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The Role of Accessibility in Urban Transport Social Sustainability

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A B S T R A C T

Accessibility is an important aspect of social sustainability, particularly in the transport systems of urban areas. The study explores how accessibility can facilitate social sustainability in urban transportation based on Amman, Jordan as an example. Urban transport accessibility indicators are used to evaluate their impact on providing quality of life and achieving the principles of social sustainability. This study analyses the relationship between transport accessibility and social sustainability measures. Based on the available parameters for mobility in Amman, the survey was conducted to quantify the effects of transport accessibility on sustainability via the social sustainability outcomes, through collated information from surveys and transport assessment analysis. The study demonstrates that increasing accessibility would enhance the overall social sustainability parameters in an urban area. The study also includes policy suggestions to enhance transport accessibility for equitable urban development.

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دور إمكانية الوصول في الاستدامة الاجتماعية للنقل الحضري

محمد ظاهر/ جامعة تورز، فرنسا

الخلاصة:

تُعدُّ إمكانية الوصول جانبًا مهمًا من جوانب الاستدامة الاجتماعية، خاصة في نظم النقل في المناطق الحضرية. تستكشف الدراسة كيف يمكن لإمكانية الوصول أن تسهم في تعزيز الاستدامة الاجتماعية في النقل الحضري باستخدام مدينة عمّان في الأردن كمثال. تُستخدم مؤشرات إمكانية الوصول للنقل الحضري لتقييم تأثيرها على تحسين جودة الحياة وتحقيق مبادئ الاستدامة الاجتماعية. تحلل هذه الدراسة العلاقة بين إمكانية الوصول للنقل وتدابير الاستدامة الاجتماعية. بناءً على المعايير المتاحة للحركة في عمّان، تم

إجراء مسح لقياس تأثيرات إمكانية الوصول للنقل على الاستدامة عبر نتائج الاستدامة الاجتماعية، من خلال المعلومات المجمعة من المسوح وتحليل تقييم النقل. تُظهر الدراسة أن زيادة إمكانية الوصول ستعزز معايير الاستدامة الاجتماعية الشاملة في منطقة حضرية. كما تتضمن الدراسة اقتراحات سياسات لتعزيز إمكانية الوصول للنقل من أجل تنمية حضرية عادلة.

الكلمات المفتاحية: إمكانية الوصول، النقل الحضري، الاستدامة الاجتماعية، عمان، جودة الحياة، الإدماج الاجتماعي.

1. Introduction

Urban transport systems determine the social, economic, and environmental fabric of cities. Social sustainability is a central pillar of the concept of sustainable development, which means that it is predicated on the dimensions of inclusion, equity, and quality of urban life. Accessibility is one essential criterion of urban transport. Looking at accessibility, three dimensions are relevant – physical accessibility, economic accessibility, and informational accessibility. The challenge is to make sure these three dimensions of accessibility will form part of the transport system, so that all population segments of the city, young and old, working and unemployed, have accessibility in their forms of transport (Litman 2003; Banister 2008).

For urban transport, the measure of social sustainability is equitable access to all residents by minimizing undue hardship to the less fortunate, including the elderly, the infirm, the poor, and new residents. For instance, Preston and Rajé (2007) highlighted the issues relevant to the measurement of social sustainability in urban transport, including the inclusion of facets of vulnerable populations, the contribution of transport to livability in cities with socioeconomic inequality, and aspiring sustainability in mobility while allowing economic development, as already experienced in countries with high GDP. This is particularly important in Amman, a city with rapid urban growth and socioeconomic disparities. Studying and enhancing accessibility has become crucial for promoting social cohesion and improving the quality of life of urban residents.

The purpose of this paper is to investigate the role of accessibility in urban transport social sustainability, with a case study of Amman. The objectives are to identify the key accessibility indicators, estimate their impacts on social sustainability, and provide policy suggestions for improving urban transport accessibility in Amman. This can be empirical evidence and insights for

instance for the policymakers and urban planners to promote urban sustainability overall (Kenworthy, 2006).

2. Literature Review

The issue of accessibility in urban travel has been widely discussed concerning social sustainability. Previous studies show that accessible transport systems can facilitate social inclusion, labor opportunities, and desirable quality of life (Cass et al., 2005). Accessibility can be assessed with several indicators, for example, traveling time and cost, as well as the availability of transport services (Geurs and van Wee, 2004).

2.1 Defining Accessibility and Social Sustainability

Accessibility refers to the access to desired goods, services, activities, and destinations – physical accessibility (transport infrastructure and vehicles), economic accessibility (affordability of transport services), and informational accessibility (availability of transport information) (Handy & Niemeier, 1997). Social sustainability refers to the quality of life and the conditions that enable people to live their lives in a meaningful and satisfying way. Social sustainability begins with creating inclusive, equitable, and liveable communities where all community members can participate fully in social and economic life (Bramley et al., 2009).

2.2 Theoretical Frameworks

This is illustrated by the fact that accessibility goes hand in hand with almost all frameworks exploring social sustainability. The Social Exclusion Framework (Church et al., 2000) suggests that low transport accessibility may lead to social exclusion, by hindering access to goods and services or taking part in society. The Capability Approach (Sen, 1999) emphasizes the role of transport in building people's capabilities to live in decent conditions and be able to take part in society.

2.3 Empirical Studies on Accessibility and Social Sustainability

Several empirical studies exist on the relationship between accessibility through transport and social sustainability. Agyemang and Gupta (2020) highlighted the importance of access to public transport for reducing social gaps. They illustrated how transport service access, such as improved public transport, can reduce social inequalities by improving social equity and economic opportunities. Improved transport accessibility can result in a more equitable society. In addition, Litman (2019) discussed economic development as a benefit of increased transport accessibility stating that accessible forms of

transport, such as transit, can increase productivity and economic growth for societies.

As Delbosc and Currie put it in 2011: 'Most significantly, from a psychological point of view, decreased transit accessibility has been associated with stronger feelings of stress and isolation or reduced social capital; improved transit accessibility is associated with reduced stress and increased social engagement.' They say that transport accessibility can boost mental health and social well-being by reducing travel-related stress and increasing social interaction.

More importantly, other studies have demonstrated the strong statistical link between increased accessibility via transport and access to employment, education, and healthcare provision, indicating that improving transport accessibility is essential for ensuring social sustainability and reducing socioeconomic inequalities in urban areas. (Lucas, 2012; Páez et al., 2010) That is exactly what we believe: we think that increasing accessibility through transport can reduce inequality in our cities. This is one of the key inputs towards a certification of social sustainability in the city. References and contacts for further information UN-Habitat (2013) Global report on human settlements: cities and equity. Nairobi, Kenya.

2.4 Accessibility in the Context of Developing Cities

For a person in a wealthy developed country, when they find a bus that comes every 15 minutes, only takes about 15 minutes on its route, and provides a direct connection between two destinations, it is deemed acceptable. However, in low-income, developing cities like Amman, the burden of increasing social sustainability through improved accessibility can be particularly heavy when the urbanization period occurs simultaneously with the rapid expansion of cities, the weakness of infrastructures, and the increase of socio-economic inequalities (UN-Habitat, 2013). Research shows that improving transport accessibility in such contexts can have a significant impact on social sustainability (in terms of decreasing social exclusion and improving the quality of life of city residents) at the urban scale.

2.5 Research Gaps and Contributions

Although it is supported by literature that has made some progress in daunting challenges, it is still hampered by the lack of context-specific empirical studies, especially those that reflect the particular or unique challenges of specific urban settings. This is the main reason for our study of Amman in Jordan and our attempt to present empirical evidence, especially unique to the context, about the role that accessibility may play in its social sustainability. Thus, we are

contributing a small bit to larger efforts to push the discourse on urban sustainability forward, especially in light of the UN Es workspace for local officials and urban planners who seek empirical evidence that is relevant to their decision-making processes for customizing their roadmap towards addressing sustainability challenges at local levels.

3. Methodology

The methodology briefly explains the research design data collection and analyses we used to achieve this study. Since this is a mixed methods study, we tried to obtain a holistic approach to the influence of accessibility on social sustainability in urban transportation in the case city of Amman, Jordan.

3.1 Research Design

Taking an approach that advocates a mixed methods research design, this study sought to make sense of the concept of accessibility and its significance to urban transport social sustainability. The combined efforts of the quantitative and qualitative methods helped analyze and reveal the importance of accessibility in creating sustainable development.

- **Quantitative methods**: these included a household travel survey, in which we interviewed residents residing in the various districts of Amman about their mobility patterns, their perceived accessibility to main attractions and transport services, and their level of satisfaction.
- **Qualitative Methods:** Semi-structured interviews with transportation planners, policymakers, and community leaders were conducted to learn more about the challenges and opportunities for better transport access in Amman.

3.2 Data Collection

3.2.1 Survey Design

The questionnaire was constituted as follows:

- **Demographic Info:** Age, gender, income level, employment status, and residential area.
- **Travel Patterns:** Frequency of travel, modes of transport used, average travel time, and travel costs.
- **Accessibility and Identification – Perceived Accessibility:** Subjective perception of accessibility of vital services (healthcare, education, employment, recreational facilities) and identification with political units.

- **Satisfaction with Transport Services:** degree of satisfaction with the performance of transport services, namely availability, affordability, safety, and comfort.

Participants' responses to statements about accessibility and satisfaction (eg, 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree) were elicited through a Likert scale survey (Creswell & Plano Clark, 2011).

3.2.2 Sampling Method

Stratified random sampling was used to ensure representativeness, which means that each stratum is chosen as a sub-sample to be representative of the total sample. For example, Amman is a city that is divided into different districts according to geographical and socio-economic criteria. In the present study, stratified random sampling was used to divide the city into 12 different districts, which were used to select the sample number, except for the northern area of the city because of government policy. Households in the sub-sample were randomly selected and then one adult member from each household responded to the survey. A total of 500 people participated in the survey.

3.2.3 Interview Protocol

Qualitative data were collected through semi-structured interviews with 20 key stakeholders, including:

- Transport planners and engineers from the municipal transport department.
- Policymakers from the Ministry of Transport and other relevant government agencies.
- Community leaders and representatives from non-governmental organizations (NGOs) focused on urban development and social equity.

The interview guide was informed by questions about the seven components as stated by Creswell & Plano Clark (2011):

- Challenges in improving transport accessibility.
- The role of transport accessibility in promoting social sustainability.
- Strategies and policies for enhancing transport accessibility.
- Perspectives on the current state of transport services in Amman.

3.3 Data Analysis

3.3.1 Quantitative Data Analysis

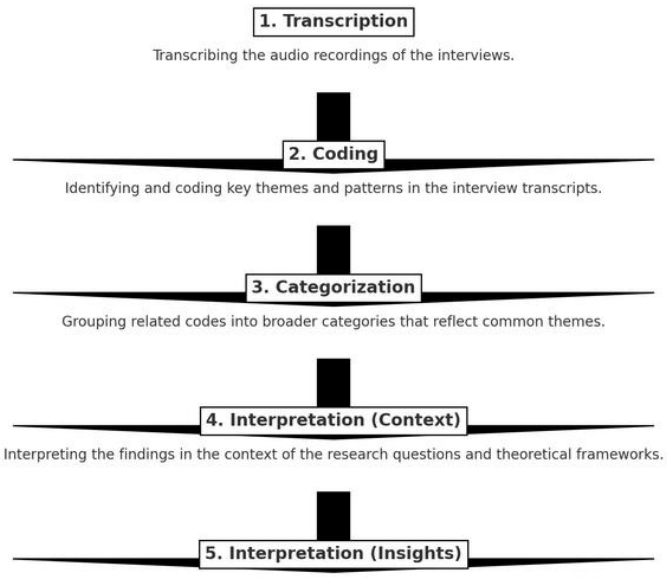
We used statistical analyses to study the quantified data from the survey to reveal if there were correlations between accessibility indicators and social sustainability outcomes. We used the following statistical techniques.

- **Descriptive Statistics**: To summarise respondents' demographic characteristics and their responses to key questions.
- Given that the above variables are assumed to be treated as categorical, carry out **correlational analysis** to examine the relationship between the perceived accessibility of people to job opportunities, satisfaction with transport services, and quality of life indicators.
- **Regression Analysis:** To determine predictors of satisfaction with transport services and quality of life, I used qualitative and quantitative data collection methods (Creswell & Plano Clark, 2011).

3.3.2 Qualitative Data Analysis

Qualitative data from the interviews were analyzed using thematic analysis: i) listening to the audio recordings of the interviews several times, ii) transcribing and verbatim translating the interviews, iii) reading through the transcribed data and generating initial codes, iv) refining codes, v) generating themes, and vi) writing-up the results.

Figure. 1 Thematic analysis of the Qualitative data



Interpreting the findings to draw insights into the challenges and opportunities for improving transport accessibility in Amman (Braun & Clarke, 2006).

3.4 Ethical Considerations

All participants in this study gave informed consent; the study received ethical approval from the relevant institutional review board.

4. Results

In the results section, the outcome of analyzing the quantitative and qualitative aspects is outlined and these outcomes provide information on the present transport situation and effects of transport's social sustainability.

4.1 Quantitative Analysis

4.1.1 Demographic Characteristics

The survey sample was composed of 500 residents of Amman. Table 1 shows the proportion of the five samples of areas over which the survey of Amman inhabitants was conducted. Table 1. Indeed, in terms of the socio-demographic characteristics of the sample under consideration, we can indicate the figures that appear in the following diagram.

Table. 1 Demographic characteristics of the sample

Demographic Characteristic	Percentage (%)
Gender	
Male	52
Female	48
Age Group	
18-29	25
30-49	45
50 and above	30
Income Level	
Low Income	40
Middle Income	45
High Income	15
Employment Status	
Employed	60
Unemployed	20
Student	10
Retired	10

4.1.2 Travel Patterns

The analysis of travel patterns revealed the following trends:

- The majority of the respondents (65 percent) said they traveled by public transport.
- 20% of respondents primarily used private cars, while 15% relied on walking or cycling.
- The average travel time for daily commutes was 45 minutes, with significant variations between central and peripheral districts.
- Travel costs were a major concern, with 55% of respondents indicating that transport expenses constituted a significant portion of their monthly budget.

4.1.3 Perceived Accessibility

Perceived accessibility scores varied across different services and destinations:

- Healthcare Services: 60% of respondents reported high accessibility, while 40% reported moderate to low accessibility.
- Educational Institutions: 70% of respondents reported high accessibility, with lower scores in peripheral districts.
- Employment Opportunities: 50% of respondents reported high accessibility, with significant differences based on income levels.
- Recreational Facilities: 45% of respondents reported high accessibility, with lower scores in peripheral districts.

4.1.4 Satisfaction with Transport Services

The survey measured satisfaction with various aspects of transport services, as summarized in Table 2.

Table. 2 Satisfaction with various aspects of transport services

Aspect of Transport Service	Mean Satisfaction Score (1-5)
Availability	3.5
Affordability	2.8
Safety	3.2
Comfort	3.0
Information Availability	2.9

4.1.5 Correlation and Regression Analysis

Correlation analysis indicated significant relationships between perceived accessibility, satisfaction with transport services, and quality of life indicators. Regression analysis identified the following predictors of satisfaction with transport services:

- Perceived Accessibility ($\beta = 0.45$, $p < 0.01$)
- Travel Costs ($\beta = -0.30$, $p < 0.05$)
- Travel Time ($\beta = -0.25$, $p < 0.05$)

These findings suggest that improving perceived accessibility and reducing travel costs and time are critical for enhancing satisfaction with transport services.

4.2 Qualitative Analysis

4.2.1 Themes from Stakeholder Interviews

The thematic analysis of the interview data identified key themes related to transport accessibility and social sustainability:

- Accessibility barriers that stem from poor infrastructure: Several stakeholders noted the scarcity of transport infrastructure in peripheral districts as a key obstacle to accessibility.
- Economic obstacles: travel costs were identified as a major barrier to achieving accessibility by transport, especially for low-income residents.
- Policy and Planning: Integrated transport planning – using inclusive design principles – was highlighted as crucial to access.
- Community Engagement: Stakeholders emphasize the importance of involving communities in transport planning processes for it to be effective and representative.

4.2.2 Perspectives on Current Transport Services

Stakeholders provided diverse perspectives on the current state of transport services in Amman:

- Transport Planners: Made the case for major investment in transport infrastructure and develop total transport policies•
- Policymakers: Highlighted ongoing efforts to improve public transport services and address affordability issues.

- Community Leaders: The social impacts of inadequate transport accessibility could be enormous, and especially disproportionately negative upon minority groups.

4.2.3 Strategies for Enhancing Accessibility

Interviewees suggested several strategies for enhancing transport accessibility in Amman:

- Investing in infrastructure: building and extending public transport networks, and upgrading road infrastructure, especially in low-income communities.
- Provide Affordability by initiating subsidies and fare integration to make transport services more accessible to low-income residents.
- Consequently, universal design principles must be adopted so that transport infrastructure, services, and systems are accessible to users of small stature, those with hidden disabilities, and other diverse or marginalized groups. In other words, universal design must escape pedestrian mythology and become inclusive design.
- Opportunities to Improve Informality: Exploring strategies to better integrate the informal transport sector into the public eye, such as through digital platforms and community outreach.

5. Discussion

The discussion section places the findings of the inquiry into conversation with the context of the current literature, and theoretical perspectives. It points towards the practical implications for policy and practice, and the limitations of the study along with providing suggestions for future research.

5.1 Interpretation of Findings

The findings underline the importance of accessibility for the social sustainability of public transport services in cities. Accessibility improvement is associated with higher satisfaction with transport services, and there is a stronger impact on the perception of quality of life, in Amman. Previous studies revealed that accessible transport leads to social inclusion, economic opportunities, and psychological well-being.

5.1.1 Accessibility and Quality of Life

The correlation we find (that optimal realized accessibility is also associated with better self-reported quality of life) supports this. The authors of the paper draw a connection to the human capability approach, where the ability to utilize

services and goods enables individuals to pursue different objectives with greater freedom.

5.1.2 Infrastructure and Economic Barriers

The quantitative and qualitative results demonstrate severe infrastructural and economic barriers limiting transport accessibility in Amman. It is found that districts situated in peripheral areas, with substandard transport infrastructure, have lower accessibility compared with central areas. High transport costs contribute to these accessibility challenges for lower-income residents as well. The results reveal two dimensions of accessibility challenges. Disparities inbuilt infrastructure can affect accessibility, while the cost of access plays an important role as well. These findings support the Social Exclusion Framework (Social Exclusion Through Inadequate Transport: A Framework for Addressing Transport and Response Poverty, 2000). It suggests that the supply of transport can lead to social exclusion when those transport services limit access to basic services.

5.1.3 Policy and Planning

Stakeholder interviews also revealed a need to explore integrated transport planning and inclusive design principles, including investment in transport infrastructure, affordability, and meaningful engagement with communities in access planning, in line with the literature on the importance of ‘complete’ transport policies that balance physical, economic and informational dimensions of accessibility (Litman, 2019).

5.2 Implications for Policy and Practice

In light of the findings from this study, the following policy recommendations can be made for improving transport accessibility and the social sustainability of the city of Amman:

5.2.1 Investing in Transport Infrastructure

Speaking in general terms, mention a lot of money that is required to build an extensive system. At the same time, a lot of attention and a lot of money needs to be paid to extend a system to the peripheral districts, especially public transport networks. In addition, an effort must be made to improve road conditions. And this is the same for all of the residents.

5.2.2 Ensuring Affordability

Policies to address the challenges of affordability in transport services should seek to reduce – or at least contain – affordable-access failure. One way of doing this is to encourage transport providers to subsidize the fares paid by low-income residents, and to introduce policies such as fare integration which enable people to use different modes of transport easily, and to transfer carryovers (that accumulate from one trip to another) across parameters, thereby making fares more affordable. Accreditation-based financial assistance targeting the most vulnerable – such as the specific subsidy on rickshaws in Kolkata described above – can also contribute towards overcoming affordable-access failure.

5.2.3 Inclusive Transport Planning

Communities must be engaged in discussions about medium- and long-term transport planning to ensure that transport systems enhance access for all citizens and that universal design principles should be at the core of all planning to make infrastructure work best for citizens with disabilities and other historically marginalized populations.

5.2.4 Enhancing Informational Accessibility

Expanding informational access allows residents access to factual and up-to-the-minute information on transport services, through a variety of digital channels, real-time updates, and community action programs.

5.3 Limitations of the Study

While this study identifies important aspects of how accessibility contributes to urban transport social sustainability, the following limitations remain:

5.3.1 Sample Size and Representation

Though the survey sample represented a diverse and large portion of Amman's population, it was not completely representative. This would require a larger, randomized, representative sample or better yet a cross-subsidy national or regional survey.

5.3.2 Cross-Sectional Design

First, the cross-sectional design of the study does not allow us to establish that increases in accessibility have a direct cause-and-effect relationship to the observed outcomes in the field of social sustainability. In other words, we cannot be certain that increased accessibility is what has led to improvements in

social sustainability outcomes. To examine the long-term effects of increased accessibility on social sustainability outcomes, we would need longitudinal studies.

5.3.3 Qualitative Data Generalizability

But though it adds valuable context, the qualitative observations cannot tell us if the findings are generalizable to other contexts. The next step should be to widen out the stakeholder sample and, where possible, to look at comparative studies of cities.

5.4 Future Research Directions

Building on the findings of this study, future research should explore the following areas:

5.4.1 Longitudinal Studies

Because transport accessibility and social sustainability work over the long term, long-term longitudinal studies are necessary to capture the true impacts of any improvement in transport accessibility on social sustainability. These studies can reveal many causal relationships and long-term outcomes.

5.4.2 Comparative Studies

However comparative studies across both cities and regions can also identify best practices and how urban mobility systems worldwide face similar challenges. Policymakers and planners can thus learn a tremendous amount from each other.

5.4.3 Technological Innovations

Work on the idea of the abstracted individual and its role in creating barriers to inclusion can inspire new directions in the design of smart transport systems and other digital platforms.

5.4.4 Focus on Vulnerable Populations

Moving forward, efforts should target the most vulnerable constituencies (eg, disabled people, the elderly, and the poor) to better invest in, and understand equity.

6. Conclusion

This paper aimed to identify whether accessibility could contribute to urban transport's social sustainability, focusing on Amman. The results showed that accessible transport is extremely important when it comes to quality of life and social inclusion. In other words, if cities make transport systems accessible, and implement inclusive transport policies, they will contribute more and more to social sustainability in these cities. The results also delved into the importance of having accessible transport when thinking of people with disabilities.

In summary, the results reinforce the imperative to make state and municipal investments in affordable transport infrastructure and to bring the private (or transit) sector into conversation with communities in transport provisioning strategies. Such choices not only make urban transport more inclusive but also have the potential to render cities more equitable and sustainable.

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