

Article

Cartagena (Colombia) Residents' Perceptions of Transport Safety, Mobility Legislation, and Public Participation in Planning Instruments: Proposals for Inclusive and Sustainable Mobility

Zaida Salas-Franco ¹ and Òscar Saladié ^{2,3,*} 

¹ Faculty of Tourism and Geography, Universitat Rovira i Virgili, 43480 Vila-seca, Spain; zaida.salas@estudiants.urv.cat

² Department of Geography, Universitat Rovira i Virgili, 43480 Vila-seca, Spain

³ University Research Institute for Sustainability, Climate Change and Energy Transition, Universitat Rovira i Virgili, 43480 Vila-seca, Spain

* Correspondence: oscar.saladie@urv.cat

Abstract

Mobility and its infrastructure represent challenges for contemporary society. It is necessary to promote collective public transport and active mobility, because they contribute to improving accessibility in cities and the well-being of society. The objectives of this research are (1) to analyze the perception of the population of Cartagena, Colombia, in relation to public transport safety; (2) to highlight the level of knowledge about legislation or regulations related to mobility and their participation in the adoption of planning tools for implementation; and (3) to analyze the proposed initiatives to achieve a more equitable, egalitarian, fair, inclusive, and sustainable mobility. The results emanate from a digital survey conducted with 828 people from different neighborhoods and socioeconomic strata in Cartagena. Regarding the first objective, the findings indicate that almost one-third of the respondents consider public transport unsafe or very unsafe. Public transport is perceived as more unsafe by women than men. In terms of the second objective, there is limited knowledge of mobility regulations (56% did not know or did not respond) and low citizen participation (12%) in the adoption of planning tools. Concerning the third objective, the results showed 54 initiatives oriented toward institutional strengthening and undertaking a more equitable, egalitarian, fair, inclusive and sustainable mobility.

Keywords: mobility; sustainability; equity; inclusion; Cartagena



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1. Introduction

Mobility and its infrastructure are intrinsically linked to the economic development and competitiveness of a territory [1], which is not always harmonious with social development. There are cases in which economic development comes at the expense of social development, and it is then that the concept of equity in transport becomes particularly important. According to Delbosc [2], the latter is understood as the distribution of transport services, aimed at achieving equal opportunities in life.

An equitable distribution of goods and resources means that people can satisfy their basic needs for a dignified life [3]. Behbahani et al. [4] and Martens et al. [5] consider that equity involves the distribution of burdens and benefits, population groups subject to distribution, and distribution criteria. The benefits to be distributed are related to the convenience and comfort of travel and the provision of state services. These burdens are

linked, among other things, to impacts on the environment, health, safety, participation, overall quality of life, and those related to land expropriation. For their part, the target groups for equity include those who are vulnerable (older adults, people with disabilities or special needs, the poor, ethnic communities, and children). Finally, the distribution criteria refer to how burdens and benefits are shared.

Research indicates that limited freedom and mobility represent the risk of social exclusion [6]. Similarly, Vella-Brodrick and Stanley [7] assert that transport mobility is essential for improving social participation and satisfies psychological needs for social inclusion, which are vital for well-being. For Friman et al. [8], travel, life satisfaction, and emotional well-being are interconnected. Begstad et al. [9] recognize that daily transfers have an emotional influence on people, indirectly affecting their subjective well-being. He et al. [10] assert that the comfort of older adults is linked to their satisfaction with transport. Finally, Gao et al. [11] connect satisfaction with travel to overall welfare.

Inclusion in transport requires a policy that ensures equal mobility opportunities for vulnerable people [12], inclusive transport systems, and projects that promote people's lives, development and well-being. Criteria for accessible transport involve an inclusive urban spatial assessment [13], streets [14] and transit stations [15]. Such inclusion is based on equity and humanistic criteria, reflecting the shift in perspective from mere "utility" to one of "equity" [16]. Di Ciommo et al. [17], Pereira et al. [18], and Beyazit [19] consider that equity in transport transcends the distribution of infrastructure and investment, seeking the well-being of vulnerable groups, enabling travel to work and participation in basic activities for subsistence and personal growth. For Li et al. [20], in the context of rapid urbanization in both developed and developing countries, transport equity and social equity are increasingly linked. In fact, equity is fundamental to achieving social sustainability, and there is a clear relationship between equity and social justice [19]. The latter encompasses parity in physical distribution, affordability of goods and services, accessibility for people, and distribution of profits.

Traffic-related pollution is another priority for transport equity. It is considered an environmental burden and involves air pollution, noise pollution, traffic congestion, accidents, greenhouse gas emissions, and waste generation. Health is another important element in transport equity. Reinhard et al. [21] assert that the health of older people is influenced by their satisfaction with transport. Ziegler and Schwanen [22] state that improving mobility is crucial for the physical, economic, and mental health of older adults.

Safety is a decisive aspect of transport [23]. In Cartagena, safety is specifically linked to the formality/informality of transport, the condition of the vehicle fleet, road infrastructure, the culture of the citizenry in mobility, and the actions of the State.

Equity, equality, and justice are required for mobility to be sustainable [24], which is understood from different perspectives. Sustainability of mobility depends on social sustainability in its planning, which requires organized groups to participate in decision making that affects them environmentally, economically, and socially [25]. Other factors contributing to sustainability are: (i) the incorporation of social changes, such as demographic transition, migration and floating populations; (ii) changes in population behavior; (iii) the development of relevant policies; (iv) institutional strengthening, planning capacities in general, and mobility in particular; and (v) the harmonization of motorized and active transport, as proposed by Nikulina et al. [26].

Sustainable mobility leads to a reduction in both energy and infrastructure costs, by saving resources. It also reduces the number of accidents and victims of traffic incidents, as well as air and noise pollution. In addition, it enables the optimization of the movement of people and goods, and the expansion of areas for citizen interaction, coexistence, and leisure.

Multimodality is vital for sustainable mobility [27] because it allows for improved flexibility of travel options, more transport connections, and complementarity that makes mobility more competitive and efficient, boosting trade and reducing the negative impacts of transport and its operating costs [28]. Nonmotorized transport, or active mobility, is fundamental to the development of sustainable transport systems, as it contributes to more accessible, safe, inclusive, and green cities. In addition, active mobility produces benefits for health, the environment, and quality of life, and reduces travel costs. Prioritizing motorized transport over nonmotorized transport harms the poorest of the poor [29]. According to Zhu et al. [30], pedestrian rates are lower in urbanized cities due to environments that discourage walking. Deng et al. [31] state that the use of motorcycles tends to be lower in large cities because they are often banned due to the traffic problems they cause.

Transport costs are determined by geography, infrastructure location, transport and communications systems, and company organizational structures [32]. Negative aspects, such as administrative barriers, the lack of road maintenance, expansion, and frequent demands for transport systems, also have a considerable impact on the specialization and treatment of certain products [33]. The integration of transport systems allows for the optimization of transport networks, as well as the construction, repair, and improvement of roads and the expansion of destinations, making it possible to reduce costs [1]. This reduction in costs, combined with road improvements, can increase productivity, competitiveness, and labor demand in economic activities [34].

The above concepts, which are related, connected and interdependent, highlight that, in terms of relationships:

- An efficient, safe, and inclusive transport system is vital for a city's economic growth and competitiveness.
- Accessible and affordable transport allows all citizens, including vulnerable groups with limitations or special needs, such as people with disabilities or those living in poverty, to access the various services provided by the State, thus contributing to equity and inclusion.
- The perception of safety, air quality and the reduction of road accidents are fundamental to sustainable mobility, which has a direct impact on quality of life and public health, contributing to social sustainability.

With regard to the interactions between these factors:

- The results of previous studies and the literature related to this topic suggest that the population's perception of safety may be associated with reported use of public transportation and active mobility modes. This relationship is consistent with previous research indicating that perceived safety can influence mobility preferences. This could lead to a reduction in traffic congestion and pollution, with consequent benefits for health and the economy.
- Legislation, regulations, and planning tools for implementation (mobility plans and land use plans) geared toward sustainable mobility, provide the foundations for more harmonious and inclusive transport systems, thus contributing to urban development and long-term sustainability.
- Citizen participation in the formulation of legislation, regulations, and planning instruments is essential for building consensus, acceptance, and social ownership of mobility policies. This ensures that the solutions proposed are aligned with the real needs of the population and promote social sustainability.

In summary, these factors are not isolated, but rather constitute a complex system in which proper planning of mobility policies, with a consistent legal basis and public support,

makes it possible to promote economic development and significantly optimize the equity and sustainability of a city.

The relationships described in the conceptual framework should be interpreted as theoretical propositions derived from the literature. The empirical analysis conducted in this study focuses on describing citizens' perceptions rather than testing causal relationships between these variables. Based on the literature, on transport equity, urban governance and sustainable mobility, the study adopts a conceptual framework (Figure 1) that links perceptions of transport safety, regulatory knowledge and citizen participation with the broader outcomes of public transport use and urban mobility sustainability. Increasing (+) perceived transport safety and knowledge of transport regulations leads to a corresponding increase (++) in public transport use and citizen participation in public processes, ultimately contributing to a more (+++++) sustainable and equitable urban mobility.

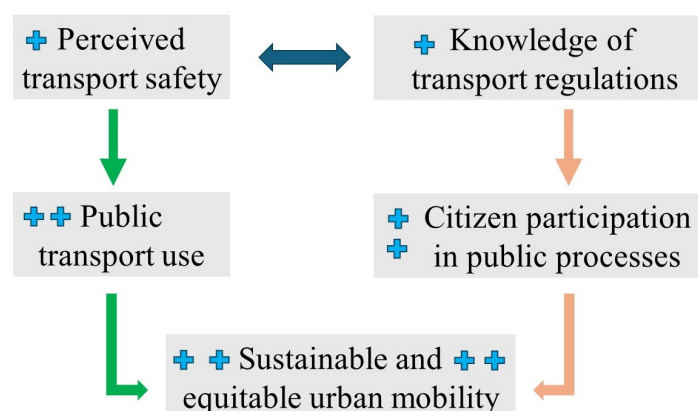


Figure 1. Conceptual framework linking transport safety perceptions, regulatory knowledge, citizen participation and outcomes in urban mobility sustainability.

In Cartagena, Colombia, there are some gaps in the populations' perception of public transport. Based on the shortcomings identified in the population's perception of public safety, mobility-related legislation, and citizen participation in Cartagena, this study is guided by the following research questions:

RQ1. How do residents of Cartagena perceive safety in public transport and how do these perceptions vary across social groups?

RQ2. How does awareness of mobility legislation vary among residents?

RQ3. What barriers to citizen participation in mobility planning are perceived by citizens?

These three questions are interrelated insofar as the perception of insecurity in general, and in mobility in particular, diminishes confidence in the system; if this is combined with ignorance of legislation and regulations, mistrust is exacerbated because it prevents the population from understanding, demanding, and accepting them. The combination of mistrust and limited knowledge of legislation appears to be associated with lower levels of citizen participation. This situation may contribute to difficulties in aligning public policies with citizens' needs and perceptions, which in turn may influence the perceived effectiveness and equity of mobility systems.

To the best of our knowledge, research such as ours has not previously been conducted in Cartagena. This research is proposed with the conviction that it is necessary to transform this reality in order to help build an equitable, inclusive, and fair city with a more participatory population, sustainable mobility, social sustainability, economic growth, competitiveness, and sustainability. It seeks to understand citizens' perceptions and proposals on the aforementioned issues. Its objectives are (1) to analyze the perception of the

population of the city of Cartagena in relation to public transport safety; (2) to highlight the level of knowledge about legislation or regulations related to mobility and its participation in the adoption of planning tools for implementation; and (3) to analyze the proposed initiatives to contribute to moving towards a more equitable, egalitarian, fair, inclusive, and sustainable mobility.

Our results provide insights into citizens' perceptions of public transport in Cartagena and, more importantly, propose measures to improve urban mobility. We consider these results to be highly valuable for consideration by public authorities. This research should be considered a first step toward reducing the gap in this type of study in cities in the Global South, such as Cartagena, Colombia.

2. Study Area

Cartagena is located on the shores of the Caribbean Sea (Figure 2). Its population exceeds one million inhabitants, according to the National Administrative Department of Statistics-DANE [35]. It has an area of 63,982.33 hectares, of which 95% is mainland, and 5% is island, and includes the island of Tierrabomba, the Corales del Rosario archipelago, and the San Bernardo archipelago. Thirty-one per cent of the city's territory is wetlands, and its coastline is approximately 385.17 km long, of which 68% is mainland and 32% is island. The city's main activities are industry, tourism, commerce, port operations, and logistics for international maritime trade. According to DANE [35], the unemployment rate in 2020 was 10.9%, the monetary poverty rate was 41.1%, and the extreme poverty rate was 13.1%.

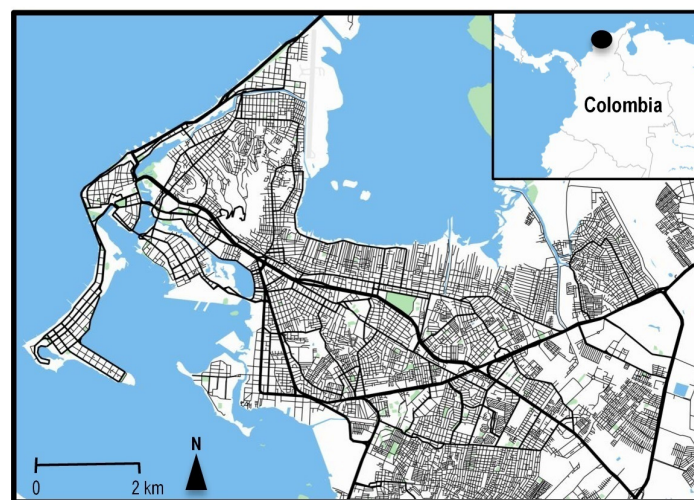


Figure 2. Study area: Cartagena, Colombia.

Throughout the 20th century, the city expanded beyond its walled enclosure, consolidating the population centers that settled along the railway line and roads to the north and south, linked to the axes of the old town. The historic center evolved into an administrative, commercial, and tourist hub, while the surrounding neighborhoods showed signs of socio-spatial segregation. The displacement of vulnerable populations led to informal settlements in coastal areas, creating areas of high environmental risk.

The revitalization of the Canal del Dique (which extends to the south and southeast of Cartagena) in the mid-20th century led to a structural transformation of Cartagena and included industrial and oil development, the strengthening of the port, and the expansion of tourism. However, while these dynamics supported the local economy, they also accentuated processes of gentrification, urban informality, and pressure on public space. In 1984, the fortresses and monumental complex of Cartagena were declared a World Heritage Site

by UNESCO, which stimulated the restoration of the historic center, although it failed to stop the displacement of the native population or the conflicts linked to land use.

In the 1990s, Cartagena became a hub for national and foreign investment. The adopted economic reforms favored the arrival of capital, particularly in the industrial, tourism, logistics, and port sectors. In addition, this model led to a homogenization of building styles in Cartagena, which, in some cases, broke with colonial architecture and, in others, overwhelmed Republican architecture. The result has been disconnectedness, contradiction, and an abrupt rupture between the historic heritage city and the modern city, creating a dichotomy between the tourist city and “the other Cartagena.” Although this neoliberal process allowed for economic growth and strengthened foreign trade, it also intensified social inequalities, the privatization of public services, and job insecurity. The city’s urban development became increasingly subordinate to market interests, weakening state planning.

At present, Cartagena has a highly fragmented urban structure, with a notable concentration of poverty in neighborhoods located in areas surrounding mangroves, marshes, hills, and areas of unmitigable risk. Despite its economic dynamism, the current development model in Cartagena has generated social exclusion and environmental deterioration. All these transformations have had an impact on mobility. The increase in real estate and expansion toward the northern area has increased environmental pressure and car usage. In the walled city, mobility was organized along clear axes. Currently, Cartagena’s road network consists of a few main arteries or corridors and secondary roads (collector/local roads) that connect the city, the metropolitan area, and its link to the regional road network. According to “Cartagena Cómo Vamos” [36], the city’s main axes are spatially continuous. However, in the “informal” neighborhoods, secondary links are irregular and suffer from deficiencies in terms of infrastructure, planning, regulation, and road safety. The Cartagena District Planning Secretariat [37] complements this diagnosis by stating that the road layout is heterogeneous, combining continuous arteries and discontinuous local networks, especially in areas of rapid growth.

The primary types of vehicles used for urban mobility in 2024 were motorcycles (55%), cars (28%), vans (10%), and others (7%). Private motorization increased between 2005 and 2024, from 2.3 to 10.1 vehicles per 100 inhabitants, which could be explained by urban growth and the insufficient supply of public transport [36].

Law 86, passed in 1989, which implemented regulations on urban public mass passenger transport systems, stated that 70% of their financing would be provided by the national government and the remaining 30% by local government. The managing bodies are organized as a joint venture between different public institutions, with the national government holding a majority stake, as evidenced by the composition of the board of directors of each managing body. In 2003, the National Council for Economic and Social Policy (CONPES), through document No. 3259 of 15 December 2003, ordered and established the start of investments and management around Transcaribe. The system arose due to the precarious nature of the public transport service provided by buses and minibuses, the emergence of motorcycle taxis, and the increase in demand for the service.

The Integrated Mass Transport System (SITM) (Transcaribe) began operating in the city in 2016 because of the precarious public transport services. Transcaribe is the backbone of formal public transport, currently with a 10.5 km main corridor and trunk and feeder services connecting the Historic Centre with some neighborhoods, covering approximately 60% of the city [36]. In addition, there are some limitations: (i) Since 2016, when this system began, its road network has remained at 25.9 km of pre-trunk lines, and since 2021, it has used 329 buses, achieving approximately 60% coverage of the urban area of Cartagena. (ii) Between 2019 and 2023, 60% fewer people used public transport, switching to informal

modes of transport [36]. This contrasts sharply with the objective for which the Transcribe System was implemented—to renew public transport and reduce dependence on informal means of transport. (iii) The financial sustainability of the system over time [38].

3. Data and Methods

A digital survey was designed as part of an ambitious project covering several topics, including natural risks, climate change, and mobility issues. The survey comprised a wide range of questions focused on the city of Cartagena. This paper presents the results of the questions aligned with the objectives of the present research. The target population were residents of Cartagena aged 16 years and older. The survey addressed sociodemographic characteristics, including gender, age, ethnicity, social strata, and studies. In addition, the survey addressed respondents' perceptions of safety in public transport, mobility-related legislation and regulations, their participation in the adoption of planning tools for implementation, and proposals to improve public transport.

Regarding the first objective, a five-point Likert scale was used to capture respondents' positions on safety in public transport in Cartagena: "On a scale of 1 to 5, do you consider public transport to be": (1) very unsafe, (2) unsafe, (3) moderately safe, (4) safe, or (5) very safe. The five-point Likert scale is a commonly used tool in research [39,40], as it allows individuals to express the strength of their agreement or disagreement with a series of statements on a given topic and facilitates comparison of results. It is sufficiently sensitive to detect changes in participants' attitudes and opinions and is easy for respondents to understand.

A larger number of questions would have been preferable; however, the Likert item was designed to elicit proposed measures, which were of primary interest to the study's researchers, as they reflected the existing problems. In other words, participants indirectly provided information about the situation, beyond a single question.

We conducted the non-parametric Mann–Whitney test to determine whether the differences were statistically significant when comparing women and men, and when comparing ethnicities. The non-parametric Kruskal–Wallis test (i.e., one-way ANOVA on ranks) was used to determine whether the differences were statistically significant across age groups, education levels, and social strata.

Following Objective 2, with respect to legislation and regulations related to mobility, the following question was posed: "Are there links and consistency between the laws and regulations at different levels of government regarding mobility?" Here, a five-point Likert scale was also used to capture respondents' positions: (1) totally disagree, (2) disagree, (3) neither agree nor disagree, (4) agree, and (5) totally agree.

Regarding this issue, as seen from the different concepts outlined in the Introduction Section, the research aimed at contributing to making mobility in Cartagena inclusive and sustainable. From this perspective, citizens must not only be aware of, but also participate in, the formulation of legislation related to mobility, because regulatory coherence directly impacts the daily lives of the population in terms of fares, controls, and infrastructure. This is crucial for the design of clear, understandable, and legitimate public policies. It is a fundamental requirement for the efficiency, legitimacy, and social appropriation of mobility policies. If citizens discern whether there is coordination between the different levels of the State, several fundamental processes for equitable and sustainable mobility will be reinforced. Citizens' awareness of regulatory consistency benefits compliance with the rules. Inconsistency, contradictions, or overlaps between different levels of government in this and other matters lead to confusion, misinformation, and, consequently, unintentional noncompliance or deliberate rejection of regulations. Ultimately, an informed public can recognize clear, legitimate, and enforceable rules.

Regulatory consistency is a central element of governance and institutional trust. If citizens perceive laws and regulations to be fragmented, contradictory, or changeable, depending on the authority that formulates them, trust in the State is weakened, and the idea of arbitrariness or improvisation is strengthened. In Cartagena, where transport informality is high, this mistrust contributes to the normalization of illegal or informal practices. Knowledge of regulatory coordination enables more informed and effective citizen participation. Participation in planning instruments, such as the District Mobility Plan or the Land Use Plan, requires the population to understand which powers correspond to each level of government and how they relate to each other. Without this understanding, participation could be symbolic, fragmented, or limited, reducing its potential to influence public decisions.

Understanding regulatory coherence is essential to ensuring equity, inclusion, and justice in mobility. The absence of coordination can lead to territorial inequalities, regulatory gaps, or excessive burdens on certain sectors of the population, particularly the most vulnerable. When citizens are aware of and evaluate this coherence, they can demand legal and regulatory frameworks that better respond to their real needs and local particularities. In Cartagena, particularly due to its status as a tourist and port city with heavy pressure on its transport systems, the lack of coherence, for example, between regulations on mobility, tourism, land use, and informal transport, has a direct impact on safety, sustainability and quality of life. Informing, training and educating citizens about these linkages is a prerequisite for building socially sustainable mobility with democratic legitimacy.

Additionally, and concerning public participation in planning instruments, the following questions were asked to the participants:

- “Have you participated in the District Mobility Plan (DMP)?”
- “If not, what were the reasons for not participating in the DMP?”
- “Have you participated in the Land Use Plan (LUP)?”
- “If not, what were the reasons for not participating in the LUP?”

Regarding the third objective, one open-ended question was asked to elicit thoughtful responses from the respondents: “What proposals would you make to improve public transport services in Cartagena, including its districts and rural areas?”

The question explicitly requested information on routes, service frequency and quality (buses, taxis, ferries, and bicycles), fares, road and cycle path infrastructure, parking for vehicles (cars, motorbikes, and bicycles), and pedestrian areas. The results have been organized in accordance with the questions asked. In the specific case of the proposals made by the respondents, the classification was made using the KJ method (Affinity Diagram) [41], named after its author, the Japanese anthropologist Kawakita Jiro. From this exercise, the initiatives were categorized as follows:

- Road safety in the provision of public transport services and citizen safety.
- Legislation related to mobility and governance.
- Institutional frameworks for mobility and public transport.
- Citizen participation in issues related to mobility and public transport.
- Public transport fares.

The KJ method was chosen for the following reasons: (a) It makes it possible to organize large amounts of qualitative data that are disorganized, such as those that may result from brainstorming, interviews, fieldwork and, in this case, the results of open-ended survey questions. (b) This organization of data is carried out from an inductive perspective, in which patterns emerge from individual contributions (in this case, from the people surveyed), without assigning prior hypotheses. This helps to avoid bias or preconceived ideas and allows the voice of the public to be effectively heard. This inductive perspective

differentiates the KJ method from others that may be deductive. (c) It allows for the visual identification of consensus issues that emerge from people's participation in completing the surveys; (d) It facilitates the identification of patterns and links that are not obvious; (e) It enables the transformation of qualitative data into actionable issues; and (f) It optimizes the understanding of a reality using visual management techniques.

The KJ method, as a tool for cataloging the open citizen proposals in this research, introduces a transformative element. Although it is known in the world literature, it is unknown in urban studies applied to the local Colombian context. In fact, in Colombia, what has been or is used in participatory urban processes (workshops, qualitative analysis of community data, or problem/solution prioritization procedures) are similar techniques or processes that share the logic of the KJ method for classifying, clustering, and examining open citizen proposals or contributions. We cite the example of Miro, a collaborative tool for developing affinity diagrams, gathering contributions from participants and ordering them into important categories for inclusive urban design. The KJ method can be performed individually to organize ideas and thoughts, examine qualitative data, and manage information without the need for a team or group.

The procedure carried out for coding is as follows:

1. Depending on the question to be addressed, the responses were filtered and extracted from the survey in Excel format, without disaggregation by gender, age, social class, ethnicity, or educational level.
2. The KJ method allowed the identification of thematic groups of citizen proposals related to mobility improvement. These categories reflect the priorities and concerns expressed by participants and may provide useful insights for policy discussions. A different color was assigned to the responses, depending on the affinity between them.
3. In line with this affinity and the objectives identified in Introduction Section 1, the responses were grouped into the categories presented.
4. The classification was carried out by the lead researcher.
5. Finally, in Section 4 (Discussion) and Section 5 (Conclusions), the analysis and synthesis of the classification carried out are developed, examining relationships, causes and effects, contradictions, and proposed solutions. All 54 proposals were ultimately grouped into the five areas presented in the section 'Initiatives proposed by respondents'.

Representatives from public and private institutions, community-based organizations, trade unions, academic institutions, nongovernmental organizations, women's groups, community action boards, the associations of community action boards, and individuals holding leadership roles in the city were contacted to discuss the survey through a series of workshops and meetings. The stakeholders participating in the workshops and meetings were responsible for both validating the survey and for disseminating it online, using a non-probabilistic convenience sampling strategy through community organizations, workshops, and social networks.

Participation was voluntary and based on self-selection through an open link to the questionnaire. Therefore, the sample should not be interpreted as statistically representative of the entire population of Cartagena. Instead, the results provide exploratory evidence of citizens' perceptions and experiences regarding transport safety, regulatory knowledge, and participation in mobility planning. The final survey was accompanied by a text explaining the purpose of the research and requesting informed consent, guaranteeing the confidentiality of participants' responses. No personal data (e.g., name, identity card number, or address) were collected. The text also included a link to the digital survey.

The result of the process was a domino effect, which contributed to the completion of 828 surveys, collected between February 2022 and December 2023. We acknowledge

that the data collection window was lengthy, because perceptions of safety, participation, and transport conditions can be time-sensitive in certain territorial contexts where changes may occur rapidly. Other approaches to implementing the survey would have been very difficult or even impossible in certain city neighborhoods. Additionally, the first researcher's movements were limited, due to security issues in certain areas, particularly when asking sensitive questions, with risks extending beyond the local residents. Our priority was to obtain over 800 participants, while accepting the limitations inherent in this approach, including the need for additional time. The sample size exceeds the minimum recommended for urban perception studies in populations exceeding one million inhabitants, which provides statistical stability to the descriptive estimators, in accordance with the classical sample size determination criteria proposed by Cochran [42].

The survey items were developed based on constructs commonly used in the literature on transport perception and urban mobility. The questionnaire was reviewed by subject matter experts to ensure content validity. Given that the survey instrument was designed specifically for this study, future research could benefit from the application of validated measurement scales and the performance of factor analyses to strengthen the construct validity.

Table 1 shows the distribution of the 828 respondents according to gender, ethnicity, age, and socioeconomic status. Women accounted for 58.3% of respondents. The remaining sociodemographic characteristics were distributed according to the thresholds established by the Colombian government. Regarding age, almost half of the respondents were between 16 and 29 years old, while those aged 80 and over represented only 3% of the total. In terms of ethnicity, 23% identified as Afro-descendant, Indigenous, *Raizales*, or Rom, while 62% identified as White or belonging to other ethnicities. Nearly two-thirds of respondents reported residing in neighborhoods corresponding to the most disadvantaged strata of the city (1–2), one-fifth in the intermediate strata (3–4), and less than 3% in the highest strata (5–6). Regarding education, respondents with secondary or university education predominated.

Table 1. Sociodemographic profile of survey respondents.

Gender		Age	
Female	58.3%	16–29	48.8%
Male	39.9%	30–59	30.8%
No answer	1.8%	60–79	15.7%
Social Strata		>79	2.9%
1–2	61.6%	No answer	1.6%
3–4	23.5%	Studies	
5–6	2.8%	Primary	9.5%
No answer	12.0%	Secondary	30.9%
Ethnicity		Technological	13.4%
AD/I/Ra/Ro ¹	23%	University	39.4%
White and others	62%	Other	5.1%
No answer	15%	No answer	1.6%

¹ Afro-descendants, Indigenous, *Raizales*, and Rom.

Observing the representativeness of the sample, gender distribution approximated the reality of the city, insofar as, by 2023, the year the survey was completed, according to DANE [43], the percentages of women and men in 2023 were 52.8% and 47.2%, respectively. At the ethnic level, sample distribution is comparable to the city, where 79% identify as

belonging to ethnic groups other than Afro-descendant, Indigenous, Raizales, and Rom, and 21% identify as belonging to these ethnic groups. Regarding age, the sample distribution showed some differences, especially among the youngest people (48.8% vs. 33.2%). The sample distribution of social status approximated the reality of the city: strata 1–2 (67.5%), strata 3–4 (30.2%), and strata 5–6 (2.3%). Finally, with regard to the level of education, no updated data for the city was available.

In summary, the research sample may be regarded as sociodemographically close to the urban reality of Cartagena and methodologically robust for exploratory, analytical, and hypothesis-generating purposes. However, its design restricts strict population inference; therefore, the results should be analyzed within a prudent interpretative framework, prioritizing their explanatory and diagnostic value rather than their absolute statistical extrapolation. Nevertheless, Lohr [44] notes that “non-probability designs may be methodologically appropriate in exploratory or diagnostic research provided that their inferential limits are explicitly recognized”, as is done in this article.

Furthermore, although the percentages of partial non-responses (12% N.A. in the socioeconomic stratum and 15% in ethnicity) may be considered relatively high, they do not diminish the value of the results. Indeed, Groves et al. [45] argue that the impact on their validity depends on the pattern of non-response and its persistent relationship with the variables of interest. From this perspective, partial non-response rates below 20% are generally regarded as methodologically manageable when there is no evidence of significant differential bias.

We are aware that the context of the city in which the research was conducted posed some limitations for the fieldwork. In addition, a digital survey for some people from the poorest sectors of the city who participated in the process was a real challenge for people who did not usually use this type of technology, requiring greater effort to interpret the results.

The survey should also make it possible to:

- (a) Recognize and analyze the priorities and proposals of respondents, thereby contributing to the development of sustainable planning for the city of Cartagena;
- (b) Raise awareness and encourage citizens to learn more about the city, foster a sense of belonging, and motivate their participation in processes related to sustainable development and growth;
- (c) Identify potential proposals with an impact on public policy.

In addition, between 21 January and 21 July 2023, the first researcher conducted a research stay in the city of Cartagena, which included, among other activities, tours by different means of transport and on foot through various sectors and neighborhoods of the city, covering all social strata, some with a predominantly Afro-descendant population, and others with populations from Indigenous Councils. Similarly, during these tours, conversations took place with people of different genders, ages, ethnicities, social strata, levels of education, and special needs. These tours were conducted on different dates and times and along varying routes and paths. The duration fluctuated between 1 h 30 min and 5 h, continuously, and there are written and photographic records of these excursions.

During these trips, dialogues were held with neighborhood residents, individually, in groups, or with representatives of legal entities. This allowed for exchanges in which, in addition to sharing the purposes of the research, it was possible to learn first-hand how citizens lived and their experiences with mobility and public transport. One of the results of this process was the interest of some people in participating in the survey, and others volunteered to help those who needed it due to lack of internet access, lack of digital literacy, or other types of limitations.

Although the conceptual framework suggests possible relationships between perceived safety, regulatory knowledge, citizen participation and mobility outcomes, the objective of this study is not to test causal relationships but to provide an exploratory analysis of citizens' perceptions. The methodological approach therefore focuses on descriptive statistics and non-parametric tests to identify differences between social groups. The causal links discussed in the paper should be interpreted as potential mechanisms suggested by the literature and by the perceptions expressed by respondents rather than empirically demonstrated relationships.

4. Results

4.1. Perceptions Regarding Safety on Public Transport and Participation in Planning Instruments

Table 2 shows the results of the question regarding the survey participants' perceptions of public transport safety in Cartagena. Two-fifths of the participants stated that they felt it was moderately safe; that is, they did not perceive it as particularly safe, but neither did they consider it unsafe. The two extreme response categories (very safe and very unsafe) accounted for only a very small proportion of the sample. Nevertheless, the combined percentage of respondents who considered public transport unsafe or very unsafe (34%) was substantially higher than that of those who regarded it as safe or very safe (14%). Finally, it should be noted that 14% of respondents did not provide an answer to this question. This question, together with the others included in this study, forms part of a broader set of items addressing additional issues related to Cartagena.

Table 2. Distribution of the responses provided by survey participants regarding their perception of the level of safety of public transport in Cartagena (Colombia).

Very safe	3%	Unsafe	24%
Safe	11%	Very unsafe	8%
Moderately safe	40%	N.A.	14%

Table 3 presents the results of the question regarding survey participants' perceptions of public transport safety in the city of Cartagena, taking into account gender, ethnicity, age, education level, and social stratum. A negative perception (unsafe and very unsafe) was higher among women than men and among Afro-descendants, Indigenous people, Raizales, and Rom populations compared to Whites and other ethnic groups. Regarding age, education level, and social stratum, the most negative perceptions were reported by older adults, individuals with technological education, and those in social strata 1–2 (the lowest income groups). The most positive perceptions were observed among respondents aged 60–79, individuals with secondary education, and those in social strata 3–4. However, statistically significant differences were found only in the case of gender ($p = 0.04129$).

The quality and safety of public transport are partly related to the role of the public administration responsible for mobility-related competences. Therefore, in cases where multiple administrations were involved, it is crucial that there be adequate consistency and coherence among them. However, the actual degree of consistency and institutional linkages is one issue, whereas how these are perceived by the population—in this case, the residents of Cartagena who ultimately make use of public transport in this Colombian city—is another.

Table 3. Perception regarding public transport safety in Cartagena, Colombia, by gender, ethnicity, age, studies, and social strata.

Gender/Ethnicity	Female	Male	AD/I/Ra/Ro	White and Others
Very safe	1.9%	3.7%	3.1%	2.5%
Safe	9.9%	12.1%	9.4%	10.5%
Moderately safe	39.8%	42.1%	36.7%	41.9%
Unsafe	27.1%	19.4%	23.6%	24.2%
Very unsafe	8.3%	8.5%	11.0%	8.2%
N.A.	13.0%	14.2%	16.2%	12.7%
Age	16–29	30–59	60–79	>79
Very safe	3.2%	2.0%	2.3%	0.0%
Safe	11.8%	8.7%	13.1%	8.3%
Moderately safe	42.9%	36.2%	43.1%	41.7%
Unsafe	22.2%	26.8%	21.5%	29.2%
Very unsafe	7.4%	10.6%	6.2%	12.5%
N.A.	12.5%	15.7%	13.8%	8.3%
Studies	Primary	Secondary	Technological	University
Very safe	0.0%	3.1%	1.8%	0.0%
Safe	8.9%	11.7%	11.7%	7.1%
Moderately safe	53.2%	34.4%	39.7%	28.6%
Unsafe	17.7%	25.8%	18.9%	39.3%
Very unsafe	7.6%	8.2%	16.2%	14.3%
N.A.	12.6%	16.8%	11.7%	10.7%
Social Strata	1–2	3–4	5–6	
Very safe	2.6%	1.5%	4.4%	
Safe	9.4%	13.5%	8.7%	
Moderately safe	41.1%	44.6%	60.9%	
Unsafe	25.9%	22.3%	13.0%	
Very unsafe	9.4%	5.7%	0.0%	
N.A.	11.6%	12.4%	13.0%	

The most frequent response corresponded to respondents who agreed that there is consistency and coherence between laws and regulations across different levels of government in mobility-related issues (Table 4), whereas responses corresponding to the two most extreme options (totally in agreement and totally in disagreement) did not exceed 5% in any case. Nevertheless, a large proportion of survey participants who reported not knowing accounted for almost two-fifths of the sample. Determining whether a public service—in this case, public transport—was more or less safe was more straightforward than assessing whether, in relation to mobility, there was coherence and consistency between laws and regulations across the different levels of government (from local to national) involved in mobility issues in Cartagena.

Table 4. Distribution of survey participants' responses regarding their perception of the coherence and consistency between laws and regulations across different levels of government in mobility-related issues.

Totally agree	5%	Disagree	9%
Agree	15%	Totally disagree	3%
Neither agree nor disagree	12%	D.K./N.A.	39%/17%

In the data presented in Table 4, although the partial nonresponses seen in the study (12% not available in the socioeconomic stratum and 15% in ethnicity) are somewhat high,

it is important to emphasize that: (i) this does not undermine the value of the results; (ii) the study is still valid even with these percentages; and (iii) the research design used is consistent with the study's objectives and the conditions of the fieldwork in Cartagena. These points are supported by the following arguments. First, we need to distinguish between nonresponse rates and nonresponse bias. This is a known difference in survey methodology. The rate of nonresponse does not necessarily mean there is bias. Research has shown that the relationship between nonresponse and bias is not straightforward. For example, Groves and Peytcheva [46] showed in their study that nonresponse rates are not strongly correlated with nonresponse bias. In many cases, big differences in response rates do not lead to big differences in bias.

Other researchers have also made valid points. Dillman et al. [47] argue that response rates alone do not tell us much about how representative the survey results are. Bethlehem [48] says that nonresponse is a problem when it is related to the key variables being studied. Tourangeau et al. [49] emphasize that what matters is not the rate of nonresponse but whether it affects the results in a significant way. In this context, the levels of item nonresponse in this study (12% and 15%) are not considered high.

Importantly, when we look at the data, we do not see any systematic differences related to missing information on socioeconomic stratum or ethnicity. Specifically, when we apply the filters, the patterns related to perceptions of security, normative coherence and participation remain consistent. For example, (i) most people think public transport is "moderately safe", (ii) few people think it is "very safe" or "very unsafe", (iii) more people think public transport is "unsafe" or "very unsafe" than think it is "safe" or "very safe", (iv) when it comes to laws and regulations, most people do not have strong opinions, and (v) most people do not participate in planning instruments.

These patterns suggest that there is no evidence of bias in the core variables of the study. In other words, people who did not provide information on socioeconomic stratum or ethnicity do not appear to have different patterns of response compared to those who did. It is also important to remember that this study is not trying to make statistical inferences for the entire population. Instead, it aims to provide an empirical diagnosis of citizens' perceptions regarding mobility, security and urban governance. The relationship between the sample and the broader urban sociodemographic composition, as well as the internal consistency of the results, supports the validity of the findings.

In summary, neither the level of nonresponse nor the non-probabilistic sampling design invalidates the study's findings. The research should be seen as a grounded empirical analysis that is appropriate to the conditions of the fieldwork and robust enough to support the conclusions without claiming to be representative of the entire population. The results should be interpreted in diagnostic terms rather than being statistically generalized to the entire population. Under these conditions, the research design can be considered coherent with both the objectives of the research and the realities of the fieldwork in Cartagena.

Public participation in public policies, such as those related to mobility, can take place through established participatory processes within the framework of developing, drafting, and approving territorial, sectoral, or urban planning instruments. Regarding the Land Use Plan and the District Mobility Plan in Cartagena, only 5% and 7% of the sample, respectively, reported having participated in them. In contrast, more than four-fifths of respondents did not. In both cases, the main reasons cited by respondents for not participating were (i) a lack of information, invitation, or opportunity, and (ii) insufficient knowledge on the subject.

4.2. Initiatives Proposed by Respondents

The KJ method enabled the identification of clusters of citizen proposals related to mobility improvement. These propositions reflect what citizens consider important and the issues that generate concern among them, thereby providing potentially valuable insights for policy discussions. The implementation of the KJ method (Affinity Diagram) facilitated the grouping of them into five areas (Figure 3): road safety in the provision of public transport services and citizen safety; legislation related to mobility and governance; institutional frameworks for mobility and public transport; citizen participation in issues related to mobility and public transport; and public transport fares.

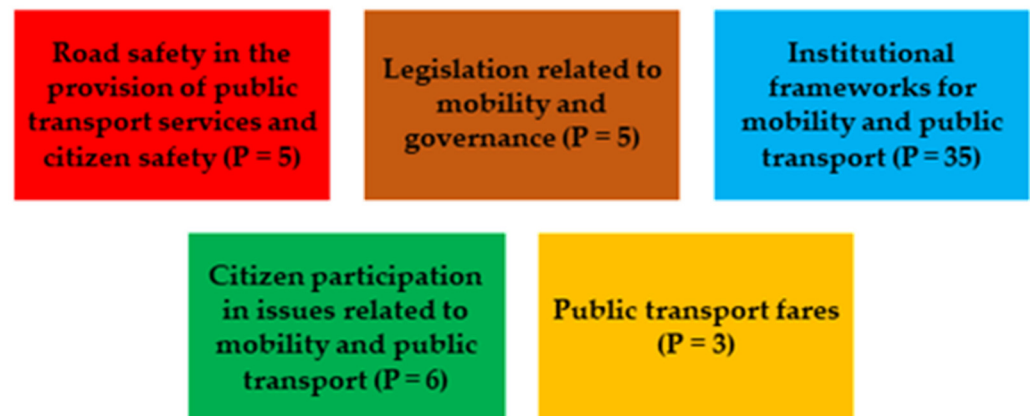


Figure 3. Five areas identified through proposal grouping (P = number of proposals).

The distribution of the 54 initiatives across the five areas shows, from the citizen's perspective, that institutional strengthening is the priority, while security, regulations, citizen participation, and tariffs play complementary roles. These findings represent participants' perceptions rather than empirically demonstrated solutions.

Five proposals were related to safety:

- (i) Safeguarding safety on the roads and in the provision of public transport services, including vehicles, bus stops, and their surrounding areas.
- (ii) Issue licenses to taxi and motorcycle taxi drivers to contribute to improving passenger safety and confidence.
- (iii) Promote the expansion of controls on taxis and minibuses to prevent reckless driving patterns.
- (iv) Facilitate the installation of security cameras or security guards and improve lighting at unsafe bus stops.
- (v) Promote driving in compliance with traffic laws and regulations.

Five proposals were in regard to mobility legislation:

- (i) Promote the review of existing laws and regulations at the district, departmental, and national levels to identify inconsistencies and legal loopholes.
- (ii) Encourage the development of a comprehensive and coherent legal framework that addresses all aspects of mobility and contributes to its improvement.
- (iii) Socialize and train citizens on legislation and regulations related to mobility.
- (iv) Encourage the rigorous application of mobility and road safety regulations.
- (v) Ensure that laws and regulations respond to the needs of the population and contribute to reducing conflicts between authorities and citizens.

Proposals related to the institutional framework for mobility and public transport account for the largest group, totaling 35:

- (i) Promote energy-efficient and nonpolluting mobility.

- (ii) Encourage an in-depth study on transport demand in Cartagena, and on formal and informal transport. Identify existing problems and necessary routes and optimize current ones.
- (iii) Analyze the possibilities of restructuring the DATT and reform the city's current public transport model to organize it, dismantle informality/illegality, guarantee access to a greater number of routes, and thus ensure better public transport services.
- (iv) Promote investment in public transport, mobility infrastructure, and roads in Cartagena.
- (v) Establish the possibilities of increasing road control by traffic officers.
- (vi) Implement actions aimed at improving driver training and performance.
- (vii) Study the possibilities of formalizing, regulating, organizing, and controlling motorcycle taxis.
- (viii) Analyze the advisability of installing taximeters in taxis.
- (ix) Analyze the possibilities of controlling the circulation of vehicles and motorcycles to reduce traffic congestion.
- (x) Promote the renewal of the minibuses on different routes.
- (xi) Encourage a sense of belonging and civic culture in mobility among the population of Cartagena.
- (xii) Promote the reduction of public transport fares, publicize them to prevent price abuse, and ensure strict control of them by the Cartagena City Council.
- (xiii) Encourage the adoption of differential fares for young people, students, people with disabilities or special needs, and elderly or vulnerable adults.
- (xiv) Establish affordable prices for the purchase of bicycles and promote their use.
- (xv) Assist in the implementation of employment contracts with people from the communities to meet the demand for personnel due to the establishment of new public transport routes.
- (xvi) Encourage the restructuring of entities that provide public transport services, or create suitable institutions to guarantee the provision of a good service.
- (xvii) Stimulate the formulation of public transport policies with citizen participation.
- (xviii) Promote actions that prevent acts of vandalism or violence in the provision of public transport services.
- (xix) Promote active mobility.
- (xx) Promote measures that guarantee rigorous technical and mechanical inspections of vehicles.
- (xxi) Encourage the installation and operation of traffic lights where necessary.
- (xxii) Promote public safety in the city as a whole.
- (xxiii) Encourage transparency in the district administration in general, and in relation to mobility.
- (xxiv) Listen to the community, and generate agreements between them and the authorities.
- (xxv) Animate the control over motorcycle driving by minors.
- (xxvi) Encourage the immobilization of vehicles and motorcycles that do not have a driver's license.
- (xxvii) Help strengthen the cooperation between different levels of government, and adopt a coherent approach among them.
- (xxviii) Enforce stricter speed limits within the city.
- (xxix) Promote the establishment of pedestrian crossings where necessary.

In contrast to these proposals, there were others that contradicted the former, and reflect the polarization that exists in Cartagena on sensitive mobility issues, such as:

- (xxx) Establishing motorcycle taxis as a business to provide safety for those who use them.
- (xxxi) Restrict the circulation of motorcycle taxis to reduce traffic congestion.

- (xxxii) Prohibit the circulation of motorcycles.
- (xxxiii) Invest more in sustainable transport, ending the mismanagement of resources that could be used to solve problems in the city.
- (xxxiv) Restructure public institutions to eradicate the lack of transparency.
- (xxxv) Implement more peak and plate restrictions (vehicle restrictions during peak traffic hours, based on the last digit of the private vehicle or public transport license plate).

This ‘institutional’ category is very broad and covers a variety of topics. The proposals made by the respondents related to aspects that are the responsibility of the public administration, which has multiple responsibilities, including directing, planning, executing, monitoring, and evaluating, are aimed at improving institutional performance, generating public value, and solving the needs and problems of citizens with integrity and quality. In fact, Article 2.2.22.3.2 of Decree 1499 of 2017 defines the Integrated Planning and Management Model (MIPG) as a technical and strategic “framework” (or institutional framework) whose purpose is to monitor the management of public entities and bodies.

There were six proposals regarding participation in planning tools for implementation, specifically the District Mobility Plan and Land Use Plan. The respondents suggested incorporating issues related to the following:

- (i) Mobility infrastructure. Building, maintaining and optimizing the road network, and adapting pavements for people with disabilities or special needs.
- (ii) Means of transport. Innovating the public transport fleet.
- (iii) Multimodality. Promote active mobility; establish water transport.
- (iv) Comfort. Increase the frequency of public transport to avoid overcrowding.
- (v) Socialize public and private city projects (real estate, port, airport and logistics). From this perspective, the socialization of Law 70/1993 is an imperative to facilitate the inclusion of Afro-descendent people.
- (vi) Strengthen citizen participation in the formulation, implementation, and evaluation of all planning instruments.

Finally, three proposals related to public transport fares:

- (i) Establish electronic payment for public transport fares.
- (ii) Adopt differential fares for young people, students, people with disabilities or special needs, and elderly or vulnerable adults.
- (iii) Reduce public transport fares, publicize them to prevent price abuse, and ensure strict control of them by the Cartagena City Council.

These citizen proposals help identify the mobility issues that respondents consider priorities and may provide useful inputs for decision making by public administration.

5. Discussion

5.1. Moderate Safety of Public Transport and Low Public Participation

In relation to the first objective regarding safety on public transport, the majority consider it to be moderately safe. However, looking at the percentages as a whole, more than half consider it safe at different levels, while a third think it is unsafe to varying degrees. However, viewed in isolation, the percentage of those who consider public transport to be unsafe is higher than those who think it is safe; and those who believe it is very unsafe outnumber those who consider it to be very safe. It is also worrisome that the highest percentage of people rate safety as moderate or limited, because road safety is a central element of sustainable mobility.

There is a relationship between perceptions of safety, social injustice, and transport use [50]. The population’s assessment of “moderately safe” shows weak confidence in the system. Although there is no widespread rejection, there is also no strong positive

perception that encourages sustained use. This reality is important given that the perception of safety is associated with the selection of means of transport and, therefore, is key in the sustainability of transport systems. The perception of insecurity is concentrated in certain social groups, such as women, older adults, ethnic groups, and socioeconomic strata 1 and 2. This might suggest that, in Cartagena, mobility transcends technical or infrastructural issues and could be a manifestation of structural social inequalities that are replicated in urban spaces and in access to basic services. It is also noteworthy that people with higher levels of education perceive the system as more unsafe, which could be interpreted as greater critical reflection on the risks and institutional shortcomings in transport management. This means that mental structures and social norms influence perceptions of safety, in addition to direct experience [51].

The preference for a means of transport could be influenced by availability, ease of access, flexibility, comfort, journey time, travel costs, safety and infrastructure [52]. Some proposals put forward relate to motorcycle taxis, which, at 29%, are the most widely used means of transport, after Transcaribe at 39%, because they are the most available and the fastest. Transcaribe is fast because it has its own lanes, and motorbike taxis are fast because they can more easily dodge traffic, although sometimes this latter “advantage” comes at the expense of road safety. In fact, according to “Cartagena Cómo Vamos” [36], 60% of accidents involve motorbikes. Other advantages of motorcycles are their ability to reach hard-to-access places, their “door-to-door” service, their adaptability to different routes, and the availability of different types of motorcycles, depending on the need. The selection of the motorcycle as the second option for transport is due to the fact that it is the least demanding in terms of mobility infrastructure requirements.

With regard to legislation or regulations related to mobility, the predominant responses were “don’t know/no response”: 39% for the existence of links and consistency between the laws and regulations of the different levels of government in aspects related to mobility, and 51% of the responses regarded whether there were links and consistency between the laws and regulations of the different levels of government in aspects related to mobility and tourism. These results may indicate: (i) a high degree of difficulty of the questions for the population, (ii) that city issues are absent from formal and informal education processes in Cartagena, leading to a significant lack of knowledge about them, (iii) that there is insufficient dissemination or socialization of regulations, and (iv) that there is a lack of interest in learning about them [53].

In terms of regulatory knowledge, institutional trust, and governance, one of the most significant findings of the study was the high level of unawareness among the population regarding legislation and regulatory consistency around mobility. The high percentage of “don’t know/no answer” could be the manifestation of the gap between the institutional outline of public policies and their social appropriation. This reality could have a negative influence on mobility governance. Lack of knowledge of regulations could undermine trust in institutions, limit compliance with rules, and contribute to the normalization of informal practices. In the case of Cartagena, where there is a high level of informality in transport, this reinforces a vicious cycle in which institutional mistrust, perceived insecurity, and regulatory weakness feed off of each other. The research findings also suggest that regulatory consistency should be evaluated not only from a technical or legal perspective, but also in terms of awareness, understanding, and acceptance of it by citizens, so that behaviors can be modified and urban mobility can be effectively optimized.

These options raise several questions: Was there citizen participation in the design of the legislation, regulations, and rules? If so, were the spaces provided suitable? How does a lack of knowledge of important city issues affect levels of citizen participation in the formulation, implementation, and evaluation of planning instruments in general

and mobility in particular? In this context, how can we determine whether the existing regulations are adequate for the city? If they are being implemented, how is this being done, and what are the effects of this implementation on the city and its inhabitants? This is a significant concern, given the city's industrial, tourist, commercial, port, and logistical vocation for international maritime trade.

It is problematic to design legislation, regulations or rules, without first diagnosing the situation or the problem to be solved, and the people involved are the best equipped to provide objective, concrete, and relevant information. The lack of citizen participation poses the following risks: (i) regulatory overload that may become a "dead letter"; (ii) a lack of ownership of the regulations, leading to ineffective implementation; and (iii) noncompliance with the regulations if there is a lack of trust in the government and its regulations. It would be interesting to analyze the legislation covered by this research *ex post*, to establish its relevance, effectiveness, and effects, and to adjust it if necessary. Doing so, with citizen participation, could have a positive impact on the adoption of fairer, more equitable and inclusive laws, rules and regulations; the generation of trust in the government on the part of citizens; and the appropriation and application of these laws, rules, and regulations.

It should be noted that most respondents did not participate in the formulation, implementation, and evaluation of planning instruments. This lack of involvement shows that transport equity and social sustainability are still pending issues in the city. As for the reasons why participation is limited or nonexistent, the majority of respondents did not answer, both in the case of the District Mobility Plan (DMP) and the Land Use Plan (LUP). In the DMP, the lack of information, invitation, or opportunity is cited as the second cause of limited or no participation, followed by lack of knowledge of the subject, and finally, "other reasons." In the LUP, limited or no participation is attributed to "other reasons," followed by lack of information, invitation, or opportunity, and finally, lack of knowledge of the subject. These responses could be the manifestation of deficiencies in the socialization of city issues and in the education and training of citizens in matters that concern them. Participation in the DMP was lower than in the LUP, which could hinder the search for consensual solutions to the multiple mobility problems identified by the population in this research.

The limited citizen participation in the formulation, implementation, and evaluation of planning instruments is especially concerning given that: (i) regarding the construction of mobility and road infrastructure, one proposal made by the people surveyed requires considerable amounts of land, which prevents its alternative uses; and (ii) it has a major impact on the lives of the population and requires large investments, which is why its planning must be linked to urban planning. The almost complete absence of participation in planning tools for implementation could mean that people are excluded from decisions on issues that directly affect them. This exclusion is a handicap to achieving sustainable mobility, because, as Hull [54] states, equal opportunities in decision making by the actors involved in the processes are essential to achieving this goal.

Without citizen participation, there can be no social sustainability in mobility, and in Cartagena, citizen involvement in planning instruments such as the District Mobility Plan and the Land Use Plan is minimal. This absence or precarious participation cannot be attributed solely to a lack of interest, but it could be the result of structural deficiencies in the mechanisms for information, outreach, and citizen education.

Limited participation is a central obstacle to the social sustainability of mobility. Decision making on infrastructure, regulation, and transport services has a decisive, profound, and long-term impact on the daily lives of the population, particularly the most vulnerable groups. Their exclusion from planning processes reduces the chances that public policies will respond to real needs and exacerbates existing inequalities. This could suggest that the

low level of citizen participation in issues related to mobility and transport is not only a procedural problem, but also a manifestation of a fragile relationship between citizens and the State, which compromises the democratic legitimacy of mobility policies [55].

5.2. A Broad Range of Proposals and Numerous Challenges Ahead

Finally, with regard to the proposals made by the respondents (second objective), it is gratifying to note that they can contribute to building a complex perspective, incorporating, among other aspects, infrastructure, the built environment, and the people who use it.

Most of the proposals relate to institutional aspects, followed by security, which is not surprising, since mobility problems in Cartagena are exacerbated by the absence of the State. This is evidenced by the proliferation of irregular/illegal means of transport, the absence of a 100% diagnosis of the road network, the nonexistence or precariousness of mobility and road infrastructure in peripheral areas and even in central areas of the city (Figure 4), and the absence of city planning with a complex perspective. This type of planning requires the coordination of economic production, environmental conservation, and historical, cultural, and archaeological heritage; social, gender and ethnic equity; adaptation to or mitigation of climate change; and natural disaster risk management.



Figure 4. Deteriorated urban roads and sidewalks encroached upon by parked vehicles in Cartagena, Colombia. Source: Zaida Salas-Franco.

The extensive way in which the city has grown could be stimulating, as Xu et al. [56] suggest, including the use of and dependence on cars and the increase in travel distances, energy consumption and greenhouse gas emissions. It is, therefore, necessary to remember that density can be a way to reduce these problems and achieve connectivity, social vitality, and comfort [57]. This raises the imperative to rethink and redefine the way in which we want the city of Cartagena to grow: whether in an expansive or more compact manner. It is interesting to note the call by some respondents for the formulation of public transport

policies with citizen participation, incentives for active mobility, and the promotion of differential fares for young people, students, people with disabilities or special needs, older adults, and those in vulnerable situations. It would also be worthwhile to explore the proposal to establish contracts with people in the communities to supply the personnel that may be required in the potential establishment of new public transport routes.

However, there are contradictory initiatives regarding motorcycle taxis. On the one hand, some propose regulating, formalizing, organizing and controlling motorcycle taxis, linking motorcycles as feeders for Transcribe, and issuing licenses to motorcycle taxi drivers. On the other hand, some indicate that motorcycle taxis should be discouraged, or even eradicated, and the circulation of motorcycles should be controlled and restricted. Although “formalize mototaxis” and “prohibit motorcycles” are opposing measures, these proposals have been raised by the population and reflect the internal contradictions regarding the issue of mototaxis. In this regard, some believe that they should be legalized and operate as a complement to Transcribe in areas where the topography or road infrastructure conditions make access by other means of transport difficult. To this end, they propose legalizing the activity, with identifying markers for mototaxi drivers to ensure user safety along with the necessary protective equipment. Those who oppose this proposal believe that mototaxis generate chaos and insecurity. This reality requires the creation of spaces for reflection, dialogue, and consultation among the actors involved to seek fair and equitable solutions for the sector in question.

Once citizens’ perceptions of safety, regulatory knowledge, and participation in mobility planning instruments have been established, the results show the latent tensions between values, expectations, and social practices. This is consistent with previous studies that highlight the role of perceptions of safety as an essential factor in the adoption of public transport and urban sustainability. The findings of this research show that positive perceptions of public transport coexist with a constant perception of insecurity and low use of the formal system.

Regarding RQ 1, the perception of safety and insecurity is associated with the use of public transport in Cartagena, as it influences the choice of one’s mode of transport. If citizens perceive insecurity, especially women [52–59], their trust in the system could decrease, or their likelihood of adopting active modes is limited. In the city, the prevailing perception of safety in public transport is negative, with 32% considering it “unsafe” or “very unsafe,” while only 40% consider it “moderately safe.”

Insecurity and perceived shortcomings of the formal system are frequently mentioned by respondents as reasons that may explain the presence or persistence of informal alternatives such as motorcycle taxis, which, although perceived as fast and accessible, are linked to a very high accident rate (60% of accidents in the city involve motorcycles). Insecurity is a burden that disproportionately affects vulnerable groups, restricting their freedom of movement and increasing the risk of social exclusion. In summary, the results suggest that perceptions of insecurity may be associated with lower levels of trust in the transport system and with concerns about the sustainability of mobility in the city. In response, some citizens have proactively proposed measures to encourage the use of public transport, such as installing security cameras, improving lighting at bus stops, increasing police presence, and requiring motorcycle taxi drivers to be licensed. All of this is aimed at restoring public trust.

In line with other research on mobility in inequitable urban contexts, positive perceptions of public transport coexist with a constant perception of insecurity and low use of the formal system. This is not a particular inconsistency, but rather evidence of structural (institutional, social, and perceptual) situations that undermine confidence in transport systems and consolidate informality. In this sense, the results add important elements to

RQ2 and RQ3, in line with previous studies that emphasize the importance of governance and institutional coupling in mobility policies [60,61].

Focusing on RQ2, the prominent lack of knowledge of legislation and regulations in Cartagena is consistent with studies that suggest that regulatory complexity, limited dissemination, and fragile coordination between different levels of government diminish social ownership of public policies. Low levels of participation and limited knowledge of planning instruments, such as the District Mobility Plan, reinforce the observations made in RQ3 and call into question the effectiveness of formal participation instruments when they are not accessible, understandable, or perceived as useful and binding. In general, these results suggest that the challenges of mobility in Cartagena are closely linked to aspects of governance, institutional communication, and citizen trust, rather than the absence of regulatory or participatory frameworks.

In contrast, the population's expectations of the authorities are reflected in the following:

- Security: Given that perceptions of security vary between moderate and low, the population demands the installation of cameras, greater police control, control of vehicle licenses, technical inspections, and lighting.
- Institutions: The population demands greater state control, more transparency, the strengthening of institutions, and the guarantee of legitimate, effective participation.

There are other tensions and contradictions within the population, which are related to the fact that:

- Some people want to formalize motorcycle taxis, while others want to eliminate them.
- Some people demand more vehicle restrictions, while others call for an increase in the vehicle fleet.
- The desire for state order clashes with mistrust of institutions.

This reality reveals a fragmented citizenry, which requires not only technical solutions, but also the implementation of effective deliberative dialogue, consultation, and consensus-building processes, which are central to public policy design.

This polarization highlights the need to create spaces for dialogue, consultation, and consensus building with citizen participation, in order to advance toward equity, justice, equality and inclusion in transport, social inclusion, and sustainable mobility [12,23].

6. Conclusions

This study suggests that mobility in Cartagena is a complex phenomenon, influenced by economic, social, institutional, environmental, and perceptual dimensions that transcend the strictly technical sphere. The predominantly moderate perception of public transport safety, linked to significant levels of perceived insecurity among vulnerable groups, suggests that mobility reproduces and amplifies existing social inequalities. Widespread ignorance of regulations and limited citizen participation in planning instruments indicates that there could be a critical gap between public policies and citizens. This gap weakens mobility governance, reduces institutional legitimacy, and limits the possibilities of moving toward a truly equitable, inclusive, and sustainable mobility model. The citizen initiatives included in this research reveal that there is a clear demand for greater institutional leadership, greater transparency, and more coherent and participatory planning. However, the presence of conflicting views also reflects the urgency of strengthening spaces for public deliberation and citizen education on mobility issues.

In summary, the results suggest that moving toward sustainable mobility in Cartagena requires not only investments in infrastructure and operational improvements, but also a comprehensive strategy aimed at strengthening trust, encouraging regulatory aware-

ness, and ensuring effective citizen participation. To achieve trust, citizen participation is necessary in the adoption of planning tools, and their proposals are essential for:

- (a) Advancing the development, well-being, and competitiveness of Cartagena. This suggests strengthening: (i) infrastructure in general and transport infrastructure in particular, which is a cross-cutting activity throughout the economy; (ii) the availability, connectivity, and accessibility of routes for different means of transport, modes, and transport systems; and (iii) the optimization of transport fares. This strengthening also implies the distribution of the benefits and costs of transport services in an equitable, inclusive, and fair manner among different groups, particularly the vulnerable. These measures would expand opportunities for citizens to access education, employment, and health, among other fundamental issues of competitiveness.
- (b) Ensuring the well-being of mobility and transport users in Cartagena. This requires improving the quality of travel and satisfaction with excursions. This initiative focuses on adapting different modes of transport to people with disabilities and special needs, older adults and pregnant women. Priorities include scrapping vehicles that need to be scrapped, renewing the vehicle fleet when necessary, improving mobility infrastructure and safety, increasing the frequency of transport services, and strengthening civic culture in mobility.

Additionally, the proposals call for state control of transport companies and the circulation of illegal/informal modes of transport. The well-being of people in their daily travels also depends on the behavior of those who drive vehicles and those who use public transport. Respect, kindness, and order can create a more satisfactory travel environment in general and for older adults, people with disabilities and special needs, and women and children in particular. Travel with these characteristics can encourage participation in social activities related to travel, and thus social integration and cohesion. The quality and comfort of travel are also linked to the implementation of intelligent traffic management systems. However, the necessary actions and mechanisms must be implemented to ensure, through access to digital transport services, the inclusion in transport of older adults, those with limitations or special needs, and those with limited financial resources [62]. The quality of travel also requires a reduction in traffic congestion, so it would be important to coordinate the schedules of the different modes of transport without negatively affecting the demand of residents and visitors.

- (c) Moving toward sustainable mobility in Cartagena could require the equitable, inclusive and fair distribution of transport benefits and costs; the implementation of multimodality; the strengthening of a culture of citizen mobility; the development of necessary policies; and the strengthening of the State's capacities in aspects related to planning, mobility, and consolidating social sustainability. In terms of multimodality, water transport and active mobility are pending issues in the city.
- (d) Adopting transport policies, systems, and projects that guarantee equal opportunities and are inclusive, which requires citizen participation, especially from vulnerable groups. To this end, public administrations at all levels must improve their dissemination and information systems. They must adopt measures that promote public participation and establish mechanisms that enable interaction between citizens and state institutions. Information, motivation, education, and training are needed to generate interest in the issues to be addressed and to enable channels for dialogue, consultation and commitment.

Strengthening the capacities of the State involves:

- Improving its efficiency, which is related to decision-making procedures and trust in the government. The latter, which is crucial for social cohesion, implies transparency.

- Optimizing budget management by promoting citizen participation, especially from vulnerable sectors, in the design of budgets. This would allow for progress in equal opportunities, equity, justice, inclusion in transport, and social inclusion in the distribution of resources. Citizen participation is also necessary in the design, implementation, and evaluation of mobility and transport systems, to integrate aspects related to “care mobility.” This implies encouraging the participation of women, as well as that of older persons. Cartagena’s aging population has increased according to “Cartagena Cómo Vamos” [36], and is demonstrated by the fact that the aging index rose from 11% in 1994 to 46% in 2024.
- Ensuring citizen security is frequently highlighted in the literature as an important factor for improving urban mobility conditions and citizens’ quality of life. In this study, respondents also emphasized the importance of safety in relation to public transport use.
- Guaranteeing citizen security, which is fundamental for stimulating investments, which could lead to job creation; facilitating active mobility; and improving the quality of life of the population. In fact, Stafford et al. [63], argue that fear of crime can be an obstacle to participation in physical and social activities that are beneficial to health.

A weak state is ineffective, easily co-opted by interest groups, a breeding ground for illegal practices, and has little or no authority or ability to control these circumstances. It is necessary to move away from a sectoral approach and establish multisectoral institutions and structures, complex perspectives, synergies, and interactions between sectors to solve the city’s mobility problems. It is essential to have the participation of the various levels of government (national, departmental and district/municipal), and the convergence of public policies related to mobility, climate change, disaster risk management, and port, logistics, trade, and tourism issues. This would enable progress in “energy saving and energy efficiency, the promotion of renewable energy sources, increased knowledge, the adoption of instruments and indicators to assess the impacts of these activities, while facilitating the adaptation and participation of key actors to achieve these objectives” [64].

This study adopts an exploratory and descriptive approach aimed at identifying citizens’ perceptions of mobility-related issues rather than testing causal relationships between variables. The research therefore focuses on describing patterns of perception regarding transport safety, regulatory knowledge and participation in planning processes. The study presents certain limitations. First, with regard to the collection of information from respondents, the data were not obtained through face-to-face interaction and may therefore incorporate certain biases, which we have attempted to minimize. Conducting the survey in person would have been preferable, as already noted in the Data and Methods Section. Second, the data collection window was lengthy. This led us to emphasize that, in cases of this kind, the involvement of public authorities is necessary in order to carry out, under more favorable conditions, surveys on issues that are both highly important and sensitive, such as mobilities in a city with the characteristics of Cartagena. A third limitation concerns the analytical techniques employed. Future research will require a more in-depth analysis using more robust methods than those applied in the present study, for example, through the use of multi-method Global Sensitivity Analysis (GSA), which has been widely implemented in the international literature [65–67]. This study is the first empirical contribution to the analysis of citizen perceptions of mobility in Cartagena and proposes future lines of research aimed at deepening the causal relationships between perceived safety, participation, informality, and urban equity, especially in cities in the Global South. These future lines of research include:

- (a) Ex post studies on the actual effectiveness of mobility regulations. Applicable in different territorial contexts, these would make it possible to determine the impact on people's quality of life and air quality, as well as on the reduction of emissions.
- (b) A more in-depth analysis of existing legislation to establish measures that help resolve certain transport crises in some areas, caused by heavy traffic congestion and the continuous growth of the vehicle fleet in the city of Cartagena.
- (c) Studies on citizen participation tools, which enable local authorities to identify people's real needs and link them to urban planning. This contributes to the construction of more equitable, fair, democratic, transparent, and sustainable cities. This type of research is valid in different territorial contexts.
- (d) Research on the formalization vs. elimination of motorcycle taxis. This type of study could facilitate the understanding of motorcycle taxis as a complex socioeconomic phenomenon, caused by the lack of job opportunities, deficiencies in public transport, and the precarious state of mobility infrastructure in Cartagena in particular, and in other Colombian cities in general.
- (e) Studies on multimodality (especially water transport). Although they can be applied in cities in many different locations, in Cartagena, they would improve port logistics, reduce road congestion, and promote economic competitiveness by integrating maritime, river, and land transport. In addition, these studies make it possible to propose sustainable solutions that reduce travel times and carbon footprints and improve the quality of life of the population.
- (f) Research on civic culture in mobility. As in multimodal transport, these studies could be applied in different cities around the world. However, in Cartagena, they are positive and fundamental because they make it possible to define, highlight, and address structural problems of road behavior and use of public space in the city. These studies provide elements for improvement, such as strengthening road safety education and optimizing infrastructure.
- (g) Analysis differentiated by vulnerable groups (women, older adults, people with disabilities). These studies, like the previous ones, have a wide field of application as they allow structural inequalities, particular barriers, and differentiated risks to be highlighted, unlike general studies. Similarly, they can raise awareness and provide evidence to support equity, social justice, and the effectiveness of public policies. In addition, they can help to prevent discrimination and exclusion and ensure the equitable distribution of resources, considering the historical disadvantages and vulnerabilities of different population groups.

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