mobil.TUM 2024 – The Future of Mobility and Urban Space, April 10-12, 2024

Open data platforms for smart mobility planning: the case of Brazilian Capitals

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Keywords: *Mobility planning, Open data, Smart Mobility, Sustainability, Transportation data*

This work addresses the following topic(s) from the Call for Contributions:
(Please check at least one box)

☐ Placemaking to integrate urban spaces and mobility
☐ Promoting sustainable mobility choices in metropolitan regions
☐ Governing responsible mobility innovations
☒ Shaping the transition towards mobility justice
☒ System analysis, design, and evaluation
☐ other: _____

Extended Abstract

Problem statement

Data acquisition and open data remains a problem within strategic transport planning, but data plays a key role in sustainable planning, both for the creation of smart initiatives and for projects in the context of the climate emergency. Planning for smart mobility and smart urban systems – and therefore equitable, inclusive, affordable, barrier-free, safe, resilient, and healthy mobility systems – requires (open and dynamic) data.

In the last few years, there has been a movement for governments to share their data, in alignment with open governance initiatives. Open data consists of data of public interest published by governments, which is characterized by its free and easy availability, *i.e.*, open data is available without any restrictions and can be easily found and accessed (Dinko et al., 2021; Janssen et al., 2015; Mahrez et al., 2022; Parycek et al., 2014; Veljković et al., 2014). Open data can include historical and up-to-date data on transport, spatial data, weather information, and other information of public importance (Dinko et al., 2021; Veljković et al., 2014). Besides that, it should be complete, primary, timely, accessible, machine processable, non-discriminatory, non-proprietary and license free (Veljković et al., 2014).

Open data and digitalisation can assist solving the accessibility and mobility issues, managing in real-time the road traffic, public transport, and transport emissions, recovering from disasters, and quickly responding to accidents or extreme climate events (Balogun et al., 2020; Consoli et al., 2017; Dinko et al., 2021; Morishita-Steffen et al., 2021; Wen et al., 2020). Emergencies as the COVID-19 pandemic prove the importance of real-time data management, pushing the development of open data initiatives (Hu et al., 2020).

Open data enhance transparency of government actions and also improve citizens adhesion to participating and developing policies, thus increasing positive interactions between citizens and the city administration (Consoli et al., 2017; Veljković et al., 2014). In some cases, municipalities are reluctant to openly share city data because of privacy concerns and the costs involved in data collection and processing (Wen et al., 2020). In other cases, municipalities must rely on state or national levels of data collection to have information regarding urban or climate change data or themselves suffer from a limited capacity of obtaining such data. Especially in developing countries, urban and climate data is often possessed by private companies, while researchers and citizens lack access to their data (Balogun et al., 2020).

Besides that, data may contain several issues, especially raw data, which often have low information quality because of mistakes on it (Janssen et al., 2015). Format issues and database errors also pose a problem to further process and integrate data into planning. In this sense, data publishing platforms will play a key role in supporting technological openness (Soriano et al., 2018). However, just publishing open data is not enough. The platforms should also include metadata and descriptions of data acquisition processes, following the requirements to be reused (Parycek et al., 2014; Veljković et al., 2014).

At last, it is worth mentioning that despite the potential of smart initiatives, security to protect massive data and privacy concerns should be carefully addressed (Borchers et al., 2021; Docherty et al., 2018; Sookhak et al., 2019), as these data may be subject to user identification and be used with surveillance purposes if privacy is neglected. Those concerns on privacy should also consider individual and community levels of exposure (Borchers et al., 2021).

Research objectives

The aim of the study is to map whether there are any open data platform initiatives for planning urban mobility and transport systems in Brazilian capital cities, investigating as well if there are any climate change data related to mobility such as pollution levels and dynamic data regarding accidents and/or extreme climate events.

Methodological approach

The methodology of this study comprised a search for open data platforms in Brazilian capitals, followed by multiple study cases. For the available platforms found, the following questions were made:
- What data regarding mobility systems is available?
- Is data on climate change events available? If so, which ones?
- Does the population receive real-time information about events related to mobility, whether everyday or extreme weather? For example, high levels of pollution, accidents, etc.
- Is popular/citizen participation encouraged by the platform / city?
- Do the databases contain up-to-date data?

Preliminary results

Open data platforms were located in 13 of the 27 capital cities (26 state capitals plus the federal capital): Belo Horizonte (Belo Horizonte, 2023), Brasília (Brasília, 2023), Campo Grande (Campo Grande, 2023), Curitiba (Curitiba, 2023), Florianópolis (Florianópolis, 2023), Fortaleza (Fortaleza, 2023), Goiânia (Goiânia, 2023), Natal (Natal, 2023), Porto Alegre (Porto Alegre, 2023), Recife (Recife, 2023), Rio de Janeiro (Rio de Janeiro, 2023), São Paulo (São Paulo, 2023), and Vitória (Vitória, 2023). Table 1 presents the mobility and transport data available in each city's platform, besides if and how popular/citizen participation encouraged.

Regarding population receiving real-time information about events related to mobility, in Recife the real-time speed of some roads is available, while in Rio de Janeiro weather conditions are available via an official mobile app. In Natal, dynamic data may be available if the user register within the platform. The level of pollution and accidents were not found in any of the platforms.

Regarding climate change data, Belo Horizonte, Florianópolis, Goiânia, Recife, and São Paulo have maps of vulnerable areas. In Rio de Janeiro, Greenhouse gases (GHG) emissions were available in the platform (other capitals may have an inventory of GHG emissions, but they were not found in the platform). At last, all platforms seem to have up-to-date data.

Table 1: Data availability on Brazilian capitals' open data platforms

Brazilian Capital	Mobility / transport data	Popular/citizen participation encouraged
Belo Horizonte	Transport network, public transport and cycling infrastructure, parking, traffic signals	-
Brasília	Transport network, public transport and cycling infrastructure	The platform has a Frequently Asked Questions (FAQ) explaining what open data is, how can be used, etc., and a page to contact the government.
Campo Grande*	Transport network, public transport and cycling infrastructure, traffic signals	-
Curitiba	Transport network, public transport and cycling infrastructure, parking, traffic signals	People can upload their own data into the platform, but that will not be available to other users
Florianópolis	Transport network, public transport and cycling infrastructure, parking, traffic signals	-
Fortaleza	Transport network, public transport and cycling infrastructure, traffic signals; historical data is also available	The platform has a FAQ explaining what open data is, how can be used, etc., and a contact page for further questions/suggestions
Goiânia*	Transport network, public transport infrastructure	It is possible to suggest corrections to the available maps
Natal	Public transport and cycling infrastructure	The platform encourages developers to create new services from the data
Porto Alegre	Transport network, public transport and cycling infrastructure, parking, traffic signals, traffic flow and accidents	Ideas can be submitted into the platform
Recife	Transport network, public transport and cycling infrastructure, traffic signals, roads' historical average speed	The platform has a FAQ explaining what open data is, how can be used, etc., and a contact page for further questions/suggestions
Rio de Janeiro	Transport network, public transport and cycling infrastructure, parking, traffic signals	The platform has a contact page for further questions/suggestions
São Paulo	Transport network, public transport and cycling infrastructure, parking, traffic signals, origin-destination zones	The platform displays places where people can go to ask for infrastructure evaluation and request services
Vitória	Transport network, public transport and cycling infrastructure, parking	-
* The data is available for visualisation but is not available in a format suitable for reuse or cannot be exported from the platform.		

Future research

Future research may deeper investigate the platforms, carrying out surveys considering the posed challenges or risks to the successful implementation of the platform and which sectors benefited or have the potential to benefit from the implementation of open data platforms. Another direction is to compare the Brazilian reality to other countries (e.g Germany) and exchange expertise.

Acknowledgments

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