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Digital and AI-Enabled Supply Chain Transparency: Building Consumer Trust for Sustainable Consumption in Service Ecosystems

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Abstract. The issue of supply chains that are transparent and trustworthy is becoming increasingly critical in sustainable consumption, especially as artificial intelligence (AI) and digital technologies redefine the service ecosystems. This paper looks at the role of digital and AI-powered supply chain transparency in helping build consumer trust and ensure sustainable consumption behavior. The study takes a conceptual approach and is backed by a comprehensive literature review, which synthesizes data available in peer-reviewed articles that have been filtered then based on PRISMA guidelines. Based on service-dominant logic, institutional theory, and socio-technical approaches, the paper establishes an integrative approach on how transparency in supply chain mediates relationships and the moderating conditions of digital literacy, regulatory enforcement, and cultural norms in forming trust. The results indicate that transparency would increase the credibility of information, decrease the perceived risk, and increase consumer trust that would be mediated by digital tools, and the strength of such mechanisms would depend on contextual boundary conditions. The research adds to the literature by elucidating the conceptual connection between transparency and trust as well as throwing service science insights on sustainable consumption. Practical implications are also provided to managers and policymakers who may want to use responsible digital technologies to create sustainable service ecosystems based on trust.

Keywords: Artificial Intelligence; Blockchain; Digital Technologies; Supply Chain Transparency; Sustainable Consumption

1. Introduction

Sustainable consumption has become one of the most important issues in the world because the deterioration of the environment, depletion of resources, and climate change put a strain on the production and consumption systems (White et al., 2020; UNEP, 2022). In this regard, the supply chains play a major role in determining the outcome of consumption, especially in their ability to deliver transparent, credible and traceable information to the consumer. Nevertheless, conventional supply chain designs are typically affected by information asymmetry, lack of visibility, absence of accountability, and negative impact consumer trust and the activities aimed at sustainable consumption (Tambo & Wossen, 2021). The growing adoption of digital and artificial intelligence (AI) technologies provides a new facet when it comes to solving these problems by facilitating real-time information and data sharing, traceability, and validation between service ecosystems (Wamba & Queiroz, 2022).

Emerging digital and artificial intelligence technologies, such as blockchain, big data processing, and Internet of Things (IoT) apps have changed the nature of supply chain information generation, processing, and communication (Dwivedi et al., 2021; Rejeb et al., 2023). The technologies contribute to the introduction of transparency into the supply chain through the provision of accurate, accessible, and verifiable data, which contributes to decreasing the amount of uncertainty in consumer decision-making (Kshetri, 2021; Duan & Zhu, 2024). The concept of transparency in this study is understood as a mediating process, but not an element of trust itself, which signals credibility and reliability to the consumers (Sullivan & Kim, 2024). Digitally mediated transparency gives consumers a chance to evaluate the environmental and social characteristics of products and services more effectively, which increases the level of trust and promotes sustainable consumption behavior (Zhang & Li, 2024).

In service science, sustainable consumption is incorporated in service ecosystems in which firms, consumers, regulators, and technology providers collaboratively create value (Gualandris & Kalchschmidt, 2021). Service-dominant logic also focuses on the reality that value is not inherent in products but is co-produced in the interaction and exchange of information in networks of actors. In this context, digital and AI-enabled transparency is presented as an operant resource enabling building trust-based relationships and value creation through collaborations (Hina et al., 2024). As a result, trust is a dynamic service interaction outcome and not a consumer attitude and contributes to the topicality of transparency in the digitally mediated service ecosystem (Ali et al., 2024).

Although the increased scholarly interest in digital technologies, supply chain transparency, and sustainable consumption, there is still a gap in existing research in several aspects. On the one hand, numerous works confuse transparency and trust and provide conceptual ambiguity (Sullivan & Kim, 2024). Second, the existing empirical research tends to focus on the results of the technological adoption and to under-theoretic the mediating and moderating variables that transparency influences consumer trust (Kouhizadeh et al., 2021; Vazquez Melendez et al., 2024). Third, we have not paid much attention to the contextual boundary conditions, including digital literacy, regulatory frameworks, and cultural norms, especially in the service ecosystems and across markets (van Deursen & van Dijk, 2019; Naseem et al., 2024). This fragmentation is a sign that there is a necessity to have an integrative conceptual framework that explains in a systematic manner how digital and AI-enabled transparency promote consumer trust and sustainable consumption.

In the logistics informatics view, transparency-enabled digital infrastructures have become platforms of service that can organize physical flows, information exchange and sustainability assurance across multi-actor supply networks. This placement puts sustainable consumption in the service-dominant logic whereby value is co-constructed through digitally mediated exchanges between firms, logistics providers and consumers (Raman et al., 2024).

To address these gaps, this paper will attempt to come up with an integrative conceptual model that will provide insight into how digital and AI-enabled supply chain transparency will help establish consumer trust and sustainable consumption in service ecosystems. Particularly, the research (i) provides the

conceptual differentiation and association between transparency and trust, (ii) synthesizes the literature based on a systematic review on the topic which follows PRISMA principles, (iii), defines the important mediating and moderating factors, i.e. supply chain transparency, digital literacy, regulatory enforcement, and cultural norms, and (iv) draws in theoretical and practical conclusions on how managers and policymakers can utilize responsible digital technologies to support sustainable consumption (Centobelli et al., 2022; Lohmer et al., 2020)

2. Literature Review

2.1 Digital and AI technologies in supply chains

The supply chain operations have been digitally and artificially transformed by digital and artificial intelligence (AI) technologies in terms of information processing, coordination, and decision-making abilities. Blockchain, big data analytics, Internet of Things (IoT) technologies allow capturing real-time data and sharing information safely across the intricate network of suppliers (Dwivedi et al., 2021; Wamba & Queiroz, 2022. Meidute-Kavaliauskiene & Linkevic (2025) discovered that the IoT implementation improves the integration and real-time monitoring of the logistics processes, which improves the visibility and coordination of the supply chain. More transparency and responsibility can be provided using blockchain, along with its related analytics.

Specifically, the use of blockchain, as well as its associated analytics, can be used to deliver more transparency and responsibility, with a series of predictive analytics and adaptive decision-making (Rejeb et al., 2023; Duan & Zhu, 2024). These technological innovations are particularly applicable in-service ecosystems, in which the flows of information and interdependence among actors play a vital role in the value co-creation.

2.2 Supply chain transparency and information visibility

Supply chain transparency is the degree to which pertinent, right, and timely information about the production processes, sourcing, and sustainability practices is available to the parties concerned. Increased transparency decreases the level of information asymmetry and allows stakeholders to assess the plausibility of sustainability assertions (Tambo & Wossen, 2021).

Digital technologies are at the center of allowing transparency due to enhancing the accuracy, traceability, and verifiability of data of all the levels of the supply chain (Kshetri, 2021; Kouhizadeh et al., 2021).

The empirical evidence indicates that transparent supply chains have greater chances to receive legitimacy and stakeholder trust, especially in the situations when the sustainability issues and ethical standards are deeply examined (Vazquez Melendez et al., 2024).

2.3 Consumer trust in digitally mediated supply chains

Consumer trust has been identified as a critical factor of sustainable consumption behavior in an environment where uncertainty and complexity of information is dominant.

Trust in digital supply chains is becoming influenced by technology-mediated forms of signals instead of interpersonal communication (Sullivan & Kim, 2024).

The data of perceived credibility and less skepticism prompted by blockchain-enabled transparency and verifiable data of sustainability improve trust in firms and their sustainability pledges (Zhang & Li, 2024).

The formation of trust, however, depends on the capability of consumers to process and analyze digital data, and digital literacy plays a crucial role in influencing the results of trust (Ali et al., 2024).

2.4 Sustainable consumption within service ecosystems

Sustainable consumption is not limited to personal purchasing, but it refers to the wider trends of value co-production in service ecosystems. Based on the service-dominant logic opinion, the creation of sustainability-related value can occur in the relationships between firms, consumers, and institutional actors and not in products (Gualandris & Kalchschmidt, 2021).

Sun (2026) also stressed that to attain green low-carbon transformation in supply chains, it is necessary to have a comprehensive sustainability framework, which integrates technological innovation, regulatory support, and cross-organizational partnership throughout the whole automotive supply network.

AI and digital transparency help to achieve sustainable consumption, helping people to make informed choices and match their values with consumption decisions (White et al., 2020). However, other issues like greenwashing and manipulation of information may destroy trust and weaken the sustainability performance when credibility of transparency mechanisms is missing or governed by an untrustworthy authority (Naseem et al., 2024).

2.5 Boundary conditions: digital literacy, regulation, and culture

Several boundary conditions of the context determine the effectiveness of digital and AI-enabled transparency in promoting consumer trust. Digital literacy reflects the ability of the consumers to obtain, decipher, and critically evaluate the sustainability data, which moderates the transparency-trust relationship (van Deursen & van Dijk, 2019; Ali et al., 2024).

The regulatory settings are also very important as they provide standards, enforcement systems and accountability structures that bolster the effectiveness of transparency efforts (United Nations Environment Programme, 2022). Alongside, cultural norms and values affect the formation of trust and views on transparency, especially when cross-market and ecosystems of services are considered (Zhang & Li, 2024).

2.6 Synthesis and research gaps

Although a great deal of research has been done on digital technologies, transparency, and sustainable consumption, there are several gaps that have not been filled in the literature. First, literature tends to equate transparency with trust, which results in conceptual uncertainty and mixed empirical results (Sullivan & Kim, 2024). Second, theoretical integration of intermediating and moderating processes that clarify how transparency can be transformed into consumer trust in service systems is limited (Kouhizadeh et al., 2021). Third, the ethical issue of greenwashing, manipulated data, and algorithmic bias is not theorized about a digitally mediated transparency (Naseem et al., 2024). To fill in these gaps, there is a need to establish a conceptual framework of integration that can explain the importance of digital and AI-enhanced transparency in promoting consumer trust and sustainable consumption.

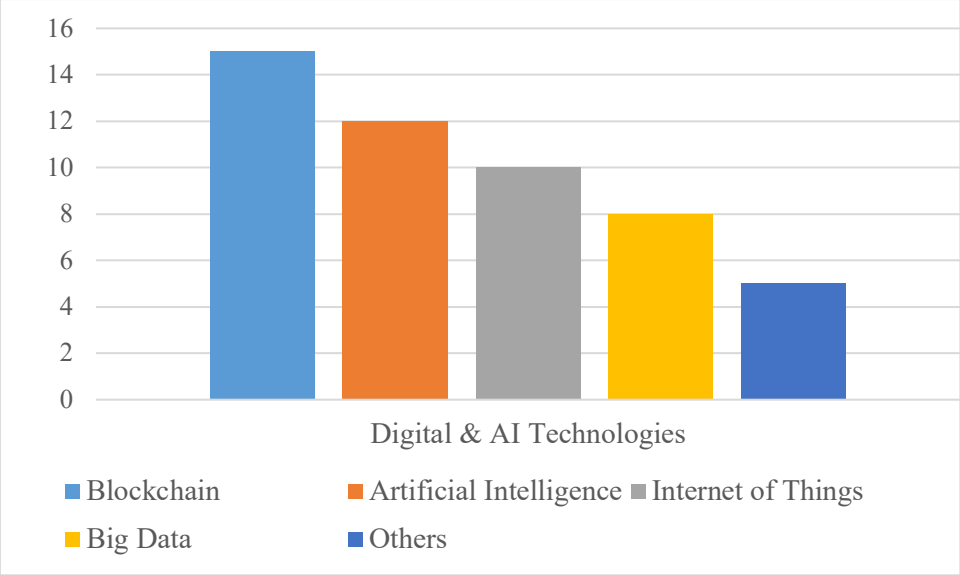

Fig. 1 Frequency of digital technologies studied in transparency research.

3. Methodology

3.1 Research Design

This paper will adopt a conceptual research design with a systematic literature review (SLR) to investigate the issue of how digital and artificial intelligence (AI)-enabled supply chain transparency can help enhance consumer trust and sustainable consumption in the service ecosystems.

Conceptual approach suits the study since the goal of the research is to develop and integrate theory and not to test the hypotheses empirically. Systematic review allows systematic and reproducible synthesis of the existing knowledge and minimizes selection bias and increases methodological transparency.

3.2 Literature search strategy

The search in the volume of major scholarly databases has been carried out to find peer-reviewed studies connected with digital technologies, supply chain transparency, consumer trust, and sustainable consumption. The databases were Scopus and Web of Science that are well known in terms of containing quality journals in the study of the supply chain, information systems and sustainability.

The keywords used in search strings included: digital technologies, artificial intelligence, blockchain, supply chain transparency, consumer trust, and sustainable consumption. Articles were only included in the review as per the publication date which dates between 2019 and 2024 to guarantee the relevance and timeliness of the reviewed literature.

3.3 Study selection and prisma procedure

The PRISMA guidelines were accepted in the selection of the study to provide a clear and organized screening of the literature. The search was first performed in the database whereby the number of records was 524 and this was further narrowed down to titles and abstracts to eliminate duplication and irrelevant studies. Then full-text screening was done to determine the eligibility by comparing it with predefined inclusion and exclusion criteria.

The studies were to be included when they specifically referred to digital or AI technologies in the supply chains and dealt with the issues of transparency, trust, or sustainable consumption. The non-

reviewed studies, conference papers, and the articles published by other sources other than those accepted by the journal were excluded. The maximum number of peer-reviewed articles included in the final sample was 74, based on which the qualitative synthesis and the formation of concepts were performed.

3.4 Data extraction and coding process

The extraction of data was guided by the need to capture major thematic aspects, which comprised digital technology types used, supply chain transparency mechanisms, trust outcomes, and sustainability implications. To increase the level of analytical rigor, a dual-coding methodology was used.

The articles that were selected were reviewed by two independent coding categories and identified findings that were coded under a certain set of preset coding categories based on the research objectives and theoretical basis. Differences were debated and agreed on to establish uniformity in interpreting the difference.

3.5 Coding reliability and validation

To determine inter-coder reliability, Cohen kappa coefficient was determined that the value of this coefficient was equal to 0.86 and this value demonstrates high level of agreement and reliability of the coding process. This level of reliability is well above generally accepted criteria of qualitative content analysis, and this increases the quality and the strength of the results of the study. Besides this, cross-checking and validation was performed as an iterative process to the maximum to reduce the subjective bias and enhance the interpretive consistency.

3.6 Data synthesis and analysis

After coding and validation, thematic synthesis was done to determine recurrent patterns, relationship and conceptual connections across the studies reviewed. The mediation as highlighted by the synthesis and the moderating effect as revealed by contextual factors such as digital literacy, enforcement of regulations or lack of it and culture are significantly important. Synthetic lessons were used in the creation of an integrative conceptual framework that connects digital and AI technologies, transparency, consumer trust, and sustainable consumption in service ecosystems.

3.7 Results

The methodology is also supported with visual evidence to make it transparent:

Figure 2 demonstrates the study identification and selection process which is based on PRISMA used in this review.

Table I (Summary of selection results) shows the filtering process that follows a sequential order of prior identification till final inclusion.

Table II (Selection Criteria and Thematic Categorization): Synthesizes the 74 included studies in terms of thematic area, frequency, and representative sources.

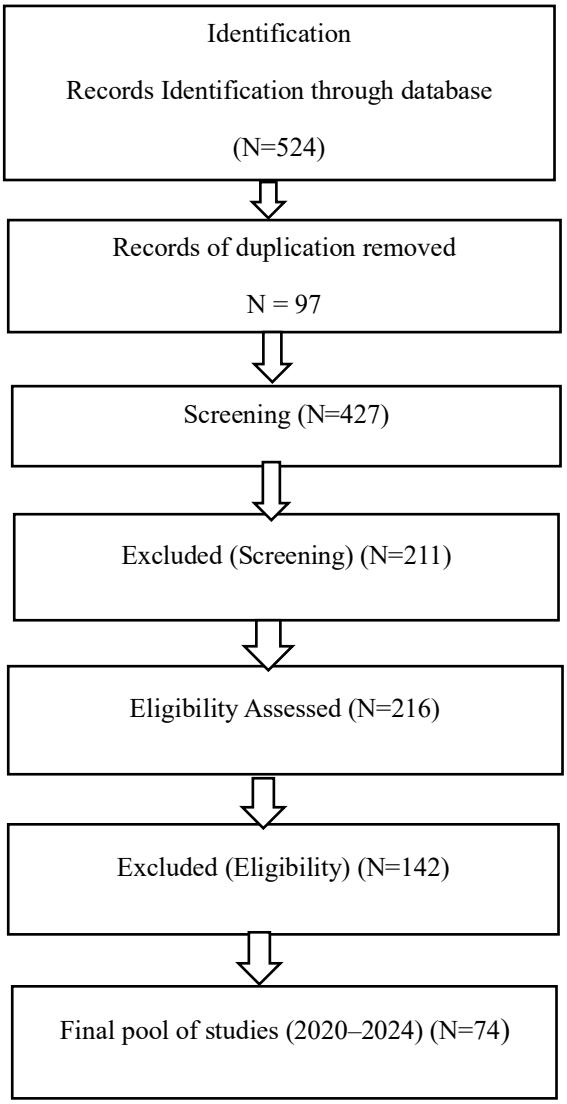

Fig. 2 PRISMA Flow Diagram of the Study Identification, Screening, Eligibility, and Inclusion Process

Table 1. Summary of Study Selection Results

Stage	**Records (n)**	**Notes**
Identification	524	Relevant studies were retrieved from Scopus, Web of Science, ScienceDirect, Emerald, and SpringerLink using combinations of keywords such as "supply chain transparency," "digital trust," "blockchain sustainability," "AI adoption," and "digital literacy in consumption."
Duplicate Removal	97	Duplicates removed using citation management tools.
Screening	427	Titles and abstracts were screened for relevance to transparency, trust, and sustainable consumption.

Excluded (Screening)	211	Excluded for being purely technical (e.g., algorithmic blockchain designs) or not directly related to transparency, trust, or sustainable consumption.
Eligibility Assessed	216	Full-text articles were assessed against inclusion and exclusion criteria.
Excluded (Eligibility)	142	Excluded due to limited engagement with transparency, consumer trust, or sustainability dimensions.
Included in Synthesis	74	Final pool of studies (2020–2024), with 74 published between 2023 and 2024.

Table 2: Literature Selection and Thematic Categorization

Theme	**Number of Studies**	**Representative Sources (2023-2024)**
Blockchain for Transparency	15	Duan & Zhu (2024); Vazquez Melendez et al. (2024)
AI for Trust & Risk Mitigation	12	(Dwivedi et al., 2021)
IoT & Traceability	10	Ali et al. (2024); Udeh et al. (2024)
Big Data & Analytics	8	Zhang & Li (2024);
Digital Literacy & Inclusion	6	Digital Literacy Report (2023);

4. Conceptual Framework and Propositions

4.1 Overview of the conceptual framework

Based on the systematic literature review, this research paper will evolve an integrative conceptual model of digital and artificial intelligence (AI) technologies affecting sustainable consumption in service ecosystems through supply chain transparency and consumer trust.

As shown in Figure 3, the framework has the supply chain transparency as the mediating variable between the digital and AI technologies with consumer trust, where the digital literacy, regulatory enforcement, and cultural norms are the moderating variables that determine the effectiveness of the transparency in building trust.

This setup is a direct response to conceptual vagueness of transparency and trust in the past and to demands to become more transparent about the supply chain boundary conditions in digitally mediated supply chains (Kouhizadeh et al., 2021; Sullivan and Kim, 2024).

Fig. 3. Theoretical model of the mediating role of supply chain transparency and the moderating influence of digital literacy, regulatory enforcement, and cultural norms of digitally mediated service eco systems.

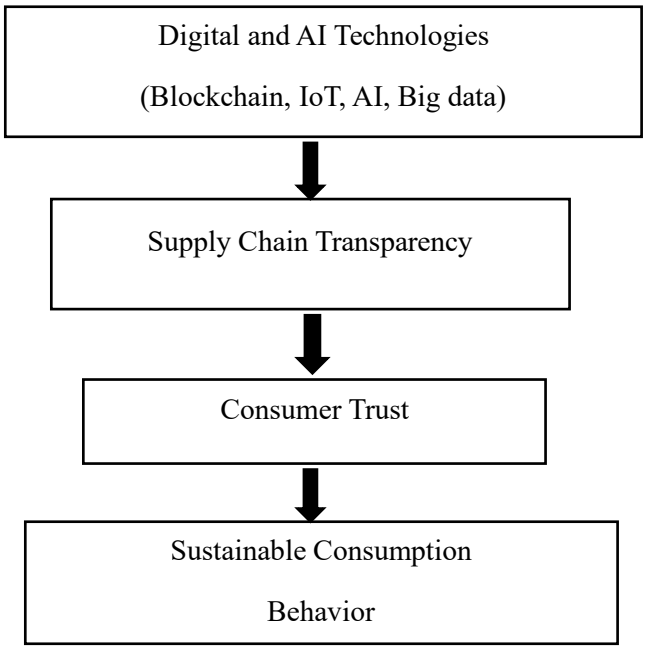

Fig.3: Conceptual model

4.2 Digital and AI technologies and supply chain transparency

Digital and AI technologies contribute to the transparency of the supply chain through better accuracy, traceability, and accessibility of information at the supply chain levels.

Blockchain and AI-based analytics and IoT solutions allow recording verifiable and immutable transaction and sustainability attributes, and real-time monitoring and predictive insights in service ecosystems (Rejeb et al., 2023; Duan and Zhu, 2024). The technological possibilities mitigate information asymmetry and enhance transparency as a valid information cue to stakeholders (Kshetri, 2021).

Proposition 1 (P1): The digital and AI technologies have a positive impact on the supply chain transparency of service ecosystems.

4.3 Supply chain transparency and consumer trust

Supply chain transparency is very essential in influencing consumer trust as a way of indicating credibility, accountability and ethical commitment. Open communication of the sourcing process, environmental and sustainability performance allows customers to gauge the truthfulness of the statements of these companies and lowers perceived risk (Tambo and Wossen, 2021).

Transparency in digital mediation serves as an indirect trust-building strategy but based on verifiable information as opposed to person-to-person interaction (Sullivan & Kim, 2024).

Proposition 2 (P2): The transparency of the supply chain has a positive effect on consumer trust in digitally mediated service ecosystems.

4.4 Consumer trust and sustainable consumption

Sustainable consumption depends largely on the central antecedent of consumer trust, especially in complex information settings that possess a credence attribute. Whenever consumers view firms and their supply chains as credible, they become more inclined to make sustainable buying choices and relational patterns in the long run (White et al., 2020).

Online facilitated trust deciphers distrust and enhances value congruence between customers and companies, reinforcing the system of sustainable consumption (Ali et al., 2024).

Proposition 3 (P3): Consumer confidence has a positive effect on sustainable consumption behavior.

4.5 Mediating role of supply chain transparency

Digital and AI technologies have expressed their impact, however, not directly to generate consumer trust, but rather through increased transparency. Ensuring the timely, verifiable, and credible flow of information, transparency acts as a medium through which the technological abilities are transformed into the results of trust (Kouhizadeh et al., 2021; Vazquez Melendez et al., 2024).

The analytical separation of transparency and trust can be explained by the conceptualization of transparency as a mediator, which will solve the confusions of previous studies that confuse between the two constructs (Sullivan and Kim, 2024).

Proposition 4 (P4): The connection between digital and AI technologies and consumer trust is mediated by supply chain transparency.

4.6 Moderating role of digital literacy

Transparency of the supply chain and consumer trust depends on the digital literacy of the consumer, which is determined by their access and interpretation and critical appraisal of digital information. The increased digital literacy also increases the ability of the consumers to interpret the signals of transparency and informational credibility, and, thus, it increases the credibility when it comes to forming trust (van Deursen and van Dijk, 2019; Ali et al., 2024).

On the other hand, low digital literacy can undermine the prospects of building trust with transparency even with the greater availability of information.

Proposition 5 (P5): There is a positive moderating effect of digital literacy between transparency in the supply chain and consumer trust.

4.7 Moderating role of regulatory enforcement and cultural norms

The efficiency of digitally facilitated transparency in consumer trust is also further conditioned by institutional and cultural contexts. This increase in credibility in transparency by having standards, verification measures, and accountability systems which restrict opportunistic behavior (United Nations Environment Program, 2022).

The expectations of information disclosure and institutional trust are also influenced by cultural norms especially in cross-market service ecosystems (Zhang and Li, 2024). All these factors contribute to the degree of transparency to turn into consumer trust.

Proposition 6 (P6): Cultural norms and regulatory enforcement moderate the relationship between the supply chain transparency and consumer trust.

5. Discussion

5.1 Digital and AI technologies as transparency enablers

The results support the idea of digital and AI technologies as tools of transparency and not direct consumer trust providers. Blockchain, AI-powered analytics, and IoT are some of the technologies that improve the traceability, real-time visibility, and data integrity in supply chains and reduce information asymmetry and opportunistic behavior (Rejeb et al., 2023; Duan and Zhu, 2024). This endorses earlier claims that technological sophistication does not create trust by itself unless it is converted into valuable and attainable transparency to consumers (Kshetri, 2021).

The scale of the equation raises the supply chain transparency to appear as a mediating variable, thus solving the discrepancies in the previous models, which have suggested a direct correlation existing between digitalization and trust. The framework brings conceptual clarity hence showing that technology-driven transparency is the informational base on which trust gets built, not a trust alternative (Vazquez Melendez et al., 2024).

5.2 Transparency–trust linkage and sustainable consumption

The findings point to supply chain visibility as one of the essential informational cues that influence consumer confidence in service ecosystems which are mediated digitally. Open access to sourcing practices, sustainability performance, and ethical standards can enable consumers to judge the solidity of the sustainability statements by companies and decrease the cynicism towards greenwashing and digital manipulation (de Freitas Netto et al., 2020; Naseem et al., 2024). Such an observation can be consistent with the views of signaling theory, which upholds the importance of verifiable information in lessening uncertainty in markets with credence attributes (Tambo and Wossen, 2021).

In its turn consumer trust is identified as an important antecedent of sustainable consumption behaviour. The notion of trust helps consumers to convert their sustainability intentions to real purchasing choices, especially in cases where the environmental and social characteristics cannot be easily verified by themselves (White et al., 2020; Kumar et al., 2021). The model thus validates trust to be a requisite psychological process between transparency and sustainable consumption outcomes and not an automatic result of availability of information.

5.3 Boundary conditions: Moderating effects of digital literacy, regulation, and culture

One of the key contributions of the research is the establishment of boundary conditions affecting the efficacy of the transparency in promoting consumer trust. Digital literacy also plays a huge role in influencing the power of consumers to interpret, evaluate and act to digitally revealed information. Highly transparent supply chains might not lead to the creation of trust among consumers with low digital competencies, which is why the theme of digital inequality and disparities in access to sustainability information can be strengthened (van Deursen and van Dijk, 2019; Ali et al., 2024).

Enforcement of regulations also preconditions the establishment of trust through raising the credibility of transparency measures. Well-developed regulatory systems minimize the opportunities of manipulation of information and opportunistic disclosure and, thus, client trust in digitally mediated sustainability narratives (United Nations Environment Programme, 2022; Sullivan and Kim, 2024). There is a moderating effect of cultural norms, whereby, these norms define expectations in terms of information disclosure, institutional trust, and sustainability priorities in various markets (Zhang and Li, 2024). These results highlight the need to position digital transparency strategies in an institutional and socio-cultural context.

5.4 Theoretical implications

This research contributes to sustainable consumption and digital supply chain literature in several theoretical ways. First, it goes forward in conceptual clarity by modeling explicitly supply chain transparency as an intercessor between digital and artificial intelligence technologies and consumer confidence, which resolves conceptual overlap between the two constructs previously. Second, the inclusion of moderating variables is responsive to the demands to pay more attention to the contextual and institutional realities in digital sustainability studies (Kouhizadeh et al., 2021; Rejeb et al., 2023). Lastly, the framework expands the coverage of the service ecosystems frameworks by showing how the mechanisms of trust formation work in digitally mediated and multi-actor settings instead of the dyadic firm-consumer relations.

5.5 Managerial implications

To practitioners, the findings would imply investments in digital and AI technologies should be planned in line with transparency goals and not as independent innovations. The companies are to pay attention to converting technological abilities into the consumer facing transparency that could be prepared, understandable, and verifiable. Transparency initiatives can be made more effective by strengthening their ability to build trust, which can be achieved through facilitating digital literacy by providing transparent communications, standardized disclosures, and user-friendly interfaces (Ali et al., 2024).

Managers also need to understand how institutional alignment helps to maintain consumer trust. This can increase the credibility of transparency and minimize the cynicism linked to the risk of greenwashing through collaboration with regulators, third-party auditors, and certification bodies (de Freitas Netto et al., 2020). The cultural expectations of information disclosure in international service ecosystems play a vital role in the context of making sure that transparency programs seek to appeal to a wide range of consumers (Zhang and Li, 2024).

5.6 Policy implications

Policy wise, the research identifies the significance of the regulatory frameworks that will facilitate standardized, verifiable and enforceable transparency practices. Digital policy makers are encouraged to lay emphasis on digital inclusion efforts to reduce the differences in digital literacy and access to make sure that the benefits of transparency are distributed (United Nations Environment Programme, 2022). One can further reduce the dark side of digitalization such as information manipulation and loss of trust in digital mediated supply chains through strengthening regulatory oversight (Naseem et al., 2024).

6. Conclusions

The aim of this study was to synthesize and conceptualize the current knowledge about the effects of digital and artificial intelligence (AI) technologies on sustainable consumption in service ecosystems in terms of transparency in supply chains and consumer trust. The systematic review and synthesis of previous studies allow the study to generate a conceptual framework, which explains how digitalization leads to sustainability.

The results show that digital and AI technologies do not directly create consumer trust but, instead, act by providing manageable and verifiable supply chain transparency. Transparency is a mediating factor that diminishes information asymmetry and facilitates the formation of trust in digitally mediated settings in which consumers are no longer physically able to see what goes on during the production and service processes. Consumer trust, in its turn, turns into a key psychological facilitator of sustainable consumption behavior, especially in markets with credibility features and an increased level of mistrust in sustainability claims.

Significantly, the research points out the fact that the success of the digitally enabled transparency is not universal but is dependent on the conditions of boundary situations. Digital literacy also determines the ability of consumers to access, analyze, and interpret the transparency indicators and the regulatory enforcement and cultural norms determine the perceived validity and applicability of the information disclosed. The framework addresses such previous demands of more subtle, context-specific models of digital sustainability and trust development in service ecosystems by including these moderators.

In all, the paper brings some conceptual clarity to literature because it has unraveled the links between digital technologies, transparency, trust, and sustainable consumption. The framework suggested offers a logical basis of future empirical studies and gives practical recommendations to managers and policymakers who are interested in using digitalization as an instrument of achieving sustainable development.

Although this research contributes to the literature on digitally empowered sustainable consumption, there are several opportunities for future research based on the conceptual breadth and scope of the study and its restrictions.

First, the proposed framework needs to be empirically tested in different service ecosystems and industry settings in the future. Quantitative research would help to determine the strength and direction of proposed relationships, especially the mediating impact of supply chain transparency and moderating impacts of digital literacy, regulatory enforcement and cultural norms. It would also be particularly useful in comparing the interactions between institutional and socio-economic contexts and trust formation processes through comparative studies conducted in developed and developing markets.

Second, longitudinal and dynamic dynamics of digitally enabled transparency and trust can be researched in the future. The formation of trust is not a one-time event, and longitudinal designs may provide information on how long-term transparency practices change customer trust and behavior in the long term, especially under regulatory changes or technological progress. These studies would enhance the knowledge on trust resilience and corrosion in digitally mediated supply chains.

Third, researchers can explore the dark side of digital transparency such as information overload, algorithmic bias, and manipulating the digital disclosures. Although transparency is typically linked to positive results, over-disclosure or information disclosure that is not designed well can further increase consumer distrust or solidify digital inequality. More conceptual and empirical research is required to learn these unintended consequences and what they mean to sustainable consumption.

Lastly, further studies could expand the framework by adding other ecosystem actors, including platform providers, certification bodies, and civil society organizations. A deeper analysis of the co-creation process, verification or challenge of transparency narratives by these actors would inform service ecosystem views and would help better understand digital sustainability governance.

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