Urban mobility and inequalities. Some perspectives from different disciplines

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Abstract

Urban mobility is one of the key aspects of urban planning and development. It plays an important role in the achievement of a resilient, inclusive and sustainable city. However, the complex interrelations of urban mobility, transportation and other city dimensions implies the need of an interdisciplinary approach to understand and plan it. In this brief paper, we discuss the social aspects of urban mobility and inequality and how it has been addressed in the literature. We also show different ways of gathering data relevant for the understanding of urban mobility, their sizes, scopes, and nature. Finally, we aim to promote an interdisciplinary debate based on our academic literature review about the relationship of urban mobility with social variables such as poverty.

Keywords:
Urban mobility, inequalities, interdisciplinary research.

Introduction

Urban mobility is the movement of people or goods in urban space in order to fulfil a necessity. Be it be the movement of people within a day, by means of transportation facilities (or walking) to do obligatory trips (such as those related to work or study) or to do voluntary movements in urban space (such as those related to leisure activities). In addition, it might relate to the movement of cargo (as in freight transportation and logistics) or even it can be broader: urban residential mobility, which tries to explain how and why people move from one neighbourhood to another (Hannam, Sheller & Urry, 2006; Rodrigue, Comtois & Slack, 2016, p. 206). Therefore, urban mobility regards to different objectives and to different space and time scales. We will focus here on the urban mobility of people within the day, regardless of the transportation mean or purpose of the trip. The explosion of data collection and new analysis techniques can complement established theoretical perspectives to give new insights about the movement or goods, services, infrastructure and people over time.

Traditionally, urban mobility studies have been addressed by transport and civil engineers, and by urbanists and architects trying to understand, model and integrate the relationship between land use patterns, activity locations and transportation, in order to improve decision making in urban planning (Ortúzar & Willumsen, 2011). However, as urban mobility results from the interconnectedness of elements of the city (individuals moving within the urban space using transportation/activity infrastructure to fulfil their needs, which might be or not in conflict with

the interest of others) it is considered as a complex system. Therefore, one plausible way to address it might come from an interdisciplinary perspective.

Besides the aforementioned relationship between land use patterns, activity location and transportation infrastructure, the complex nature of human urban mobility includes other important aspects such as: environmental concerns (given that transportation is one of the main causes of air pollution, at least in cities in developing countries, which in turn affect the health of citizens), the economic costs of the externalities produced by mobility, and the social inequality given by the accessibility to different transportation modes (and its efficiency, comfort and security) for different groups of the population.

These aspects (environmental, economic and social) are the three pillars of sustainability or also known as the triple bottom line concept (Sala, Ciuffo & Nijkamp, 2015). Thus, the importance of addressing urban mobility as a key aspect for a resilient, inclusive and sustainable city. However, in this working paper, we will discuss the social aspects of urban mobility and how it can either produce (or reduce) the social gap or social inequality. We also propose a debate about the importance of addressing it from an interdisciplinary approach.

Data sources

In order to understand the mobility patterns of people in the urban context, it is necessary to have real information about these movements. The ways of gathering urban mobility data are diverse and so are their sizes, scopes, and nature; ranging from small to big data and from traditional survey methodologies to smart city devices and artificial intelligence related forms of collecting information.

Barbosa *et al* (2018) explain different sources of data for understanding human mobility, but most of them are intended for mathematical/simulation modelling, mainly from a STEM (quantitative) perspective. However, there have been also studies and qualitative approaches from the social sciences to understand urban mobility (Sheller & Urry, 2006). From the qualitative to quantitative, from the small to the big data, some approaches to measure or depict urban mobility are:

- The reading and analysis of historical archives such as diaries and autobiographies (historiographical methods) where people narrate their journeys (Pooley 2016; Pooley, 2017). These data sources cannot be proved to be representative of population but provide insightful information about the evolution and changes over time in the preferences or places where people tend to move. Pooley has used almost 16,000 such sources, which suggests a wide cross-section of population and time.

- The traditional approach by transport engineers and urban decision makers have been the use of census data and origin-destination surveys intended to capture the flows between predefined zones of the city (Barbosa *et al,* 2018).

- Finally, new technologies allow stakeholders to collect big data from diverse sources and from those to infer mobility patterns. These include Call Detail Records from mobile phone calls, bank transactions and Social media interactions, among others.

Urban mobility and social inequalities

Rapid urbanisation, especially in developing countries, has brought not only more mobility and transport demands within the city but also a growing phenomenon that cannot be seen in isolation: urban poverty (Davila *et al*, 2013). In transport studies, the relationship between the accessibility given by the transport facilities and social exclusion has been a secondary but important issue (Bergman *et al*, 2016).

The more privileged citizens travel in a more efficient way and might be able to choose how and when, while the poor might lack the resources to access transport, which in turn might reduce their opportunities to improve their condition (Davila *et al*, 2013; Lotero et al, 2016; Pooley, 2016). Some other studies that analyse urban mobility and social segregation, inequalities and poverty are those of Hu & Schneider (2017); Le Roux et al (2017); and Yip et al (2017).

The differences between the way in which inhabitants of different socioeconomic status use transport and move within the city results in social inequality due to urban mobility. This relationship is so complex that improving infrastructure/services does not necessarily improve options for the mobility of the poor (Davila *et al*, 2013) and may lead to the mobility of ones but the immobility of others, as stated by Hannam, Sheller and Urry (2006).

The role of other disciplines

Urban mobility (and immobility) and its relationship with social variables such as poverty might be of interest for many other disciplines. Some ideas regarding the role of other disciplines are:

- For economists: urban mobility has associated to it diverse externalities (positive such as the access to services and infrastructure, and negative such as air/noise pollution and congestion, among others) and have been studied broadly (Small et al 2007). Others, such as Goetz et al (2010), have studied how commuting patterns explain the variations in per capita income growth in US counties. Economic policies to reduce the gap between different social classes and those related to urban mobility should be of interest from an economic point of view.

- For environmental engineers: transportation is known as one of the main contributors to air pollution, a problem that might affect the whole population of a city regardless of their socioeconomic conditions. However, the way people are exposed to contaminants might be different according to their mobility patterns (Reis et al, 2018), and if the mobility patterns are different given their status (Lotero et al, 2016), therefore there might be inequality in the way people are exposed to pollutants and their hazards to health.

- For epidemiologist and public health policy makers: The interaction of people in public transportation or the interaction of citizens in their origin and destination zones (be those in a local or global context) is one of the vectors for the spread of infectious

diseases. Some works that address this issue are those of Balcan et al (2009); Belik, Geisel & Brockmann (2011); Colizza et al (2006); Soriano-Paños et al (2018) and (Tizzoni et al (2014), among others.

Many others disciplines ranging from urban history to computer science and physics might be interested in how urban mobility and inequalities are related and how to overcome or at least reduce the inequality gap. Ideally, research about urban mobility and inequalities regards the study and understanding of a complex system and therefore it should be addressed in a holistic and interdisciplinary way. However, it is not about only adding disciplines knowledge, as in multidisciplinary studies, but working together in the research process in order to develop a common approach, because, as in the case of complex system, the results is more than just the sum of its parts.

Final thoughts and conclusions

Although we have nowadays smart cities technology to collect big data regarding urban mobility, there are still some concerns about the human capacity to process it in an efficient way to promote public policies that might help reduce social inequalities and improve urban mobility. There is also the issue of "formulating the right question" to the large amount of datasets collected in real-time and there is open debate on privacy/ethics of using people's data. There is no perfect data available, until now, for understanding urban mobility patterns and their relationship with inequalities. However, different approaches and types of data might offer different insights of high value in this matter.

Not only we need a multidisciplinary approach when addressing social aspects related to urban mobility; it is not about adding socio historical aspects to the engineering infrastructure for transport and using data algorithms to predict behaviours, it is about a real interdisciplinary way of thinking both the problem and the solutions. An interdisciplinary approach might offer new perspectives to tackle urban mobility problems and those related to inequalities, but also to the issues that each discipline might have in which urban mobility plays an important role.

Finally, we must take all of this into account in order to achieve the Sustainable Development Goals promoted by the United Nations, especially goal number 11, which looks forward to making cities and human settlements inclusive, safe, resilient and sustainable.

Acknowledgments

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