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Territorial Resilience and Green Logistics: Government Actions in the Face of Climate Challenges

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Abstract: Resilience has increasingly been framed not as a simple ability to "bounce back" after shocks, but as a capacity to absorb, adapt, and transform under natural and anthropogenic disturbances while maintaining functional continuity and acceptable service levels (Gonçalves & Ribeiro, 2020). This perspective becomes critical in contexts where mobility, climate pressures, and logistics infrastructure intersect, as transport and supply networks operate as socio-ecological systems exposed to extreme events, environmental variability, and accelerating urban demands. Despite the expansion of sustainability, decarbonisation, and green logistics agendas, relevant gaps remain in understanding how public policies, multilevel governance, and institutional arrangements effectively translate into territorial resilience in transport and logistics systems. In particular, the lack of integration across institutional, territorial, and technological dimensions tends to produce partial and poorly coordinated responses that fall short of addressing the complexity of contemporary climate and socio-economic risks, motivating the guiding question: How do government actions guide and promote resilience and green logistics in the face of climate challenges? Accordingly, this study aimed to analyse how recent scientific literature addresses the role of government actions in promoting territorial resilience and green logistics under climate challenges. The analysis was structured around three analytical objectives: (i) to identify how governmental actions are discussed in terms of governance, policy integration, and multilevel coordination; (ii) to describe how government action is addressed in the organisation of territory, infrastructure, and operational capacity for resilience under climate shocks; and (iii) to characterise how public policies and state instruments are associated with transitions toward low-carbon and green logistics. Methodologically, we conducted an integrative literature review guided by the PRISMA logic. Searches were performed in the Web of Science Core Collection using a combined query on green/sustainable logistics and transport, government/governance/public policy, and climate change/adaptation/mitigation/resilience. After applying open-access and eligibility filters (2020–2026; articles and reviews), screening titles/abstracts, and full-text assessment, the final sample comprised 29 studies. Findings converge around three result blocks. First, the literature highlights that territorial resilience and sustainability in transport and logistics depend less on isolated interventions than on governments' capacity to articulate policies, scales, and actors through multilevel governance, policy integration, and legitimacy-building mechanisms. Second, results show that resilience is simultaneously institutional and territorial-operational: public decisions regarding infrastructure use, spatial organisation, and disaster-response capacities shape the ability of logistics systems to function under stress and recover from shocks. Third, the literature frames low-carbon transition as both technological and political, showing that green logistics diffusion, electrification, digitalisation, and circular strategies rely on the coherence between regulatory instruments, incentives, implementation capacity, and institutional alignment—while also revealing risks of symbolic compliance when ambitious targets are not matched by enforcement, coordination, and resources.

Keywords: *Territorial Resilience; Green Logistics; Climate Governance; Institutional Theory; Multilevel Governance; Low-Carbon Transition.*

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I. INTRODUCTION

Resilience should be understood not only as the ability of a system to return to a previous state after shocks, but also as its ability to absorb, adapt, and transform itself in the face of natural and anthropogenic disturbances, maintaining acceptable levels of service and functional continuity for users (Gonçalves & Ribeiro, 2020).

This approach is particularly relevant when addressing the interdependence between mobility, climate, and logistics infrastructure, since transport and logistics networks do not operate in isolation, but as part of complex socio-ecological systems exposed to extreme weather events, environmental variability, and increasing urban pressures. In a context where cities and regions face increases in the frequency and intensity of climatic events such as floods, heat waves, and storms, and where sustainable logistics chains are required to reconcile operational efficiency with decarbonization goals, it becomes imperative to understand how public policies and governance arrangements can structure responses that promote territorial resilience and logistical sustainability in an integrated way.

In the field of sustainable logistics, the concept of green logistics emerges as a branch of practices and arrangements that aim to reduce environmental impacts throughout the supply chain, integrating aspects of operational efficiency and emission reduction. The adoption of green innovation strategies that include low-carbon transport, sustainable storage processes, and efficient resource management not only reduces the environmental footprint but is positively associated with strengthening the resilience of supply chains, demonstrating that green practices can act as mechanisms that mediate sustainability gains and adaptive capacity in the face of disruptions (Issa et al., 2024). This interdependence between logistics sustainability and resilience becomes even more critical when considering government responses to climate pressures, since effective public policies need to articulate regulatory instruments and incentives to promote transitions that make logistics systems capable of facing environmental shocks and short- and long-term risks, such as climate change and extreme events.

Thus, a central problem emerges: despite the progress of sustainability, decarbonization, and green logistics agendas, there are still gaps in the understanding of how public policies, multilevel governance, and institutional arrangements are articulated to actually produce territorial resilience in transport and logistics systems. The lack of integration between institutional, territorial, and technological dimensions tends to generate partial, poorly coordinated responses that are often incapable of dealing with the complexity of contemporary climate and socioeconomic risks. In light of this, the following guiding question emerges: How do government actions guide and promote resilience and green logistics in the face of climate challenges?

In this context, the overall objective is to analyze how recent scientific literature addresses the role of government actions in promoting territorial resilience and green logistics in the face of climate challenges.

- To achieve this objective, we propose the following specific objectives: To identify how government actions are addressed in the literature in terms of governance, policy integration, and multilevel coordination for the promotion of territorial resilience and green logistics.
- To describe how the literature addresses government action in the organization of territory, infrastructure, and operational capacity aimed at resilience in the face of climate shocks.
- To characterize how public policies and state instruments are associated, in the literature, with the transition to green logistics and low carbon. To achieve these objectives, we conducted an integrative literature review.

II. LITERATURE REVIEW

Contemporary discussions on territorial resilience have progressively shifted from a "returnist" perspective—focused on restoring systems to a previous state after shocks—toward an understanding of resilience as capacity, that is, the set of institutional, social, and economic resources that enable a territory to absorb disturbances, adapt, and reorganize without collapsing its essential functions (Pontarollo & Serpieri, 2018). Within this framework, territory is not conceived merely as a physical space, but as a political–institutional arrangement in which public policies, infrastructure, state capacities, and local coalitions condition responses to crises and transitions (Pontarollo & Serpieri, 2018). Consequently, territorial resilience has become increasingly associated with governance quality, social participation, and innovation capacity—dimensions that help explain why some territories sustain more robust adaptive trajectories than others (ESPON, 2023).

When the focus turns to climate-related challenges, this debate gains additional depth. Climate change operates as a systemic pressure that cuts across sectors—such as energy, infrastructure, mobility, and supply systems—exposing interdependencies and reducing the effectiveness of isolated policy responses. In this context, the literature emphasizes that resilience, rather than being an attribute of a single organization or technical network, depends on institutional coordination capable of reducing decision-making fragmentation and aligning public objectives across multiple governance scales (Zhang, 2023). It is precisely at this juncture that the institutionalist lens gains explanatory strength, as it helps clarify why, despite mounting evidence and climate urgency, public policies often generate formal adherence without substantive transformation, or changes that remain confined to "islands" of institutional innovation (Meyer & Rowan, 1977).

Institutionalism structures this interpretation by arguing that organizations and governments do not operate solely according to technical efficiency, but are driven by the pursuit of legitimacy, conformity, and stability vis-à-vis social,

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normative, and regulatory expectations (Scott, 2014). Under conditions of high uncertainty—such as climate transitions—this logic tends to intensify: public actors may replicate established models, import "best practices," and reinforce modernization narratives, even when implementation is constrained by limited capacity, distributive conflicts, and fiscal pressures (Scott, 2014). As a result, climate policies may become "paper architectures": they exist formally, are communicated and signal commitment, but do not necessarily reconfigure coordination patterns or state delivery mechanisms (Meyer & Rowan, 1977).

Within this context, the concept of institutional isomorphism helps explain why governments and organizations tend to resemble one another—not because they have independently identified the same optimal solution, but because they respond to similar pressures (DiMaggio & Powell, 1983). In public policy, the most salient dimension is coercive isomorphism, which arises from state regulations, legal requirements, funding conditionalities, and multilateral agreements that compel organizations and territories to adjust in order to maintain access to resources, reputation, and decision-making arenas (DiMaggio & Powell, 1983). In other words, the state—and supranational arrangements—not only "encourage" action but actively shapes behavioral patterns through norms, sanctions, targets, and conditionalities, a dynamic that is particularly central to climate governance.

At the same time, institutional conformity is not purely coercive. Institutional theory highlights that adaptation also occurs through mimetic isomorphism—imitation under uncertainty—and normative isomorphism, driven by professionalization, epistemic communities, and technical–bureaucratic networks (DiMaggio & Powell, 1983). In climate agendas, this means that policies may diffuse not only because they are demonstrably effective, but also because they appear appropriate, have been endorsed by international organizations, or have become standard within specific professional fields (Scott, 2014). This ambiguity is critical: while diffusion can enhance alignment and comparability, it can also produce superficial adoption detached from local capacity and implementation design (Meyer & Rowan, 1977).

This tension becomes particularly visible when examining public-sector adaptation and organizational change in response to climate pressures. Recent evidence suggests that public organizations respond to climate change through a combination of institutional pressures, internal routines, and external incentives, leading either to substantive reforms or to symbolic responses—especially when accountability structures and resources do not match political ambition (Zhang, 2023). From this perspective, institutionalism allows public action to be interpreted as a process of adjustment among legitimacy, capacity, constraints, and external pressures, rather than as a function of isolated political will.

When the analysis shifts toward sustainability and supply chains, the institutional debate further consolidates. Green logistics does not emerge solely from voluntary corporate decisions, but from an ecosystem of regulatory pressures, market demands, and social norms that induce changes in logistical practices (Jazairy, 2020). In this setting, governments act as field-structuring agents—imposing standards and restrictions, designing incentives, and coordinating actors—while firms respond by adjusting investments, reporting practices, and routines to meet environmental legitimacy expectations (Jazairy, 2020). The central insight is that green logistics is less a purely technical package and more an institutional outcome, shaped by how regulation, enforcement, economic instruments, and public narratives operate.

The climate agenda intensifies this challenge because the transition requires changes across infrastructure, technology, planning, and interorganizational coordination. As a result, recent approaches emphasize that policies must be understood as implementation systems in which coercion, incentives, and multilevel coordination operate jointly; otherwise, fragmentation, territorial asymmetries, and gaps between targets and delivery tend to prevail (ESPON, 2023; Zhang, 2023). Within this view, territorial resilience extends beyond "resistance to shocks" to encompass the state and collective capacity to govern interdependencies under crisis conditions and fiscal constraints.

This perspective also opens space for an important counterpoint: institutional pressures may accelerate the adoption of green standards, but they can also generate ritualistic compliance, in which formal requirements are met without altering deeper structures (Meyer & Rowan, 1977). In climate policy, this dynamic appears when targets and plans are widely publicized, while intersectoral coordination, enforcement, financing, and monitoring remain weak. Institutionalism, therefore, does not romanticize governmental action; rather, it provides a theoretical explanation for why public responses often oscillate between transformation and symbolism, depending on institutional design, capacity, and coercive and normative pressures (DiMaggio & Powell, 1983; Scott, 2014; Zhang, 2023).

Against this theoretical background, the phenomenon of "governmental actions in the face of climate challenges" can be interpreted as a field in which the state simultaneously acts as an inducer of conformity (through coercive mechanisms), as a coalition builder, and as a producer of public legitimacy, while territories respond unevenly according to their institutional capacity and governance arrangements (DiMaggio & Powell, 1983; Pontarollo & Serpieri, 2018; Zhang, 2023). At the same time, green logistics emerges as an agenda that depends on how the institutional field—rules, regulation, incentives, and expectations—shapes organizational decisions and technological trajectories (Jazairy, 2020; Scott, 2014).

This theoretical framing establishes the basis for engaging with the empirical discussion: if territorial resilience and green logistics are institutionally mediated outcomes, then the analysis of the literature must reveal how governmental roles in coordination, territorial–operational structuring, and green transition are described, as well as which institutional mechanisms appear as enablers, constraints, or drivers of merely symbolic compliance (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Zhang, 2023).

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III. MATERIALS AND METHODS

This study adopts the integrative literature review method, guided by the logic of the PRISMA protocol, with the objective of mapping and synthesizing evidence on the articulation between green logistics, government actions, and climate challenges, under the interpretative lens of governance for sustainability and resilience.

➢ *Database and Search Strategy*

The search was conducted in the Web of Science Core Collection, as it presents a higher density of international publications in the areas of logistics, public policies, sustainability, and climate change. A single search string was used, constructed to balance thematic breadth and operational feasibility:

("green logistics" OR "sustainable logistics" OR "sustainable transport") AND ("public policy" OR governance OR government) AND ("climate change" OR adaptation OR mitigation OR resilience) The initial search returned 102 records.

➢ *Application of Filters*

In the next step, the following filters were applied:

- Access type: open access
- Period: 2020 to 2026
- Document type: articles and reviews

After applying these filters, the number of records was reduced from 102 to 43 articles, which comprised the set for the screening stage.

➢ *Screening by Title and Abstract*

The 43 articles were organized into a bibliographic database and submitted to title and abstract reading, classifying each study as:

- Include: when it explicitly addressed logistics or transportation, government action or public policy, and relationship with climate, sustainability, adaptation, mitigation, or resilience.
- Exclude: when it did not meet at least two of these three axes.
- Doubt: when it presented partial adherence.

In this step, 13 articles were excluded due to thematic misalignment or only partial adherence, resulting in 30 studies selected for full-text reading.

➢ *Eligibility by Full Text*

The remaining 30 articles were read in full, verifying:

- Existence of governmental action, public policy, or governance arrangement.
- Explicit relationship with logistics, transport, or supply chains.
- Link with climate challenges, decarbonization, adaptation, mitigation, or resilience.

At this stage, 1 article was excluded because it dealt predominantly with environmental management and recreational use of waterways, without consistent articulation with strategic logistics, climate policies, or territorial resilience.

Thus, the final sample of the integrative review consisted of 29 studies.5 Síntese e análise

The synthesis of the included studies was carried out through analytical reading of the full texts and systematic extraction of information relating to: type of government action, climate purpose, logistics or transport sector, territorial scale and main results. The analysis followed a thematic logic, with categories derived directly from the specific objectives of the study. The interpretation of the findings was guided by the lens of governance for sustainability and resilience, ensuring coherence between theoretical framework, analytical categories and discussion of results.

The complete workflow followed the PRISMA logic, encompassing the stages of identification, screening, eligibility and final inclusion of studies.

IV. RESULTS AND DISCUSSION

➢ *Governance, Policy Integration, and Multilevel Coordination*

The literature shows that territorial resilience and sustainability in transport and logistics systems depend less on isolated solutions and more on the ability to articulate policies, scales, and actors. As Aquilina and Sheate (2022) point out, the lack of integration between transport policies, green infrastructure, and urban form compromises the effectiveness of climate resilience in London, even in the face of ambitious goals. The "nexus" approach highlights that disconnected sectoral policies produce institutional silos that block systemic responses to climate risks.

According to Dindar (2025), urban regeneration projects only produce sustainable gains when they articulate land use, transport, and participatory governance, and the absence of this integration generates perverse effects, such as social displacement and weakening of resilience. This reading converges with Bauchinger et al. (2021), showing that rural-urban mobility solutions only work when supported by multilevel governance arrangements, adapted to territorial specificities, rejecting standardized models.

In the field of public administration, Greenwood et al. (2024) reinforce this logic by applying the polycentric lens and Ostrom's IAD model, demonstrating that decarbonization goals require coordination between local, metropolitan, and national levels, as climate externalities transcend administrative boundaries. This coordination also appears on a global scale: according to John et al. (2025), international agreements such as the Paris Agreement shape national transport policies, but their effectiveness depends on institutional capacity, enforcement, and regional articulation.

This institutional dimension is further explored by Lartey and Glaser (2024), who show that, in the African context, active mobility policies fail not only due to a lack of resources, but also due to a lack of technical, organizational,

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and environmental capacity at multiple levels of government. In a relational key, Grandin and Haarstad (2021) highlight that sustainable transformations in Addis Ababa emerge from network mobilization among local, national, and international actors, articulating local experiences with global flows of knowledge and funding.

Finally, Nikolaidou et al. (2024) add that governance is also communication: climate transport policies only gain legitimacy when their objectives are translated and debated in the public sphere, with social networks serving as instruments for monitoring and adjusting political priorities.

- *Infrastructure, Territory and Operational Resilience*

Literature also shows that resilience is not only institutional, but also territorial and operational. As demonstrated by Chen et al. (2025), the creation of urban logistics centers in idle public infrastructure, such as metro stations in Seoul, strengthens last-mile resilience by aligning location, accessibility, and cooperation between public and private actors, especially after shocks such as the COVID-19 pandemic.

This spatial dimension also appears at the regional scale. According to Dindar (2025), urban regeneration projects that integrate transport and land use can reduce congestion and emissions in the long term, provided they address distributive conflicts and adopt inclusive governance mechanisms. Bauchinger et al. (2021) reinforce that rural-urban connectivity depends on flexible solutions, articulated with existing infrastructure, functioning as feeders for public transport and reducing dependence on automobiles.

In the field of global logistics, Cordova et al. (2025) show that supply chains produce direct impacts on marine ecosystems, requiring regulatory responses and rapid response capacity to accidents, spills, and diffuse pollution, which connects logistics to environmental governance and the resilience of strategic ecosystems.

The dimension of extreme shock is further explored by Korkmaz et al. (2025), who propose the use of digital twins for urban disaster management. By integrating geospatial, transport, and infrastructure data, these systems allow for faster planning, response, and recovery, transforming logistics into a central instrument of territorial adaptive capacity.

- *Green Logistics and Low-Carbon Transition*

The third axis shows that the climate transition in transport and logistics is simultaneously technological and political. As Ali et al. (2020) state, practices such as green procurement, green logistics, and environmental regulation improve carbon performance, but require active public policies, such as fuel standards and emission limits. This political dimension also appears in John et al. (2025), who demonstrate that international agreements shape national policies, but depend on institutional capacity to produce real effects in the transport sector.

In emerging countries, Bulat and Carp (2025) demonstrate that the adoption of green logistics occurs more due to pressure from international actors and supply chain leaders than due to effective national policies, highlighting regulatory weaknesses and the need for tax incentives and public-private partnerships. This weakness is also observed by Sisay (2025), who argues that developing countries need to "leapfrogging" to avoid carbon-intensive trajectories, but encounter political and institutional barriers.

The technological transition appears strongly in electrification. Boldizsár et al. (2025) show that electric trucks only become viable when subsidy, toll, and taxation policies are adjusted to protect the competitiveness of small businesses. Complementarily, Fuinhas et al. (2021) show that electric vehicles reduce emissions in the European Union, but only when accompanied by consistent political planning. This same logic is further developed by Yi et al. (2025), who show that, in China, the transition to electric and hydrogen vehicles depends on synergies between policy, market, and technological innovation.

Li and Wei (2025) deepen this debate by showing that subsidies should be transitional: their gradual reduction stimulates market self-regulation and fiscal sustainability, while models such as battery swapping reduce barriers to entry for companies. This discussion dialogues with Stefaniec et al. (2025), who show that poorly calibrated subsidies can compromise both social equity and decarbonization goals.

The transition is also socio-technical. Camilleri et al. (2022) show, via backcasting and social practice theory, that low-carbon futures require a reconfiguration of daily habits, not just technological change. This cultural dimension also appears in Scriosteanu and Criveanu (2024), who indicate that reverse logistics and circular economy policies need to consider national cultural patterns to be effective.

Finally, Pei et al. (2025) demonstrate that AI, big data, and blockchain act as enablers of urban decarbonization by integrating sustainable logistics, circular economy, and digital governance, reinforcing the idea that green transition is also institutional and informational transition. This digital base also supports energy infrastructure policies, as shown by Tilly et al. (2025b) when discussing the integrated expansion of charging stations as part of resilient urban systems.

Mashamaite (2025) completes the picture by showing, in the context of the BRICS, that green logistics and innovation only thrive when there is political will, resources, and alignment with national development strategies. This interpretation aligns with Zhang and Witlox (2020), who indicate that transport governance and pricing policies are central to aligning economic development and climate mitigation.

V. CONCLUSIONS

This study aimed to analyze how recent scientific literature addresses the role of government actions in promoting territorial resilience and green logistics in the face of climate challenges. To meet this objective, an integrative literature review was conducted, structured according to the PRISMA protocol, which allowed mapping, selecting, and synthesizing international evidence published between 2020 and 2026. The analysis of the 29 eligible studies made it possible to identify recurring patterns, analytical convergences, and gaps in the way state action has been

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discussed in addressing climate risks associated with logistics and transportation systems.

Regarding the first specific objective, which sought to identify how the literature addresses government actions in terms of governance, policy integration, and multilevel coordination, the results indicate that territorial resilience strongly depends on the ability of governments to articulate sectoral policies, administrative scales, and multiple actors. The literature converges in pointing out that fragmented responses, marked by institutional silos and low intergovernmental coordination, tend to limit the effectiveness of climate agendas. On the other hand, multi-level governance arrangements, polycentric models, and horizontal and vertical coordination mechanisms appear as central elements for aligning climate objectives, reducing externalities, and expanding the adaptive capacity of territories.

With regard to the second specific objective, aimed at describing how the literature addresses government action in the organization of territory, infrastructure, and operational capacity for resilience in the face of climate shocks, the studies show that the territorial dimension of resilience is inseparable from public decisions on location, infrastructure use, urban planning, and response to extreme events. The literature shows that public policies can strengthen operational resilience by integrating logistics, transportation, and territorial planning, especially when oriented towards flexibility, redundancy, and rapid response capacity. At the same time, the results indicate that distributive conflicts, territorial inequalities, and institutional limitations remain relevant obstacles to the consolidation of long-term resilient strategies.

Regarding the third specific objective, which sought to characterize how public policies and state instruments are associated, in the literature, with the transition to green and low-carbon logistics, the findings reveal that this transition is simultaneously technological, institutional, and political. The literature indicates that the adoption of green logistics practices, electrification, circular economy, and digital solutions depends less on isolated voluntary initiatives and more on the combination of regulation, economic incentives, state planning, and strategic alignment with national development agendas. However, it is observed that poorly calibrated policies or those disconnected from local capacities can generate symbolic effects, social inequalities, or low environmental effectiveness, reinforcing the importance of institutional design and coherence between goals and instruments.

In an integrated way, the results allow us to answer the guiding question of the study: how do government actions guide and promote resilience and green logistics in the face of climate challenges, highlighting that the role of the government is mainly manifested as a structurer of institutional fields. State actions guide resilience and sustainability trajectories through policy coordination, territorial and operational organization of logistics systems, and the induction of low-carbon transitions, even though these processes are traversed by tensions between substantive transformation and merely symbolic conformity. Thus, the literature indicates that the effectiveness of climate responses depends less on the formal existence of policies and more on the institutional capacity to implement them in an integrated, coherent, and sensitive manner to territorial specificities.

Finally, this study contributes by offering a systematized reading of recent scientific production, articulating territorial resilience, green logistics, and government action under an institutional lens. At the same time, it points out relevant gaps, especially with regard to the empirical evaluation of policy implementation and the distributive effects of green transition strategies. These gaps indicate promising avenues for future research, aimed at deepening the understanding of how different institutional contexts condition the capacity of governments to transform climate agendas into concrete results of resilience and sustainability.

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