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Artificial Intelligence and Social Fragmentation: Sustainable Supply Chain as A Strategic Tool for Societal Resilience

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ABSTRACT

Where economic and environmental aspects are considered to be the core parts of sustainable supply chain, yet the social aspect is seen as too peripheral while warranting sustainable supply chain. This study uses a review-based approach to analyze the social implications of Artificial Intelligence (AI) and how they can be addressed within business supply chains. To effectively explore the social aspect in sustainable supply chain, Artificial Intelligence (AI), is considered to be a transformative force in the process that may amplify the social fabric in a circular economy.

Using sustainable supply chain as a tool is likely to complement the erosion of social cohesion. In sustainable supply chain, intentional design and ethical considerations could enable AI to mend rather than exacerbate these divides. This study employs a mixed-methods approach, combining bibliometric analysis with an integrative literature review. The bibliometric analysis of 112 publications (2010-2025) first maps the field, revealing a significant gap: while research on sustainable supply chains grows at 14.87% annually, explicit links to AI and social fragmentation are rare, building on this Using an integrative literature review, the study has attempted to reconstruct AI's disruptive implications through the lens of socially sustainable supply chain and conceptualizes to explain how supply chains can restore social cohesion, rebuild trust, and enhance inclusive value creation. The study further adds academic rigor by reframing AI not merely as a technological enabler but as a socio-technical force that reshapes relationships, networks, and power asymmetries. It concludes by emphasizing the moral responsibility of technologists, policymakers, and citizens to embark upon sustainable supply chain as a strategic tool to shape AI's role in rebuilding the social fabric.

Introduction

The concept of the "social fabric" has long been a cornerstone in discussions about societal cohesion, trust, and collective identity. It refers to the intricate web of relationships, shared values, norms, and institutions that bind individuals into communities and societies. When it is said that social fabric is "torn," it refers to a state where these connections are weakening or breaking down, leading to instability, alienation, and conflict. This phenomenon is not new—historically, societies have faced periods of fragmentation due to wars, economic crises, or cultural shifts—but the contemporary era presents unique challenges exacerbated by rapid technological advancements, particularly in the realm of Artificial Intelligence (AI) (Manoharan et al.,2024). The premise

of research is to enhance social acceptability of AI by capitalizing on sustainable supply chain as a strategic tool. This aspect introduces AI as a socio-technical system. AI must be understood not merely as a technological artifact or operational tool, but as a socio-technical system—a dynamic configuration of algorithms, data infrastructures, human actors, organizational routines, institutional logics, and societal norms that co-evolve over time (Kudina & Poel, 2024).

Within business and supply chain contexts, AI does not operate in isolation; rather, it embeds itself within existing power structures, labor relations, governance mechanisms, and cultural values, thereby actively shaping social outcomes alongside economic and environmental performance. Conceptualizing AI as a socio-technical system reveals how its impacts on trust, inclusion, transparency, and social cohesion are not accidental externalities, but structurally produced consequences of how technological capabilities interact with human decision-making, ethical frameworks, and institutional arrangements. From this perspective, AI-enabled supply chains emerge as critical societal interfaces where efficiency-driven automation can either exacerbate social fragmentation—through exclusionary procurement, algorithmic opacity, and labor precarity—or, when intentionally designed and governed, function as mechanisms for social repair (Weger & Yeazitzis, 2023). By foregrounding the socio-technical nature of AI, this study advances the argument that sustainable supply chains represent not only operational systems but moral and social infrastructures capable of mediating AI's societal implications, repositioning business organizations as active agents in rebuilding trust, restoring social cohesion, and shaping a more inclusive and ethically grounded AI-driven economy.

The advancement in AI has led to the generation of novel ideas and data related to various aspects of supply chain management. However, it is pertinent to explore the social considerations which are usually ignored while supply chain operations are in progress (Dauvergne 2022). The rise of AI as a transformative force in society has introduced both opportunities and risks. On one hand, AI holds the potential to address pressing global challenges such as climate change, healthcare disparities, and educational inequities (D. Corsaro et al. 2022). On the other hand, its current trajectory often mirrors and amplifies societal fractures, contributing to the erosion of trust, polarization, and inequality. This paper explores how artificial intelligence orientation may address the social fabric while linking it to sustainable supply chain. While AI becomes pervasive in day to day business activities, complementing the erosion of social cohesion through sustainable supply chain will ensure value creation (Ratten, 2022). It is to explore too how intentional design and ethical considerations could enable AI to mend rather than exacerbate these divides.

To understand this dynamic within supply chain management, it is essential to examine the notion of a *torn social fabric* and its interaction with AI-enabled supply chain systems. Drawing on theoretical perspectives from human-centered disciplines, this study demonstrates how AI both reflects and intensifies structural fractures within supply chains and their broader socio-institutional environments. For example, the erosion of trust among key supply chain stakeholders—governments, firms, suppliers, and consumers—is a critical manifestation of a torn social fabric. This erosion is exacerbated by AI-driven misinformation, algorithmic opacity, and deepfake technologies, which distort information flows, weaken governance mechanisms, and undermine confidence in supply chain transparency and accountability (Wardle & Derakhshan, 2017). Such distortions can lead to stakeholder misperceptions regarding product quality, ethical standards, and operational integrity. These AI-enabled mechanisms are not merely passive mirrors of existing vulnerabilities; rather, they actively contribute to the fragmentation of supply chain relationships by shaping how stakeholders interpret data, assess risk, and coordinate actions across the supply network.

The concept of *sportswashing* is introduced not merely as an analogy but as a theoretical lens for understanding complicity, legitimacy laundering, and stakeholder distraction, which are equally relevant to AI-enabled supply chains. In sportswashing, corporations or states strategically associate themselves with popular sports to divert attention from unethical practices, thereby making fans, athletes, sponsors, and governing bodies unwittingly complicit in legitimizing wrongdoing (Fruh et al., 2023). This mechanism of moral distraction and normalized complicity provides a powerful framework for analyzing how similar dynamics operate within global supply chains.

The era of AI is characterized by rapid technological advancement but also uncertainty about its societal implications. While AI has the potential to solve global challenges, its current trajectory often aligns with and amplifies societal fractures. Key factors include the speed of technological change, which outpaces our ability to regulate or understand its impacts, and the concentration of AI technologies in the hands of a few corporations and governments, raising concerns about equity and fairness (Brynjolfsson & McAfee, 2014). These dynamics highlight the dual role of AI as both a mirror and an amplifier of societal trends, capable of reflecting existing fractures while simultaneously deepening them.

The concept of sportswashing is well known in terms of understanding how AI leads to a torn social fabric in connection with supply chain systems. Organizations which use AI in their supply chain have experienced seamless information flows, improved decision making and refined general perception among the masses. Logistics and manufacturing industries have witnessed strong impact of sound AP applications in terms of optimized operations (Zuboff, 2019). Inequitable algorithmic procurement practices can

marginalize smaller suppliers, creating exclusionary dynamics that strain the broader socio-economic fabric (Santoso et al. 2024). Yet, when deliberately designed and ethically governed, AI within sustainable supply chains can assume a reparative role—enhancing transparency across tiers, enabling fairer sourcing, strengthening traceability, and fostering collaborative networks that rebuild trust and social cohesion.

The purpose of this paper is to use a review based literature review that helps examine how AI contributes to the tearing of the social fabric while also exploring its potential to repair societal bonds (Sartori & Theodorou, 2022). By synthesizing observations, theoretical frameworks, and empirical evidence, we aim to elucidate the ethical challenges posed by AI in an era of societal fragmentation particularly from t.he lens of supply chain. The structure of the paper follows a conceptual flow, beginning with an exploration of what it means for the social fabric to be torn, examining AI's role in amplifying societal fractures, and taking supply chain to leveraging AI imperatives. The scholarly attention at this critical intersection is rapidly growing, as evidenced by a bibliometric analysis of the field (2010-2025), which shows an annual growth rate of 14.87% in publications linking supply chain, AI, sustainability, and social factors. However, this same analysis reveals a significant thematic imbalance: while keywords like 'supply chain management' (8% frequency) and 'sustainable development' (5%) dominate, 'artificial intelligence' appears in only 1% of the keyword landscape, and terms like 'social fragmentation' are notably absent. This quantitative gap in the literature underscores the novelty and necessity of the present inquiry, which seeks to explicitly bridge AI, social fragmentation, and supply chain strategy (Hendriksen, 2023). Through this analysis, we hope to contribute to ongoing discussions about the intersection of technology, business, and society, emphasizing the moral responsibility of technologists, policymakers, and citizens to shape AI to serve the common good (Muldoon et al. 2025).

Exploring Indicators and Implications for Torn Social Fabric

Importance of supply chain is considerable with reference to the torn social fabric in terms of how disruptions in social cohesion—such as declining trust, widening inequalities, labor exploitation, and weak institutional accountability manifest within supply chains and influence their performance (Hao & Demir, 2023). Key indicators include unethical sourcing practices, exclusion of small suppliers, workforce precarity, lack of transparency, and power imbalances between global firms and local actors. The implications are significant: such fractures increase operational risks, reduce resilience, damage corporate legitimacy, and undermine long-term sustainability. Understanding these indicators helps organizations redesign supply chains that are not only efficient but also socially inclusive, ethical, and trust-based, thereby contributing to the repair of the broader social fabric.

One of the most prominent indicators of a torn social fabric is the erosion of trust. Trust serves as the foundation of social cohesion, enabling individuals to rely on institutions, governments, and one another. However, recent decades have witnessed a decline in trust across multiple domains. For instance, surveys conducted by the Pew Research Center reveal that public confidence in institutions such as the government, media, and corporations has steadily decreased over the past half-century (Smith et al., 2020). This decline is fueled by factors such as corruption, misinformation, and systemic failures, which undermine the legitimacy of these entities. The erosion of trust is particularly concerning because it creates a feedback loop: as trust diminishes, individuals become more skeptical and less willing to engage in collective action, further weakening societal bonds. Developing communal relationships, ethical values, and impartial employment opportunities may help promote ecofriendly business environments. Such ecofriendly business environment will lead to sound social clout.

Theoretical frameworks from sociology and philosophy provide valuable insights into the implications of a torn social fabric in the context of AI and its applicability to supply chain. Social capital theory, for instance, emphasizes the importance of networks and trust in fostering collective action (Coleman, 1988). When these elements weaken, societies become more vulnerable to instability and conflict. The relationship between society and supply chain management (SCM) with reference to AI is structural, relational, and institutional, not merely contextual (Yaroson & Roux, 2025). Supply chains are not only technical systems for moving goods; they are social systems embedded in society. Thus it is the application of AI which is required to be determined in terms of providing a framework that ensures the systems corresponding to human behavior, power relations, norms, and institutions (Valdivia, 2025).

These frameworks underscore the need for interventions that address the root causes of societal fragmentation. Such intervention may be effectively assessed in supply chain of businesses.

In conclusion, a torn social fabric reflects the inability of AI to sustainably arouse the society with trust, shared values, ethics addressing the challenges to torn social fabric. Ensuring ethical and healthier social trends through AI in supply chains may help effectively address the torn social fabric.

Mechanisms and Manifestations

Artificial Intelligence (AI) assumes a dual role in contemporary societies; while its exploitative and opaque uses can deepen societal fractures, its responsible integration within supply chains offers a powerful mechanism for repairing a torn social fabric. Modern supply chains operate as socio-technical systems embedded within economic, political, and institutional contexts, making them uniquely positioned to translate AI from a source of inequality into an instrument of trust and inclusion. When governed ethically, AI-enabled supply chain tools such as transparency platforms, traceability systems, and fair-trade monitoring can reduce information asymmetries, curb exploitative practices, and enhance accountability across stakeholders (Sharma, Gunasekaran & Sabramanian, 2024). By fostering visibility, equitable value distribution, and participatory decision-making, businesses supply chains can mitigate polarization and rebuild institutional trust, thereby transforming supply chains from passive reflectors of social divisions into active agents of social repair and cohesion.

AI as an Active Contributor

Within business supply chains, AI systems increasingly mirror and reinforce existing societal fractures by reproducing dominant economic priorities, power asymmetries, and efficiency-driven logics. Algorithmic decision-making in areas such as demand forecasting, supplier selection, and inventory optimization often prioritizes cost reduction and speed over social equity (Rolf et al. 2023). As a result, AI-enabled procurement systems may systematically favor large, data-rich suppliers while marginalizing small producers, informal workers, and developing-country vendors, thereby reflecting and amplifying pre-existing inequalities embedded in global supply networks. This algorithmic bias mirrors broader societal trends in which economic value is privileged over social well-being.

A related manifestation is the emergence of algorithmic silos within supply chains, analogous to social media echo chambers. AI-driven platforms tend to reinforce established supplier relationships and historical performance data, limiting exposure to alternative suppliers, ethical sourcing options, or innovative business models. Such data-driven path dependency reduces diversity within supply networks and restricts opportunities for inclusive participation. Scholars argue that this form of technological lock-in narrows organizational vision and weakens adaptive capacity, while simultaneously entrenching unequal power relations across supply chain tiers (Archer & Matheson, 2021).

Furthermore, the automation of supply chain interactions has led to a measurable erosion of human connection across business ecosystems. AI-mediated systems increasingly replace relational governance—traditionally based on trust, negotiation, and long-term collaboration—with transactional, performance-based metrics. While automation enhances efficiency, it can also distance firms from workers, suppliers, and communities, particularly in labor-intensive sectors such as manufacturing, logistics, and agriculture. Frey and Osborne (2017) note that such automation diminishes interpersonal engagement, which is critical for trust-building and social cohesion. In this way, AI-driven supply chains mirror broader societal tendencies toward depersonalization, contributing to a fragmented social fabric within and beyond business networks.

Gauging AI's Impact in Real World

Real-world examples illustrate the mechanisms through which AI contributes to societal fragmentation. The Facebook-Cambridge Analytica scandal provides a stark illustration of how AI-driven microtargeting can deepen societal fractures. During the 2016 U.S. presidential election, Cambridge Analytica used AI algorithms to analyze user data and deliver personalized political advertisements. This approach not only influenced voter behavior but also exacerbated polarization by targeting individuals with divisive content (Cadwalladr, 2018). Similarly, China's Social Credit System demonstrates how AI-driven surveillance can erode civil liberties and foster societal divisions by rewarding compliance and punishing dissent (Creemers, 2018).

Real-world business cases demonstrate how AI-driven supply chain applications can both expose and intensify societal fragmentation when deployed without ethical and institutional safeguards (Wu, Liu & Liang, 2024). In global manufacturing and retail supply chains, AI-enabled demand forecasting and dynamic pricing systems have been shown to shift risks downstream, disproportionately burdening small suppliers and contract workers. Similarly, the use of AI-driven monitoring and performance management systems in logistics and warehousing illustrates how technological efficiency can erode trust and social cohesion. Companies increasingly rely on algorithmic surveillance to track worker productivity, delivery times, and error rates. While these systems improve operational efficiency, studies indicate that excessive monitoring fosters stress, alienation, and adversarial labor relations, particularly in platform-based and gig logistics models. At the same time, emerging applications of AI in supply chain transparency and traceability provide contrasting evidence of AI’s reparative potential. When aligned with inclusive governance

frameworks, these tools can enhance accountability, rebuild trust among stakeholders, and support fairer value distribution. Collectively, these cases underscore AI's dual role in real-world supply chains—as both a reflector and amplifier of societal fractures, and, under responsible governance, as a mechanism for mitigating fragmentation and fostering social cohesion

Challenges and Opportunities for Supply Chain in Shaping Society Wellbeing

Supply chains should be reimagined not merely as operational systems but as social institutions with moral and developmental responsibilities. When businesses align supply chain strategies with societal well-being, they contribute to sustainable economic growth, reduced inequality, and stronger social cohesion (Allen, Zhu & Sarkis, 2021). This shift requires integrating ethical AI governance, stakeholder engagement, and human-centered metrics into supply chain design, positioning supply chains as active agents in shaping a more inclusive and resilient society. a central challenge lies in the dominance of efficiency-driven and profit-maximization models that prioritize cost reduction over social value creation. AI-enabled supply chains often intensify this challenge by accelerating decision-making while obscuring accountability, leading to labor exploitation, supplier marginalization, and environmental degradation. Another critical challenge is the asymmetry of power within global supply chains. Large multinational corporations increasingly control AI-driven procurement, logistics, and forecasting systems, enabling them to shift risks downstream to small suppliers and informal workers (Hickok, 2024).

Unprecedented Technology Disruption

One of the defining features of the AI era is the unprecedented speed of technological change. AI systems evolve faster than our ability to regulate or understand their societal impacts, leading to unintended consequences. Brynjolfsson and McAfee (2014) describe this phenomenon as the "second machine age," where exponential growth in computing power enables rapid innovation. While this progress holds immense promise, it also poses significant challenges. For instance, the rapid deployment of AI-driven automation has outpaced efforts to develop adequate social safety nets, leaving displaced workers vulnerable to economic insecurity. Similarly, the proliferation of AI-generated misinformation has outstripped efforts to combat its spread, undermining trust in information and institutions.

The speed of change also exacerbates the gap between technological innovation and ethical oversight. Regulatory frameworks often lag behind technological advancements, leaving AI systems unaccountable for their societal impacts. For example, facial recognition technology has been widely adopted before robust safeguards were established to address privacy and bias concerns. This regulatory lag not only undermines public confidence in AI systems but also deepens societal fractures by fostering a sense of helplessness and mistrust.

Power Imbalances

Another critical factor shaping the era of AI is the concentration of power in the hands of a few corporations and governments. Control over AI technologies is increasingly concentrated in entities with significant resources and influence, raising concerns about equity and fairness. Pasquale (2015) describes this phenomenon as the "black box society," where opaque algorithms and proprietary data sets reinforce existing power imbalances. For instance, tech giants like Google, Amazon, and Facebook wield disproportionate influence over the development and deployment of AI systems, often prioritizing profit over societal well-being.

The focus on technological power is not detached from the academic discourse. In terms of research output, bibliometric findings have showed a strong geographic imbalance with North America accounting for approximately 100 publications in the dataset, compared to only 5 from Africa and 10 from South America. This suggests that the frameworks, assumptions, and solutions dominating the literature may not adequately reflect the social fragmentation challenges and AI adoption contexts in the Global South. This geographic concentration of research influence is visualized in Figure 1 which shows that this undermines democratic accountability and exacerbates societal fractures. Marginalized groups, in particular, are disproportionately affected by biased or exploitative AI systems.

Human Dependency

A third factor shaping the era of AI is the growing dependence on AI systems for decision-making, creativity, and emotional support. As individuals increasingly rely on AI for guidance and validation, there is a risk of losing essential human skills and connections. Harari (2018) describes this phenomenon as the "data religion," where individuals defer to algorithms for answers to complex questions. While this reliance can enhance efficiency and convenience, it also diminishes opportunities for critical thinking, empathy, and collaboration.

The dependency on AI systems also raises ethical concerns about autonomy and agency. For instance, AI-driven recommendation systems shape individuals' preferences and behaviors in ways that may not align with their best interests. This manipulation not only undermines personal autonomy but also erodes societal bonds by fostering a culture of passivity and conformity. Similarly, AI-driven emotional support systems, such as chatbots and virtual assistants, provide temporary relief but fail to address the root causes of loneliness and disconnection. These dynamics highlight the need for interventions that balance the benefits of AI with the preservation of human agency and connection.

AI in Supply Chain Help Mend the Social Fabric? Strategies for Repair and Transformation

AI can strengthen human-centered governance and collaboration in supply chains (Kumar & Kumar, 2025). While AI currently complements the tearing of the social fabric, it has the potential to play a reparative role by promoting transparency, bridging divides, and enhancing human connection in supply chains. This section explores strategies for leveraging AI strategies in supply chain to mend societal bonds, emphasizing the importance of intentional design, regulation, and ethical considerations.

Promoting Transparency

One of the most promising ways AI can mend the social fabric is by promoting transparency and accountability in supply chain. Transparent AI systems enable the managers of supply chain businesses to understand how decisions are made, fostering trust and confidence in their outcomes. Floridi et al. (2018) emphasize the importance of explainability in AI systems, arguing that transparency is essential for ensuring accountability and fairness. For instance, AI-driven tools can be used to detect and combat misinformation by providing users with clear explanations of how content is flagged or removed.

Government regulations have enabled businesses to develop supply chain frameworks that play a crucial role in promoting transparency (Meltzer, 2023). Policymakers must establish robust safeguards to ensure that AI systems are accountable for their societal impacts. For example, the European Union's General Data Protection Regulation (GDPR) requires organizations to provide users with clear explanations of how their data is collected and used. These regulations not only enhance public confidence in AI systems but also mitigate the risks of exploitation and abuse.

Bridging Divides

AI can play a critical role in bridging divides within and across supply chains by fostering dialogue, coordination, and mutual understanding among diverse and often fragmented stakeholders, including suppliers, manufacturers, logistics providers, regulators, and local communities. Drawing on Dahlgren's (2009) insights on the role of digital platforms in facilitating constructive engagement, AI-enabled supply chain platforms can create spaces for transparent information sharing and collaborative problem-solving. For instance, AI-driven analytics can identify shared objectives—such as cost efficiency, risk reduction, or sustainability compliance—among supply chain partners with competing interests, thereby enabling more informed and cooperative decision-making.

Strategic tools can promote data literacy, ethical awareness, and critical evaluation of AI based insights among supply chain professionals (Buchan et al., 2024). For example, intelligent learning platforms can deliver personalized training modules on topics such as responsible sourcing, bias in supplier evaluation, and sustainability reporting. These initiatives not only enhance individual decision-making capabilities but also strengthen relational trust and social cohesion across supply chains by fostering a shared understanding of values, responsibilities, and long-term collective goals (Hämäläinen et al., 2021).

Enhancing Human Connection

Supply chains, when designed with a human-centric orientation, can significantly enhance human connection by augmenting rather than replacing interpersonal collaboration across networks of suppliers, manufacturers, distributors, and communities (Villar et al. 2023). Organizations now focus on supply chains which operate as relational ecosystems where trust, coordination, and shared purpose are essential. In line with Shirky's (2010) emphasis on technologies that complement human capabilities, AI based supply chain systems can strengthen communication and cooperation among geographically dispersed actors, enabling meaningful professional relationships despite physical and cultural distance. AI can also enhance human connection in supply chains by supporting emotional and social dimensions of work, particularly in complex, high-pressure environments (Riad et al. 2024).

Examples of Positive AI Applications

Real-world examples illustrate the potential of AI to mend the social fabric. Projects like IBM's Watson Health and Microsoft's AI for Earth demonstrate how AI can be used to address pressing global challenges such as healthcare disparities and environmental

sustainability. Similarly, community-building platforms like Nextdoor and Meetup leverage AI to connect individuals based on shared interests and values, fostering a sense of belonging and solidarity. These examples highlight the importance of intentional design and ethical considerations in leveraging AI to promote societal cohesion.

From supply chain perspective, for instance, the application of AI in retail and manufacturing sectors help to forecast market demand and further allows the company to augment right quantities and manage stockouts and overproduction. The repercussions may be seen in terms of reduced waste, improved carbon footprint, and pleasant customer experience (Kacar, 2023).

In conclusion, AI has the potential to mend the social fabric by promoting transparency, bridging divides, and enhancing human connection. By fostering collaboration between technologists, policymakers, and citizens, we can ensure that AI serves the common good and addresses the challenges posed by societal fragmentation.

Challenges and Opportunities

The integration of AI into supply chains presents both significant challenges and transformative opportunities for addressing societal fragmentation. On the one hand, the rapid pace of technological adoption, increasing concentration of decision-making power among dominant firms, and growing dependence on algorithmic systems pose serious risks to social cohesion within and across supply chain networks.

On the other hand, AI-enabled supply chains hold substantial potential to address pressing global challenges and promote equity, inclusion, and resilience. When intentionally designed, AI can enhance supply chain transparency, improve labor condition monitoring, and support ethical sourcing practices, thereby strengthening trust between producers, firms, and consumers (Iftikhar et al. 2024). These opportunities highlight the critical importance of fostering collaboration among technologists, supply chain managers, policymakers, and civil society actors to ensure that AI serves the common good within supply chain ecosystems. Ethical governance frameworks, participatory design, and regulatory oversight are essential to balancing efficiency with social responsibility (Richey et al. 2023). In conclusion, the AI era in supply chains is characterized by rapid technological advancement, uneven power distribution, and increasing human reliance on automated systems. While these dynamics pose challenges to trust, equity, and social cohesion, they also offer opportunities to redesign supply chains as human-centered, transparent, and socially embedded systems.

Proposed Conceptual Framework

Table 1: Divergent Routes of AI Adoption in Supply Chains

Dimension	Fragmentation Route	Restoration Route
Origin	Implementing AI primarily as a tool for efficiency and cost optimization	Socio-technical intervention on ethical and governance basis
Underlying Governance Conduit	Profit maximization, centralized decision-making, weak ethical oversight	Sustainability orientation, Value co-creation, Responsible business
Core Mechanisms	Supply chain malfunction, Opaque decision-making, Fractured relationships	Synchronized supply chain, inclusive design, human-centered AI
Operational Mechanism	Efficiency over equity and social outcomes	Equity social wellbeing alongside efficiency and performance
Impact on Stakeholders	Marginalization of small suppliers and workers; reduced bargaining power	Enhanced stakeholder participation; shared value across supply-chain tiers
Social Fabric Outcomes	Irresponsible business activity, Erosion of trust, reduced supply-chain diversity	Rebuilt trust, inclusive value creation, enhanced supplier diversity
Moderating Factors	Institutional weakness, asymmetric stakeholder power, opaque technical design	Supportive institutions, balanced stakeholder power, explainable and accountable AI

Dimension	Fragmentation Route	Restoration Route
Strategic Intervention Points	Limited or reactive interventions	Proactive interventions at policy, organizational, technical, and network levels
Overall Trajectory	Social fragmentation and concentration of economic and decision-making power	Social restoration through collaboration, shared benefits and shared governance

Proposed Conceptual Framework: Divergent Pathways of AI Adoption in Supply Chains

Building upon the analysis of AI's role in either fragmenting or revamping the social fabric within supply chain contexts, the proposed conceptual framework synthesizes the theoretical and empirical insights into an integrative conceptual framework. The proposed model (Table 1) delineates two analytically distinct routes; the Fragmentation Route and the Restoration Route that illustrate divergent trajectories of AI adoption in supply chains (Belhadi et al. 2021). The proposed conceptual framework is built to assess if AI enabled supply chain would help scholars and practitioners to configure a socially responsible and sustainable business.

Conceptual Underpinning

The conceptual framework builds upon socio-technical systems theory, which posits that technological systems and social structures are mutually constitutive and co-evolve over time (Kudina & Poel, 2024). According to this perspective, AI as a tool cannot be perceived in isolation to act for supply chains; rather, it has to be reframed in terms of design, governance, and operational logics directing toward the social relations, power asymmetries, and institutional arrangements within which it is embedded. Consequently, the framework recognizes that the trajectory of AI adoption is contingent upon the underlying governance logics, stakeholder configurations, and ethical commitments that accompany technological implementation.

Besides, the framework gains support from social capital theory (Coleman, 1988; Putnam, 2000), which refers to the role of trust, networks, and shared norms in enabling collective action and societal cohesion. The Fragmentation Route reflects conditions under which AI-enabled supply chains weaken social capital by displacing relational governance with transactional patterns, marginalized stakeholders' orientation, and concentrated decision-making. The Restoration Route on the other hand specifies AI enabled supply chain with reference to trust rebuilding, fostered inclusive participation, and distribute benefits more equitably across supply chain tiers.

Methodology

This study employed a review-based methodology, capitalizing on findings from peer-reviewed academic literature, government policy reports, and some case studies published between 2015 and 2025. Key methodological steps include:

- Systematic literature review focused on AI, sustainable supply chain, and ecosystem
- Mainstream trends around adoption of AI and ensuring sustainable supply chain
- Bibliometric Analysis / Data Collection

Table 1. The keywords for the literature search.

Category	Keywords
AI	Artificial Intelligence, Machine Learning, Generative AI
Amplification	Elaboration, Addition, Modification, Renovation, Revision
Social Fabric	Community Social Coherence, Social Structure, Social Cohesion

Category	Keywords
Circular Economy	Service Economy, Upcycling, Sharing Economy, Circular Supply Chain
Supply Chain	Sustainable, Supply Chain, Business

Using keywords methodology such as *"social fabric," "polarization," "supply chain,"* with *"AI," "artificial intelligence* various databases and sources were consulted. The sources included peer-reviewed journals, online technology and social magazines and open-access repositories (PMC, arXiv). The study mainly focused on literature ranging from 2015 to 2025 that witnessed and produced researches on the underlying matter of AI general impact or ramifications on social fabric.

The primary purpose of the study is to grasp the literature on AI's effects on social fabric from various perspectives particularly supply chain management published in multidisciplinary journals (Vinuesa et al., 2020). This has facilitated in developing clarity in comprehension that how these multidimensional aspects of AI have led to the applicability of sustainable supply chain that ensures socio-technical orientation (Soares et al. 2024). This integrative approach has enabled to comprehend how social fabric may be further improved under the shadow of AI and to support the sustainable supply chain process.

Research Tool

Bibliometric Analysis. To empirically ground the literature review and map the research landscape, a bibliometric analysis was conducted. Data was extracted from the Scopus database using a structured query focused on supply chain concepts ("Supply Chain," "Circular Supply Chain," "Sustainable Supply Chain") combined with social cohesion indicators ("social structure," "social cohesion," "social disruption"). The search, limited to 2010-2025, yielded 112 documents from 80 sources. These documents were analyzed using bibliometric techniques to identify publication trends, core sources, geographic distribution, collaborative networks, and thematic evolution. This quantitative analysis complements the subsequent integrative review of key theoretical and empirical papers, ensuring a comprehensive understanding of both the field's scope and its substantive gaps.

Metric	Result
Timespan	2010-2025
Sources (Journals, Books, etc.)	80
Documents Analyzed	112
Annual Growth Rate	14.87%
Avg. Citations per Document	20.15
Keywords Plus / Author's Keywords	784 / 443
International Co-authorship %	26.79

The discourse is primarily shaped by a core set of interdisciplinary journals. Analysis via Bradford's Law identifies 'Sustainability (Switzerland),' 'PLOS ONE,' and leading operations journals (e.g., 'International Journal of Production Research') as the most

prolific sources. This indicates that the conversation is happening at the nexus of environmental science, multidisciplinary sciences, and operational management, yet with less frequent contribution from core sociology or ethics journals. The core sources shaping the discourse, as identified by Bradford's Law analysis, are presented in Figure 2

Figure 1: **Geographic Distribution of Publications in the Analyzed Dataset (2010-2025)**

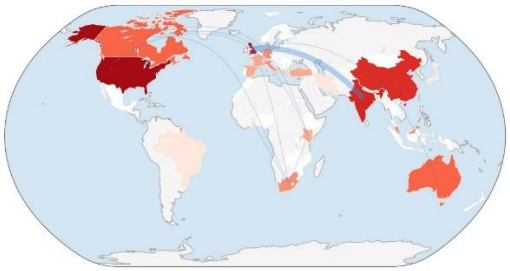
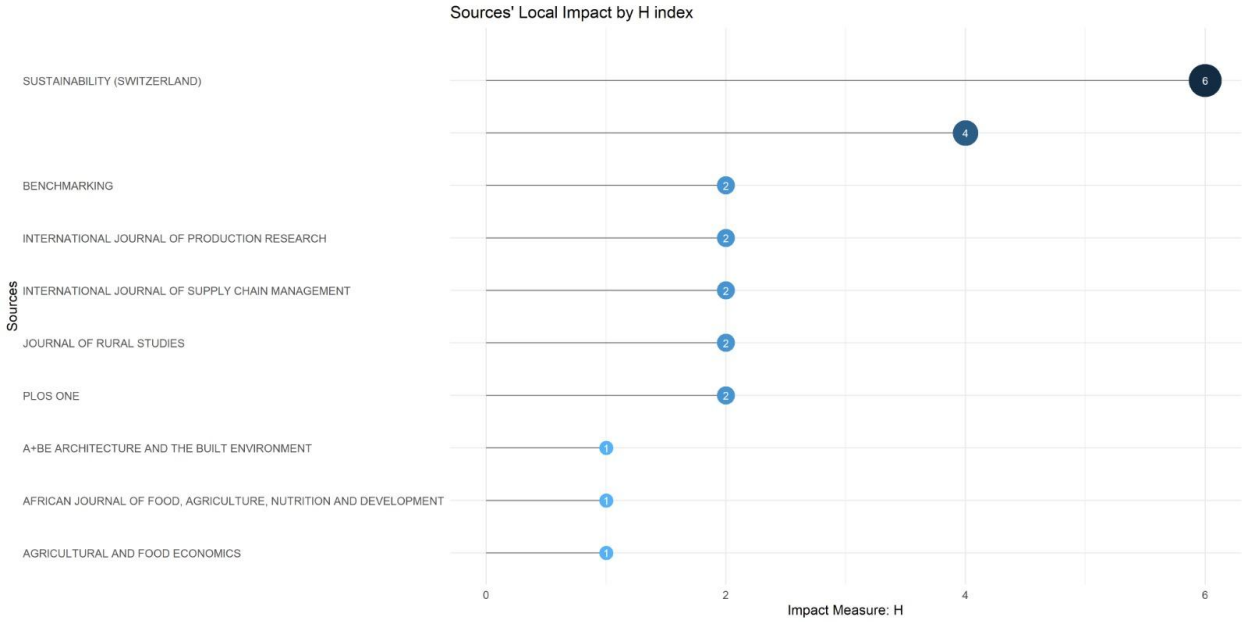


Figure 2. Core Sources by Bradford's Law, Highlighting the Most Prolific Journals.



Conclusion

The literature gives a subtle view that AI has some contribution or impact on amplifying echo chambers, enabling manipulation, and reinforcing inequality. A wide range application of AI highlights a critical challenge of our time due to polarization, inequality, and mistrust, that AI has amplified resulting into misinformation, and economic displacement. By addressing the ethical, social, and political dimensions of AI, we can steer its development toward healing rather than further tearing the social fabric. The question is not whether AI will shape society, but how we will shape AI to serve the common good. Considering the pervasive clout generated by AI in multifaceted socio-economic implications, it is pertinent to devise a strategic integration of AI through supply chain. There is likelihood to witness a more balanced and sustainable social fabric using the strategic tool of sustainable supply chain for equitable socio-economic future.

This paper has argued that AI-enabled sustainable supply chains can be strategically designed as tools for societal resilience. This argument addresses a clear gap illuminated by bibliometric analysis: the weak thematic link between 'Artificial Intelligence' and 'Social Cohesion' within the supply chain literature, and the under-representation of research from vulnerable geographies. Future research must therefore pursue two parallel tracks: first, deepening interdisciplinary work that integrates sociological theories of fragmentation with technical AI supply chain models; and second, prioritizing contextual studies in regions like Africa and South America, where the social fabric faces unique pressures and where AI-supply chain interventions must be uniquely calibrated. By doing so, the field can evolve from largely documenting efficiency gains to proactively engineering systems for social repair.

It is insufficient to focus solely on the technical optimization of AI within supply chains; policymakers and industry leaders must also address the ethical, social, and institutional dimensions shaping this transformation. When governed responsibly, AI-enabled supply chains can move beyond efficiency gains to promote fair resource distribution, transparent decision-making, and the reduction of systemic inequalities across global production and distribution networks. This transformation represents not merely a technical challenge for supply chain management, but a broader societal opportunity to reconfigure supply chains as engines of inclusion, resilience, and sustainability. Approached thoughtfully and collaboratively, AI-driven supply chains can play a pivotal role in strengthening social cohesion, supporting community well-being, and building a more equitable and sustainable future for all stakeholders.

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