Constructing an Inclusive Sustainable Mobility Guarantee: A Synergistic Mechanism of Transport Equity, Green Travel, and Social Wellbeing

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Abstract*—Introduction and Problem Statement The transition towards sustainable mobility has become one of the most pressing issues in the urban development due to the dual threats of global climate change and urbanization. Nonetheless, current transport policies have been inclined more on carbon emission reduction and building of infrastructure which sometimes ignores the mobility exclusion and spatial inequality which vulnerable groups experience during this transition. At present, there is no systematic framework that incorporates transport equity, green travel, and social wellbeing. This research suggests the idea of the Inclusive Sustainable Mobility Guarantee (ISMG) and develops a synergistic model of Transport Equity- Green Travel-Social Wellbeing with respect to design innovation and interdisciplinary approaches. The study uses a low resource analysis strategy that does not depend on high cost field experimentation or large scale modeling that is hard to reproduce by using literature synthesis, indicator mapping and clear scenario-based interpretation. Implementation: This paper presents a reproducible assessment method of high-density urban environments through the combination of the results of current transport equity, green travel, and wellbeing researches and observable public indicators of the daily mobility conditions. The procedure is based on the usual planning and design problems and can be applied without proprietary spatial data, a specific GIS extraction process, or major primary surveys. Main Results: The findings of the analysis indicate that the promotion of green travel, such as use of public transport and active mobility, is not necessarily associated with improvement in social welfare. It has a positive impact when transport services are seen as spatially fair, economically accessible and equitable to vulnerable people. Low-cost interventions like barrier-free walking environment, safer transfer spaces, targeted fare support, and accessibility improvement at the neighbourhood level can be used within the ISMG framework to lessen mobility exclusion among low-income and elderly individuals. Significance and Value: The paper develops the conceptual limits of the customary Sustainable Mobility Guarantee, offering a theoretical foundation to the paradigm shift in urban transport planning to be oriented towards human well-being rather than efficiency. Moreover, it gives policy makers and designers a clear and simple evaluative scheme to use when developing transportation policies that aim at reducing emissions but at the same time promote social inclusion.

Keywords—Sustainable Mobility Guarantee, Transport Equity, Social Wellbeing, Reproducible Assessment, Green Travel, Inclusive Design

I. Introduction

A. Background

The decarbonization of the transportation sector is an important aspect of the solution to global climate change and the achievement of the Sustainable Development Goals (SDGs). A recent study on transport planning has highlighted the fact that sustainable mobility must not just alleviate the reliance of the population on personal vehicles but it needs to ensure that people can access their basic daily mobility using public transportation and active mobility networks [1]. At the same time, with the rapid pace of urbanization, spatial restructuring tends to isolate more vulnerable groups, including low-income people and the elderly, who are at high risk of experiencing serious "Transport Poverty" and social isolation. Hence, the question of how to protect social equity during the promotion of green travel has posed a significant challenge to modern urban management and transportation plans.

B. Research Problem

Despite widespread recognition of the idea behind Sustainable Mobility, many applications of it tend to get stuck in the trap of Green Gentrification: expensive low-carbon transport networks (e.g., new rail transit lines and high quality greenways) have the unintended consequence of increasing the cost of living nearby, thus displacing the very people who need affordable transportation options the most - the low income population. In transport justice terms, transport policy needs not only to be concerned with the fair allocation of infrastructure but also to be more aware of the way in which mobility systems impact vulnerable populations, social inclusion, and the fairness of institutions [2]. The central issue to consider in this research is: what kind of synergistic mechanism can be created in the process of green transformation of urban transport so that non-motorized and low-carbon transport can be promoted without compromising the fundamental mobility requirements and the welfare of life of all social groups?

C. Current Status of Research

Over recent years, researchers have been associating sustainable transportation with digitalized urban governance, economic transformations as well as social inclusion, and it has been indicated that smart urban mobility is not just a technological problem, but also a social and institutional problem [3]. Nevertheless, the current Sustainable Mobility Guarantee ideas are generally based on experiences within

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low density or rural regions of Europe, where the emphasis is placed on the core offer of minimalistic public transport services with fewer attempts to apply them in high-density and spatially complicated Asian megacities. In addition, the majority of the available studies are still at the stage of qualitative discussion of policy ideas, and there are no operational and simply replicable procedures of analysis to explain how the measures of transport guarantee can be translated into real social wellbeing of the residents.

D. Existing Gaps

The gaps that exist in existing research are threefold. First, transport equity and green travel research usually grows separately, without a systematic approach based on a common wellbeing paradigm. Second, current measures of transport equity focus on one objective spatial accessibility indicator which neglects the importance of the subjective perception and varying social inclusion levels between individuals. In recent work on walkability and life satisfaction, researchers have demonstrated that the health and wellbeing impacts of mobility environments are directly associated with transport conditions and residents experiences [4]. Lastly, there is also a lack of literature investigating the ways in which transport systems transform social connections and psychological well-being through the lens of design innovation and interdisciplinary analysis.

E. Research Objectives and Positioning

The purpose of this paper is to fill the gaps in the above-mentioned by localizing and theoretically extending the European idea of the Sustainable Mobility Guarantee in this study, namely the Inclusive Sustainable Mobility Guarantee (ISMG). The research boundary of the present study is clearly defined as daily commuting and living travel in high-density cities not considering intercity transport over distances. The goals of the research are the following: (1) definition of the main dimensions of ISMG; (2) creation of a low-resource and reproducible analytical model of the Transport Equity - Green Travel - Social Wellbeing; (3) determination of the diverse mobility requirements of various social groups operating under this synergistic mechanism.

F. Structure of the Paper

The rest of this paper will be structured as follows: Literature review is conducted in Section 2 to formulate the theoretical foundation; Conceptual framework of ISMG and associated work is discussed in Section 3; Low-resource methodology, indicator design and analysis process are presented in Section 4; Results of the framework assessment are provided in Section 5; Detailed discussion and comparison across the horizontal/vertical are given in Section 6; and lastly, Section 7 presents conclusions and highlights the implication of policymaking and further research opportunities.

II. Literature Review

A. Transport Equity and Social Exclusion

The Transport Equity is concerned with the distributive justice of transport resources, costs, and benefits among various populations and places. The initial studies on transport equity mainly revolved around the notion of horizontal equity, which implied that all people should receive the same amount of transport-related resources. But over time, academics increasingly understood that it was also essential to consider vertical equity, implying that transport systems ought to benefit marginalized individuals to offset their unfavorable position within the socioeconomic hierarchy. Empirical analysis of megacities has indicated that accessibility and spatial correspondence between the demand of services and the supply of public transport are important indicators of transport inequity in densely populated areas of cities [5][6]. An equitable transport system is one where vulnerable populations cannot gain easy access to work, medical care and education facilities hence they become part of the vicious cycle of social exclusion. As such, transportation planning needs to be more than just purely oriented towards mobility but towards accessibility and social inclusion.

B. Green Travel and the Built Environment

Green Travel is commonly used to describe the travel mode with lower carbon footprint and ecological effect, including walking, cycling, and use of public transport. A lot of research has been made indicating that the five Ds (Density, Diversity, Design, Accessibility to Destinations, and Distance to Transit) features of the urban built environment have a strong impact on the residents' desire to participate in green travel. Nevertheless, more recent interdisciplinary research indicates that it cannot be assumed that merely enhancing the objective built environment will trigger behavioral change. Personal views on a situation, e.g., feelings of safety and security or comfort with respect to the transportation environment, and social-cultural values are also important factors of choice in green travel modes.

C. Transport and Social Wellbeing

Social Wellbeing is a multi-dimensional construct that includes life satisfaction, physical and mental health, and social cohesion. Interdisciplinary studies in transport psychology and urban geography have started to pay attention to the spillover effects of transport systems on the wellbeing of the residents, in recent years. Mobility systems have been found to impact wellbeing through factors beyond saving travel time, including the development of autonomy, access to opportunities and social participation [7]. Moreover, research on accessibility and active travel has demonstrated that walking and cycling can be beneficial to physical and mental health with daily mobility activities and healthier travel patterns [8]. Nevertheless, the question of how to implement the micro-level health advantages of green travel at the macro-level social wellbeing by institutional design, like the mobility guarantees is a field that needs more research.

III. Related Work

When researching the overlap between transport policy and social wellbeing, an abundance of exciting literature has been produced over the past few years. The Sustainable Mobility Guarantee studies available can be considered as significant theoretical foundations of this paper as they highlight the fact that active mobility network and public transport must allow people to satisfy their day-to-day travelling demands without having to resort to using personal vehicles. However, these works mostly concern institutional aspects and policy feasibility, whereas the micro-level psychological and social mechanisms by which mobility guarantees affect individual wellbeing are relatively poorly addressed.

In terms of the quantitative measurement of transport equity, past research regarding the Chinese megacities has shown that the spatial allocation of transport resources has tremendous implications on the socioeconomic opportunities of the inhabitants. Research on Beijing and Shanghai, among

others, indicates that the level of accessibility of public transportation and the correspondence between the rail transportation and urban services demands are major determinants of transport equity in densely populated urban areas. Recent findings in studies connecting wellbeing and travel behaviour also indicate that travel satisfaction and perceived accessibility are strong indicators of life satisfaction particularly in places where urban transport facilities are still not evenly available [9].

Moreover, in the interdisciplinary studies, scholars have started to pay attention to the social aspects of the constructed environment. Qualitative research has revealed that active mobility amenities like benches and greenery can be used as not only physical infrastructure but also as social space which facilitates regular communication, particularly among the elderly [10]. Evidence of green spaces and vulnerable populations also suggests that easy accessibility to friendly settings can enhance mental health through enhanced social relations and decreased environmental stress [11].

To sum up, the current studies have brought about successful outcomes in the measurement of transport equity, health consequences of green travel, and the macro-policy of Sustainable Mobility Guarantee. Nevertheless, most of the available literature considers equity, green and wellbeing as separate problems or easy bivariate associations. This paper is unique as it breaks the conventional assumption of unidirectional causality. It reorganizes the concept of Inclusive Sustainable Mobility Guarantee as a multifaceted socio-technical system. Via a mechanism-oriented analysis that is reproducible, it elucidates the importance of transport equity perception in the bridging capacity between green travel and social wellbeing, offering a new interdisciplinary theory of transport governance in megacities of developing nations.

IV. Methodology

A. Research Strategy and Conceptual Framework

The study has employed a low resource approach to research namely theory construction-indicator mapping-scenario based mechanism interpretation. The current paper is going to develop a theoretical framework of the Inclusive Sustainable Mobility Guarantee (ISMG) on the basis of literature review, which consists of three basic analytical aspects such as Transport Equity Perception (TEP), Green Travel Experience (GTE), and Social Wellbeing (SWB).

We propose the following core analytical propositions:

1) A satisfactory green travel experience has the potential of enhancing transport equity perceptions in case green travel facilities have space accessibility, safety, and inclusiveness.

2) A good green travel experience as a support to social wellbeing can enhance the level of satisfaction with daily travels, neighborhood interaction and perceived autonomy.

Transport equity perception is an important tool by which mobility resources can be converted into social wellbeing.

The hypothesis number H4: It is predicted that transport equity perception will be used as an intermediary between green travel experience and social wellbeing.

B. Data Collection and Indicator Design

This study has its indicators based on the available literature, publicly observable mobility trends, and typical elements of planning evaluation. The research does not involve gathering massive amounts of primary survey data as the study utilizes an open-ended indicator system which may be reproduced by other researchers, planners or community groups in typical situations.

1) Green Travel Experience (GTE): It has three operation indicators which are Infrastructure Completeness (GTE1), Travel Safety (GTE2), and Intermodal Connectivity (GTE3).

2) Transport Equity Perception (TEP): It consists of three operational indicators: Spatial Equity (TEP1), Economic Affordability (TEP2) and Vulnerable Group Inclusion (TEP3).

3) Social Wellbeing (SWB): It has three operational indicators which include Travel Satisfaction (SWB1), Social Cohesion (SWB2), and Life Satisfaction (SWB3).

C. Low-Resource Analytical Procedure

This framework evaluation was carried out through the use of a low-resource analysis process. The process is subdivided into three stages, which include the first step, definition of indicators and their practical meanings, the second step, determining whether an indicator can be measured using publicly available information, regular planning documents or simply by observing the community and, the third step, outlining the logical relationship between green travel experience, transport equity perception and social wellbeing. Figure 1 shows the general conceptual framework and synergy of the study.

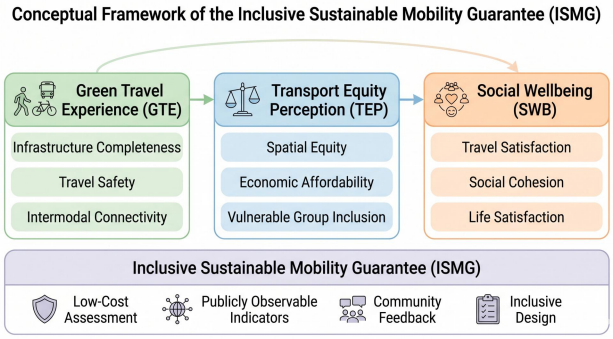

Fig. 1. Conceptual framework of the Inclusive Sustainable Mobility Guarantee (ISMG) and the low-resource synergistic mechanism among transport equity, green travel, and social wellbeing.

V. Analytical Materials and Reproducibility

A. Indicator Sources and Analytical Scope

The research is not based on expensive questionnaire distribution or massive field sampling. It develops an analytical model of high density urban settings by integrating the findings of previous studies and by choosing indicators that can be tested with conventional planning documents, traffic information, street-level observation and community feedback. Shanghai, Nanjing, and Hangzhou are employed as examples of high-density urban contexts of theoretical interpretation, not as places where we need to gather further large-scale information.

In order to be clear analytically, the research concentrates on three groups that are often addressed in literature related to transport equity: low-income population, seniors, and regular commuters who rely on the use of public transport or active transport. The groups are not regarded as statistically sampled populations, but they can be considered interpretative categories in order to analyze how the same intervention of green travel can produce various equity and wellbeing effects.

B. Indicator Coding and Reproducibility Notes

Prior to the mechanism analysis, all of the indicators were defined by their meaning, inexpensive sources of evidence, and importance to inclusive mobility. Table I gives the operational definition of the indicators. The design makes it possible to reproduce the framework without using professional statistical software, proprietary datasets, or expensive field experiments.

TABLE I. OPERATIONAL INDICATORS AND LOW-COST EVIDENCE SOURCES

Analytical Dimension	**Indicator Code**	**Operational Meaning**	**Low-Cost Evidence Source**	**Interpretation**
Green Travel Experience (GTE)	GTE1: Infrastructure Completeness	Continuity and basic quality of walking, cycling, and public transport facilities	Public transport maps, street-level observation, planning documents	Indicates whether green travel is physically convenient
Green Travel Experience (GTE)	GTE2: Travel Safety	Perceived and observable safety of walking, cycling, crossing, and transfer environments	Community feedback, traffic safety records, field observation	Indicates whether residents can use green travel without excessive risk
Green Travel Experience (GTE)	GTE3: Intermodal Connectivity	Ease of transfer among walking, cycling, buses, and metro services	Public route information, station layout, transfer signs	Indicates whether green travel modes form a coherent daily mobility chain
Transport Equity Perception (TEP)	TEP1: Spatial Equity	Whether essential services and mobility nodes are reasonably reachable by different neighborhoods	Public service maps, transit coverage information, community observation	Indicates whether transport resources are spatially fair
Transport Equity Perception (TEP)	TEP2: Economic Affordability	Whether travel costs are acceptable for low-income residents and frequent users	Fare policies, subsidy information, public transport pricing	Indicates whether transport access is economically inclusive
Transport Equity Perception (TEP)	TEP3: Vulnerable Group Inclusion	Whether elderly people, people with disabilities, and other vulnerable users can use the system comfortably	Barrier-free facility audit, crossing time observation, community feedback	Indicates whether the system supports vulnerable groups
Social Wellbeing (SWB)	SWB1: Travel Satisfaction	Overall satisfaction with daily travel convenience, comfort, and reliability	Short interviews, community feedback, local reports	Indicates direct perceived travel wellbeing
Social Wellbeing (SWB)	SWB2: Social Cohesion	Opportunities for neighborhood interaction and community participation supported by mobility environments	Observation of public spaces, community activity records	Indicates whether mobility spaces support social connection
Social Wellbeing (SWB)	SWB3: Life Satisfaction	Contribution of daily mobility to autonomy, participation, and quality of life	Short questionnaires, interviews, secondary literature	Indicates broader wellbeing effects of inclusive mobility

VI. RESULTS

A. Internal Logic and Indicator Consistency Review

In order to make the framework transparent and reproducible, the inner logic of the indicators was initially checked. As it is seen in Table II, all the indicators were considered based on three criteria: conceptual relevance, low-cost measurability, and practical policy usefulness. The review supports the fact that the framework may be implemented without costly experiments but with a clear association between transport equity, green travel, and social wellbeing. B. Mechanism Mapping and Proposition Assessment

The relationships between the three analytical dimensions were evaluated using mechanism mapping instead of bootstrapping or statistical model fitting. It concentrates on whether the suggested relationships can be theoretically consistent, observable in practice, and helpful in designing low-cost policies. Mechanism assessment is depicted in Figure 2 and Table III.

The mechanism assessment results (Figure 2 and Table III) indicate:

1) The green travel experience may increase the sense of transport equity in case the infrastructure developments are spread over various neighborhoods and are accessible to vulnerable groups as it supports H1.

2) The green travel experience may help to enhance social well being through enhancing the comfort of daily

travelling, safety and chances of interacting with people in the neighborhood which supports H2.

3) Perception of transport equity is one of the significant pathways in which mobility resources can be transformed into social welfare, as stated in H3.C.Interpretation of Bridging Mechanisms

In order to explain H4, the present study explores the role of Transport Equity Perception (TEP) as an intermediary between Green Travel Experience (GTE) and Social Wellbeing (SWB). It is implied that green travel improvements are not necessarily associated with wellbeing benefits. They acquire greater social significance as soon as the population finds the transport system just, inexpensive, secure, and non-discriminatory. Such result confirms the hypothesis H4. The low-resource mechanism map of ISMG framework is presented in figure 2.D.Scenario-Based Group Difference Analysis

In order to investigate further the differences in the synergistic mechanism between various social groups, this paper compares scenarios based on low-income residents, middle-income commuters, high-income residents, young adults, middle-aged adults, and elderly adults. Figure 3 is used to present the results. Low-income residents are more susceptible to the factors of affordability, transfer convenience, and spatial distribution of the public transport and active mobility facilities (Figure 3a). This group finds green travel improvements particularly beneficial when it helps to ease the daily travel burden and enhances access to work, medical care and other public services. Conversely, high-income residents can perceive green travel as a healthy and environmental friendly way of life instead of being an essential mobility assurance.

Based on the analysis of age groups (Figure 3b), it can be seen that elderly people are particularly susceptible to the presence of barrier-free facilities, age-friendly crossing times, resting places, lighting, and safe transfers. In this case, fairness and usability of the transportation system affect their ability to act independently daily, participate in society, and enjoy a higher quality of life. It is therefore evident that inclusive design is an underlying part of sustainable mobility that ought not be viewed as an extra addition to a facility upgrade.

TABLE II. REPRODUCIBILITY AND PRACTICAL APPLICABILITY CHECK OF THE INDICATOR FRAMEWORK

Assessment Criterion	**Evaluation Focus**	**Result**	**Practical Implication**
Conceptual Relevance	Whether each indicator corresponds to the ISMG framework	All indicators are directly linked to GTE, TEP, or SWB	The framework maintains theoretical coherence
Low-Cost Measurability	Whether the indicator can be assessed without expensive equipment or proprietary data	Most indicators can be checked through public information, observation, or short community feedback	The framework is suitable for ordinary planning and design conditions
Reproducibility	Whether another researcher can repeat the assessment steps	Indicator definitions and evidence sources are explicitly listed	The framework supports transparent replication
Vulnerable Group Sensitivity	Whether the indicator captures the needs of low-income residents, older adults, and users with mobility barriers	TEP2 and TEP3 directly address affordability and vulnerable group inclusion	The framework avoids a facility-only interpretation of green travel
Policy Usefulness	Whether the indicator can guide feasible interventions	Indicators can be translated into actions such as barrier-free design, safer transfers, and targeted subsidies	The framework supports practical decision-making

TABLE III. ECHANISM-ORIENTED PROPOSITION ASSESSMENT RESULTS

Proposition Path	**Low-Cost Assessment Result**	**Mechanism Interpretation**	**Conclusion**
H1: GTE -> TEP	Supported through theoretical and practical consistency	Green travel facilities improve equity only when they are accessible, safe, connected, and inclusive	Supported
H2: GTE -> SWB	Conditionally supported	Green travel contributes to wellbeing through comfort, safety, health, and social interaction, but the effect depends on service quality	Supported
H3: TEP -> SWB	Strongly supported at the mechanism level	Perceived fairness, affordability, and vulnerable group inclusion are central to wellbeing-oriented mobility	Supported
H4: GTE -> TEP -> SWB	Supported as a bridging mechanism	Transport equity perception connects physical green travel improvements with broader social wellbeing outcomes	Supported

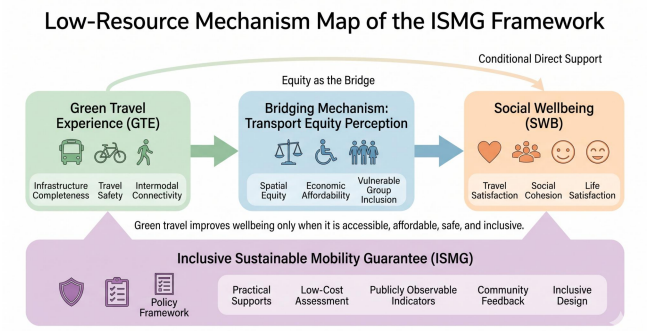

Fig. 2. Low-resource mechanism map of the ISMG framework and the bridging role of transport equity perception.

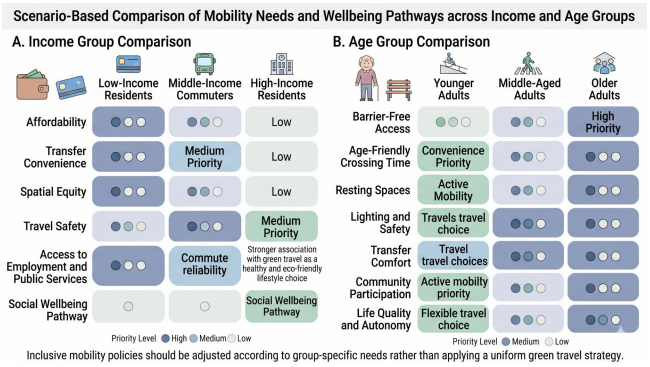

Fig. 3. Scenario-based comparison of mobility needs and wellbeing pathways across income and age groups.

VII. Discussion

A. Horizontal Comparison and Theoretical Dialogue

These findings of the current research substantiate the explanatory nature of the Inclusive Sustainable Mobility Guarantee (ISMG) paradigm. In contrast to conventional research that frequently considers low-carbon transportation and social equity to be separate, this paper shows how closely related they are with the use of a mechanism-based theoretical approach. It confirms the position of Yasin et al. (2026) that perceived accessibility is the most important link between transport and life satisfaction [10] and extends the research areas of Kroesen and Van Wee (2022) [9]. It implies that social wellbeing cannot be maximized simply by creating bike lanes or making buses more frequent but requires that such physical changes are viewed by residents as a fair right and an inclusive setting whereby their positive impact on social cohesion and life satisfaction can be fully released.

B. Vertical Association and Mechanism Attribution

The careful examination of the inside logic shows that Vulnerable Group Inclusion (TEP3) is among the most significant indicators in the equity perception dimension. This indicates that in the densely populated cities of China where the aging process and social stratification are increasing, non-physical barriers-free design and consideration of vulnerable groups in the transportation system are essential components that form part of a feeling of equity. It is quite well aligned with the qualitative results of Ottoni et al. (2016) [11] that indicate that even small design solutions like street benches or secure crosswalks may significantly improve the spatial autonomy and community participation feelings of elderly people, and thus physical mobility guarantee would be transformed to psychological wellbeing guarantee.

C. Attribution of Differences and Contextual Reflection

The ISMG developed in this research has great contextual discrepancies in its mechanisms of action as compared to the SMG concept suggested by Shibayama and Laa (2024) within the European context [2]. European implementation of SMG is usually confronted with the issue of coverage expenses in sparsely populated rural areas, and in densely populated Chinese megacities, network coverage of public transit is already quite high. The actual problems are the micro-spatial fragmentation of the last mile and the spatial mismatch between jobs and homes due to high housing prices. Thus, the ISMG structure focuses on both fare affordability and spatial equity and inclusion of vulnerable groups. This makes policymakers realize that to introduce mobility guarantees in heavily populated Asian cities, they need to switch to the concept of "macro network expansion" to the idea of "micro spatial stitching" and "inclusive design."

D. Policy Recommendations and ISMG Implementation Pathways

The present paper is an outcome of the analysis presented above and it suggests that the following policy recommendations can be used to implement the concept of "Inclusive Sustainable Mobility Guarantee (ISMG) in the Chinese cities:

Initially, in the context of infrastructure provision, all-age friendliness and barrier-free design must be imposed as evaluation measures of transport projects. As an example, there should be systematic repair of damaged walkways within a 500-meter distance of bus stations, and elderly-friendly rest benches and shelter structures should be installed in order to improve spatial inclusivity on the micro scale.

Moreover, in terms of economic affordability, it is necessary to move towards targeted transport subsidies instead of universal low-fare policies. Cities do not necessarily have to depend on expensive or proprietary big-data infrastructure, but they can also apply regular municipal data, including public transport operation statistics, community responses, local welfare indicators, and basic accessibility assessments, to determine critical population groups and areas with spatial gaps that are affected by "transport poverty, " offering solutions to this problem in the form of employment commuting grants or free travel within limited time slots that would benefit low-income earners and those looking for work.

At last, in the sphere of governance mechanisms, it is important to break the barriers that exist between transport, planning, civil affairs, and health departments. The transport equity indicators (the availability of core public services to the vulnerable groups) must be integrated in the urban physical examination and high quality development evaluation systems, which would be a paradigm shift in the field of transport management moving away from the concept of transport engineering management to the concept of urban wellbeing governance.

VIII. Conclusion

A. Core Conclusions

Based on the viewpoint of design and multidisciplinary innovation, the current study will systematically develop the framework of the "Inclusive Sustainable Mobility Guarantee (ISMG)." Mechanism-oriented analysis discloses the importance of transport equity perception as a bridging

mechanism between green travel experience and social well-being. The study indicates that the essence of creating sustainable transport is found in the attainment of technical objectives of reducing carbon emissions, but it is much more important in the elimination of mobility exclusion and the restoration of social cohesion and overall life wellbeing of residents with the help of equitable and inclusive spatial designs and resource distribution.

B. Research Implications

The given research offers significant theoretical and practical contributions to the governance of urban transportation. Theoretically, the present paper contributes to the development of the paradigm of classical transport engineering by incorporating subjective perception, spatial justice, and psychological well-being into a single and reproducible analytical model, which enhances the theoretical framework of interdisciplinary research. In practice, as they develop green travel plans, policymakers have to give up the notion of technologies-only or facilities-only and instead focus on inclusive design (e.g., age-friendly adaptations and humanized amenities in the active mobility environment) as their main KPIs. It is only through creating a cross-departmental synergistic mechanism which is deeply rooted in the integration of both transport planning and community building and public health policy that a real win win of sustainability and inclusivity can be realised.

C. Research Limitations

The present research has some weaknesses. Firstly, as far as the scope limitations are concerned, the framework is largely conceived in the context of high-density urban areas; it should be used with caution when extrapolating the findings to less developed areas of the central and western regions or poorly populated settlements. Secondly, as far as methodological constraints are concerned, this paper offers a mechanism-centered and resource-constrained analytical framework instead of a causal-statistical test. Its aim is therefore to assist in conceptual clarification and policy formulation, but other research can continue studying its applicability by using small scale, repeatable and context sensitive case studies.

D. Future Research Directions

The future study can be extended in the following fields: Firstly, small scale before and after case studies can be carried out so as to determine the wellbeing of the residents before and after particular transport guarantee measures are implemented like the barrier-free street renovation, safer transfer design, or targeted fare support. Secondly, merging publically accessible transport information, brief community surveys, and street-level observation to contrast perceived subjective equity with observed mobility conditions. Thirdly, examining what can happen to the mobility guarantee systems of vulnerable groups due to low-cost mobility solutions, such as neighborhood shuttle service, shared bicycle racks, and community-oriented mobility support.

REFERENCES

[1] Shibayama, T., & Laa, B. (2024). Sustainable mobility guarantee: Developing the concept from a transport planning perspective. Transport Policy, 155, 287 – 299. https://doi.org/10.1016/j.tranpol.2024.07.003

[2] Karner, A., London, J., Rowangould, D., & Garfinkel-Castro, A. (2020). From transportation equity to transportation justice: Within, through, and beyond the state. Journal of Planning Literature, 35(4), 440–459. https://doi.org/10.1177/0885412220927691

[3] Zotov, N., & Tsenzharik, M. (2025). Smart urban mobility: Economic and social dimensions of digitalized sustainable development. Journal of Chinese Architecture and Urbanism, 8(1). https://www.tandfonline.com/doi/abs/10.1080/15568318.2025.2462161

[4] Hsieh, H. S. (2025). Impacts of transport and recreational walkability on health and life satisfaction. International Journal of Sustainable Transportation. https://doi.org/10.1080/15568318.2025.2462161

[5] Sun, Z., & Zacharias, J. (2020). Transport equity as relative accessibility in a megacity: Beijing. Transport Policy, 97, 109−117. https://doi.org/10.1016/j.tranpol.2020.109−117

[6] Jiang, P., Liu, Y., Shi, X., Zhuo, H., Liu, Y., Fu, M. E., Lin, S., & Cheng, S. (2026). Measuring spatial equity between metro accessibility and public service demand in Shanghai using a data-driven framework. Scientific Reports, 16, Article 8992. https://doi.org/10.1038/s41598-026-40160-y

[7] Delbosc, A. (2012). The role of well-being in transport policy. Transport Policy, 23, 25 – 33. https://doi.org/10.1016/j.tranpol.2012.03.001

[8] Kroesen, M., & Van Wee, B. (2022). Understanding how accessibility influences health via active travel: Results from a structural equation model. Journal of Transport Geography, 102, 103378. https://doi.org/10.1016/j.jtrangeo.2022.103378

[9] Yasin, H., Mohino, I., & Carpio-Pinedo, J. (2026). How life satisfaction interacts with travel satisfaction and perceived accessibility in an underdeveloped urban region. International Journal of Sustainable Transportation. https://doi.org/10.1080/21650020.2026.2613555

[10] Ottoni, C. A., Sims-Gould, J., Winters, M., Heijnen, M., & McKay, H. A. (2016). ″ Benches become like porches ″ : Built and social environment influences on older adults' experiences of mobility and well-being. Social Science & Medicine, 169, 33 − 41. https://doi.org/10.1016/j.socscimed.2016.09.016

[11] Xian, Z., Nakaya, T., Liu, K., Zhao, B., Zhang, J., Zhang, J., Lin, Y., & Zhang, J. (2024). The effects of neighbourhood green spaces on mental health of disadvantaged groups: A systematic review. Humanities and Social Sciences Communications, 11, Article 488. https://doi.org/10.1057/s41599-024-02970-1

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AVAILABILITY OF DATA

Not applicable.

AUTHOR CONTRIBUTIONS

Berat Demir contributed to the conceptualization of the study, literature review, methodology design, framework construction, data organization, formal analysis, visualization, and drafting of the original manuscript. Semra Polat contributed to the research supervision, theoretical guidance, methodology refinement, validation of the analytical framework, and critical revision of the manuscript. Both authors discussed the results, reviewed the final version of the manuscript, and approved it for submission.

COMPETING INTERESTS

The authors declare no competing interests.

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