

T12P03 / Subnational Transportation and Sustainability Policy

Topic : T12 / MULTI-LEVEL GOVERNANCE, LOCALISM, FEDERALISM

Chair : Nils Bandelow (Technische Universität Carolo-Wilhelmina Braunschweig)

Second Chair : Sofie Klingner (Technische Universität Carolo-Wilhelmina Braunschweig)

Third Chair : Ilana Schröder (University of Bern)

Fourth Chair : Nihit Goyal (Delft University of Technology)

GENERAL OBJECTIVES, RESEARCH QUESTIONS AND SCIENTIFIC RELEVANCE

Subnational Sustainability and Infrastructure Policy

The urgency of addressing climate change demands political action across all levels of governance, from international and national to local contexts. At the local level, the planning of sustainable mobility – especially the transition away from motorized individual transportation – poses unique challenges, often intersecting with various political jurisdictions. Local governments face the complex task of developing and implementing policies that not only promote sustainable practices but also cater to the specific needs of their communities. These efforts necessitate a multifaceted approach, requiring vertical coordination between governmental levels and horizontal collaboration across municipalities, which is often necessary to advance sustainable infrastructure projects and reach climate objectives. Such collaboration further includes the participation of local non-governmental actors such as citizens, associations, and private sector stakeholders to identify local needs, possible barriers, and optimal solutions. In many cases, collaborative governance has been shown to help mitigate conflicts and facilitate agreements, even when the beliefs of the actors diverge (Koebele & Crow, 2023). Not only municipal coordination, however, poses challenges to local sustainability policy but also issues of financing, multilevel pressures, lacking capacity, decisions on policy instruments, and policy conflicts (Ji, 2020; Vihma & Toikka, 2021; Wolf, 2021; Kern et al., 2023; Schröder & Bandelow, 2024; Zeigermann et al., 2024). Addressing these diverse issues is evident in various studies on the implementation of policies related to the built environment (e.g., bike lanes, railroads, renewable energy infrastructure) that aim to contribute positively to the shift toward greater sustainability. As such, authors have highlighted the role of, inter alia, policy entrepreneurship (Timmermans et al., 2014; Harvey?Scholes et al., 2023), narratives (Nagel & Schäfer, 2023; Parkkinen & Vikström, 2024), and policy diffusion (Schulze et al., 2024; Jensen et al., 2023) in local sustainability and infrastructure policymaking. These elements provide valuable insights into how policies can be crafted, promoted, and adapted to meet the unique challenges faced by local governments.

This panel aims to explore these challenges, their consequences, and possible solutions for subnational sustainability and infrastructure policymaking through the lens of public policy. Investigating and comparing specific sustainability policies at different stages of the policymaking process can contribute to a deeper understanding of the institutional, political, and social factors that facilitate or hinder their design and implementation. As such, our panel calls for empirical contributions on single or multiple case studies, research on good and bad practices, comparative analyses, and systematic reviews of the current research landscape. The goal is to open a dialog that bridges the gap between theoretical frameworks and practical applications, promotes innovation in policy making and encourages collaborative research.

Submissions exploring sustainability policies at the local or municipal level, especially including efforts to increase sustainable infrastructure, are encouraged even if they do not focus on vertical or horizontal coordination. For instance, by examining how different stakeholders – ranging from policymakers and urban planners to local businesses and community organizations – interact and influence policy outcomes, we can gain deeper insights into the dynamics that shape the development of sustainable mobility solutions.

Understanding the interplay between actor networks and their collaboration, as well as the public narrative surrounding sustainability and infrastructure policies and the communication among policy actors, is of crucial importance. Moreover, there is a growing interest in understanding how cities and municipalities can promote specific instruments such as the integration of bike-sharing programs in urban planning to support cycling as a viable, eco-friendly mode of transport. These initiatives highlight that effective local climate action can also be driven by local initiatives, policy entrepreneurs, focusing events, or the strategic use of narratives. We are calling for submissions that highlight these or other elements of public policy research in relation to subnational sustainability and infrastructure policymaking.

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CALL FOR PAPERS

Subnational Sustainability and Infrastructure Policy

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coordination. For instance, by examining how different stakeholders – ranging from policymakers and urban planners to local businesses and community organizations – interact and influence policy outcomes, we can gain deeper insights into the dynamics that shape the development of sustainable mobility solutions. Understanding the interplay between actor networks and their collaboration, as well as the public narrative surrounding sustainability and infrastructure policies and the communication among policy actors, is of crucial importance. Moreover, there is a growing interest in understanding how cities and municipalities can promote specific instruments such as the integration of bike-sharing programs in urban planning to support cycling as a viable, eco-friendly mode of transport. These initiatives highlight that effective local climate action can also be driven by local initiatives, policy entrepreneurs, focusing events, or the strategic use of narratives. We are calling for submissions that highlight these or other elements of public policy research in relation to subnational sustainability and infrastructure policymaking.

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Session 1 Cycling Policy

Thursday, July 3rd 16:00 to 18:00 (D4)

International comparison of inter-municipal cycling promotion: Political, cultural and infrastructural success factors for a sustainable transport transition

Sofie Klingner (Technische Universität Carolo-Wilhelmina Braunschweig)

Nils Bandelow (Technische Universität Carolo-Wilhelmina Braunschweig)

This paper investigates success factors for inter-municipal cycling promotion in Germany, Denmark, the Netherlands, Switzerland, and the United Kingdom. Through a systematic review applying the PRISMA methodology, the study identifies key governance, cultural, and infrastructural elements that support cycling as a sustainable mode of transport. The findings highlight the importance of multi-level governance structures that integrate national, regional, and local policy efforts. Collaborative funding models, which pool resources across administrative levels, prove to be essential for enabling large-scale infrastructure development. Moreover, supportive legislative frameworks that prioritize cycling mobility, such as clear regulations for inter-municipal coordination, play a crucial role.

Cultural factors, including societal acceptance of cycling and its integration into everyday life, are identified as significant enablers for increasing cycling rates. Infrastructural aspects, such as seamless, safe, and well-connected cycling networks, are critical for overcoming municipal boundaries and promoting cycling as a viable transport alternative. By analyzing exemplary projects, the study highlights the importance of flexibility in design and cooperation between municipalities to address diverse local needs while achieving overarching sustainability goals.

The paper concludes by offering practical insights for policymakers and planners on developing strategies to foster cross-boundary cycling infrastructure. These findings contribute to the broader discussion on sustainable urban mobility and inter-regional cooperation.

Stakeholder Collaboration in Developing Bicycling Infrastructure in Kunshan City, China

Annemieke van den Dool (Duke Kunshan University)

As urban centers worldwide seek sustainable mobility solutions, bicycling infrastructure has emerged as a key component of municipal climate action. Kunshan City, China, has developed targeted initiatives promoting cycling for both daily commuting and tourism. This paper examines the development of bicycling infrastructure, aimed at enhancing sustainable tourism and integrating cycling into the city's broader infrastructure framework. Through an analysis of local policies and case study, the study explores the role of municipal governance, private sector partnerships, and community engagement in shaping the local bicycling initiatives. By assessing the strengths and weaknesses of this initiative, the paper contributes to broader discussions on the role of municipal action in sustainable infrastructure policymaking. The findings offer insights into how cities can effectively promote cycling while collaborating among stakeholders and learning from policies adopted elsewhere.

How policy entrepreneurship shapes policy mixes: Cycling policy evolution in Enchede and Zwolle

Nihit Goyal (Delft University of Technology)

Policy mixes, or strategic combinations of policy instruments, are crucial for addressing complex societal challenges in sustainability transitions. While characteristics such as coherence, comprehensiveness, consistency, and credibility are recognized as critical to their success, limited research has examined how actors shape these characteristics over time. This study investigates the evolution of policy mixes and the role of policy entrepreneurship—a concept that has received limited attention in transition studies—through a comparative analysis of cycling policies in two Dutch cities from 2000 to 2020. Drawing on official documents, news articles, third-party reports, and elite interviews, the study integrates the co-evolutionary framework of policy mixes with a typology of policy entrepreneurship to illuminate how various actors, including political entrepreneurs and problem brokers, influence policy dynamics. Our findings demonstrate that entrepreneurial strategies drive sociotechnical outcomes by restoring credibility, aligning policy objectives with societal needs, and enhancing policy coherence. This research deepens understanding of the evolution of policy mixes, highlights the role of policy entrepreneurship in sustainability transitions, and cross-fertilizes insights between policy studies and transition studies.

Dynamic Panel Data Analysis of Induced Traffic Using Generalized Method of Moments Estimation: Evidence from the Gujrat Division, Pakistan

Khurram Shahzad (University of Seoul, South Korea)

Asim Naveed (University of Agriculture Faisalabad)

This study investigates the relationship between road infrastructure expansion and induced traffic demand in the Gujrat Division of Punjab, Pakistan, utilizing panel data spanning 2014 to 2023 from three districts: Gujrat, Hafizabad, and Mandi Bahaudin. Employing Dynamic Panel Data (DPD) models, including Arellano-Bond (difference GMM) and Blundell-Bond (system GMM) estimators, this analysis quantifies elasticity estimates to explore the dynamics of vehicle kilometers travelled (VKT) per capita in response to changes in road capacity and socioeconomic factors. Additionally, annualized variation (AVa) calculations for key indicators, including lane kilometers per capita, vehicles per capita, and VKT per capita, uncover distinct district-level trends over the study period. The econometric results confirm the presence of induced traffic, with a 1% increase in road capacity resulting in a 0.60% increase in VKT per capita ($\beta = 0.601$, $p < 0.0001$). Vehicle ownership also exhibits a strong positive elasticity ($\beta = 0.620$, $p < 0.0001$), highlighting its critical role in traffic generation. Conversely, population elasticity is negative ($\beta = -0.382$, $p = 0.0834$), reflecting the moderating effects of urban density on mobility patterns. Growth rate elasticity ($\beta = -0.316$, $p = 0.0010$) demonstrates a significant negative association with traffic demand, likely driven by shifts to more efficient transport modes in economically advancing regions. Fuel price elasticity ($\beta = 0.415$, $p < 0.0001$) indicates moderate sensitivity, suggesting limited travel alternatives in the region. Diagnostic tests validate the robustness of the econometric models, with no evidence of second-order autocorrelation ($p > 0.05$) and valid instruments (Sargan test, $p < 0.0001$). These findings emphasize the need for balanced infrastructure investments and strategic demand management measures to mitigate the effects of induced traffic. Policy implications highlight the importance of integrating public transport solutions and implementing demand-side interventions, such as congestion pricing and carpool incentives, tailored to district-specific growth patterns and socioeconomic dynamics.

(Virtual) Assessing Urban Sustainable City in Cambodia: The Case of Phnom Penh

Chanthy Theng (Université Jean Moulin (Lyon III))

As urbanization rapidly accelerates in Cambodia, particularly in Phnom Penh, the need for sustainable urban development becomes increasingly critical. Phnom Penh, the capital and largest city in Cambodia, faces various challenges in balancing economic growth, environmental protection, and social well-being. This study seeks to assess the urban sustainability of Phnom Penh by exploring the perceptions of its citizens and identifying the socio-economic factors that influence their views on sustainable development. The research aims to fulfil three primary objectives: assessing citizens' perceptions of sustainability, quantifying the socio-economic determinants shaping these views, and critically evaluating key aspects of urban sustainability, such as transportation systems, waste collection services, and urban green spaces. The study adopts a mixed-method approach, integrating qualitative interviews with key stakeholders from the government, private sector, NGOs, and academic institutions, and quantitative data gathered from a

survey of approximately 400 citizens across various sectors in Phnom Penh. The findings indicate spatial inequality in the provision of basic services. Additionally, Phnom Penh's urban practices in transportation, waste management, and green spaces reveal areas that require significant improvement to align with sustainable development principles. Addressing these issues would involve coordinated efforts among government, private stakeholders, and the community, emphasizing infrastructure development, regulatory measures, and public awareness campaigns. Such efforts are essential for Phnom Penh to manage its rapid urbanization effectively while enhancing livability and promoting a sustainable urban future.

Circular Economy and Strategic Oversight in Policymaking: Evidence from Regional Electric Vehicle Policies in India

Shubham Sharma (Delft University of Technology)

As India transitions toward electric mobility, state governments play a crucial role in shaping policy outcomes due to the country's federal governance structure. This paper examines the sub-national dimensions of electric vehicle (EV) policies in India, with a specific focus on multi-level governance, local policy experimentation, and strategic oversight in sustainability transitions. While national policies such as FAME I & II (Faster Adoption and Manufacturing of EVs) have set overarching goals, their implementation is contingent on regional governments' capacity and policy priorities. This results in highly uneven EV policy landscapes across states, with varying degrees of integration between industrial policy, transportation sustainability, and circular economy (CE) principles. Through an interpretive policy analysis of 29 state EV policies, this study identifies three critical governance challenges:

1. Asymmetry in policy capacity among states – Highly industrialized states lead EV adoption and manufacturing, while less-industrialized regions struggle to develop comprehensive policy frameworks.
2. Fragmentation in subnational governance – The interplay between state transport, industry, and environment departments creates competing priorities, leading to policy misalignment.
3. Limited integration of circular economy principles – Despite CE niches like vehicle scrapping, retrofitting, battery reuse, and recycling being essential for sustainability, they remain secondary concerns in most regional policies.

By applying correspondence analysis (CA) and K-means clustering, the paper reveals distinct patterns in regional EV policy making and their alignment (or lack thereof) with industrial and sustainability goals. The study argues that federal oversight, institutional coordination, and cross-state learning mechanisms are necessary to ensure a more equitable and strategic transition to sustainable transportation. This research contributes to the broader discourse on multi-level governance, policy local-ism, and federalism in sustainable transportation transitions. It underscores the importance of regional policy innovation, intergovernmental coordination, and regulatory clarity to harness EV adoption as a lever for both industrial policy and environmental sustainability. The findings hold relevance for policymakers and scholars interested in comparative federalism, sustainable mobility governance, and circular economy integration in transportation policies.