

EDITORIAL

Insights from the sustainable mobility using data in Latin America and the Caribbean special collection

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1. Introduction

As urban centers continue to grow globally, it is crucial to ensure safe, accessible, inclusive, and sustainable mobility. Sustainable urban mobility lies at the core of climate and social justice agendas, as it establishes the means and environment for citizens and businesses to access both essential and prosperous opportunities that urban agglomerations have to offer. Hence, urban mobility is fundamental for the productivity, quality of life and environmental balance of cities. The global environmental crisis and social inequalities as well as the economic shortcoming of Latin America and the Caribbean (LAC), calls for an urgent transformational change in the mobility and transportation sector. By leveraging technology and big data, there is more readily available evidence, to make informed decisions in the planning, design, investment, operation, and maintenance of mobility services.

The TUMI Mobility Data Hub project, funded by the GIZ and the German Development Ministry (BMZ), aimed to advance sustainable mobility using data and technology. The Transformative Urban Mobility Initiative (TUMI), and CAF, collaborated to develop a package of three components to transform urban mobility, initially focusing on Latin America: a [Data Hub for Mobility Data](#), technological practical applications of data collection and analysis for public policy in three pilot cities and a deepened and innovative academic research. For the latter, a [call for papers](#) was launched to foster collaboration with experts, conduct research on urban mobility and planning using the collected data, and extract innovative ideas to translate them into policy. The call sought innovative methodologies and reliable data to build knowledge on sustainable mobility in LAC, focusing on topics like urban mobility, public and sustainable transport, and additional points were awarded to proposals addressing issues such as gender, diversity, informal areas, vulnerable populations, and the climate crisis.

To ensure the project's success, CAF worked along with the Governance Laboratory (GovLab), applying a participatory methodology to define and prioritize 10 actionable questions to make transportation and mobility policies more data driven. Over 80 global experts contributed to identifying high-impact questions, resulting in a list of 10 questions. The top 10 questions guided the project, including the call and the selection of academic research papers.

Three papers were selected from the TUMI Mobility Data Project call, and to enhance the dissemination of the developed knowledge, a collaboration with Cambridge University proposed the creation of a special collection within the *Data & Policy* journal that aims to promote a new theory of policy–data interactions, emphasizing research on data use in policy and exploring ethical and efficient data utilization in the LAC region. Therefore, the call was reopened in January 2023 and after several reviews and editorial processes, eight papers were published to give birth to the “Sustainable Mobility Using Data in Latin America and the Caribbean” special collection.

2. Discussion of papers

The collection of research papers presented herein represents a multifaceted exploration of urban mobility and transportation systems, leveraging diverse data sources and methodologies. Each study contributes valuable insights that hold policy significance for the development of inclusive, sustainable, and efficient urban mobility strategies.



Twenty-one cities covered in this collection. Note that 11 cities are covered in Fioravanti et al. (2023) urban logistics.

Saniger et al. (2024) employ anonymized GPS data to analyze travel patterns in Mexico City, focusing on suburban and central zones. Findings highlight the central area's diverse entertainment, commendable walkability, and higher proportion of long trips. The findings underscore the importance of prioritizing transportation and pedestrian conditions to enhance accessibility and mobility in these areas. In the LAC context, the paper offers essential insights for the development of regional policies in mobility and transportation, despite being based on cell phone data, which is often owned by the private sector. Finally, it can be applied as an instrument to prioritize places for interventions according to population needs.

Mesquita et al. (2023) make use of public transit data from transit smart cards in the city of Fortaleza, Brazil, to infer spatial and temporal travel patterns of users. Specially, it focuses on tap-on system

(validation right after boarding, but not at disembarkation), and it uses socioeconomic tags such as the student voucher to identify certain user groups. Understanding transit users' travel patterns, opens a range of possibilities to optimize the service and reduce operating costs. This paper continues to assess the use of machine learning techniques to extract valuable and very cost-effective insights from disorganized, and passively collected data.

Nieto-Combariza et al. (2024) delve into the role of motorized three-wheelers (MTWs) in Caribbean popular transport, emphasizing regulatory challenges. Through case studies in Puerto Viejo, Costa Rica, and Soledad, Colombia, it examines MTWs' impact on safety, accessibility and the environment using qualitative and quantitative data. Advocating for just urban mobility planning, it stresses ecological and social considerations. The methodology introduces cost-effective data techniques for future research on sustainable mobility in resource-limited urban areas. Insights from studying informal transport contribute to innovative solutions, addressing accessibility gaps, fostering social inclusion, and informing adaptive, inclusive policies.

Hidalgo et al. (2024) article critically examines the state of Bus Rapid Transit (BRT) in Latin America, focusing on Curitiba, Quito, Bogotá, Mexico, and Santiago. Despite BRT's rapid growth and promises of low cost and rapid implementation, operational and financial challenges persist. The paper addresses issues such as overcrowding, reliability, fare evasion, safety concerns, and poor maintenance in BRT systems. The analysis emphasizes institutional, financial, and technical constraints, suggesting that BRT's success hinges on ongoing management, investment, and attention to data, technology, urban integration, and public participation for sustained contribution to mobility networks.

Fioravanti et al. (2023) apply the data envelopment analysis (DEA) methodology to evaluate in a comparative way the performance of urban logistics of 12 cities in Brazil. The authors use only publicly available data representing macro-level variables. With input-oriented and output-oriented models, cities are benchmarked against the ones closer to the production frontier, meaning, more efficient. This is a replicable and scalable methodology, to continue shedding light on urban logistics' literature to inform policymakers.

Martinazzo (2023) conducts a comparative examination of transit accessibility to health facilities in the city of Córdoba, Argentina, before and after the pandemic, utilizing open-source code and data that enables reproducibility and scalability. Additionally, it examines the acquired findings with the distribution of households categorized by vulnerability levels. This analysis can offer evidence to guide urban and transport planners to incorporate equity issues in future and existing interventions. Finally, it contributes to the scarce literature in Argentinean medium-sized cities.

Montoya Robledo (2023) highlights the relevance of users' perception to access transport systems using qualitative methods. It explores the disparity between expert-drawn transit maps and domestic workers' street-level commute maps in Bogotá and Medellín, Colombia. Through qualitative fieldwork, it delves into the implications for the Right to the City (RtC) and feminist geography, offering policy recommendations for inclusive urban planning reflected on maps and users' information. In the regional context, it contributes to discussions on leveraging qualitative data and technology for equitable urban mobility, given that domestic workers are part of population groups with greater intersectionalities and social inequities, and their perspective is essential to recognize the gaps between the urban planner's viewpoint and that of the average citizen.

Learning from international cases and their measurements on cycling infrastructure and experience, Ángel et al. (2023) propose a new cycling index and apply it to the city of Bogotá. For the index, a survey is designed to not only include safety/related variables (road and personal), the quality of infrastructure and sense of well-being but also, it incorporates the experience of care trips, including a gender-sensitive approach. The overall index and its disaggregation unveil infrastructure, policy and cultural improvements that can be implemented to make any city a more cyclable one for all.

3. Analysis

Common themes and issues emerge from the diverse research papers, collectively shedding light on key challenges and opportunities in urban mobility and transportation.

3.1. Open access data for decision intelligence

Several studies leverage advanced data analysis techniques, such as GPS data, smart card data, and DEA, emphasizing the crucial role of data in informing policy decisions. This approach allows for evidence-based interventions, optimizing transit services, and benchmarking logistics efficiency. To achieve this, the sector needs to work on facilitating open access data, developing open-source methods as well as strengthening data-science skills in the public realm. This will enable moving from data to decision intelligence.

These papers also show the importance of leveraging private sector data to make decisions such as the location of public spaces in the city. For this, the sector needs to advance on public–private associations to reach those pieces of information that enhance urban analysis to make decisions.

3.2. Equity and inclusion

The research consistently highlights the importance of equity and social inclusion in urban planning. Studies delve into issues faced by vulnerable populations, such as suburban residents, low-income groups, and domestic workers. Policies and interventions are urged to address accessibility gaps and ensure just mobility, considering diverse socioeconomic backgrounds and promoting the right to the city.

3.3. Operational challenges in public transit

The examination of public transit systems, particularly BRT in Latin America, reveals persistent operational and quality challenges. Overcrowding, safety concerns, and reliability issues underscore the need for comprehensive strategies and ongoing management to ensure the success of mass transit systems, from the perspective and perception of individuals.

3.4. Policy recommendations for urban planning

Each paper contributes valuable policy recommendations for urban planners and policymakers. Whether it is advocating for targeted interventions in suburban zones, inclusive urban planning, or the creation of a cycling index, the studies provide actionable insights and translate findings to guide future policies and interventions in urban mobility.

In summary, the common threads of data-driven decision making, equity, sustainability, operational challenges in public transit, and actionable policy recommendations weave through these papers, collectively providing a comprehensive understanding of the complex landscape of urban mobility.

4. Moving forward

This collection is a tasting of the positive role that data and digitalization can have in enabling a more cost-effective and comprehensive understanding of the stakeholders and processes happening in the urban mobility dynamics. This facilitates more efficient and clever decisions that can improve the quality of life and productivity of cities.

To move further into harnessing all the power that data and technology can have in urban mobility, these authors express some recommendations about the challenges and areas that need to be improved.

4.1. Literature is still scarce in urban logistics, last mile services and informal transit in LAC

Informal transport serves as a solution addressing city accessibility issues in LAC. However, it remains in the regulatory gray area, often carrying a negative connotation that undermines its utility. Further research like the one Nieto-Combariza et al. (2024) will be key to increase the visibility and understanding of the needs these services cover, and proper public policies that make them safer, more efficient, and environmentally friendlier.

4.2. Innovative and cost-effective methods to understand mobility patterns using passively collected data

The use of machine learning methods and IA applied to passively collected data can allow for analysis of individual travel behavior and spatial movements, which contribute to decipher modal split, users' movements, providing valuable insights to decide on operational improvements, or planning policies. Research methodologies that involve verification of modal split through big data into traditional methodologies, could save time, resources, efforts and conduct to more accurate data that guides management and behavioral transportation policies. Furthermore, continue expanding the knowledge on the use of smartcard data will also be valuable for the region.

4.3. Innovative methods for inclusive solutions

Proposing innovative solutions that gather information from communities and vulnerable populations is needed to bridge accessibility gaps, foster social inclusion, and inform adaptive and inclusive policies. Advocating for fair urban mobility planning with new methodologies such as the one Montoya Robledo (2023) explores is key to a sustainable system. Work like this can guarantee stronger project cycles, more efficient use of resources and assure acceptance and appropriation of interventions adding to its sustainability in time.

4.4. Impact assessment studies to advocate for sustainable modes

Besides, useful discussions around public transportation such as the one presented by Hidalgo et al. (2024), the sector and especially the LAC region, need more impact assessment studies to continue to display the myriad benefits that investments in public transportation and cycling quality infrastructure can have on cities. For this, cities must make efforts to plan measurable objectives, gather data before the implementation of projects in line with these objectives and collect information post-implementation, to prove benefits, minimize impacts, provide tools and evidence to politicians and policy makers. Case studies, especially in the LAC region, are scarce.

4.5. Policies for public–private coordination and collaboration mechanisms

The role of the private sector in capturing relevant data for public policy planning and operations is crucial, some of which can be as low-hanging fruit as the passively collected data. In this digitalization era, researchers and practitioners not only from the transport sector, but from the digital, software, and legal areas shall join to explore the role of cities in enhancing regulations, policy frameworks, and fostering agreements between the public and private sectors to benefit from this information. This while maintaining appropriate privacy practices, data usage and other societal concerns.

These authors humbly hope this collection not only generates insights but also promotes debate around these topics and others and enables further research and collaborative work to expand the knowledge in the region.

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