

Article

# Social sustainability in urban mobility: An approach for policies and urban planning from the Global South

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## CITATION

Grande-Ayala CE, Marin MA, Rincon-Garcia N. (2024). Social sustainability in urban mobility: An approach for policies and urban planning from the Global South. *Journal of Infrastructure, Policy and Development*. 8(8): 5786. <https://doi.org/10.24294/jipd.v8i8.5786>

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## ARTICLE INFO

Received: 13 April 2024

Accepted: 28 May 2024

Available online: 7 August 2024

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**Abstract:** Historically, transportation projects and urban mobility policies overlook the dimension of social sustainability, mainly focusing on economic and environmental criteria. This neglect, seen enhanced in the Global South, leads to long travel times, growing congestion, reliance on motorcycles, high traffic accident rates, and limited access to public transport, jobs, and urban facilities, especially for the more vulnerable population. In light of these issues, this paper proposes the Social Sustainability of Urban Mobility (SSUM) approach as an analytical framework that assesses the state of social sustainability in urban mobility by applying a Systematic Literature Review where three gaps were found. First, by tailoring the SSUM approach to the context of the Global South, it is possible to address the population-focused gap in urban mobility. Second, in the literature review, a theoretical gap defining social sustainability in urban mobility and its three primary categories has yet to reach a consensus among practitioners and academics. Finally, more empirical research should be conducted to discuss methodological aspects of operationalizing the SSUM approach through the three main categories: accessibility, the sustainability of the community, and institutionality. The SSUM approach promotes implementing a sustainable urban agenda that builds inclusive, equitable, and just cities in urban mobility.

**Keywords:** Social Sustainability of Urban Mobility (SSUM); Global North; Global South; transportation management; social sustainability; urban mobility

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## 1. Introduction

The transition from current urban mobility towards a more sustainable one represents one of the most significant challenges for humanity. Discussions on sustainability emphasize the importance of improving energy consumption efficiency, which accounts for approximately 40% of total fossil fuel consumption. This energy consumption significantly contributes to greenhouse gas emissions and has an economic impact through air pollution, one of the leading causes of respiratory diseases.

Healthcare spending in many countries due to unsustainable mobility stems from two sources. The first is respiratory diseases associated with air pollution (Foster and Bedrosyan, 2014), a consequence of both global and local CO<sub>2</sub> emissions produced by fossil fuel technologies. A second source is related to cities that promote motorization of travel, leading to increased sedentary lifestyles associated with chronic illnesses, injuries, and deaths resulting from traffic incidents.

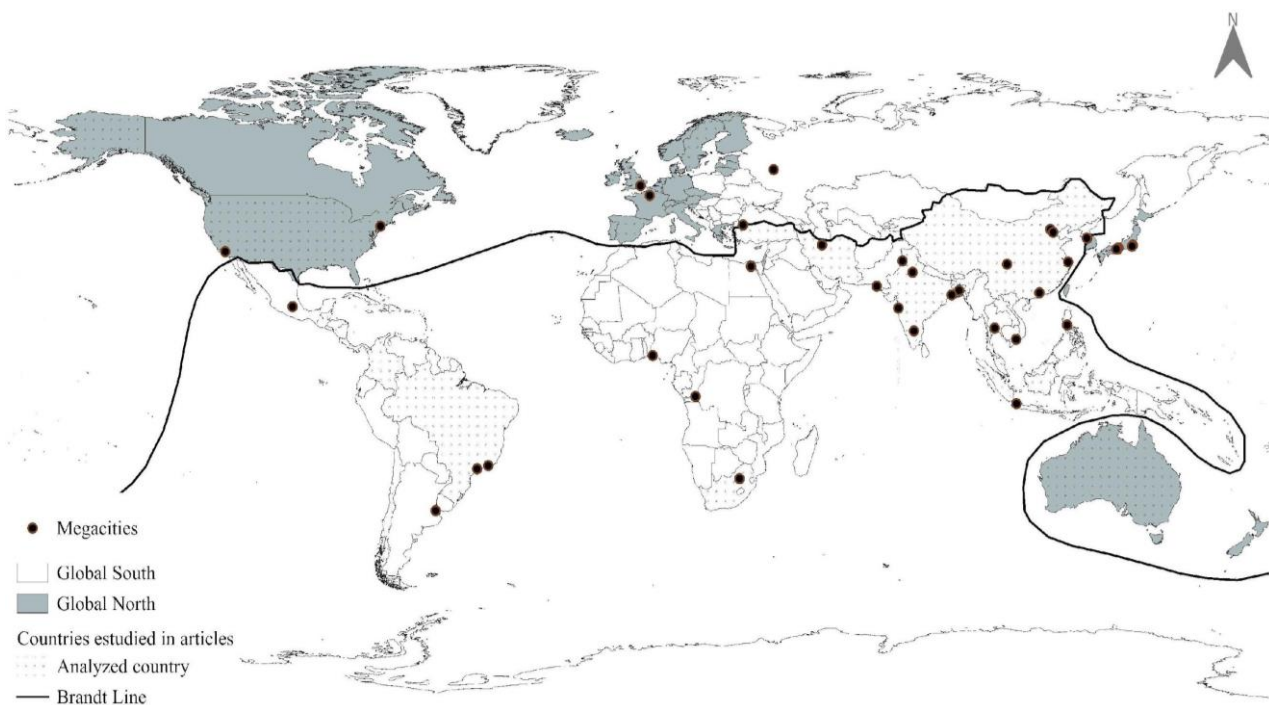
Central and local governments worldwide should prioritize these challenges to improve the quality of life in cities through urban mobility. However, some regions

still suffer from these problems and require significant boosts in fundamental issues such as equity and inclusion.

The Global South (GS) is one of the regions that needs a holistic vision that includes a citizen rights approach in any urban mobility project. As Vasconcellos (2011) asserts, this notion does not fit into the traditional scheme of transportation project development, which is mainly dominated by an eminent engineering perspective.

Therefore, this article refers to the GS adhering to the idea proposed by Mahler (2017). This idea acknowledges a geographical south but transcends it, identifying the adverse effects of contemporary global capitalism on various regions and communities. This deterritorialized perspective implies recognizing excluded individuals within the Global North, challenging the conventional North-South dichotomy.

However, for practical purposes, this research will classify the literature based on the geographical scope of the GS's territorialization, which can be defined based on the Brandt Line proposal, which is still in force after forty years (Lees, 2021). This proposal, depicted in **Figure 1**, segments countries the World Bank considers high-income from those that are not.



**Figure 1.** South and North Global countries analyzed.

Although it is necessary to clarify that, in some reflections in this document, the terms “developed” and “developing” countries are used, primarily when it is necessary to emphasize that inequality and exclusion, when resorting to the term GS, always involve wealthy countries to remain consistent with the deterritorialized analysis proposed by Mahler.

In any case, the GS is critical. Rodríguez-Pose and Griffiths (2021, p. 442) affirm that by 2030, 30 out of 43 megacities will be located in low-income or low-middle-income regions and will maintain significant population growth. Additionally, out of the 2400 existing intermediate cities, 60% are found in this geographical region,

reinforcing the importance of this perspective in addressing the issue of sustainable urban mobility.

Transportation in the GS faces numerous challenges. As cities expand and incomes improve, citizens acquire more cars and motorcycles, increasing congestion and traffic accident rates. TomTom measures the traffic index, calculated as the difference between free-flowing traffic conditions and average speed during peak hours. In 2019, 15 cities had a traffic index exceeding 50%, with 14 in the GS (TomTom, 2021).

The reported risk of fatal accidents involving motorcycles is between 16 and 30 times higher than passenger cars (Clarke et al., 2004; NHTSA, 2018). Many megacities and intermediate cities in developing countries are experiencing a growth in motorcycle usage (Hoang and Okamura, 2020). In India, two-wheeled vehicles accounted for 58,747 deaths in 2019, contributing to 38.0% of the total accidental deaths on roads in the country (NCRB-MHA, 2020).

Bogotá is experiencing rapid growth in motorcycle ownership and its impact; in 1998, there were nearly 30,000 registered motorcycles, and by 2018, this number had increased to almost half a million. Bogotá recorded 514 traffic accident deaths in 2018, with 265 related to motorcycles (179 motorcyclists, 80 pedestrians, and 6 cyclists), implying approximately eight traffic accident deaths per 100,000 inhabitants. In contrast, for a megacity in the Global North, such as London, this figure ranges from 1 to 2 (Rincon-Garcia et al., 2018).

Another challenge in developing countries is the gender gap in access to transportation. Although women tend to make more complex and varied trips than men because the purpose of their trips includes not only work or education but also childcare and household chores, walking remains their predominant mode of transportation. This is because other modes of transportation are often unavailable due to being too expensive or inconvenient in terms of proximity, cultural acceptance, personal safety, and risk perception. Women tend to have less access to private motorized modes of transportation (Babinard et al., 2010).

Additionally, new transportation networks are often justified based on their ability to improve conditions for the poorest individuals. However, evidence frequently indicates the opposite and suggests that disadvantage increases further (Grieco, 2015, p. 83). For instance, Pirie (2013, p. 14) conducts a comprehensive analysis of various formal and informal modes of transportation in Sub-Saharan African countries and asserts that governments are increasingly aware of the differentiated accessibility and mobility of urban residents.

Car owners' mobility is nearly infinite (although traffic congestion hinders it), but many people find intra-urban travel extremely expensive, inconvenient, slow, challenging, dangerous, and lacking in dignity. In South America, Garretón (2011, p. 57) demonstrates that despite a robust multimodal system in Santiago, Chile, substantial inequalities persist in the location of households and their mobility capacities, concluding that socio-spatial specialization and differences in accessibility could have a multiplier effect on income inequality.

Turner (2013) highlights that in Asia, transportation planning methods lack systematic, socially inclusive processes, and transportation professionals are not trained in such methods. This hinders citizen participation and identifies their needs in

different urban mobility planning and management phases. Turner asserts that “social sustainability still too rarely ‘makes it onto the radar’ (Turner, 2013, p. 11).

Based on these premises, several opportunities for inquiry arise from the perspective of urban planning and daily mobility. Firstly, is it possible to theorize what some authors (Colantonio, 2009, p. 867; Dempsey et al., 2011, p. 290; McKenzie, 2004, p. 6; Shirazi et al., 2019, p. 3; Uteng et al., 2019 p. 60) call the “untheorized dimension of sustainable development” and its link with urban mobility? What does social sustainability imply in urban mobility? Is it possible to characterize this relationship?

Additionally, it is necessary to inquire whether an approach can be termed socially sustainable. Are there specific categories and subcategories in academic discourse that can be deemed vital to understanding the true meaning of the social sustainability approach in urban mobility? Is it possible to establish a methodological framework to operationalize social sustainability assessment?

In this regard, the literature review presented in this document addresses three fundamental aspects. Firstly, it characterizes a population gap by prioritizing the Global South region’s positioning and reflection on social sustainability in urban mobility in the literature review. This is defined in more detail later in the methodology.

Secondly, it considers a theoretical gap related to the definition of Social Sustainability in Urban Mobility (SSUM). This entails searching for evidence to determine if there is a notion or, at best, some definitions that allow identifying its main theoretical contributions and understanding the critical attributes discussed in the academic debate.

Thirdly, it lays the groundwork to close the empirical gap in assessing social sustainability in urban mobility by identifying its primary attributes, establishing the main categories and subcategories present, and offering evaluation alternatives.

Based on all of the above, the central question of this research is posed: What characteristics define social sustainability in urban mobility in the geographical context of the Global South? This sets the main objective of this inquiry as defining an approach to characterizing and evaluating social sustainability in urban mobility in the Global South.

Furthermore, it is crucial to state that the Global South and North are established as the study cases for this article. Therefore, it can be hypothesized that Global South countries’ urban mobility projects and policies neglect or do not include an interest in social sustainability. This leads to missing the opportunity to contribute to a better urban transportation system and a satisfactory transformation of exclusionary social structures in the social production of space.

### **Social sustainability and urban mobility, definitions and applications**

Since the Brundtland report introduced the social dimension of sustainability (WCED, 1987), many papers reflect what social sustainability (SS) means and how it can be used (Kui and Pramono, 2023; Vallance et al., 2011). McKenzie (2004) developed historical research about building social sustainability as a concept that contrasts with the other two sustainability dimensions (environmental and economic). This framework proposal included much scholarly discussion about the theme.

Colantonio (2009) claims that two approaches to SS exist. First, called “theoretical,” it is possible to include the following authors’ ideas about social sustainability. First, Sachs (1999, p. 867) considered a “sociohistorical process rather than a state,” or it can also be interpreted as a development goal (Assefa and Frostell, 2007).

Nevertheless, the Colantonio discourse focused on the second category, which is discipline-specific, and cited Polèse and Stren’s (2000) concept. Perhaps this plays an intermediate role between the theoretical and policy-making approaches, “highlighting the tensions and trade-offs between the development and social disintegration intrinsic to the concept of sustainable development. However, they also acknowledge the importance of the physical environment (e.g., housing, urban design, and public spaces) within the urban sustainability debate” (Polèse and Stren, 2000, pp. 15–16).

Therefore, there are more precise definitions of SS from the urban context. For instance, Chan and Lee’s paper (2008) introduce “six critical factors” of SS, Yung et al. (2014) define other “five factors” to accomplish SS and urban development, and Dempsey et al. (2011, p. 289) define a general “two dimensions” about how to build a social dimension of sustainable development in an urban context. These features, factors, and dimensions relate to sustainable community and equitable access.

The second approach to SS described in the articles cited above identifies elements related to urban mobility, such as equitable access and Provisions facilitating daily life operations. In addition, several studies propose schemes to evaluate sustainable urban transport systems, including some that incorporate indicators of the SS dimension: evaluative methods proposed by Jeon et al. (2013, p. 2013) and Zegras (2011, pp. 554; 536–570) also details at least four alternatives of evaluative schemes; that include indicators such as social equity, safety, human health, quality of life, access to means of mobility, equity in access, among others.

Therefore, it is possible to ensure that from the field of urban mobility, there is a consensus that SS is an essential aspect of evaluations of sustainable transport; conversely, Jeekel affirms at least that “we leave the nebulous world of social sustainability at the generic level” (Jeekel, 2017, p. 4306). However, there is no consensus on the aspects that define SS in urban mobility or make it operational. Although the work of Jeon and Amekudzi (2005, p. 33) extracts from at least 16 evaluation schemes the indicators referring to the social dimension, the study’s emphasis is not on SS. It includes only countries from the Global North. In this context of urban mobility, it is essential to highlight the advanced descriptive definition of SS of transport systems proposed by Flora (2001, pp. 385–386) and the more conceptual definition of Cervero (2014, p. 180), which can be synthesized and grouped as shown in **Table 1**.

Different case studies consider an approximation of the SSUM approach to offer nuanced inputs toward sustainability in urban mobility, emphasizing various outcomes according to our findings. One interesting case in São Paulo, Brazil, provides a practical application that explores how the SSUM approach enhances a pathway to sustainable urban mobility planning with a case study in Sao Luis, Brazil (Silva and Teles, 2020), where guidelines toward sustainable urban mobility are conceptualized and assessed by measuring GHG in four different scenarios. Another case considers a

survey that evaluates perceptions toward sustainable transportation in Jakarta, Indonesia; their findings indicate that most sustainable transportation initiatives are relevant to and positively perceived (Lee et al., 2021). Finally, another case proves the importance of pedestrianization as a social impact evaluated through surveys in Chaharbagh Abbasi Pedestrian Street (ChAPS) (Shahmoradi and Guimarães, 2024), which provides practical guidelines for urban planners intending to enhance social sustainability through built environmental planning at the city level.

**Table 1.** Critical ideas to the operational definition of social sustainability of urban mobility<sup>1</sup>.

The operative definition of Flora (2001)	The conceptual definition of Cervero (2014)
Elimination of all gender discrimination.	
Greater use of nonmotorized transportation.	
Planning for job reduction, retirement, and relocation to help former public transport employees.	Equal and fair distribution of mobility benefits.
Viable subsidy systems are not simply an artificial implementation of a lower charge.	
Development of community participation.	
Improvement in accessibility to jobs, infrastructure, and mobility systems.	Few, if any, inequalities in access to transport infrastructure and services based on income, social, and physical differences
City planning, emphasizing accessibility and public transportation.	

<sup>1</sup>A preliminary theoretical framework is developed on the social dimension of sustainability in urban mobility based on key texts, primarily by Flora (2001, p. 385) and Cervero (2014, p. 180). These texts are deemed essential for a comprehensive understanding of equity (both horizontal and vertical (Ferrell et al., 2023, p. 12) and inclusion in transportation, as well as for grasping the social dimension from the perspective of the Global South.

By building on these foundational texts, a preliminary group of categories/indicators is established to delineate a socially sustainable approach to urban mobility based on the work of Dempsey et al. (2011). This approach aims to identify concepts of “context-sensitive” sustainable urban mobility (Dimitriou, 2011, p. 34) suitable for projects and policies in the Global South.

Although their SS approach does not start from an exhaustive analysis of cases or literature, it is based on the most recent idea of equity and justice in urban mobility (Pereira et al., 2016).

## 2. Materials and methods

As seen in the previous paragraphs, there is evidence that the debate on sustainable development, in general, and in social sustainability in specific, is an open topic, and a consensus has not been reached, especially regarding the issue of operationalization for impact assessment (Colantonio, 2009; McKenzie, 2004; Shirazi et al., 2019; Zegras, 2011).

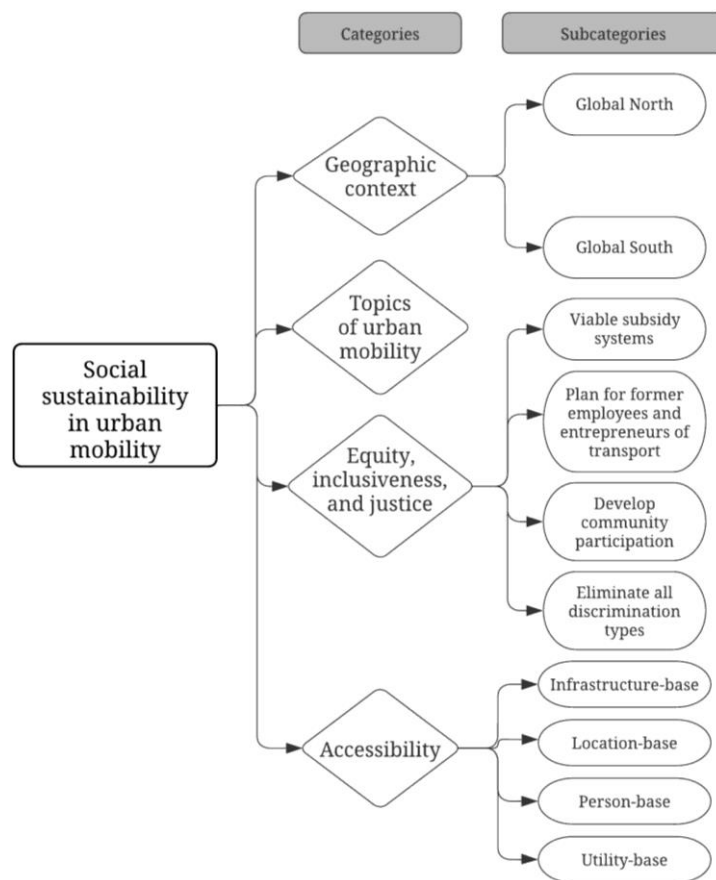
This lack of consensus on social sustainability evaluation can make understanding what this dimension truly means difficult. Dimitriou in Zegras (2011, p. 58) is an example of academics who show concern about how the discussion can be more in-depth in transport systems and how sustainability can become a neo-imperialist concept imposing “Western” values while ignoring local circumstances and values.

Dimitrou stated that seeking more “context-sensitive sustainability concepts” (Dimitrou, 2011, p. 58) to implement plans and urban mobility policies is the key to breaking this ‘neo-imperialist’ trend in the GS. By doing so, we must be aware that traditionally, the environmental and economic dimensions of development in sustainable urban mobility policies and projects are given weight, and the majority’s social well-being is bypassed under the assumption that the transport services in the

GS countries have satisfactory accessibility inclusion and equity.

Therefore, identifying key factors and defining indicators that promote a more accurate evaluation of the social sustainability dimension is a concrete action to improve context-sensitive sustainability concepts and evaluations, which must be implemented in policies and projects in the GS. Identifying these key factors is the basis for constructing a systematic literature review (SLR) that can answer the main question above.

In this sense, the SLR considered the “background reviews” of Xiao and Watson (2019) and the thematic analysis method suggested by Braun and Clarck (2006). The selected documents are systematized based on the conceptual coding depicted in **Figure 2**.



**Figure 2.** Theoretical coding scheme of key social sustainability aspects of urban mobility.

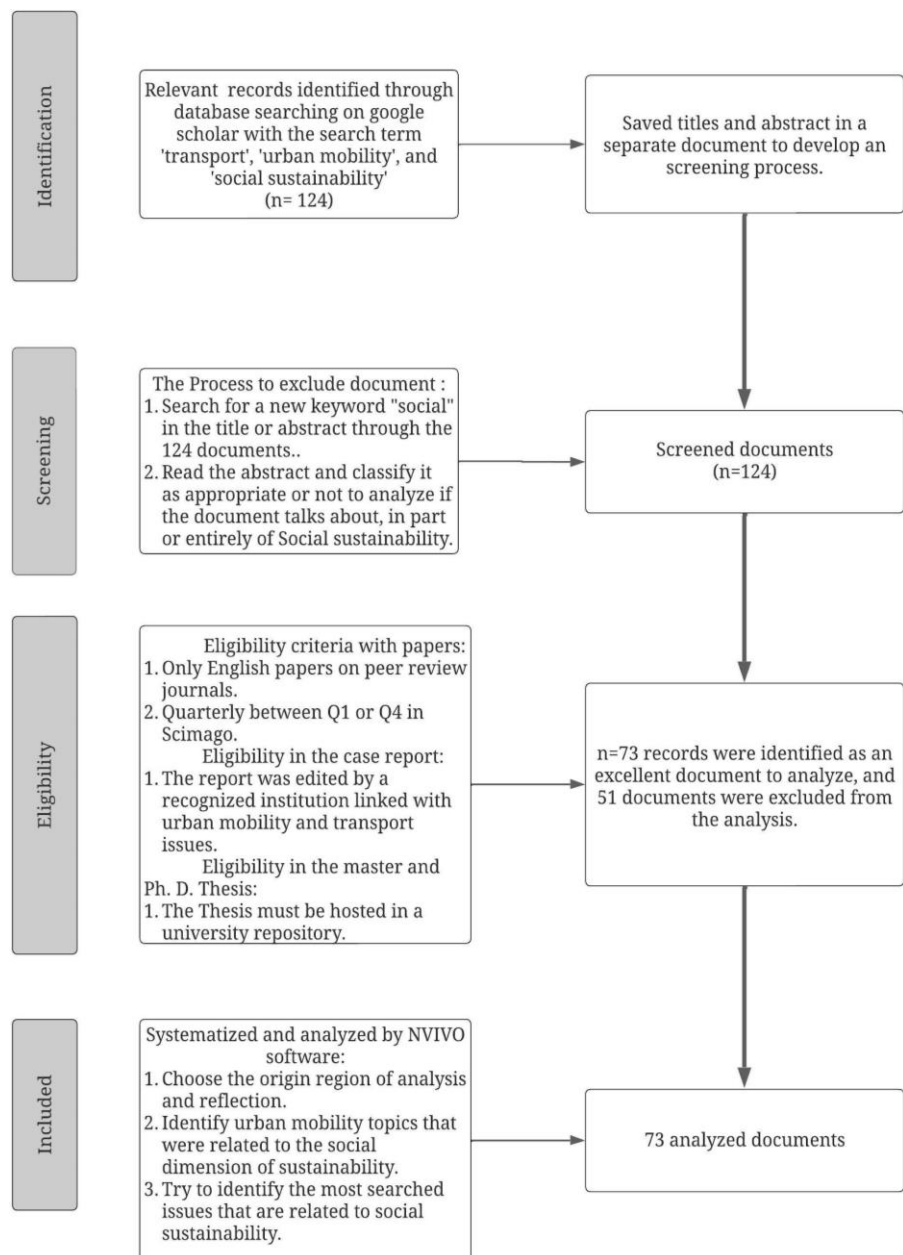
For the thematic analysis of the texts selected, different coding types will be used in two cycles, utilizing the Nvivo software as a tool to systematize coding. The types and coding cycles start with “provisional coding” or exploratory coding methods, as established by Saldaña (2021). **Figure 2** outlines four categories and ten subcategories for the first coding cycle, which become codes. This indicates an initial deductive coding strategy, as recommended by Saldaña (2021, p. 47), when the research is theory-based and focuses on specific experiences, phenomena, and actions, among other factors known to appear in the empirical materials.

The SLR includes scientific articles that address social sustainability issues and

urban mobility, including peer-reviewed scientific articles as a criterion. Additionally, documents such as book chapters and technical reports from recognized institutions in the transport field are included, the latter considering two criteria.

Firstly, Littig and Griessler (2005, p. 5) state that, “Approaches to the social sustainability concept have not been grounded in theory but rather on a practical understanding of plausibility and current political agendas”. Secondly, Van Wee and Banister (2023) expose the idea of the reasoned approach, which implies explaining the motivation for choices and graphing the selection process.

The literature search is carried out in Google Scholar by searching for texts in the English language with the following keywords: “social sustainability,” “urban mobility,” and “transport” in the period from 2000 to 2020. The systematic literature review is performed in four phases, as depicted in **Figure 3**.



**Figure 3.** Systematic literature review scheme process.



The data was also manually analyzed and proceeded to interpret the mainstream concepts related to social sustainability. This process helped to validate or restructure the framework proposed in **Figure 2**, which can be understood as a schematic hypothesis, to give a final version of the conceptual framework of the concepts about SSUM.

In the “included” phase, it is essential to remember the importance of manually analyzing the coded texts to determine the patterns of meanings to avoid excessive dependence on automatic software analysis that identifies the “semantic repetition in the data analysis process” and not the sense and meaning of grammatical constructions (Zhao et al., 2016, p. 8). Thus, these qualitative research analysis categories consider the criteria of credibility, the possibility of confirmation, meaning in context, recurring patterns, and saturation proposed by Leininger (1994, pp. 86–88).

The cycles of coding concluded with reaching saturation in coding, meaning when new contributions or “in vivo” codes cannot be identified (Strauss and Corbin, 1998, p. 136).

The final result of this process provides a proposal of categories/indicators that make up a theoretical framework product of the analysis of the “mainstream” regarding Social Sustainability in Urban Mobility. Second, a geographical vision of the regions in which this approach is used the most establishes the basis for discussing the implications of using this approach in inequitable, exclusive, and unfair contexts.

### **3. Results and conclusions**

Social sustainability in urban mobility in the Global South unveils crucial findings and insights. It identifies a substantial population gap when considering social sustainability criteria in transportation projects, emphasizing the urgent need to prioritize these aspects for enhancing urban mobility and addressing exclusionary social structures. The research also highlights a theoretical gap in understanding social sustainability within urban mobility, refining key concepts such as accessibility and Sustainability of Community. Moreover, the study lays the groundwork to bridge the empirical gap by defining categories and subcategories for evaluating social sustainability in urban mobility in the Global South while emphasizing context-sensitive sustainability evaluations of accessibility, using sustainability of community and institutionality. The research advocates for a nuanced understanding of social sustainability in transportation projects, particularly in the Global South region. Overall, the results section underscores the significance of integrating social sustainability principles into urban mobility planning to advance inclusive and equitable urban development.

#### **3.1. Population gap: Geographical context, key issues, and social sustainability approach proposal**

The relative absence of consideration for social sustainability in the GS is confirmed. In the geographical context depicted in **Figure 1**, 40 articles are from the Global North, 19 are from the GS, and the remainder do not have a specific geographic context.

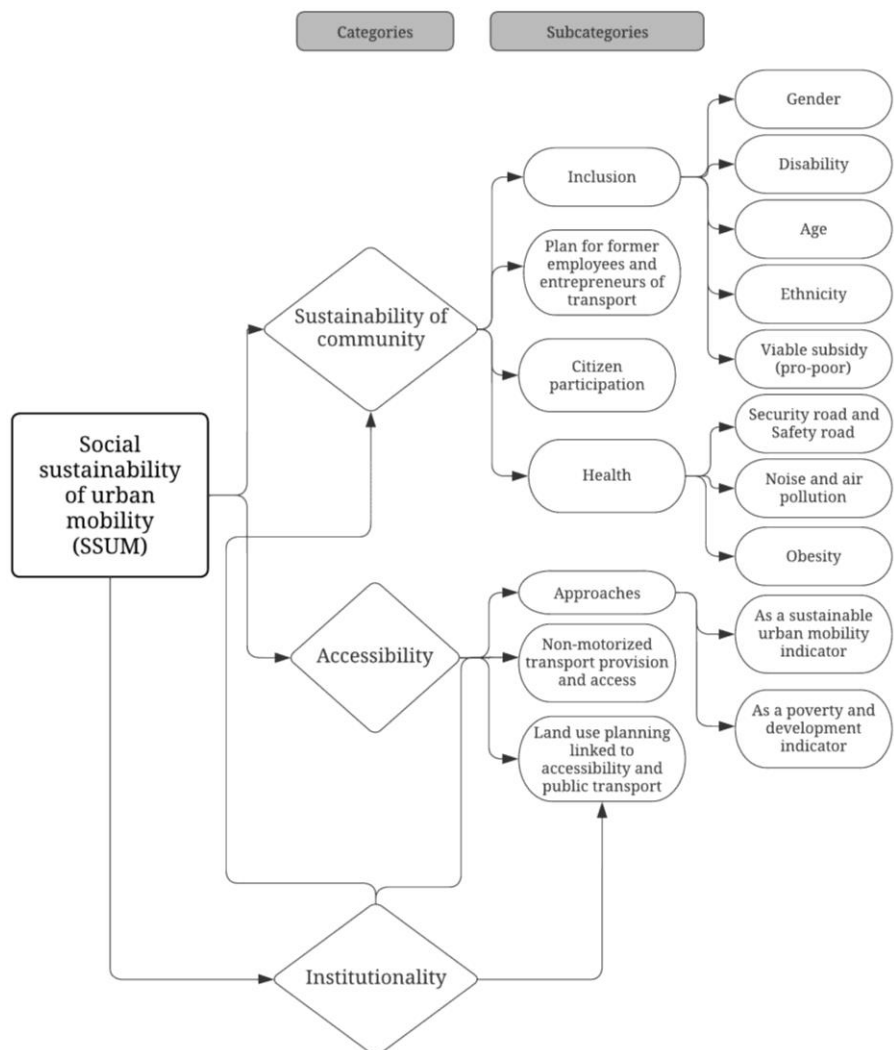
The social sustainability approach has a more significant presence in reports and

research from developed countries, as Kumar and Anbanandam affirm:

“Although researchers and practitioners focus on the economic and environmental dimension of sustainability, less attention is given to the social dimension of sustainability, particularly in developing countries” (Kumar and Anbanandam, 2019, p. 1).

### 3.2. Theoretical gap: A conceptual framework of social sustainability for urban mobility

The 73 selected papers were conceptually coded to improve the initial **Figure 2**, with some differences in the theoretical framework depicted in **Figure 4**. This sample of significant concepts concentrated on social sustainability from urban mobility studies, namely accessibility, community sustainability, and Institutional sustainability.



**Figure 4.** The theoretical framework of social sustainability in urban mobility.

In **Figure 4**, the category Sustainability of community and subcategories Health and Security and road safety are identified as relevant for social sustainability but are not considered in the first theoretical scheme shown in **Figure 2**; these categories are the product of coding that identified their contribution to greater coherence in the

conceptual structure of SSUM.

For instance, the health issue can be linked to SSUM in at least three subcategories: noise, air pollution, and obesity; the last is related to sedentary lifestyles, but all are linked to unhealthy urban environments (Hynes, 2017, p. 6). and excessive motorized mobility (Armstrong et al., 2015, p. 14; Marletto et al., 2015, p. 13).

Furthermore, there are other specific issues related to health and urban mobility, security, and road safety, and it is possible to find expenditure indicators related to the health costs associated with these “diseases” in the government budgets (Batty et al., 2015, p. 112).

The “security road” regards people’s perception of security moving through the city (Sdoukopoulos and Pitsiava-Latinopoulou, 2017, p. 625), something that Chakwizira (2009, p. 118) calls fear-based exclusion and does affect mainly elderly people and women. On the other hand, Safety Road regards road accidents, which annually cause deaths and disabilities. “Security and safety are therefore essential conditions for the development of human life, freedom, and solidarity” (Candia et al., 2019, p. 191).

Finally, note how Cervero proposed that “inclusion and fair distribution of the benefits of mobility” is replaced by “Sustainability of Communities.” This idea is considered a more appropriate category/indicator for two reasons: first, the idea of “community” has recurrent use in the Global North and facilitates the standardization of the evaluation, although this is challenging to operationalize mainly due to the delimitation of the neighborhood or community (Jenks and Dempsey, 2007), and second, it is much more consistent with the logic of urban development in countries of the GS and comparable with the idea of “popular habitat” or “social production of habitat” (Miranda Gassull, 2017) of significant impact in Latin America in general.

This additional topic, not included in the first theoretical scheme depicted in **Figure 2**, defines the main categories and subcategories.

### **3.3. Methodological aspects of operationalizing the SSUM approach**

#### **3.3.1. Accessibility**

Accessibility, also known as social equity and vertical equity (Bonicelli, 2015, p. 22; Shirazi et al., 2019, p. 10), is the most common of the elements present in the transport literature and urban mobility related to social sustainability (Dempsey et al., 2011, p. 292; Uteng et al., 2019, p. 60). In general, at least 390 references integrate some form of the operational definition proposed by Van Wee and Geurs (2004), defining accessibility as “the extent to which land-use and transport systems enable (groups of) individuals to reach activities or destinations by means of a (combination of) transport mode(s)” (Van Wee and Geurs, 2004, p. 128) but with different approaches that might be complementary.

Considering the GS context, accessibility should be approached in two ways. Firstly, the idea that understands “accessibility as a poverty and development indicator,” which acknowledges accessibility as a “basic need,” and urban mobility is a demand derived from this need (Godard, 2011, p. 234; Zegras, 2011, p. 556). Secondly, accessibility should be understood as a “sustainable urban mobility

indicator” for a more comprehensive assessment (Zegras, 2011, p. 581). This finding does not intend to delve into methodologies. In fact, in the context of the GS, it is difficult to access reliable data that guarantees good results regardless of the methodologies; however, describing the levels of accessibility in urban reality requires the best methodological options for evaluation.

The last two subcategories of accessibility that are proposed are “land use planning linked to accessibility and public transport,” which is crucial for improving accessibility through the SSUM approach and is synthesized in the proposal of Venter et al. (2018, p. 18), which states that, “Enhancing accessibility is necessary for using extended trunks and/or denser feeder networks”. In addition, many authors suggest that nonmotorized transport provision and access (Armstrong et al., 2017, p. 62; Grieco, 2019, p. 92; Lyons, 2017, p. 416) is a relatively inexpensive means of improving poorer people’s accessibility.

### **3.3.2. Using sustainability of community to shape social sustainability in urban mobility**

This paper proposes blending concepts, intertwining the ‘sustainability of communities’ and ‘equity and inclusion indicators in urban mobility.’ This has great potential to become a category/indicator and a helpful tool for two reasons: it links each subcategory mentioned above and its profound meaning of social sustainability.

Colantonio states that “the ‘community and the ‘local level’ have re-emerged as main and operational spatial categories for the pursuit of sustainability” (Colantonio, 2009, p. 875), and Dempsey offers a wide definition that fleshes the urban mobility scope (Dempsey, 2011, p. 290). This SLT identifies the following structure to include this item in the SSUM indicator and find the contribution of urban mobility to boost the ‘sustainability of communities.’

For Jeekel (2017. p. 4306), “sustainability of community is basically about functioning city networks on all geographical levels”, offering an approach related to urban mobility. However, the most recent reference found was Uteng (2019, p. 63), who took up the Lineburg (2016) scheme of social sustainability in transport, proposed “sustainability of communities” as the primary indicator of social sustainability and included it as sub-indicator cohesion, participation, and awareness. Instead, Dempsey (2011, p. 294) proposes social interaction/social networks in the community as sub-indicators that can be interpreted as inclusiveness, participation in collective groups and networks, community stability, and pride/sense of place.

The following paragraphs argue and contextualize the importance of the community’s Sustainability subcategories; it is warned that Health and Safety Road was described in the paragraphs above. Nevertheless, issues related to participation and inclusion should be part of the Sustainability of community indicators. Hence, according to the evidence found in SLR, the subcategorization for “sustainability of communities” is proposed as summarized in **Figure 4**, considering as main items, namely, inclusion and citizen participation, but adding issues related to health and the interaction with former employees and entrepreneurs of transport.

For instance, the issue of health, as Hynes (2017) suggests, is another lens through which to view and understand people’s travel routines, practices and beliefs in addition to the issue of congestion. The author highlights this issue by comparing it

with the crucial role of warnings about tobacco in planning and policymaking, including “tackling some of the big issues of the day including energy security and climate change, public health and obesity, creating healthy urban environments, supporting economic growth, and reducing traffic congestion” (Hynes, 2017, p. 6).

Therefore, it is possible to link health indicator aspects such as the number of deaths from chronic diseases associated with air pollution due to transport, noise levels associated with transport pollution, and the incidence of diseases associated with sedentary lifestyles for each 1000 inhabitants; in some cases, it is possible to find expenditure indicators related to the health costs associated with these diseases.

If health issues in urban mobility are traditionally related to noise, air pollution and sedentary lifestyles (Armstrong et al., 2017, p. 56; Marletto et al., 2015, p. 11), there are specific issues of health, safety and security (Batty et al., 2015, p. 112). The first argument regards people’s perception of safety moving through the city (Sdoukopoulos and Pitsiava-Latinopoulou, 2017, p. 625), something that Chakwizira (2009, p. 118) calls fear-based exclusion. The second regards road accidents, which annually cause deaths and disabilities. “Security and safety are therefore essential conditions for the development of human life, freedom, and solidarity. Security and safety concern not only the lives of individuals but also the development of the city and sustainability” (Candia et al., 2019, p. 191).

The concept of inclusion plays a pivotal role in ensuring equitable participation in economic, political, and social aspects of community life. Cervero’s (2014) inclusion assertions, supported by Arsenio et al. (2016, p. 4), emphasize the significance of inclusive mobility, defining it negatively through the exclusion, understood as restricted accessibility to opportunities and services due to inadequate mobility. This underscores the necessity of fostering inclusive urban mobility to enhance community engagement and well-being.

Conversely, Inclusive urban transportation strategies should encompass former entrepreneurs and employees of urban transport systems to ensure a comprehensive understanding and representation within the sector. Flora’s (2000) advocacy for their inclusion highlights the potential benefits of crafting more inclusive and equitable transportation policies and initiatives.

Addressing informal transportation is one of the multiple ways to promote pro-poor urban mobility. Still, as Cervero et al. (2007, p. 457) underscore, it requires a balanced approach from local authorities. Policymakers must choose between complete acceptance and outright prohibition, fostering an environment conducive to sustainable urban mobility while addressing the challenges posed by informal transport systems.

The provision of transportation alternatives for marginalized groups, including the economically disadvantaged and individuals with disabilities, remains a pressing issue in the Global South (GS). Grieco (2015, p. 85) and Stjernborg (2019, p. 2) highlight the imperative of accessible transportation options to mitigate marginalization and empower these communities. This underscores the necessity of addressing transportation deficits to promote inclusive and sustainable urban mobility practices.

Finally, the social sustainability perspective mainly concerns gender inclusion. Turner advises that “women are particularly dependent on (reliable and affordable)

public transport, and therefore public transport systems are often of greater value to them than to men” (Turner, 2013, p. 4).

### **3.3.3. Institutionalality**

The third category refers to institutional arrangements related to sustainable urban mobility. Armstrong et al. (2017, p. 92) assert that “enriching governance and a solid institutional and regulatory framework is necessary” to achieve equitable mobility, build sustainable communities, and improve urban mobility.

Ortuzar (2019, p. 2) highlights the importance of the institutional dimension in “making sustainability happen” rather than just “aspiring” to it. Furthermore, considering the context of countries in the Global South, Dobranskyte-Niskota et al. (2009, p. 12) and Littig et al. (2005, p. 15) suggest including the political-institutional dimension as part of the social dimension of sustainability due to the institutional weaknesses present in these countries.

### **3.3.4. Challenges: Methodological approaches and their further empirical research**

This article identifies indicators that best characterize the relationship between social sustainability and urban mobility in the Global South, combining social and technical aspects. Authors such as Vasconcellos (2011, p. 332) and Zegras (2011, p. 555) refer to this as a sociotechnical approach.

This dual nature of the subject determines the characteristics of the methodological design, which is both qualitative and quantitative, to operationalize the variables and their indicators, as represented in **Figure 3**. From the perspective of critical realism (Danermark et al., 2019), this dual nature is approached through methodological pluralism. The greatest challenge of this approach is the application of an integrated and balanced analysis, diagnosis, and synthesis based on both qualitative and quantitative analysis. This aims to be an honest rather than ambitious proposal, incorporating as much complexity as possible from reality.

The Systematic literature review highlights three main aspects regarding methodologies for evaluating social sustainability and urban mobility (SSUM). The first is the set of methodologies from the Global North, notably the holistic work by Lineburg (2016, p. 36) with over 100 outcome and process indicators, along with studies by Mouratidis et al. (2024), Pitarch-Garrido (2013) and Ruiz et al. (2017), which focus more on equity-accessibility. These methodologies are characterized by their sophistication and high data and technical capacity requirements.

In the countries of the Global South, there have been advances in evaluating social sustainability in urban mobility, mainly focused on accessibility. Examples of such research can be found in India (Kumar and Anbanandam, 2020), Iran (Haghshenas et al., 2015; Shahmoradi and Guimarães, 2024), Colombia (Delmelle and Casas, 2012; Henao and Véliz, 2020), and Central America (Grande-Ayala, 2024). This group is notable for seeking alternative methodologies and collecting their own data, highlighting another significant challenge in a context with scarce open data. Muenta-Kunigami (2018, p. 48) argues that Latin America can be compared to Africa and Asia regarding their low scores in indicators like the Global Open Data Index, Open Data Inventory, and Open Data Barometer, which assess countries’ strategies for implementing open government data.

Finally, in the Global South, the critical aspect is the integrated analysis of the sociotechnical SSUM approach, which involves variables that can be considered quantitative, such as accessibility and some community sustainability indicators, alongside more qualitative aspects like institutional analysis and citizen participation. This has not been thoroughly identified in this systematic literature review; however, there are notable steps in this direction, such as the proposals by Guzmán et al. (2017) and Grande et al. (2023), which lay the groundwork for future advances in operationalizing the SSUM approach.

#### **4. Conclusion**

The results enable the development of the theoretical framework depicted in **Figure 4** from the categories analyzed in the SLR. In this sense, it can be defined a group of consolidated categories around which the relationship of urban mobility with social sustainability can be accounted for.

Between urban mobility and social sustainability, various authors consider two significant categories for characterize this relation, namely, accessibility, known as social equity (Dempsey et al., 2011, p. 292; Lineburg, 2016, pp. 17,36), and the concept of Sustainability of Community (Dempsey et al., 2011, p. 293; Jeekel, 2017, p. 4306; Uteng et al., 2019, p. 60). Additionally, this article supports the ideas of several authors (Armstrong et al., 2015, p. 92; Dobranskyte-Niskota et al., 2009, p. 12; Griessler, 2005, p. 15; Littig and Ortúzar, 2019, p. 2), who argue that, in the context of Global South countries, it is essential to incorporate a third category in the SSUM related to the inclusion of the political and institutional dimensions to achieve equitable mobility and build sustainable communities.

Building upon these premises, the study first contributes to the Theoretical Gap by addressing the definition of social sustainability categories in urban mobility. Additionally, it identifies a Population Gap, highlighting a specific population segment that requires contextualization. Furthermore, this research also provides an operational definition of this relationship, arguing that urban mobility is considered socially sustainable when:

- 1) A sociotechnical approach is adopted by the competent institution: Planning and management entities conceptualize urban mobility as a sociotechnical system composed of actors, land uses, and transportation systems (road networks, modes, and complementary infrastructure).
- 2) Continuous improvement of accessibility is achieved: Close collaboration with other urban stakeholders is established to ensure continuous improvements in accessibility to jobs and essential urban facilities.
- 3) Community sustainability is promoted: Efforts recognize impacts on the sociotechnical system and therefore focus on promoting “community sustainability” through significant progress in five key areas:
  - Inclusion: Ensuring equitable access to mobility for all community members, regardless of socioeconomic status, gender, age, ethnicity, or physical ability.
  - Citizen and road safety: Reducing traffic accidents and creating a safe road environment for all users, including pedestrians, cyclists, and motorists.

- Health: Promoting healthy and active transportation modes, such as walking, cycling, and public transportation, to reduce car dependency and improve public health.
- Citizen participation: Actively engaging citizens in the planning, implementing, and evaluating urban mobility policies and projects.

Support for former employees and entrepreneurs in the transportation sector: Providing assistance and opportunities to workers affected by the transition to more sustainable mobility.

## **5. Discussion**

The following discussion structure is proposed to ensure that the discussion reflects the overall argument of the article. First, the results of the SSUM approach are nuanced as a methodological tool and analytical framework. Second, unexpected results are presented and contextualized with a systematic literature review to identify potential biases and areas for improvement.

Third, the topics of Climate Change and Communications and information technologies ICT are addressed, highlighting challenges and intersections with the SSUM approach and suggesting areas for future research. Fifth, the application of the SSUM approach in the Global North and Global South is contrasted, emphasizing the benefits of this contextualization. This comparison underscores the importance of adapting strategies to local contexts, reinforcing the existing literature on urban mobility and social sustainability, and finally this section outlines key policy recommendations for effective implementation of SSUM, ensuring sustainable equitable and inclusive urban mobility.

The first aspect to discuss is that the SSUM approach offers a valuable analytical framework for evaluating the social impact of urban mobility interventions. It does this by focusing on three key variables: accessibility, community sustainability, and institutionalization. While the SSUM approach identifies areas for social impact evaluation, its application in the Global South as a methodological tool faces multiple challenges. The diverse contexts, varying levels of inequity, and the inconsistency of data quality and availability make a one-size-fits-all solution impractical. As a result, developing a tailored approach for the Global South is considered a long-term goal.

A second line of discussion relates to unexpected results of the SSUM approach in the Global South. For example, in the Global North, the key category is social equity. However, for the Global South, it is proposed to use the concept of accessibility since it is pertinent to urban mobility issues and, as previously mentioned, shows a more homogeneous conceptual development in terms of its approaches. Accessibility serves as a tool for achieving equity, measuring poverty, and is a robust indicator of sustainable urban mobility.

Regarding accessibility, for the SSUM approach in the Global South, it is more appropriate to discuss accessibility evaluation rather than accessibility measures. Although this presents challenges in comparing regions, it captures specific relationships and processes that can identify areas for improvement in policy, planning, and project formulation. Discussing a single measure for evaluating accessibility is inappropriate, as the measurement of accessibility remains a subject of



much debate and can vary. For instance, Zegras (2011, p. 579) argues that even in the Global North, evaluation methodologies are not on the path to consensus.

On the other hand, in Global South, it is preferred not to speak in particular about the definition of the “unique methodology” to assess accessibility, and to instead, it is better to establish criteria to evaluate accessibility since the SSUM approach, those criteria are, firstly the idea of a decrees time to access to workplaces and urban facilities and secondly the sustained trend of this decrees time evaluated; this implies two things, first, homogeneity in the measurement in the country or region, and second, evaluation at least two different moments.

One of the reasons to stablish criteria and not methodology is the difficulty to obtain reliable data. As such, the difficulty of access and the quality of the data accessed in countries of the GS are too well known. Munte-Kunigami (2018, p. 48) argues that the Latin American region can be compared to Africa and Asia in terms of lower scores in indicators like the Global Open Data Index, Open Data Inventory, and Open Data Barometer that assess countries’ strategies for implementing open government data. Therefore, each country should seek the most viable methodologies considering, data, economic and technical resources.

The ‘sustainability of communities’ concept is highly replicable in the GS. Its usage potentially strengthens communities for at least two reasons: first, it considers several concepts that imply the idea of ‘habitat’ widely disseminated in Latin America (Miranda Gassull, 2017), and second, it is deeply linked with ideas such as the ‘social production of the space’ by Lefevbre (2013) widely disseminated in this geographical area. The “sustainability of communities” provides an opportunity to generate policy options and bottom-up-type projects (Marletto et al., 2015), which have rarely been explored for urban mobility in Latin America.

Accordingly, the “health” which is a sub indicator of “sustainability of community” offers a significant challenge in terms of the compilation of data, mainly because traditionally, it is not linked to effects from mobility; initially, it could be related to deaths from pollution and road accidents, and gradually, databases and awareness of this critical link between sustainable urban mobility and quality of life in countries of the GS could be built. According to this, studies like as developed by Stankov et al. (2020) can open the agenda in global south to stablish the link between urban mobility and urban health improvement.

A similar situation can be observed in the context of citizen security, because the dissuasive effect of the situation is such that it leads to a reduction in the use of public transport and non-motorised mobility, but also, because it is difficult to link this situation to data that can reveal this specific behavior in urban mobility users, Authors as Fernandez (2016, p. 3) and Shahmoradi and Guimarães (2024, p. 12) link the citizen security in mobility system related with topic as gender, social activities, the quality of night lighting and police monitoring.

Regarding the intersection topics, the third discussion topic, Arsenio et al. (2016) assert that climate change issues can be implicitly embedded through a social sustainability approach. Leveraging a reduction in CO<sub>2</sub> emissions from transport and reducing car traffic by promoting public transport and nonmotorized transport (walking and cycling), among other issues that appear to be social sustainability indicators, can help deal with this crucial issue. Most GS cities can succeed in both

current challenges and parallelly and indirectly address climate change issues and improve equity and accessibility.

On the other hand, the Communications and Information Technologies ICT topic is considered to intersect with the SSUM approach for three reasons. First, they represent a significant tool to address what Coppola and Silvestri (2019, p. 54) state: “In fact, transportation systems might be, in a short time, inadequate to meet the demand that will not only grow but will become more complex and exigent, and will require high-quality standards and customized transportation services.”

Second, Creutzig et al. (2019, p. 3) link it with the three significant evolutions in transportation (sharing, electrification, and automation) but also highlight a significant risk to social sustainability regarding the potential monopolistic trends in urban mobility strategies. Finally, during the COVID pandemic, technologies have shown essential benefits in containment and, in some cases, substitution of urban mobility.

There is no doubt that ICT is a powerful tool and alternative to enhance the social sustainability of urban mobility, as evidenced particularly in the Global North. As Grieco (2015b, p. 2) states, “Permit the development of alternative e-service provision which reduces the need for trips. There is a pressing need to think outside of the conventional transportation box.”

However, Uteng (2019, p. 68) offers a nuanced perspective: “A bigger issue than access to digital services or a smartphone is the lack of digital literacy, the knowledge, comfort, and confidence to use smartphones. In many emerging economies, disparities in digital literacy compound disparities in basic literacy and reduce people’s access to smart solutions and services.”

Additionally, given that the inclusion of a social dimension analysis is more developed in the Global North, it is relevant to highlight that this practice aligns with Mheler’s idea of “Global Souths” within the Global North. However, the same strategies for evaluating social sustainability in the Global North may not always be applicable in the Global South.

The discussion suggests adapting this approach to the Global South has at least three main benefits. First, including institutions as a category of analysis introduces a key variable for the success of transport projects, especially in the Global South, where institutions may be weak in policy continuity but strong in decision-making.

Second, it provides guidance for identifying potentially vulnerable groups by describing disaggregated indicators, which help recognize social groups that could be considered when defining mobility demands.

A third benefit is the recognition of the impact on urban habitat. The concept of community sustainability emphasizes that urban mobility interventions directly affect urban habitats, thereby broadening the scope of impact evaluations and highlighting their complexity.

Finally, the policy recommendations for enhancing the Social Sustainability of urban mobility (SSUM) in the Global South should emphasize the need for tailored accessibility measures, community-centric planning, and institutional strengthening. Governments should develop specific accessibility criteria that focus on reducing travel time to essential services and ensuring affordable public transport through targeted subsidies. Also, procuring to enhance data collection and community involvement in integrating transport and planning can help address accessibility gaps;

this can be supported by capacity-building initiatives that empower local organizations to participate effectively.

Health and safety improvements are critical, with recommendations to incorporate health impact assessments into urban mobility projects and implement safety measures like better lighting and increased police presence. Promoting green mobility options such as public transport, cycling, and walking can reduce carbon emissions and improve environmental sustainability. Governments should set emission reduction targets and provide incentives for adopting sustainable transport options. Leveraging ICT in mobility planning can enhance efficiency and user convenience, although efforts to improve digital literacy and access are necessary to ensure inclusive benefits.

Finally, addressing and recognizing the broader urban habitat's impact on mobility, including the needs of vulnerable groups, is essential through targeted interventions and inclusive mobility policies that consider gender-sensitive planning and universal design principles to make urban infrastructure more accessible. By focusing on these areas, cities in the Global South can effectively adapt the SSUM framework to local contexts, enhancing the social sustainability of their urban mobility systems and improving residents' quality of life.

**Author contributions:** Conceptualization, CEGA; methodology, CEGA and MAM; software, CEGA; validation, CEGA, MAM and NRG; investigation and resources, CEGA; writing—original draft preparation, CEGA; writing—review and editing, CEGA and MAM; visualization, CEGA. All authors have read and agreed to the published version of the manuscript.

**Acknowledgments:** This research was funded partially by IAJES: Founding and collaboration between Jesuit Universities. This publication was made possible thanks to the publication funds of the Vice-Rectorate of Innovation and Publications of the Universidad Centroamericana José Simeón Cañas, El Salvador.

**Conflict of interest:** The authors declare no conflict of interest.

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