \rightarrow EM$
Ukko et al., 2019	Managerial Capability (0)	[MOD: Sustainability Strategy (0)]	FINANCIAL PERFORMANCE	$ST \rightarrow EM$
	Operational Capability (0)	[MOD: Sustainability Strategy (+)]		$ST \rightarrow EM$
Ardito et al., 2021	Digital Orientation (+)		INNOVATION PERFORMANCE	$DT \rightarrow ST$
Ardito, 2023	Cloud Computing (0)		SUSTAINABLE INNOVATION (SOCIAL AND ENVIRONMENTAL)	$DT \rightarrow ST$
Qualitative Insights (not statistically tested)				
Source	Impact Factor		Outcome Factor	
none				

¹¹ Nayal et al. (2021) additionally examine the impact of each supply chain flexibility factor on AI-IoT adoption (coded relationship $ST \rightarrow DT$). However, as these relationships fall outside the scope of our study, they have been excluded from the analysis.

Note: The direction and quality of effects is indicated as follows: (+) positive effect; (-) negative effect; (0) not significant.

Across the reviewed studies, a consistent narrative emerges: Digital transformation and technology adoption play pivotal roles in enhancing ECONOMIC (SUSTAINABILITY) PERFORMANCE, though the nature and magnitude of these effects vary depending on mediating factors, strategic alignment, and organisational capabilities. ECONOMIC (SUSTAINABILITY) PERFORMANCE stands out as the most comprehensive indicator of economic efficiency, reflecting both profitability and long-term sustainability. Ghobakhloo, Asadi, et al. (2023) show that intelligent automation implementation improves ECONOMIC SUSTAINABILITY PERFORMANCE, underscoring how automation can combine profitability with sustainability objectives. Similarly, Li (2022) demonstrates that digital transformation positively affects ECONOMIC PERFORMANCE, particularly under conditions of market turbulence, indicating that external pressures can amplify the economic benefits of digital initiatives. Extending this perspective, Li et al. (2022) reveal that digital technology adoption enhances ECONOMIC PERFORMANCE, with the relationship strengthened by digital technology capabilities and moderated by a firm's digital strategy. These findings emphasise the importance of both internal competencies and external conditions to maximising the economic impact of digitalisation.

The enhancement of SUPPLY CHAIN COLLABORATION – both internally and externally – is another central pathway through which digital technologies boost economic efficiency. Wang et al. (2023) find that digital orientation fosters INTERNAL AND EXTERNAL SUPPLY CHAIN COLLABORATION, which in turn improves ECONOMIC PERFORMANCE. Firms with a strong digital orientation adopt advanced technologies such as big data analytics and AI, enabling better communication, information sharing, and responsiveness. Other benefits include improved collaboration, streamlined operations, reduced costs, and enhanced market competitiveness, highlighting the interdependence between digital readiness and operational efficiency. At a more granular level and with the help of a complex structural equation modelling, Nayal et al. (2021) focus on SUPPLY CHAIN FIRM PERFORMANCE (SCFP), testing if supply chain flexibility factors in all areas of the firm improve SCFP when mediated by AI-IoT adoption. They find that most flexibility aspects influence the integration of AI and IoT, which in turn has a positive influence on SCFP. This finding illustrates how digital tools enable real-time data collection and adaptive decision-making, allowing firms to respond swiftly to market changes and improve financial results. However, there is no evidence for complex relationships. Kristoffersen et al. (2021) further highlight that business analytics capabilities do not directly influence FIRM PERFORMANCE but instead increase a firm's resource orchestration capability and the ability to succeed in the circular economy. This dual mediation pathway underscores the importance of data-driven resource management and sustainability-oriented practices in achieving economic gains.

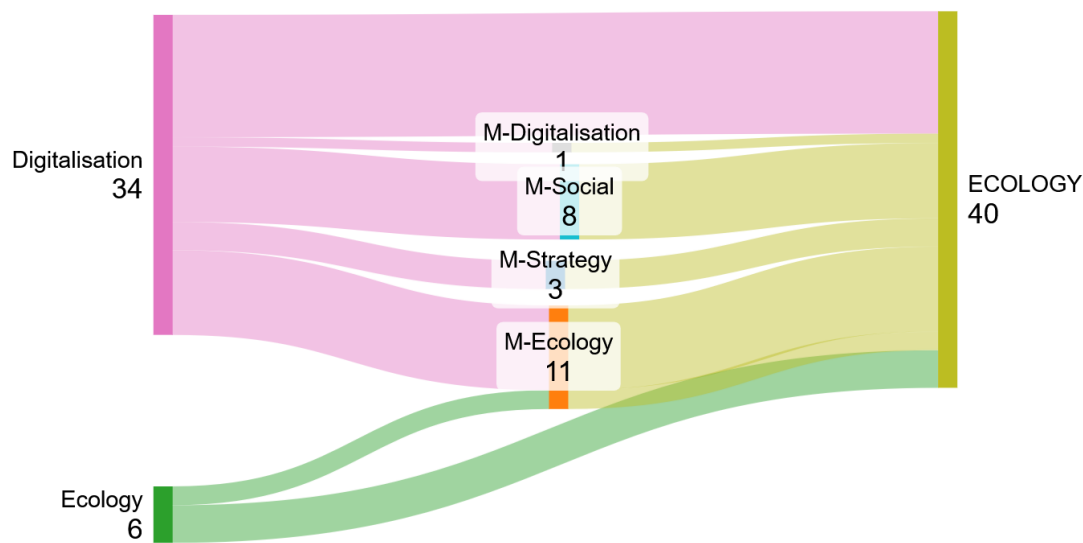
While most studies report positive impacts, some findings suggest that traditional organisational capabilities are insufficient to drive economic performance without digital integration. For instance, Ukko et al. (2019) find no significant direct relationship between managerial or operational capabilities and FINANCIAL PERFORMANCE, implying that conventional skills and processes should be augmented with digital competencies to yield economic benefits. This distinction reinforces the notion that digital transformation is not merely about adopting new technologies but about integrating them into broader strategic and operational frameworks. INNOVATION PERFORMANCE represents another important dimension of economic efficiency. Ardito et al. (2021) demonstrate that digital orientation positively influences the innovation capabilities of firms, enabling the development of new products and

processes that drive profitability. This relationship highlights the critical role of digital readiness in sustaining long-term economic competitiveness, with innovation serving as a key mechanism through which digitalisation translates into financial success. Another study of Ardito (2023) focuses on impact of concrete technology, namely cloud computing, on sustainable innovation, which is proven to be insignificant.

4.3. (Digitally driven) Ecologic Efficiency

Comprising 40 relationships that appear in ten studies, this cluster focuses on how digital technologies enable resource optimisation, emissions reductions, and improved environmental performance. Figure 8 visualises this strong, direct relationship, which is reinforced by mediating effects of social and strategic dimensions.

Figure 8: Cluster Impact Map – (Digitally driven) Ecologic Efficiency



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right (more detailed in the table below). "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Table 5: Cluster Profile – (Digitally driven) Ecologic Efficiency

Source	Independent Variable	Mediator [MODerator]	Dependent Variable	Code Pattern
Ferreira et al., 2023	Cloud Computing (+)		ENVIRONMENTAL SUSTAINABILITY	$DT \rightarrow EL$
	Blockchain (+)			$DT \rightarrow EL$
	Robotics (+)			$DT \rightarrow EL$
	Big Data Analytics (+)			$DT \rightarrow EL$
	AI (+)			$DT \rightarrow EL$
Ghobakhloo, Asadi, et al., 2023	Intelligent Automation Implementation (+)		ENVIRONMENTAL SUSTAINABILITY PERFORMANCE	$DT \rightarrow EL$
Li, 2022	Digital Transformation (+)	[MOD: Market Turbulence (+)]	ENVIRONMENTAL PERFORMANCE	$DT \rightarrow EL$
Li et al., 2022	Digital Technology Adoption (+)	Digital Technology Capability (+) [MOD: Digital Strategy (+)]	ENVIRONMENTAL PERFORMANCE	$DT \rightarrow DT \rightarrow EL$

Al-Khatib, 2023	Industrial Internet of Things (IIoT) (+)	Supply Chain Visibility (+)		$DT \rightarrow ST \rightarrow EL$
Wang et al., 2023	Digital Orientation (+)	Supply Chain Internal Collaboration* (+)		$DT \rightarrow SC^* \rightarrow EL$
		Supply Chain External Collaboration* (+)		$DT \rightarrow SC^* \rightarrow EL$
Lerman et al., 2022	All independent variables as part of the Smart Supply Chain: Digital Transformation Strategy (+)		GREEN PERFORMANCE	$DT \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow EL$
	Front-end Technologies (0)			$DT \rightarrow EL$
	Digital Transformation Strategy (+)	Customer Relationship (0)		$DT \rightarrow SC \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow SC \rightarrow EL$
	Front-end Technologies (+)			$DT \rightarrow SC \rightarrow EL$
	Digital Transformation Strategy (+)	Supplier Relationship (+)		$DT \rightarrow SC \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow SC \rightarrow EL$
	Front-end Technologies (+)			$DT \rightarrow SC \rightarrow EL$
	Digital Transformation Strategy (0)	Green Packaging (0)		$DT \rightarrow EL \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow EL \rightarrow EL$
	Front-end Technologies (0)			$DT \rightarrow EL \rightarrow EL$
	Digital Transformation Strategy (0)	Green Manufacturing (+)		$DT \rightarrow EL \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow EL \rightarrow EL$
	Front-end Technologies (0)			$DT \rightarrow EL \rightarrow EL$
	Digital Transformation Strategy (+)	Green Purchasing (0)		$DT \rightarrow EL \rightarrow EL$
	Base Digital Technologies (0)			$DT \rightarrow EL \rightarrow EL$
	Front-end Technologies (+)			$DT \rightarrow EL \rightarrow EL$
Wei et al., 2023	Supplier Low Carbon Collaboration (+)		CARBON PERFORMANCE	$EL \rightarrow EL$
	Customer Low Carbon Collaboration (+)			$EL \rightarrow EL$
	Eco-control systems (+)	Supplier Low-carbon Performance (+)		$EL \rightarrow EL \rightarrow EL$
		Customer Low-carbon Collaboration (+)		$EL \rightarrow EL \rightarrow EL$
	Eco-control Systems (+)	[MOD: Organizational Unlearning (0)]	SUPPLIER LOW-CARBON PERFORMANCE	$EL \rightarrow EL$

	Eco-control Systems (+)	[MOD: Organizational Unlearning (+)]	CUSTOMER LOW- CARBON COLLABORATION	<i>EL→EL</i>
Di Maria et al., 2020	Smart-manufacturing Technologies (+)	Supply Chain Integration (SCI) (+)	CIRCULAR ECONOMY	<i>DT→ST→EL</i>
	Data-processing Technologies (0)			<i>DT→ST→EL</i>
	Smart-manufacturing Technologies (+)			<i>DT→EL</i>
	Data-processing Technologies (+)			<i>DT→EL</i>
Findik et al., 2023	Industry 4.0 Technologies (+)		CIRCULAR ECONOMY (PRACTICES)	<i>DT→EL</i>

Qualitative Insights (not statistically tested)

Source	Impact Factor	Outcome Factor
Neligan et al., 2023	Digitalization	Efficiency of Circular Business Models
Rusch et al., 2022	Digital Technology	Sustainable Product Management in Circular Economy
Agrawal, Surendra Yadav, et al., 2023		Circularity in Supply Chains
Okorie et al., 2023		Net Zero Manufacturing Emissions
Böttcher et al., 2023		Ecological Sustainability in Business Models
He et al., 2023		Enterprise Green Strategy Evolution
Kristoffersen et al., 2020		Implementation of Circular Economy
Liu et al., 2022		Digital Functions
Neri et al., 2023	Digital-enabled Dynamic Capabilities	
Dwivedi & Paul, 2022	Digital Supply Chains	
Gupta & Singh, 2021	Industry 4.0 Implementation	
Ćwiklicki & Wojnarowska, 2020	Industry 4.0	
Lopes de Sousa Jabbour et al., 2018		
Sahu et al., 2022	Industry 4.0	Circular Economy
Parmentola et al., 2022	Blockchain	Environmentally Sustainable Development Goals
Yadav et al., 2023	Lean, Green and Digital Technologies	Net Zero Emissions

Note: The direction and quality of effects is indicated as follows: (+) positive effect; (-) negative effect; (0) not significant.

The reviewed studies consistently emphasise digitalisation as a key enabler of green efficiency, focussing on various dimensions of ecological outcomes: While ENVIRONMENTAL SUSTAINABILITY (Ferreira et al. 2023) reflects a company's overarching environmental objectives, ENVIRONMENTAL SUSTAINABILITY PERFORMANCE (Ghobakhloo, Asadi, et al., 2023), and ENVIRONMENTAL PERFORMANCE (e.g., Li, 2022) focus on measurable environmental results. GREEN PERFORMANCE (Lerman et al., 2022) translates these overarching goals into concrete operational practices, particularly in supply chain and production contexts. Ferreira et al. (2023) examine how various digital technologies – including cloud computing, blockchain, robotics, big data analytics, and artificial intelligence – contribute to ENVIRONMENTAL SUSTAINABILITY, highlighting their positive effects on reducing emissions, optimising resource use, and improving environmental management systems. Building on this, Ghobakhloo, Asadi,

et al. (2023) emphasise the importance of intelligent automation, which significantly enhances ENVIRONMENTAL SUSTAINABILITY PERFORMANCE by enabling precise environmental monitoring and real-time adjustments to operations. Li (2022) and Li et al. (2022) further explore how broader digital transformation efforts and digital technology adoption improve ENVIRONMENTAL PERFORMANCE, particularly under conditions of market turbulence. Their studies underscore the role of digital capabilities as both enablers and moderators of environmental outcomes, with digital strategies amplifying these positive effects. Connecting these broader environmental goals to operational execution, Lerman et al. (2022) find that advanced technologies like digital transformation strategies and front-end technologies positively influence GREEN PERFORMANCE by strengthening customer and supplier relationships, while foundational digital technologies have neutral effects. This underscores the need for the strategic integration of digital tools into organisational processes to achieve environmental goals. Similarly, Wang et al. (2023) highlight the importance of supply chain collaboration – both internal and external – in enhancing ENVIRONMENTAL PERFORMANCE, further bridging the gap between overarching sustainability goals and operational outcomes.

Carbon performance is another critical focus, particularly in studies examining supply chain collaborations. Wei et al. (2023) highlight that low-carbon collaborations between suppliers and customers, supported by eco-control systems, significantly improve CARBON PERFORMANCE. These collaborations facilitate the exchange of environmental information, enabling firms to implement low-carbon strategies more effectively. However, the relationship is moderated by organisational unlearning: while unlearning strengthens CUSTOMER LOW-CARBON COLLABORATION, it shows a non-significant effect on SUPPLIER COLLABORATION. This finding underscores the importance of organisational culture and adaptability in maximising the ecological benefits of digital technologies. The CIRCULAR ECONOMY (PRACTICES) represents another prominent outcome variable. Di Maria et al. (2022) find that smart-manufacturing technologies enhance circular economy outcomes, particularly when mediated by supply chain integration (SCI). However, data-processing technologies show mixed results, with direct effects on circular economy practices but no significant impact when SCI is considered as a mediator. Findik et al. (2023) further support the positive relationship between Industry 4.0 technologies and circular economy practices, emphasising the role of advanced manufacturing and digital integration in promoting resource efficiency.

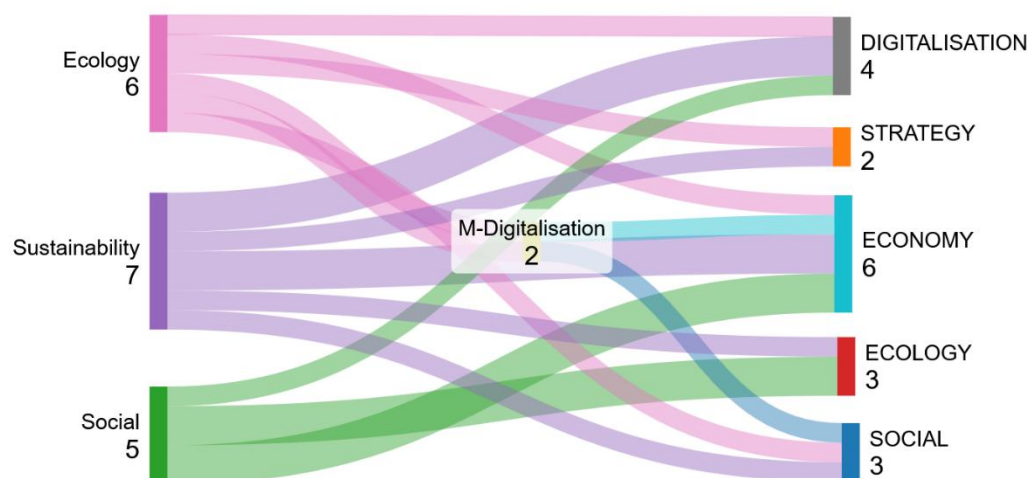
The qualitative contributions in this cluster emphasise the role of digital technologies in advancing circular economy (practices) and improving ecological sustainability, especially net-zero emissions. Different scholars (Ćwiklicki & Wojnarowska, 2020; Gupta & Singh, 2021; Lopes de Sousa Jabbour et al., 2018) examine how Industry 4.0 applications promote resource efficiency and circular economy adoption. Liu et al. (2022) and Neri et al. (2023) highlight digital functions and dynamic capabilities as enablers of circular business models. Okorie et al. (2023) and Yadav et al. (2023) address how digital technologies contribute to net-zero manufacturing and emissions reduction, while Parmentola et al. (2022) explores blockchain's potential for achieving environmentally sustainable development goals. The strategic integration of these technologies is viewed as key to achieving ecological outcomes (Böttcher et al., 2023; Neligan et al., 2023).

4.4. Sustainability-Driven Business and Digitalisation

Encompassing 18 relationships in eight studies, this cluster explores how corporate sustainability initiatives align with digital technologies and with the integration of sustainability into core business strategies. Figure 9 visualises how ecological, social, and sustainability-

related factors interact with economic and strategic dimensions. Digitalisation emerges as both an outcome and a mediator.

Figure 9: Cluster Impact Map – Sustainability-Driven Business and Digitalisation



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right (more detailed in the table below). "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Table 6: Cluster Profile – Sustainability-Driven Business and Digitalisation

Source	Independent Variable	Mediator	Dependent Variable	Code Pattern
Xu et al., 2023	Sustainable Performance (+)		ECONOMIC PERFORMANCE	$SU \rightarrow EM$
Wang et al., 2023	Supply Chain Internal Collaboration* (+)			$SC^* \rightarrow EM$
	Supply Chain External Collaboration* (+)			$SC^* \rightarrow EM$
Torrent-Sellens et al., 2023	Environmental Assets (+)			$EL \rightarrow EM$
	Environmental Assets (+)	Industry 4.0 (+)		$EL \rightarrow DT \rightarrow EM$
Broccardo et al., 2023	Sustainability Performance (+)		COMPANY PROFITABILITY PERFORMANCE	$SU \rightarrow EM$
Pînzaru et al., 2022	Sustainability Practices (+)		BENEFITS PERCEIVED BY COMPANIES	$SU \rightarrow ST$
Ardito et al., 2021	Environmental Orientation (+)		INNOVATION PERFORMANCE	$EL \rightarrow ST$
Torrent-Sellens et al., 2023	Environmental Assets (+)		SOCIAL PERFORMANCE	$EL \rightarrow SC$
	Environmental Assets (+)	Industry 4.0 (+)		$EL \rightarrow DT \rightarrow SC$
Xu et al., 2023	Sustainable Performance (+)		ENVIRONMENTAL PERFORMANCE	$SU \rightarrow SC$
	Sustainable Performance (+)			$SU \rightarrow EL$
Wang et al., 2023	Supply Chain Internal Collaboration* (+)			$SC^* \rightarrow EL$
	Supply Chain External Collaboration* (+)			$SC^* \rightarrow EL$

Ghobakhloo, Asadi, et al., 2023	Environmental factors*: Environmental Turbulence (0) External Stakeholder Pressure (0)		INTELLIGENT AUTOMATION IMPLEMENTATION	$EL^* \rightarrow DT$
	Human factors*: Social Capital Competency (+) Employee Socio-Behavioral Concerns (-) Management Digitalization Competency (+)			$SC^* \rightarrow DT$
Pinzaru et al., 2022	Internal Sustainability Factors (+)		DIGITALIZATION	$SU \rightarrow DT$
	External Sustainability Factors (+)			$SU \rightarrow DT$
Qualitative Insights (not statistically tested)				
Source	Impact Factor	Outcome Factor		
Feroz et al., 2023	Dynamic Capabilities	Sustainable Digital Transformation		
Pauliuk et al., 2022	Co-design of Digital Transformation and Ecological Sustainability			
Isensee et al., 2020	Organizational Culture	Environmental Sustainability		
Mukhuty et al., 2022	Social Responsibility and HR Practices	Industry 4.0 Development		
Benešová et al., 2021	Green Strategies	Maturity Models for Industry 4.0		
Ribeiro et al., 2021	Implementing (Digital) Social Innovation in Developing a Tool to Support Product Strategy.			
Demir et al., 2023	Smartness and Sustainability Aspects	Supply Chain Operations		
zu Knyphausen-Aufseß & Santarius, 2021	Role of Firms	Digitalization		
Niehoff, 2022	Sustainability Reports			
Goede, 2021	Sustainability	Data-driven Decision Making in Organisations and Business Intelligence Systems		
Zarte et al., 2022	Sustainability Aspects	Knowledge Framework for the Collection of Data		
Sætra, 2023	AI ESG Protocol			

Note: The direction and quality of effects is indicated as follows: (+) positive effect; (-) negative effect; (0) not significant.

Across the cluster, ECONOMIC PERFORMANCE emerges as a central outcome variable. Studies show that sustainable performance positively influences economic outcomes (Xu et al., 2023), while sustainability practices improve BENEFITS PERCEIVED BY COMPANIES (Pînzaru et al., 2022). Similarly, environmental assets are linked to better economic performance, with Industry 4.0 partially mediating this relationship, underscoring the role of advanced technologies in translating sustainability efforts into profitability (Torrent-Sellens et al., 2023). Broccardo et al. (2023) further demonstrate that improved sustainability performance is associated with increased COMPANY PROFITABILITY PERFORMANCE, emphasising the economic value of sustainability-oriented strategies. In terms of INNOVATION PERFORMANCE, Ardito et al. (2021) find that an environmental orientation enhances a firm's capacity to innovate, particularly when aligning sustainability objectives with product and process development. SOCIAL PERFORMANCE is similarly impacted by sustainability drivers. Xu et al. (2023) report that sustainable performance contributes to enhanced SOCIAL PERFORMANCE, while Torrent-Sellens et al. (2022) show that environmental assets improve social outcomes both directly and through the partial mediation of Industry 4.0. ENVIRONMENTAL PERFORMANCE and GREEN

PERFORMANCE also feature prominently. Xu et al. (2023) demonstrate that sustainable performance drives environmental improvements, whereas Wang et al. (2023) highlight the role of supply chain internal and external collaboration in achieving better environmental outcomes. Lerman et al. (2022) find no effect of customer relationships on GREEN PERFORMANCE, as long as they are strategically integrated into sustainability initiatives.

A closer look into Sustainability-Driven Digitalisation reveals how sustainability considerations influence technological adoption. Pînzaru et al. (2022) show that internal and external sustainability factors drive DIGITALISATION efforts, emphasising the role of organisational culture and regulatory pressures. Ghobakhloo, Asadi, et al. (2023) further illustrate how human factors such as social capital competency, management digitalisation competency, and employee concerns shape the extent of INTELLIGENT AUTOMATION IMPLEMENTATION, whilst external stakeholder pressure and environmental turbulence seem to have no effect.

The qualitative contributions in this cluster explore how sustainability considerations shape digital transformation and organisational strategies. Feroz et al. (2023) conceptualise digital transformation as more than technological adoption; instead, they argue that, to achieve long-term sustainability, it requires fundamental shifts in processes, structures, and mindsets, with leadership commitment and strategic alignment serving as key enablers. Ribeiro et al. (2024) explore Digital Social Innovation, identifying key enablers such as social value creation, stakeholder involvement, digital ecosystems, economic sustainability, and risk management. Benešová et al. (2021) examine how green strategies influence Industry 4.0 maturity models. Organisational culture and stakeholder engagement emerge as central themes, with Isensee et al. (2020) and Mukhuty et al. (2022) addressing how internal drivers and HR practices support sustainable digital transformation. Niehoff (2022) examines sustainability reporting as a tool for integrating digitalisation within corporate sustainability strategies and highlights how data-driven decision-making in organisations depends on factors such as clear vision, management support, and high-quality user access tools, which influence the effectiveness of sustainable business intelligence systems. Demir et al. (2023) focus on smartness and sustainability aspects in supply chain operations, and Sætra (2023) introduces an AI ESG protocol to assess sustainability impacts.

4.5. Strategy as a Catalyst for Sustainable Transformation

This cluster comprises 18 relationships that appear in six quantitative empirical studies highlighting the pivotal role of sustainability-oriented strategies and practices in shaping firm performance, process improvements, and technological adoption. Figure 10 illustrates the strong link between strategy and the ecological, economic, social, and digitalisation dimensions, emphasising how the integrative function of strategy aligns diverse sustainability efforts emphasising its integrative function in aligning diverse sustainability efforts at the corporate level.

Figure 10: Cluster Impact Map – Strategy as a Catalyst for Sustainable Transformation



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right (more detailed in the table below). "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Table 7: Cluster Profile – Strategy as a Catalyst for Sustainable Transformation

Source	Independent Variable (positive influence)	Mediator	Dependent Variable	Code Pattern
Chatzistamoulou, 2023	Firm specific heterogeneity: Decreased Turnover (-) Firm Size (-) Firm Age (0)		SUSTAINABILITY TRANSITION	$ST \rightarrow SU$
	Business operational problems: Corruption (0) Complexity of Administrative Procedures (0) Fast Changing Legislation (0) Inadequate Infrastructure (0) Tax Rates (0) Access to Financing (0)			$ST \rightarrow SU$
	The country attitude towards sustainability: Resource Productivity (-) Renewable Energy Use (-) Eco Innovation Index (+) Environmental Protection Expenditure at the National Level (+)			$ST \rightarrow SU$
	Attitude towards business environment: Digital Competitiveness Ranking (+) Regulation (0) Corruption Perception Index (-)			$ST \rightarrow SU$

	Public procurement processes: Perceived Corruption in Public Procurement Nationally (+) Public Procurement Participation (+)			$ST \rightarrow SU$
Tasleem et al., 2019	Total Quality Management (+)		CORPORATE SUSTAINABILITY PERFORMANCE	$ST \rightarrow SU$
	Technology Management (0)			$ST \rightarrow SU$
	Total Quality Management (+)		ENVIRONMENTAL SUSTAINABILITY PERFORMANCE	$ST \rightarrow EL$
	Technology Management (0)			$ST \rightarrow EL$
	Total Quality Management (+)		SOCIAL SUSTAINABILITY PERFORMANCE	$ST \rightarrow SC$
	Technology Management (0)			$ST \rightarrow SC$
	Total Quality Management (+)		ECONOMIC SUSTAINABILITY PERFORMANCE	$ST \rightarrow EM$
	Technology Management (+)			$ST \rightarrow EM$
Broccardo et al., 2023	Company Size (+)		SUSTAINABILITY IMPLEMENTATION AND RELATED COMPANY PERFORMANCE	$ST \rightarrow SU$
Ardito et al., 2021	Interaction between Digital Orientation and Environmental Orientation (0)		INNOVATION PERFORMANCE	$ST \rightarrow ST$
Di Maria et al., 2020	Supply Chain Integration (+)		CIRCULAR ECONOMY	$ST \rightarrow EL$
Ghobakhloo, Asadi, et al., 2023	Technological Factors: Investment Risk (0) Cybersecurity Risk (0) Integrability (0) Strategic Value (+)		INTELLIGENT AUTOMATION IMPLEMENTATION	$ST \rightarrow DT$
	Organisational factors: Absorptive Capacity (+) Digitalization Technical Competency (+) Resource Availability (+)			$ST \rightarrow DT$
Qualitative Insights (not statistically tested)				
Source	Impact Factor	Outcome Factor		
Allal-Chérif et al., 2023	Disruptive Strategy	Successful Sustainable Entrepreneurship		
	Social Product Innovation			
	Digitalization			
Dwivedi et al., 2023	Digital Supply Chains	Circular Economy Adoption		
Grunwald, 2022	Sustainability Co-Creation	Digitalised Global Value Chains		

Haftor & Climent, 2021	Innovative Offerings in Industry	Environmental Sustainability
Hristov & Appolloni, 2021	Sustainable Development	Integration of Stakeholder Perception in Performance Management System
	Organisational Drivers	
	Digital Transformation	
	Cultural Context	

Note: The direction and quality of effects is indicated as follows: (+) positive effect; (-) negative effect; (0) not significant.

The concept of SUSTAINABILITY TRANSITION emerges prominently in Chatzistamoulou (2023), who investigates how firm-specific factors (e.g., decreased turnover, smaller size, older firm age) and business operational challenges (such as corruption, administrative complexity, and access to financing) hinder the adoption of sustainability-focused strategies. Interestingly, external conditions – such as a country’s attitude toward sustainability, renewable energy use, and eco-innovation – exert mixed influences, with positive effects obtained from eco-innovation indices but negative or neutral impacts from resource productivity and corruption perceptions. Public procurement participation positively contributes to the transition, underscoring how external institutional environments shape firms’ sustainability pathways. Closely tied to this theme, CORPORATE SUSTAINABILITY PERFORMANCE is examined by Tasleem et al. (2019), who find that Total Quality Management (TQM) significantly improves economic, environmental, and social sustainability outcomes, whereas Technology Management shows no direct effect, unless it is mediated by TQM. These findings emphasise the importance of structured management approaches in enhancing sustainability performance across all dimensions. Furthering this, Broccardo et al. (2023) analyse SUSTAINABILITY IMPLEMENTATION AND RELATED COMPANY PERFORMANCE, showing that larger company size positively influences the integration of sustainability into business operations. Their findings highlight how organisational capacity and resource availability facilitate the embedding of sustainability practices, leading to improved performance outcomes.

Innovation-driven perspectives also feature in this cluster. Ardito et al. (2021) explore INNOVATION PERFORMANCE and reveal that while environmental orientation positively affects innovation outcomes, the interaction between digital and environmental orientation yields mixed effects – partially supporting the notion that pursuing both simultaneously can strain organisational resources, potentially dampening innovation gains. Likewise, SUSTAINABLE INNOVATION – particularly when it addresses both social and environmental dimensions – is explored in studies emphasising the importance of strategic sustainability efforts in fostering innovative solutions. These innovations are shown to stem from firms adopting comprehensive sustainability strategies that align with broader environmental and social goals. The cluster also examines resource-related outcomes, particularly through the lens of circular economy initiatives. Di Maria et al. (2022) demonstrate that supply chain integration plays a crucial role in enhancing CIRCULAR ECONOMY practices, with smart manufacturing technologies positively influencing integration and, consequently, circular outcomes. However, the effect of data-processing technologies remains inconclusive, highlighting the varying effectiveness of digital solutions in sustainability contexts.

Finally, INTELLIGENT AUTOMATION IMPLEMENTATION emerges as a critical technological pathway influenced by sustainability drivers. Ghobakhloo, Asadi, et al. (2023) show that organisational factors (such as absorptive capacity and digitalisation competency) and technological considerations (like strategic value) positively affect automation adoption, enabling firms to better meet sustainability objectives through process efficiencies. Conversely, environmental factors (e.g., environmental turbulence) do not significantly influence adoption

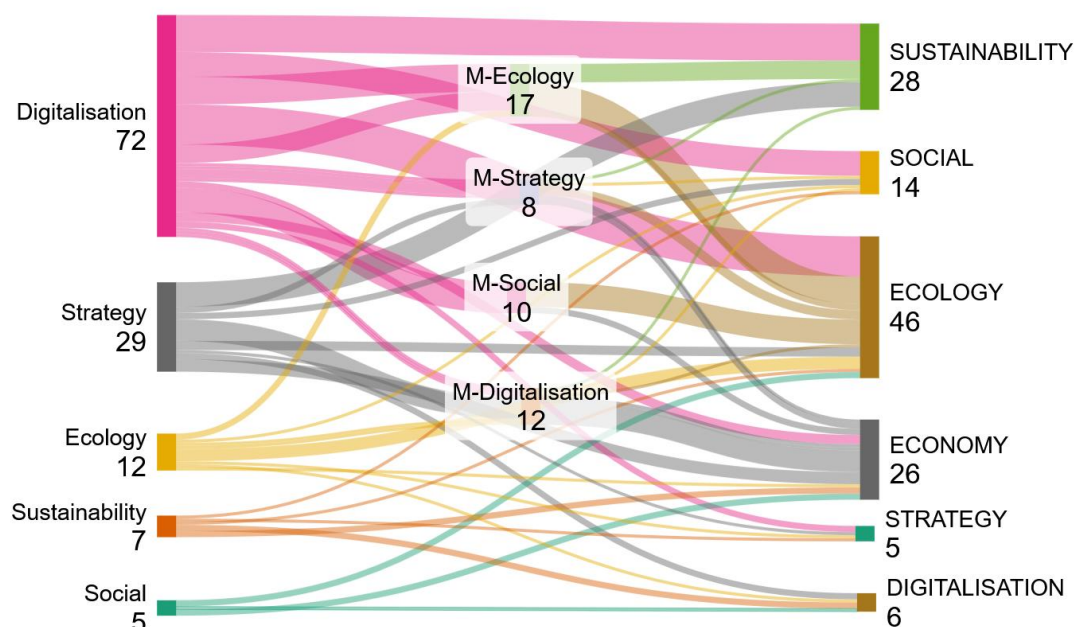
decisions, underscoring the predominance of internal capabilities over external environmental pressures in driving technological integration.

Qualitative studies underscore strategy as a key enabler for aligning digitalisation with sustainability goals. Dwivedi et al. (2023) explore digital supply chains as catalysts for circular economy adoption, while Allal-Chérif et al. (2023) highlight how disruptive strategies and social product innovation foster sustainable entrepreneurship. Innovative offerings from industrial organisations (Haftor & Climent, 2021) and sustainability co-creation within digitalised global value chains (Grunwald, 2022) emerge as pivotal themes. Organisational drivers and stakeholder integration are crucial for fostering adaptability and embedding sustainability into performance management systems (Hristov & Appolloni, 2022).

5. Discussion of Key Findings and Research Gaps

Guided by our research question we provide a structured overview of the research field, outlining key thematic and methodological patterns. The sample impact map (Figure 11) illustrates an interconnected yet fragmented research landscape, where digitalisation frequently serves as a catalyst for corporate sustainability outcomes. The map reflects the field's strong focus on technology-driven efficiency and environmental improvements. Strategy also plays a pivotal role, acting as a bridge between digitalisation and economic and sustainability outcomes. In contrast, connections to social dimensions remain comparatively limited, indicating an underexplored area in current research. Building on this cross-topic perspective, the following discussion systematically explores key findings and research gaps derived from the cluster analysis, and offers insights into prevailing research foci, thematic imbalances, and potential future research directions.

Figure 11: Aggregated Cluster Impact Map



Note: The figure depicts all the relationships examined in this cluster, regardless of the direction and significance of the effect. Categories of independent variables are on the left; categories of dependent variables are on the right. "M" denotes mediators; moderators are not depicted. Numbers represent the frequency of variables in each category. The thickness of the connecting lines indicates the frequency of a given relationship.

Fragmented Sustainability Perspectives

While all the studies in our sample inherently address environmental, social, economic, and strategic dimensions, due to the breadth of our search string, only a few explicitly adopt a

multi-dimensional sustainability approach. Instead, sustainability dimensions are predominantly analysed individually or in specific combinations, such as the alignment of strategy with ecology or the economic impacts of circular economy practices. This fragmented approach limits a comprehensive understanding of how sustainability dimensions interact. Though necessary for analytical clarity, such separation underrepresents systemic interdependencies, potentially overlooking rebound effects and synergies between sustainability goals. Future research should develop integrated frameworks that incorporate ecological, economic, and social sustainability dimensions, and explore multi-level models that capture sustainability interdependencies in corporate settings to overcome the conceptual divide between research on CS outcomes, and on CS approaches and knowledge (Montiel et al., 2020; Pranugrahaning et al., 2021). As research increasingly investigates the intersection of CS and digitalisation, it has become all the more important to account for interdependencies between the two, and to avoid overlooking rebound effects and synergies. Additionally, trans- and interdisciplinary studies could provide valuable insights into how trade-offs between digitalisation, strategy, and sustainability are managed in practice.

Digitalisation as Main Enabler of Sustainability

Consistent with prior literature positioning digitalisation as a transformative force (e.g., Flyverbom et al., 2019), our findings show that digitalisation is primarily examined as an enabler rather than as a sustainability goal. Studies highlight how the AI, IoT, big data analytics, and digital business transformation contribute to achieving sustainability objectives. Particularly when the sustainability objectives are efficiency-driven. This aligns with the concept of digital sustainability, which describes the synergy effects of digitalisation on sustainability goals (George et al., 2021; Guandalini, 2022). Yet, research remains largely efficiency-oriented, focusing on operational gains rather than systemic sustainability transformations. There is a notable gap in understanding the organisational and contextual factors – such as culture, governance, and strategic alignment – that influence digital sustainability outcomes. Longitudinal studies assessing the lasting impacts of digitalisation on sustainability, and sector-specific analyses in underrepresented industries, could contribute valuable knowledge. Moreover, the concept of sustainable digitalisation – embedding sustainability principles in digital infrastructure development – remains largely unexplored in the sample, highlighting the need for research on how to prevent unintended social and environmental consequences through appropriate governance.

Strategy as a Key Factor in Sustainability Integration

Anchoring sustainability in corporate strategy is well-established in CS research (Amini & Bienstock, 2014) and therefore reflected in our findings. Strategy emerges as a primary driver and frequently as a mediator between digitalisation and sustainability, underscoring its function as organisational infrastructure that translates technological capabilities into sustainability outcomes. Mechanisms such as resource orchestration, supply chain visibility, and technology management illustrate how strategic frameworks enable alignment between digital tools and sustainability goals. This finding mirrors the distinction between outcome-driven and implementation-driven sustainability research (Van Zanten & Van Tulder, 2021). However, it also reveals a blatant gap: while many studies focus on sustainability performance outcomes, only a few explore how sustainability is institutionalised within strategic planning processes. Future research should not only investigate how strategic capabilities shape long-term sustainability performance, but also examine how governance structures support sustainability-oriented decision-making, and how strategic planning itself can be positioned as a sustainability objective. Particular attention should be paid to the integration of social and governance dimensions alongside ecological and economic priorities.

Dominance of Ecology and Efficiency-related Topics

Our review reveals the dominance of ecology-related topics, represented by the largest thematic area of both mediator and outcome variables. This prominence suggests that sustainability research, particularly in connection with digitalisation, is largely shaped by efficiency-driven perspectives, focusing on measurable outcomes such as operational efficiency, resource optimisation, and ecological performance. Digitalisation is primarily examined in relation to these quantifiable aspects, aligning closely with regulatory frameworks that prioritise environmental compliance and cost-efficiency measures. Studies emphasise how digitalisation enables resource efficiency, closed-loop production, and sustainable supply chain operations, reinforcing the prevalence of technical and economic sustainability. While valuable, this focus often overlooks broader systemic transformations. Notably, the integration of digitalisation and sustainability remains prevalent in manufacturing contexts, where digital solutions have immediate operational impacts. Social and governance dimensions remain underexplored, even though regulations like the EU's Corporate Sustainability Reporting Directive (CSRD) suggests their growing importance, reshaping forthcoming corporate priorities. To address these gaps, future research should move beyond efficiency-driven perspectives, exploring the mitigation of rebound effects through governance mechanisms and sustainability-oriented digital strategies (Bohnsack et al., 2022). Regulatory shifts like the CSRD offer opportunities to examine how ESG compliance affects long-term corporate investment decisions beyond regulatory obligations.

Shifting Research Priorities in Topics and Methods

The research landscape shows first signs of evolving beyond efficiency-driven, ecology-focused orientation. While themes like Industry 4.0, circular economy, and supply chain management remain prevalent, there is a noticeable tendency toward exploring strategic, social, and governance-related sustainability dimensions. The rising interest in sustainable digitalisation and its strategic implications suggests a broadening of research priorities. Until recently, sustainability research has been shaped by measurable, performance-oriented outcomes, often aligning with regulatory frameworks that emphasise environmental compliance and financial performance. This explains why ecological goals have received the most attention. Yet, regulatory developments like the CSRD are likely to elevate the prominence of strategy and social sustainability considerations (Tettamanzi et al., 2022). From a methodological perspective, the research field remains largely quantitative, frequently employing performance metrics to assess sustainability outcomes. This favours ecological and economic research areas where sustainability impacts can be quantified and directly linked to technological innovations. While such approaches offer clarity, they often fail to capture the complexity of sustainability transitions, particularly in social and governance contexts. Recent trends present an increasing methodological diversity by adopting mixed-methods and qualitative, especially case-based, approaches (e.g., Allal-Chérif et al., 2023; Feroz et al., 2023). Despite this diversification, systematic literature reviews continue to be a dominant approach in this field. Refining the focus and methodological positioning of such reviews could help guide future research more effectively towards specific directions (e.g., Krlev et al., 2025). To fully grasp the synergies and challenges in the context of digitalisation and sustainability, future research should embrace longitudinal studies, case-based research, and mixed-methods designs to provide a more comprehensive understanding of sustainability transitions and its dynamics. This expansion should not replace the ecological focus but complement it by integrating new perspectives alongside efficiency concerns.

Table 8: Key Findings, Research Gaps and Future Directions

Key Findings	Research Gaps	Research Paths	Examples of Research Questions
Fragmented Sustainability Perspectives	Lack of integrated, multi-dimensional sustainability approaches	Develop integrated frameworks accounting for ecological, economic, and social sustainability dimensions	
		Explore multi-level models capturing sustainability interdependencies	
		Increase trans- and interdisciplinary studies	
	Predominant focus on isolated sustainability dimensions	Integrate sustainability perspectives across research disciplines	What strategies can promote a cross-disciplinary approach to sustainability research?
		Develop methodologies that address sustainability holistically	How can sustainability research frameworks be adapted for multi-dimensional analysis?
Dominance of Ecology and Efficiency-related Topics	Underrepresentation of social and governance dimensions	Expand empirical research beyond efficiency-driven approaches	How can social and governance sustainability dimensions be better integrated into corporate sustainability strategies?
		Investigate the impact of regulatory frameworks (e.g., CSRD) on corporate sustainability priorities	What are the long-term sustainability effects of efficiency-driven digitalisation?
	Overemphasis on efficiency-driven sustainability approaches	Develop interdisciplinary methodologies integrating ecological, economic, and social sustainability dimensions	How do different sustainability perspectives impact digital transformation strategies?
Digitalisation as Main Enabler of Sustainability	Limited research on digitalisation as a sustainability goal rather than an enabler	Investigate sector-specific applications of digital sustainability	What factors determine whether digitalisation leads to sustainability outcomes beyond efficiency improvements?
		Conduct longitudinal studies on digital sustainability transitions	What are the long-term sustainability implications of digital transformation?
	Insufficient focus on contextual factors affecting digital sustainability adoption	Explore governance mechanisms preventing unintended sustainability consequences	How do governance structures shape sustainable digital transformation strategies?

Strategy as a Key Factor in Sustainability Integration	Lack of research on institutionalising sustainability within corporate strategy	Explore strategy as a sustainability objective in itself	
Shifting Research Priorities in Topics and Methods	Predominance of quantitative, efficiency-focused models	Expand use of mixed-methods and qualitative research in sustainability studies	
		Bridge research design gaps in digital sustainability and social governance factors	How do evolving regulations shape corporate sustainability priorities and strategies?
	Limited use of mixed-methods and qualitative approaches	Investigate evolving corporate sustainability strategies amid increasing regulatory pressures	

6. Conclusion

The reviewed articles exhibit considerable variation in scope, methodological approaches, and perspectives. These divergences stem from differing conceptions of sustainability and digitalisation, and a wide array of identified drivers and barriers. The identified clusters reflect both the potential and the complexity of integrating digitalisation into corporate sustainability. This review highlights the dual role of digital technologies and strategic planning as enablers of systemic change while revealing gaps in understanding how these dimensions interact across different contexts. Digitalisation is often portrayed as an enabler of CS. The relative dominance of ecological topics further emphasises measurable, efficiency-driven aspects of sustainability, often linked to digital technologies and regulatory incentives. In contrast, social dimensions remain underexplored, with limited integration into sustainability frameworks. This synthesis underscores the need for an integrated approach that captures the interdependence between sustainability dimensions. Advancing this integration enables addressing the dynamic interplay of digitalisation, strategy, and sustainability. By building on these insights, future research can provide more comprehensive pathways for operationalising sustainability in a rapidly evolving digital landscape.

7. References

References that are part of the systematic literature review are marked with an asterisk (*). References that are part of the systematic literature review, but part of non-VHB-ranked journals, are marked with two asterisks (**).

- *Acciarini, C., Borelli, F., Capo, F., Cappa, F., & Sarrocco, C. (2022). Can digitalization favour the emergence of innovative and sustainable business models? A qualitative exploration in the automotive sector. *Journal of Strategy and Management*, 15(3), 335–352. <https://doi.org/10.1108/JSMA-02-2021-0033>
- **Agrawal, R., Majumdar, A., Kumar, A., & Luthra, S. (2023). Integration of artificial intelligence in sustainable manufacturing: Current status and future opportunities. *Operations Management Research*, 16(4), 1720–1741. <https://doi.org/10.1007/s12063-023-00383-y>
- *Agrawal, R., Surendra Yadav, V., Majumdar, A., Kumar, A., Luthra, S., & Arturo Garza-Reyes, J. (2023). Opportunities for disruptive digital technologies to ensure circularity in supply Chain: A critical review of drivers, barriers and challenges. *Computers & Industrial Engineering*, 178, 109140. <https://doi.org/10.1016/j.cie.2023.109140>
- *Al-Khatib, A. W. (2023). The impact of industrial Internet of things on sustainable performance: The indirect effect of supply chain visibility. *Business Process Management Journal*, 29(5), 1607–1629. <https://doi.org/10.1108/BPMJ-03-2023-0198>
- *Allal-Chérif, O., Costa Climent, J., & Ulrich Berenguer, K. J. (2023). Born to be sustainable: How to combine strategic disruption, open innovation, and process digitization to create a sustainable business. *Journal of Business Research*, 154, 113379. <https://doi.org/10.1016/j.jbusres.2022.113379>
- Amini, M., & Bienstock, C. C. (2014). Corporate sustainability: An integrative definition and framework to evaluate corporate practice and guide academic research. *Journal of Cleaner Production*, 76, 12–19. <https://doi.org/10.1016/j.jclepro.2014.02.016>
- *Ardito, L. (2023). The influence of firm digitalization on sustainable innovation performance and the moderating role of corporate sustainability practices: An empirical investigation. *Business Strategy and the Environment*, 32(8), 5252–5272. <https://doi.org/10.1002/bse.3415>
- *Ardito, L., Raby, S., Albino, V., & Bertoldi, B. (2021). The duality of digital and environmental orientations in the context of SMEs: Implications for innovation performance. *Journal of Business Research*, 123, 44–56. <https://doi.org/10.1016/j.jbusres.2020.09.022>
- *Bag, S., Telukdarie, A., Pretorius, J. H. C., & Gupta, S. (2021). Industry 4.0 and supply chain sustainability: Framework and future research directions. *Benchmarking: An International Journal*, 28(5), BIJ-03-2018-0056. <https://doi.org/10.1108/BIJ-03-2018-0056>
- Bansal, P., & Song, H.-C. (2017). Similar But Not the Same: Differentiating Corporate Sustainability from Corporate Responsibility. *Academy of Management Annals*, 11(1), 105–149. <https://doi.org/10.5465/annals.2015.0095>
- Barth, M., Gossen, M., Lang, D. J., & Santarius, T. (2023). Sustainable digitalization - fostering the twin transformation in a transdisciplinary way. *GAIA - Ecological Perspectives for Science and Society*, 32(1), 6–9. <https://doi.org/10.14512/gaia.32.S1.3>
- *Belhadi, A., Kamble, S., Gunasekaran, A., & Mani, V. (2022). Analyzing the mediating role of organizational ambidexterity and digital business transformation on industry 4.0 capabilities and sustainable supply chain performance. *Supply Chain Management: An International Journal*, 27(6), 696–711. <https://doi.org/10.1108/SCM-04-2021-0152>
- *Benešová, A., Basl, J., Tupa, J., & Steiner, F. (2021). Design of a business readiness model to realise a green industry 4.0 company. *International Journal of Computer Integrated Manufacturing*, 34(9), 920–932. <https://doi.org/10.1080/0951192X.2021.1946858>
- Biró, K., & Szalmáné Csete, M. (2022). How Can Development Strategies Foster Agri-digitalisation in the Era of Climate Change? *Periodica Polytechnica Social and Management Sciences*, 31(1), 9–18. <https://doi.org/10.3311/PPso.20411>
- Bohnsack, R., Bidmon, C. M., & Pinkse, J. (2022). Sustainability in the digital age: Intended and unintended consequences of digital technologies for sustainable development. *Business Strategy and the Environment*, 31(2), 599–602. <https://doi.org/10.1002/bse.2938>

- *Böttcher, T. P., Empelmann, S., Weking, J., Hein, A., & Krcmar, H. (2023). Digital sustainable business models: Using digital technology to integrate ecological sustainability into the core of business models. *Information Systems Journal*, 34(3), 736–761. <https://doi.org/10.1111/isj.12436>
- Brenner, B., & Hartl, B. (2021). The perceived relationship between digitalization and ecological, economic, and social sustainability. *Journal of Cleaner Production*, 315, 128128. <https://doi.org/10.1016/j.jclepro.2021.128128>
- *Broccardo, L., Truant, E., & Dana, L.-P. (2023). The interlink between digitalization, sustainability, and performance: An Italian context. *Journal of Business Research*, 158, 113621. <https://doi.org/10.1016/j.jbusres.2022.113621>
- *Chatzistamoulou, N. (2023). Is digital transformation the Deus ex Machina towards sustainability transition of the European SMEs? *Ecological Economics*, 206, 107739. <https://doi.org/10.1016/j.ecolecon.2023.107739>
- Chauhan, C., Akram, M. U., Jahnavi Patky, & Chauhan, A. (2023). Mapping pathways for building resilient supply chains: A systematic literature review. *Journal of Cleaner Production*, 425, 138701. <https://doi.org/10.1016/j.jclepro.2023.138701>
- *Ching, N. T., Ghobakhloo, M., Iranmanesh, M., Maroufkhani, P., & Asadi, S. (2022). Industry 4.0 applications for sustainable manufacturing: A systematic literature review and a roadmap to sustainable development. *Journal of Cleaner Production*, 334, 130133. <https://doi.org/10.1016/j.jclepro.2021.130133>
- *Contini, G., Peruzzini, M., Bulgarelli, S., & Bosi, G. (2023). Developing key performance indicators for monitoring sustainability in the ceramic industry: The role of digitalization and industry 4.0 technologies. *Journal of Cleaner Production*, 414, 137664. <https://doi.org/10.1016/j.jclepro.2023.137664>
- **Ćwiklicki, M., & Wojnarowska, M. (2020). Circular Economy and Industry 4.0: One-Way or Two-way Relationships? *Engineering Economics*, 31(4), 387–397. <https://doi.org/10.5755/j01.ee.31.4.24565>
- Daly, H. E. (1995). On Wilfred Beckerman's Critique of Sustainable Development. *Environmental Values*, 4(1), 49–55. <https://doi.org/10.1177/096327199500400103>
- Daly, H. E. (1996). *Beyond growth: The economics of sustainable development*. Beacon Press.
- Del Río Castro, G., González Fernández, M. C., & Uruburu Colsa, Á. (2021). Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs): A holistic review. *Journal of Cleaner Production*, 280, 122204. <https://doi.org/10.1016/j.jclepro.2020.122204>
- Del Río Castro, G., Gonzalez Fernandez, M. C., & Uruburu Colsa, Á. (2021). Unleashing the convergence amid digitalization and sustainability towards pursuing the Sustainable Development Goals (SDGs): A holistic review. *Journal of Cleaner Production*, 280, 1–40. <https://doi.org/10.1016/j.jclepro.2020.122204>
- **Demir, S., Gunduz, M. A., Kayikci, Y., & Paksoy, T. (2023). Readiness and Maturity of Smart and Sustainable Supply Chains: A Model Proposal. *Engineering Management Journal*, 35(2), 181–206. <https://doi.org/10.1080/10429247.2022.2050129>
- Denyer, D., & Tranfield, D. (2009). Producing a Systematic Review. In D. A. Buchanan & A. Bryman (Hrsg.), *The Sage handbook of organizational research methods* (S. 671–689). Sage Publications Ltd.
- DesJardins, J. R. (2007). *Business, ethics, and the environment: Imagining a sustainable future*. Pearson/Prentice Hall.
- *Di Maria, E., De Marchi, V., & Galeazzo, A. (2022). Industry 4.0 technologies and circular economy: The mediating role of supply chain integration. *Business Strategy and the Environment*, 31(2), 619–632. <https://doi.org/10.1002/bse.2940>
- **Dwivedi, A., Chowdhury, P., Agrawal, D., Paul, S. K., & Shi, Y. (2023). Antecedents of digital supply chains for a circular economy: A sustainability perspective. *Industrial Management & Data Systems*, 123(6), 1690–1716. <https://doi.org/10.1108/IMDS-05-2022-0273>
- *Dwivedi, A., & Paul, S. K. (2022). A framework for digital supply chains in the era of circular economy: Implications on environmental sustainability. *Business Strategy and the Environment*, 31(4), 1249–1274. <https://doi.org/10.1002/bse.2953>

- Elkington, J. (1998). ACCOUNTING FOR THE TRIPLE BOTTOM LINE. *MESURING BUSINESS EXCELLENCE*, 2(3), 18–22. <https://doi.org/10.1108/eb025539>
- Epp, L., Foit, D., Kürpick, C., Plaß, S., Scholz, T., & Schreiner, N. (2024). Developing A Conceptual Model for Strategic Integration of Sustainability and Digitalization in Manufacturing. *2024 IEEE International Conference on Technology, Informatics, Management, Engineering and Environment (TIME-E)*, 100–105. <https://doi.org/10.1109/TIME-E62724.2024.10919721>
- **Feroz, A. K., Zo, H., Eom, J., & Chiravuri, A. (2023). Identifying organizations' dynamic capabilities for sustainable digital transformation: A mixed methods study. *Technology in Society*, 73, 1–13. <https://doi.org/10.1016/j.techsoc.2023.102257>
- Ferrante, M., Vitti, M., Facchini, F., & Sassanelli, C. (2024). Mapping the relations between the circular economy rebound effects dimensions: A systematic literature review. *Journal of Cleaner Production*, 456, 142399. <https://doi.org/10.1016/j.jclepro.2024.142399>
- *Ferreira, J. J., Lopes, J. M., Gomes, S., & Rammal, H. G. (2023). Industry 4.0 implementation: Environmental and social sustainability in manufacturing multinational enterprises. *Journal of Cleaner Production*, 404, 136841. <https://doi.org/10.1016/j.jclepro.2023.136841>
- *Findik, D., Tirgil, A., & Özbuğday, F. C. (2023). Industry 4.0 as an enabler of circular economy practices: Evidence from European SMEs. *Journal of Cleaner Production*, 410, 137281. <https://doi.org/10.1016/j.jclepro.2023.137281>
- Flyverbom, M., Deibert, R., & Matten, D. (2019). The Governance of Digital Technology, Big Data, and the Internet: New Roles and Responsibilities for Business. *Business & Society*, 58(1), 3–19. <https://doi.org/10.1177/0007650317727540>
- Garriga, E., & Mele, D. (2004). Corporate Social Responsibility Theories: Mapping the Territory. *Journal of Business Ethics*, 53, 51–71.
- *George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2021). Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development. *Entrepreneurship Theory and Practice*, 45(5), 999–1027. <https://doi.org/10.1177/1042258719899425>
- **Ghobakhloo, M., Asadi, S., Iranmanesh, M., Foroughi, B., Mubarak, M. F., & Yadegaridehkordi, E. (2023). Intelligent automation implementation and corporate sustainability performance: The enabling role of corporate social responsibility strategy. *Technology in Society*, 74, 102301. <https://doi.org/10.1016/j.techsoc.2023.102301>
- *Ghobakhloo, M., Iranmanesh, M., Grybauskas, A., Vilkas, M., & Petraitė, M. (2021). Industry 4.0, innovation, and sustainable development: A systematic review and a roadmap to sustainable innovation. *Business Strategy and the Environment*, 30(8), 4237–4257. <https://doi.org/10.1002/bse.2867>
- *Ghobakhloo, M., Iranmanesh, M., Morales, M. E., Nilashi, M., & Amran, A. (2023). Actions and approaches for enabling Industry 5.0-driven sustainable industrial transformation: A strategy roadmap. *Corporate Social Responsibility and Environmental Management*, 30(3), 1473–1494. <https://doi.org/10.1002/csr.2431>
- Giddings, B., Hopwood, B., & O'brien, G. (2002). Environment, economy and society: Fitting them together into sustainable development. *Sustainable development*, 10(4), 187–196.
- **Goede, R. (2021). Sustainable business intelligence systems: Modelling for the future. *Systems Research and Behavioral Science*, 38(5), 685–695. <https://doi.org/10.1002/sres.2813>
- *Grunwald, G. (2022). Sustainability co-creation in digitalized global value chains. *Strategic Change*, 31(1), 19–29. <https://doi.org/10.1002/jsc.2477>
- **Guandalini, I. (2022). Sustainability through digital transformation: A systematic literature review for research guidance. *Journal of Business Research*, 148, 456–471. <https://doi.org/10.1016/j.jbusres.2022.05.003>
- *Gupta, A., & Singh, R. K. (2021). Applications of emerging technologies in logistics sector for achieving circular economy goals during COVID 19 pandemic: Analysis of critical success factors. *International Journal of Logistics Research and Applications*, 1–22. <https://doi.org/10.1080/13675567.2021.1985095>
- *Haftor, D. M., & Climent, R. C. (2021). CO2 reduction through digital transformation in long-haul transportation: Institutional entrepreneurship to unlock product-service system innovation. *Industrial Marketing Management*, 94, 115–127. <https://doi.org/10.1016/j.indmarman.2020.08.022>

- Hashim, M. A. M., & et al. (2022). Emergent Strategy in Higher Education: Postmodern Digital and the Future? *Administrative Sciences*.
- *He, Z., Kuai, L., & Wang, J. (2023). Driving mechanism model of enterprise green strategy evolution under digital technology empowerment: A case study based on Zhejiang Enterprises. *Business Strategy and the Environment*, 32(1), 408–429. <https://doi.org/10.1002/bse.3138>
- Hina, M., Chauhan, C., Kaur, P., Kraus, S., & Dhir, A. (2022). Drivers and barriers of circular economy business models: Where we are now, and where we are heading. *Journal of Cleaner Production*, 333, 130049. <https://doi.org/10.1016/j.jclepro.2021.130049>
- *Hristov, I., & Appolloni, A. (2022). Stakeholders' engagement in the business strategy as a key driver to increase companies' performance: Evidence from managerial and stakeholders' practices. *Business Strategy and the Environment*, 31(4), 1488–1503. <https://doi.org/10.1002/bse.2965>
- *Isensee, C., Teuteberg, F., Griesse, K.-M., & Topi, C. (2020). The relationship between organizational culture, sustainability, and digitalization in SMEs: A systematic review. *Journal of Cleaner Production*, 275, 1–19. <https://doi.org/10.1016/j.jclepro.2020.122944>
- **Islam, A., Wahab, S. A., & Latiff, A. S. A. (2022). Annexing a smart sustainable business growth model for small and medium enterprises (SMEs). *World Journal of Entrepreneurship, Management and Sustainable Development*, 18(2), 22–46. <https://doi.org/10.47556/J.WJEMSD.18.2.2022.2>
- **Jamwal, A., Agrawal, R., & Sharma, M. (2022). Deep learning for manufacturing sustainability: Models, applications in Industry 4.0 and implications. *International Journal of Information Management Data Insights*, 2(2), 1–13. <https://doi.org/10.1016/j.jjime.2022.100107>
- *Kristoffersen, E., Blomsma, F., Mikalef, P., & Li, J. (2020). The smart circular economy: A digital-enabled circular strategies framework for manufacturing companies. *Journal of Business Research*, 120, 241–261. <https://doi.org/10.1016/j.jbusres.2020.07.044>
- *Kristoffersen, E., Mikalef, P., Blomsma, F., & Li, J. (2021). The effects of business analytics capability on circular economy implementation, resource orchestration capability, and firm performance. *International Journal of Production Economics*, 239, 108205. <https://doi.org/10.1016/j.ijpe.2021.108205>
- Krlev, G., Hannigan, T., & Spicer, A. (2025). What Makes a Good Review Article? Empirical Evidence From Management and Organization Research. *Academy of Management Annals*, 19(1), 376–403. <https://doi.org/10.5465/annals.2021.0051>
- **Kumar, N., Kumar, G., & Singh, R. K. (2021). Big data analytics application for sustainable manufacturing operations: Analysis of strategic factors. *Clean Technologies and Environmental Policy*, 23(3), 965–989. <https://doi.org/10.1007/s10098-020-02008-5>
- **Kumar, V., Vrat, P., & Shankar, R. (2022). Factors Influencing the Implementation of Industry 4.0 for Sustainability in Manufacturing. *Global Journal of Flexible Systems Management*, 23(4), 453–478. <https://doi.org/10.1007/s40171-022-00312-1>
- Legner, C., Eymann, T., Hess, T., Matt, C., Böhmman, T., Drews, P., Mädche, A., Urbach, N., & Ahlemann, F. (2017a). Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community. *Business & Information Systems Engineering*, 59(4), 301–308. <https://doi.org/DOI 10.1007/s12599-017-0484-2>
- Legner, C., Eymann, T., Hess, T., Matt, C., Böhmman, T., Drews, P., Mädche, A., Urbach, N., & Ahlemann, F. (2017b). Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community. *Business & Information Systems Engineering*, 59(4), 301–308. <https://doi.org/10.1007/s12599-017-0484-2>
- *Lerman, L. V., Benitez, G. B., Müller, J. M., De Sousa, P. R., & Frank, A. G. (2022). Smart green supply chain management: A configurational approach to enhance green performance through digital transformation. *Supply Chain Management: An International Journal*, 27(7), 147–176. <https://doi.org/10.1108/SCM-02-2022-0059>
- *Li, L. (2022). Digital transformation and sustainable performance: The moderating role of market turbulence. *Industrial Marketing Management*, 104, 28–37. <https://doi.org/10.1016/j.indmarman.2022.04.007>
- **Li, X., Wu, T., Zhang, H., & Yang, D. (2022). Digital Technology Adoption and Sustainable Development Performance of Strategic Emerging Industries: The Mediating Role of Digital Technology Capability and the Moderating Role of Digital Strategy. *Journal of*

- Organizational and End User Computing*, 34(8), 1–18.
<https://doi.org/10.4018/JOEUC.315645>
- *Liu, Q., Trevisan, A. H., Yang, M., & Mascarenhas, J. (2022). A framework of digital technologies for the circular economy: Digital functions and mechanisms. *Business Strategy and the Environment*, 31(5), 2171–2192. <https://doi.org/10.1002/bse.3015>
- *Lopes de Sousa Jabbour, A. B., Jabbour, C. J. C., Godinho Filho, M., & Roubaud, D. (2018). Industry 4.0 and the circular economy: A proposed research agenda and original roadmap for sustainable operations. *Annals of Operations Research*, 270(1–2), 273–286.
<https://doi.org/10.1007/s10479-018-2772-8>
- Montiel, I., Gallo, P. J., & Antolin-Lopez, R. (2020). What on Earth Should Managers Learn About Corporate Sustainability? A Threshold Concept Approach. *Journal of Business Ethics*, 162(4), 857–880. <https://doi.org/10.1007/s10551-019-04361-y>
- *Mukhuty, S., Upadhyay, A., & Rothwell, H. (2022). Strategic sustainable development of Industry 4.0 through the lens of social responsibility: The role of human resource practices. *Business Strategy and the Environment*, 31(5), 2068–2081. <https://doi.org/10.1002/bse.3008>
- *Nayal, K., Kumar, S., Raut, R. D., Queiroz, M. M., Priyadarshinee, P., & Narkhede, B. E. (2021). Supply chain firm performance in circular economy and digital era to achieve sustainable development goals. *Business Strategy and the Environment*, 31(3), 1058–1073.
<https://doi.org/10.1002/bse.2935>
- *Neligan, A., Baumgartner, R. J., Geissdoerfer, M., & Schögl, J. (2023). Circular disruption: Digitalisation as a driver of circular economy business models. *Business Strategy and the Environment*, 32(3), 1175–1188. <https://doi.org/10.1002/bse.3100>
- *Neri, A., Negri, M., Cagno, E., Kumar, V., & Garza-Reyes, J. A. (2023). What digital-enabled dynamic capabilities support the circular economy? A multiple case study approach. *Business Strategy and the Environment*, 32(7), 5083–5101. <https://doi.org/10.1002/bse.3409>
- *Niehoff, S. (2022). Aligning digitalisation and sustainable development? Evidence from the analysis of worldviews in sustainability reports. *Business Strategy and the Environment*, 31(5), 2546–2567. <https://doi.org/10.1002/bse.3043>
- *Okorie, O., Russell, J., Cherrington, R., Fisher, O., & Charnley, F. (2023). Digital transformation and the circular economy: Creating a competitive advantage from the transition towards Net Zero Manufacturing. *Resources, Conservation and Recycling*, 189, 106756.
<https://doi.org/10.1016/j.resconrec.2022.106756>
- *Pan, S. L., & Nishant, R. (2023). Artificial intelligence for digital sustainability: An insight into domain-specific research and future directions. *International Journal of Information Management*, 72, 102668. <https://doi.org/10.1016/j.ijinfomgt.2023.102668>
- Parmar, B. L., Freeman, R. E., & Harrison, J. S. (2010). Stakeholder Theory: The State of the Art. *Academy of Management Annals*, 4(1), 403–445.
- *Parmentola, A., Petrillo, A., Tutore, I., & De Felice, F. (2022). Is blockchain able to enhance environmental sustainability? A systematic review and research agenda from the perspective of Sustainable Development Goals (SDGs). *Business Strategy and the Environment*, 31(1), 194–217. <https://doi.org/10.1002/bse.2882>
- *Patil, A., Dwivedi, A., Abdul Moktadir, Md., & Lakshay. (2023). Big data-Industry 4.0 readiness factors for sustainable supply chain management: Towards circularity. *Computers & Industrial Engineering*, 178, 109109. <https://doi.org/10.1016/j.cie.2023.109109>
- *Pauliuk, S., Koslowski, M., Madhu, K., Schulte, S., & Kilchert, S. (2022). Co-design of digital transformation and sustainable development strategies—What socio-metabolic and industrial ecology research can contribute. *Journal of Cleaner Production*, 343, 1–12.
<https://doi.org/10.1016/j.jclepro.2022.130997>
- **Pînzaru, F., Dima, A. M., Zbucnea, A., & Veres, Z. (2022). Adopting Sustainability and Digital Transformation in Business in Romania: A Multifaceted Approach in the Context of the Just Transition. *Www.AmfiteatruEconomic.Ro*, 24(59), 28. <https://doi.org/10.24818/EA/2022/59/28>
- Pranugrahaning, A., Donovan, J. D., Topple, C., & Masli, E. K. (2021). Corporate sustainability assessments: A systematic literature review and conceptual framework. *Journal of Cleaner Production*, 295, 126385. <https://doi.org/10.1016/j.jclepro.2021.126385>
- Prihadyanti, D., & Aziz, S. A. (2023). Indonesia toward sustainable agriculture—Do technology-based start-ups play a crucial role? *Business Strategy & Development*, 6(2), 140–157.

- Raworth, K. (2017). *Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist*. Chelsea Green Publishing. <https://books.google.de/books?id=7A4lDgAAQBAJ>
- **Rejeb, A., & Rejeb, K. (2020). Blockchain and supply chain sustainability. *Logforum*, 16(3), 363–372. <https://doi.org/10.17270/J.LOG.2020.467>
- *Ribeiro, G. C., Oliveira, K. K. S., & Souza, R. A. C. (2024). DSI Strategy Canvas: Modelling the Digital Social Innovation Strategy. *Journal of Social Entrepreneurship*, 15(2), 630–658. <https://doi.org/10.1080/19420676.2021.1987971>
- *Rusch, M., Schöggel, J., & Baumgartner, R. J. (2022). Application of digital technologies for sustainable product management in a circular economy: A review. *Business Strategy and the Environment*, 32(3), 1159–1174. <https://doi.org/10.1002/bse.3099>
- *Sætra, H. S. (2023). The AI ESG protocol: Evaluating and disclosing the environment, social, and governance implications of artificial intelligence capabilities, assets, and activities. *Sustainable Development*, 31(2), 1027–1037. <https://doi.org/10.1002/sd.2438>
- *Sahu, A., Agrawal, S., & Kumar, G. (2022). Integrating Industry 4.0 and circular economy: A review. *Journal of Enterprise Information Management*, 35(3), 885–917. <https://doi.org/10.1108/JEIM-11-2020-0465>
- *Sahu, A. K., Sahu, N. K., & Sahu, A. K. (2023). Laminating STRATH block chain technology-SWOT architectures to endure business strategy between digital transformation, firms and supply chains capabilities for sustainability. *Journal of Cleaner Production*, 383, 135531. <https://doi.org/10.1016/j.jclepro.2022.135531>
- **Santarius, T., & Wagner, J. (2023). Digitalization and sustainability: A systematic literature analysis of ICT for Sustainability research. *GAIA - Ecological Perspectives for Science and Society*, 32(1), 21–32. <https://doi.org/10.14512/gaia.32.S1.5>
- Strand, R. (2023). Strategic Leadership of Corporate Sustainability. *Journal of Business Ethics*, 123(4), 687–706. <https://doi.org/10.1007/s10551-013-2017-3>
- **Tasleem, M., Khan, N., & Nisar, A. (2019). Impact of technology management on corporate sustainability performance: The mediating role of TQM. *International Journal of Quality & Reliability Management*, 36(9), 1574–1599. <https://doi.org/10.1108/IJQRM-01-2018-0017>
- Tettamanzi, P., Venturini, G., & Murgolo, M. (2022). Sustainability and Financial Accounting: A Critical Review on the ESG Dynamics. *Environmental Science and Pollution Research*, 29(11), 16758–16761. <https://doi.org/10.1007/s11356-022-18596-2>
- *Torrent-Sellens, J., Ficapal-Cusí, P., & Enache-Zegheru, M. (2023). Boosting environmental management: The mediating role of Industry 4.0 between environmental assets and economic and social firm performance. *Business Strategy and the Environment*, 32(1), 753–768. <https://doi.org/10.1002/bse.3173>
- *Ukko, J., Nasiri, M., Saunila, M., & Rantala, T. (2019). Sustainability strategy as a moderator in the relationship between digital business strategy and financial performance. *Journal of Cleaner Production*, 236, 117626. <https://doi.org/10.1016/j.jclepro.2019.117626>
- Van Marrewijk, M. (2003). Concepts and Definitions of CSR and Corporate Sustainability: Between Agency and Communion. In A. C. Michalos & D. C. Poff (Hrsg.), *Citation Classics from the Journal of Business Ethics* (S. 641–655). Springer Netherlands. https://doi.org/10.1007/978-94-007-4126-3_32
- Van Zanten, J. A., & Van Tulder, R. (2021). Improving companies' impacts on sustainable development: A nexus approach to the SDGS. *Business Strategy and the Environment*, 30(8), 3703–3720. <https://doi.org/10.1002/bse.2835>
- Waddock, S. A., & Graves, S. B. (1997). THE CORPORATE SOCIAL PERFORMANCE-FINANCIAL PERFORMANCE LINK. *Strategic Management Journal*, 18(4), 303–319. [https://doi.org/10.1002/\(SICI\)1097-0266\(199704\)18:4<303::AID-SMJ869>3.0.CO;2-G](https://doi.org/10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G)
- *Wang, K., Zhang, L., Lei, Z., & Huang, X. (2023). Investigating the impact of digital orientation on economic and environmental performance based on a strategy-structure-performance framework. *International Journal of Logistics Research and Applications*, 1–18. <https://doi.org/10.1080/13675567.2023.2215167>
- *Wei, S., Wang, L., Jiang, W., Feng, L., & Feng, T. (2023). How eco-control systems enhance carbon performance via low-carbon supply chain collaboration? The moderating role of organizational unlearning. *Corporate Social Responsibility and Environmental Management*, 30(5), 2536–2554. <https://doi.org/10.1002/csr.2501>

- *Xu, J., Yu, Y., Zhang, M., & Zhang, J. Z. (2023). Impacts of digital transformation on eco-innovation and sustainable performance: Evidence from Chinese manufacturing companies. *Journal of Cleaner Production*, 393, 136278. <https://doi.org/10.1016/j.jclepro.2023.136278>
- *Yadav, S., Samadhiya, A., Kumar, A., Majumdar, A., Garza-Reyes, J. A., & Luthra, S. (2023). Achieving the sustainable development goals through net zero emissions: Innovation-driven strategies for transitioning from incremental to radical lean, green and digital technologies. *Resources, Conservation and Recycling*, 197, 1–19. <https://doi.org/10.1016/j.resconrec.2023.107094>
- *Zarte, M., Pechmann, A., & Nunes, I. L. (2022). Knowledge framework for production planning and controlling considering sustainability aspects in smart factories. *Journal of Cleaner Production*, 363, 1–12. <https://doi.org/10.1016/j.jclepro.2022.132283>
- Zhang, S., & et al. (2020). *A sustainable and preventative warning strategy for the safe production of underground hydrocarbon storage*.
- *Zheng, L. J., Zhang, J. Z., Kai Ming Au, A., Wang, H., & Yang, Y. (2023). Leveraging technology-driven applications to promote sustainability in the shipping industry: The impact of digitalization on corporate social responsibility. *Transportation Research Part E: Logistics and Transportation Review*, 176, 103201. <https://doi.org/10.1016/j.tre.2023.103201>
- **zu Knyphausen-Aufseß, D., & Santarius, T. (2021). Strategic management, the theory of the firm, and digitalization: Reintroducing a normative perspective. *Corporate and Business Strategy Review*, 2(1), 41–53. <https://doi.org/10.22495/cbsrv2i1art4>