Supply chain resilience and just transitions in the Global South

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This study analyses one of the different dimensions of climate and ecological risk in the Global South, namely that of supply chains in these regions. The resilience of this economic-territorial tool is analysed through the lens of just transitions, reframing supply chains as socio-ecological systems. This perspective aligns with emerging interdisciplinary approaches while offering an original focus on territorial justice, informal economies, and participatory governance in urban logistics systems. The article innovatively proposes the integration of logistics and social resilience, and examines how decarbonisation, circular economy strategies and participatory

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Introduction

Sustainability transitions in the Global South confront complex challenges arising from climate change, ecological degradation, and entrenched global economic inequalities (WHO, 2021; Simon and Leck, 2014).

While regional integration and trade have spurred growth, they have also intensified socio-environmental disparities (Braun et al., 2018). The United Nations Sustainable Development Goals (SDGs), despite their emphasis on inclusive growth, often coexist with industrial expansion models that accelerate resource depletion, emissions, and inequality (Adelman, 2018). Rapid urbanisation, particularly in informal settlements, heightens vulnerability to environmental risks due to deficient infrastructure (UN-Habitat, 2024; Sonwa et al., 2012). Furthermore, unsustainable supply chain configurations contribute to pollution and public health burdens (EPA, 2022).

governance shape sustainable supply chain transformations, highlighting the risk of reinforcing economic dependencies through sustainability policies centred on the global North that neglect local realities. Extending the discourse from urban planning and social justice to logistics, the research positions supply chains as critical elements of planetary justice. Through a comparative analysis of urban regions in the Global South, the study identifies best practices and obstacles to the sustainable adaptation of supply chains. The findings highlight the importance of participatory governance, regional supply networks and inclusive circular economy models to prevent new forms of economic subordination. By supporting place-based and justice-oriented approaches, this research contributes to strengthening spatial justice transferred to the logistics context, highlighting the central role of supply chains in promoting equitable and resilient ecological transitions for weaker countries.

In the absence of integrated policy frameworks connecting economic development with environmental justice (Caniglia et al., 2016), cities in the Global South face compounding crises (Sachs, 2019).

A key structural driver of these tensions lies in global supply chains (SCs). These systems, while central to economic development, also account for a substantial share of environmental externalities. Moreover, supply chain emissions represent the majority of corporate carbon footprints, with disproportionate contributions from a few sectors (Fuhr, 2021).

Decarbonisation strategies that do not account for territorial disparities risk deepening inequalities—particularly in countries hosting Special Economic Zones (SEZs), where firms often cluster to capitalise on trade advantages (Di Ruocco and D'Auria, 2024).

Sustainability policies shaped in Global North contexts may impose technocratic or compliance-heavy frameworks that reinforce dependencies instead of enabling just transitions (Lintukangas et al., 2023), and this difference is a first disparity at the macro level, furthermore, at the micro-local level, even within the Global South itself, disparities are evident.

Recent global crises have exposed the fragility of these supply networks, particularly within the Global South. Shocks disrupted essential SCs for food, energy, and medical supplies, disproportionately impacting low-income economies and exacerbating poverty and inequali-

ty limiting the logistics activity (Barbieri et al., 2020; Rademaker MTL, 2019; Lozzi et al., 2021). Climate change further amplifies these risks, particularly in vulnerable urban areas where rising sea levels and extreme weather events threaten livelihoods, infrastructure, and food security (Baker, 2012; Kasperson and Kasperson, 2012). These risks are particularly severe in sectors with high climate sensitivity—agriculture, fisheries, extractive industries—where resilience depends on infrastructure, financial capacity, and institutional support (Tucker et al., 2015; Mensah et al., 2022).

Two dominant paradigms shape the discourse on resilience: an engineering model focused on restoring equilibrium (Fiksel, 2016), and a socio-ecological model emphasising adaptive capacities and systemic interdependencies (Folke et al., 2021). The latter is increasingly relevant for the Global South, where fragmented infrastructure and widespread informality require more flexible and inclusive strategies (Negri et al., 2021).

These frameworks frequently neglect the intersections between SCs, environmental justice, and labour inequalities—issues particularly acute in urban areas of the Global South (Wieland, 2021; Feola, 2020). Global value chains (GVCs) have accelerated economic integration but also entrenched asymmetric dependencies. Decarbonisation and circular economy transitions, while conceptually promising, risk marginalising Global South actors when implemented through regulatory models designed in the Global North (Gualandris et al., 2023; Hofstetter et al., 2021). Tools such as Extended Producer Responsibility (EPR) can exacerbate exclusion when access to technology or capital is uneven (Karaosman and Marshall, 2023).

Despite extensive literature on sustainability transitions, a critical gap remains in addressing how SCs function as socio-ecological infrastructures that reproduce or transform systemic inequalities in the Global South. While several recent studies have started to address logistics as embedded in socio-ecological systems, many approaches still frame supply chains primarily through technical and managerial lenses. This paper contributes to this evolving debate by integrating justice and territorial dimensions into the analysis of urban supply chains.

This paper addresses a critical gap by reframing SCs not as linear economic mechanisms, but as territorially embedded and multi-scalar systems involving both formal and informal actors. Logistics is reconceptualised as an ensemble of interconnected practices—including transport, warehousing, coordination, and governance—that mediate flows of goods, labour, and environmental impacts across space. This approach draws on insights from political ecology (Escobar, 2018; Hickel, 2021), urban infrastructure studies (Hodson and Marvin, 2010a,b), and economic geography (Yeun and Coe, 2015), emphasising the socio-ecological complexity of

supply systems in the Global South.

To explore the justice implications of these systems, the study adopts Nancy Fraser's tripartite (2008, 2009) theory of justice—Recognition, Redistribution, and Representation—as a normative lens. Recognition concerns the cultural and political visibility of marginalised actors, such as informal workers and local communities. Redistribution focuses on material equity, including access to logistics infrastructure, green finance, and the distribution of benefits across the supply chain. Representation refers to the democratic inclusion of diverse actors in decision-making, institutional governance, and participatory planning.

Building on this normative foundation, the analysis employs four interlinked dimensions to assess empirical case studies. The first, supply chain resilience, concerns the capacity of urban logistics systems to absorb shocks and sustain operations through adaptive mechanisms and decentralised infrastructure. The second, environmental justice, examines the unequal spatial distribution of environmental risks and burdens—such as pollution, land-use conflicts, and differentiated exposure across social groups. The third dimension, governance and representation, interrogates the extent to which inclusive governance structures and participatory mechanisms shape urban SCs. Finally, the dimension of circular economy and decarbonisation addresses the implementation of reuse strategies, the incorporation of informal economic actors, and the equitable diffusion of clean technologies and climate-related innovations.

Together, these dimensions provide an integrated analytical framework for evaluating the justice outcomes of urban supply chain transitions, moving beyond technocratic or efficiency-based models toward more inclusive and context-sensitive interpretations.

This application of Fraser's tripartite justice model in informal urban contexts is informed by recent studies (see e.g. Rigon, 2022), which highlight its relevance for bottom-up urban interventions. The research questions are:

- RQ1: "How can supply chain management in the Global South transition to socio-ecological systems that support just and inclusive decarbonization?" and
- RQ2: "What governance mechanisms and participatory approaches can enhance resilience and sustainability in urban and regional supply chains?".

The research contributes both empirically and policy-wise: it analyses how cities in the Global South balance economic integration, supply chain resilience and sustainability; it compares urban governance models to highlight best practices and structural barriers; and it provides policy recommendations for decarbonization and inclusive economic transitions.

The study is structured as follows: Section 1 defines the introduction and state of art.

Section 2 introduces the analytical framework.

Section 3 presents the comparative methodology and case study selection. Section 4 shows the results and Section 5 highlights the discussion and policy directions. Section 6 describes the conclusions and recommendations for further studies.

Methodology and Analytical Framework Application

Grounded in urban studies, planning theory, and supply chain governance, this research integrates critical perspectives from socio-ecological resilience and political ecology to investigate how infrastructure transitions intersect with justice outcomes in Southern cities. This section outlines the methodological approach used to examine the role of SCs in enabling just transitions within urban contexts in the Global South. A qualitative comparative case study design, informed by the analytical framework introduced in Section 1, which integrates Fraser's theory of justice (Recognition, Redistribution, Representation) with four operational dimensions: supply chain resilience, environmental justice, participatory governance, and circular economy transitions according to main studies in this sector (Herrera et al., 2018; Cockburn et al., 2020), and other studies employed in other non-European contexts, such as in Chile (Aguayo and Eames, 2017), southeastern Zimbabwe (Dhliwayo, 2023).

Rooted in established traditions of research on urban resilience and sustainability governance (Meerow and Stults, 2016; Hodson and Marvin, 2010b), this approach conceptualizes SCs as complex socio-ecological systems shaped by political, economic, and environmental dynamics (Folke et al., 2021). Previous comparative studies in non-European contexts (e.g. Chile: Aguayo and Eames, 2017; Zimbabwe: Dhliwayo, 2023) inform the adaptation of this framework to the Global South, where intersecting vulnerabilities and transition pathways vary significantly. The six cities analysed—Mumbai, Ho Chi Minh City, Cape Town, Bogotá, Nairobi, and Recife—were selected to capture a wide range of geographical settings, governance structures, and supply chain profiles. While Mumbai, Ho Chi Minh City, and Cape Town function as major metropolitan centres, Bogotá, Nairobi, and Recife represent emerging hubs with decentralised dynamics. Of note, Bogotá recently established the Región Metropolitana Bogotá–Cundinamarca (2022), but it is still undergoing implementation; thus, it is considered a transitional governance context in this study. City selection was guided by established comparative methodologies in urban sustainability research.

Case selection followed comparative criteria widely adopted in urban sustainability research (Parnell and Robinson, 2012), ensuring a balance across geographical regions, supply chain configurations, levels of environmental vulnerability, and economic functions. The selected cities represent diverse regional contexts across

City and urban initiative	Resources	Actor groups	Objectives	Institutions	Scales
Mumbai – Industrial and port reorientation towards circular transitions	***	***	***	**	***
Ho Chi Minh City – Resilient logistics and metropolitan governance	**	**	**	**	**
Cape Town – Water resource management in a climate crisis context	***	**	***	***	**
Bogotá – Urban development focused on sustainable mobility and local SCs	**	***	**	**	**
Nairobi – Agri-food policies and innovation in urban markets	***	***	**	**	***
Recife – Circular economy experimentation in a peripheral and coastal context	**	**	***	***	*

Legend: Resources: Logistics infrastructure, natural resources, urban ecosystems, value chains. Actor groups: Inclusion of public authorities, private sector, local communities, NGOs. Objectives: Just transition, urban resilience, decarbonisation, social inclusion.

Institutions: Levels and forms of governance (local, regional, national, partnerships). Scales: Local, metropolitan, regional, international.* = single element involved, ** = two elements, *** = more than two elements involved or high complexity.

Global South cities and the many multiples characterizing just transitions in urban supply chains.
Source: elaboration of author
Tab. 1

Latin America, Africa, and Asia (Swyngedouw and Heynen, 2003), exhibit varying degrees of integration into global and regional value chains (Yeung and Coe, 2015), and differ significantly in their exposure to climate-related risks, particularly those affecting low-income communities (Anguelovski et al., 2014). Moreover, their roles within national and international economies range from industrial and port hubs to experimental centres for circular economy transitions (Hodson and Marvin, 2010a).

To ensure analytical depth and methodological rigour, the study combines desk-based research with a triangulation of secondary data sources (Yin, 2017). These include municipal policy documents and urban development strategies aligned with global frameworks (e.g., UN-Habitat, 2020); trade and supply chain data from institutions such as the World Bank, UNCTAD, and national ministries (Gereffi et al., 2005); climate vulnerability assessments from the IPCC and city-specific reports (Revi et al., 2014); academic literature on resilience, sustainability transitions, and just urban governance in Global South contexts (Bulkeley, 2015); and spatial and GIS datasets for mapping critical infrastructures and environmental exposure zones (Seto and Ramankutty, 2016).

The analytical framework is applied through two comparative tables. Table 1 presents a

City	Integration in GVCs	Governance model	Climate risk exposure	Economic and sustainability profiles
Mumbai	*** High – GVC node, port and manufacturing hub	** Medium – Centralized with strong state and municipal actors	*** High – Floods, heatwaves	*** High – Industrialization, emerging circular economy
Ho Chi Minh City	*** High – Global logistics and maritime trade	** Medium – Mixed governance, progressive decentralization	** Medium – Risk of coastal flooding	** Medium – Manufacturing hub, ongoing green transition
Cape Town	** Medium – Regional trade and agri-food GVC	**Medium – Polycentric governance with strong municipal role	*** High – Drought and water crisis	***High – Innovation, tourism, circular projects
Bogotá	* Low – Mostly regional SCs	** Medium – Decentralization with strong municipalism	** Medium – Hydrogeological risk	** Medium – Urban innovation centre and emerging logistics
Nairobi	** Medium – Role in intra-African logistics networks	* Low – Hybrid governance with strong national pressures	*** High – Climate instability and informal urbanization	** Medium – ICT hub, fragmented urban economy
Recife	* Low – Local and interregional chains	*** High –Strong municipal role, coordination with federal state	*** High – Sea level rise, tropical storms	** Medium – Mixed economy with sustainability experimentation

Legend: Level of multiplicity (* = high, ** = medium, * = low): Integration in GVCs: Role in global value chains. Governance: Institutional model and degree of decentralization. Climate risk: Exposure to extreme events and environmental vulnerability. Economic profiles: Productive structure, innovation, and circular practices.

Case studies and multiple dimensions of urban supply chains in Global South contexts.

Source: elaboration of author
Tab. 2

qualitative overview of actor dynamics, institutional arrangements, and strategic objectives in each city, using the "many multiples" perspective (Cockburn et al., 2020).

The use of the table inspired by the 'many multiples' model (Cockburn et al., 2020) helps to visualise the variety of case studies and systematically compare their operational and institutional dimensions. Table 2 complements this by analysing key structural dimensions–such as value chain integration, governance models, climate risks, and economic profiles–revealing both convergences and divergences in how urban SCs contribute to just transition processes across the Global South. However, it should be emphasised that, despite its comparative usefulness, such a grid has limitations in representing the nuances of local contexts, especially where informal governance dynamics, socio-environmental tensions and

bottom-up resistance practices play a central role in transition processes (Table 2).

Results

This section presents the comparative results of six case studies—Mumbai, Ho Chi Minh City, Cape Town, Bogotá, Nairobi, and Recife—restructured through a justice-oriented supply chain framework. The analysis is guided by Fraser's 3Rs—Recognition, Redistribution, Representation—mapped across four analytical dimensions: supply chain resilience, environmental justice, just transition governance, and circular economy.

The analytical framework unfolds in two interrelated phases. First, it advances a critique of prevailing sustainability transition models predominantly shaped in the Global North. These models often prioritise technocratic efficiency and top-down innovation, while neglecting the roles of informal labour, community knowledge, and spatial inequalities. This technocratic bias tends to obscure the socio-political dimensions of sustainability, particularly in the context of cities in the Global South.

In response, the second phase of the framework develops a justice- and place-oriented perspective that re-conceptualises SCs as socio-ecological infrastructures—deeply embedded in political, economic, and cultural contexts. The use of Context-Mechanism-Outcome (CMO) configurations provides a heuristic lens to capture how justice is either integrated into or excluded from supply chain transitions, enabling a more situated and relational understanding of transformation processes.

The comparative case study approach reveals multiple adaptation trajectories shaped by local institutional capacity, economic systems, and exposure to environmental risks. Mumbai and Ho Chi Minh City demonstrate how state-led industrial strategies and digital logistics can improve environmental performance but often fail to incorporate informal economies or address distributive justice. In contrast, Bogotá and Nairobi highlight the potential of decentralised governance and grassroots innovation to enhance resilience and inclusion. Cape Town and Recife exemplify hybrid strategies that blend crisis-triggered policy shifts with regional cooperation and community participation.

To translate this critique into a forward-looking framework, the study introduces the Social Justice-Oriented Supply Chain (SJ-SC) model, grounded in Fraser's (2008) tripartite justice pillars—Recognition, Redistribution, and Representation:

- Recognition involves acknowledging the knowledge systems, contributions, and rights of informal workers, marginalised populations, and locally grounded practices (Thondhlana et al., 2015).
- Redistribution refers to restructuring access to logistics infrastructure, markets, and public goods to correct historical asymmetries, as illustrated in Recife's cooperative

Dimension	Indicator	Description	3Rs Link	Evolution
Supply Chain Resilience	Logistics infrastructure accessibility	Multimodal density, hub investment, global/regional connectivity	Redistribution	●
	Disruption exposure	Climate shocks, conflict, strikes, pandemics	Recognition	● ▲
	Adaptive capacity of freight systems	Flexibility, AI/IoT integration, informal logistics inclusion	Representation	▲ ★
	Resilience policy interventions	Local vs national response, funding mechanisms	Redistribution	● ▲
Environmental Justice	Spatial distribution of risks	Pollution, vulnerable zones, geography/class mapping	Recognition	●
	Socio-economic impact disparities	Access gaps, health inequality, labour precarity	Redistribution	● ▲
	Land-use conflicts	Displacement, zoning disputes, competing claims	Representation	●
	Access for marginalised groups	Equity in freight access, mobility infrastructures	Redistribution	▲ ★
Just Transition & Governance	Policy inclusion of justice principles	Equity in infrastructure, social safety nets	Redistribution	▲
	Informal labour representation	Worker participation, fair pay, social protection	Recognition / Representation	▲ ★
	Decarbonisation strategies	Carbon targets, incentives, green logistics	Redistribution	● ▲
	Participatory governance mechanisms	Community co-design, conflict mediation	Representation	▲ ★
Circular Economy & Decarbonisation	Circular supply models	Closed loops, reuse logistics	Redistribution	▲
	Renewable energy in logistics	Clean energy logistics, green warehousing	Recognition	▲ ★
	Local resource recovery	Urban mining, eco-symbiosis, community waste	Representation	▲ ★
	Formalised waste-to-value chains	Public-private integration, recycler recognition	Recognition / Redistribution	▲ ★

Legend
● = Foundational (acknowledged, fragmented implementation)
▲ = Emerging (pilots, partial adoption)
★ = Transformative (integrated, systemic)

Analytical Framework for Comparative Case Studies.
Source: elaboration of author
Tab. 3

food and freight networks (Hill et al., 2012).

- Representation stresses the importance of participatory decision-making and governance mechanisms, as seen in Bogotá's multimodal planning or Nairobi's inclusive waste management strategies (Williams and Doyon, 2020).

These three dimensions form the normative criteria for evaluating supply chain transformations in the Global South, offering an alternative to metrics focused exclusively on efficiency or carbon emissions. Moreover, they resonate with decolonial calls to foreground local autonomy, dismantle extractive trade relations, and build infrastructural governance from below (Cockburn et al., 2020; Robinson et al., 2016).

The framework not only contributes to theoretical debates on resilience and urban justice (Meerow and Stults, 2016; Anguelovski et al., 2014) but also provides empirically grounded tools to reframe SCs as instruments of redistribution and social inclusion—rather than mere conduits for global trade (see Table 3).

Comparative Discussion

This section interprets the empirical findings without classifying cities into normative categories but rather identifying patterns and context-specific dynamics across urban logistics systems. These findings do not aim to benchmark cities but to illustrate the tensions between different governance models and justice outcomes within the shared constraints of the Global South.

It is important to note that differences across cities reflect diverse historical, institutional, and infrastructural contexts rather than linear trajectories of success or failure. The analysis does not rank performance but highlights specific practices that respond to local vulnerabilities and opportunities.

Recognition

Recognition involves valuing the knowledge, contributions, and needs of marginalised actors, particularly informal workers and community-based systems. The analysis reveals that cities like Nairobi and Bogotá embed recognition through participatory urban planning and the integration of informal waste actors. Their strategies counter the dominant technocratic narratives observed in Mumbai and Ho Chi Minh City, where state-led digital logistics often exclude informal networks. Cape Town's drought response and Recife's community food logistics show the importance of recognising grassroots innovation in shaping adaptive systems. Recognition also extends to environmental justice—spatial risk mapping in Cape Town and Bogotá identifies vulnerable populations, enabling targeted planning.

Redistribution

Redistribution addresses material inequities in supply chain access, infrastructure investment,

and exposure to risk. The cases highlight that cities like Recife and Nairobi have adopted cooperative logistics or community waste systems that redistribute benefits across social groups. Bogotá's multimodal infrastructure supports decentralised markets, enhancing equitable access to urban resources. In contrast, Mumbai and Ho Chi Minh City remain skewed toward export-driven models that channel investment to formal sectors, exacerbating existing inequalities. Indicators such as access to green finance, land-use conflicts, and infrastructural coverage underscore the role of policy in mediating distributive outcomes.

Representation

Representation refers to inclusive decision-making and governance structures that reflect diverse voices. As argued by Doorn et al. (2019), resilience must be understood not only in technical or infrastructural terms, but also through the lens of social justice, ensuring that adaptive capacity includes equity considerations and does not exacerbate existing vulnerabilities. The study finds that multi-level governance systems, as in Cape Town and Nairobi, facilitate conflict resolution and adaptive capacity through community participation. These cities demonstrate that embedding local actors into policy processes leads to more robust supply chain governance. By contrast, top-down models in Mumbai and Ho Chi Minh City exhibit limited participation from informal sectors. Participatory governance in Bogotá further reflects how cities can institutionalise co-design processes, influencing long-term transition strategies.

Conclusion and directions for future research

This study offers an initial framework for analysing how logistics and urban SCs in the Global South contribute to sustainability transitions, using a territorial lens to bridge gaps in the current literature, particularly in contexts where climate vulnerability and food insecurity intersect, often in distinct ways compared to Northern settings (Raj et al., 2022). While some cities adopt state-led circular economy models, others are experimenting with community-driven approaches that promote social inclusion and economic diversification. Policy implications suggest that decarbonisation and resilience strategies must be context-specific rather than imposed by global frameworks that overlook informal labour systems and economic dependencies.

Governance structures should support multi-level coordination and participatory planning, recognising the legal and spatial pluralisms that shape access to infrastructure and justice in fragmented urban contexts (Robinson & Graham, 2018). Moreover, circular economy policies must avoid replicating trade dependencies and should facilitate equitable access to sustainable markets and investment opportunities.

In response to the two guiding research que-

stions, this study confirms that urban logistics systems in the Global South are not only pivotal for sustainability transitions, but also deeply embedded in local socio-economic dynamics. Moreover, participatory and territorially grounded governance models emerge as critical to achieving just and resilient supply chains. e

Specifically the RQs, this study opens a panorama on the discussion of resilience in logistics in very fragile and vulnerable areas, stressing that research must also analyze what happens in the Global South. Certainly, the paper highlights the need to match different domains, and a OneHealth approach would be recommended to follow both at an academic and practical level. The SCs needs above all to be analyzed in territorial logistics, targeting vulnerable categories, a major lever of the work process in the cities analyzed. Regarding the second RQ, the governance processes suggested include a strong bet on the public with the insertion of PE in citizenship. This theme leads us to believe that we are analyzing urban democracy for logistics, representing a great innovation at a conceptual level.

Building on the empirical insights, the study proposes several cross-cutting strategies: investing in regional supply networks, co-producing circular economy policies with informal actors, integrating justice metrics in planning, supporting financial inclusion, and fostering multi-level governance. These actions, while already piloted in some cities, require broader institutional commitment to scale and replicate.

Future research should adopt longitudinal approaches to evaluate the evolution of urban supply chain resilience and explore cross-regional comparisons to assess how regulatory environments and socio-economic vulnerabilities affect sustainability outcomes (Tofu et al., 2023).

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