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Improving Public Bus Services in Irbid City: Assessing User Satisfaction and Urban Mobility Challenges. A Pathway to Sustainable Improvement

Samia Ayyoub Salim Ayyoub*, Zaid A. O. Aldeek

Department of Architecture Engineering, Hijjawi Faculty for Engineering Technology, Yarmouk University, Irbid 21163, Jordan

Corresponding Author Email: samia.ayyoub@yu.edu.jo

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ABSTRACT

Public transportation plays a crucial role in urban mobility and living conditions. In Irbid city, assessing the quality of bus services is essential to improve service delivery and meet public access needs. The study used an online survey to measure public satisfaction with the transit system. Respondents rated various aspects of bus services using a Five-point Likert scale. The data was analyzed with SPSS to identify areas requiring improvement. The analysis focused on identifying key elements of the bus service that need improvement. Over half of the respondents found the current bus services unsatisfactory. Key issues included uncomfortable bus interiors and seating, poorly maintained bus stops, inadequate information at stops, infrequent bus services, and poor timing accuracy. These issues collectively contributed to a negative perception of the public transport system. The study underscores the need for qualitative improvements in the bus services within Irbid city, enhanced bus stop infrastructure, and more reliable schedules. These insights can guide policymakers and bus operators in designing and implementing an effective, user-focused, and sustainable public transportation system. The study's findings are also applicable to other developing cities aiming to improve urban mobility and public transit services.

1. INTRODUCTION

The term "transit" broadly refers to the movement of people or goods from one location to another, encompassing a wide range of transportation modes and systems. Public transportation is a subset of transit systems specifically designed for public use rather than private purposes, providing a collective means of mobility for individuals across urban and rural areas. These systems are essential for ensuring accessibility, mobility, and connectivity, operating along predetermined routes and adhering to specific schedules to deliver consistent and reliable services [1].

Globally, transportation infrastructure has continued to evolve and expand, regardless of a city's level of economic development or urbanization. Among the various modes of public transit, buses stand out as the most widely utilized option for commuters, primarily due to their inherent flexibility, accessibility, and cost-effectiveness. Unlike rail systems, which require significant upfront investments in infrastructure, bus systems can be implemented with relatively modest resources, including vehicles, garages, maintenance facilities, and strategically placed bus stops. This makes them an attractive option for regions with lower passenger volumes or areas in the early stages of transit development. In many cities, buses act as the backbone of public transportation networks, connecting peripheral neighborhoods and underserved areas to urban hubs. Their ability to adapt quickly to changing demand, reroute as needed, and operate in both dense urban cores and sprawling suburban landscapes contributes to their enduring popularity. However, this flexibility comes with certain limitations. On high-volume routes, buses often struggle to match the capacity, durability, and perception of permanence associated with rail systems. Furthermore, their reliance on shared roadways makes them vulnerable to traffic congestion, which can significantly impact their speed, reliability, and overall efficiency. Frequent stops for passenger boarding and alighting further exacerbate these challenges, reducing average travel speeds and making it difficult for buses to compete with private vehicles in terms of convenience and travel time [2, 3].

Despite these operational challenges, buses remain a critical component of sustainable urban transportation systems. They offer an affordable and convenient alternative for individuals seeking to avoid the expenses and inconveniences of driving and parking, particularly in densely populated urban areas. In developing cities, the role of public transportation is even more pronounced, as it serves as a lifeline for millions of residents and plays a pivotal role in shaping environmentally sustainable urban growth. Investments in well-planned bus networks, modernized infrastructure, and eco-friendly vehicles have the potential to reduce reliance on private cars, alleviate traffic congestion, and lower greenhouse gas emissions, paving the way for greener and more livable cities [1].

This study focuses on assessing the quality and performance of public transit systems from the perspective of their users, with particular emphasis on bus systems.

By identifying the key factors that influence user satisfaction and overall transit performance, the research aims to uncover actionable insights for optimizing public transportation systems. The findings are intended to support urban planners and policymakers in enhancing transit services to better meet the needs of growing urban populations, ultimately contributing to more sustainable and efficient cities [4, 5]. This study seeks to identify the gaps in service quality and performance as perceived by users, as well as to determine the key factors that define the overall performance of transit services.

2. LITERATURE REVIEW

Sustainable urban mobility places a strong emphasis on inclusivity by ensuring transportation systems are accessible and cater to the needs of all social groups, particularly vulnerable populations such as middle- and lower-income communities. These groups often rely heavily on public transportation as a lifeline, providing them with affordable and dependable access to critical opportunities, including employment, education, and healthcare – key factors essential for achieving social mobility. In many cities, buses serve as the primary mode of transportation for these communities. Expanding and improving public transport networks is crucial to ensuring equitable access to essential services, thereby promoting social equity and inclusion. These efforts align with the overarching goals of sustainable urban mobility, which aim to create fair, inclusive, and thriving cities where no one is left behind [6].

An integral component of sustainable urban mobility is the focus on minimizing environmental impacts. This includes efforts to reduce carbon emissions, energy consumption, and air pollution. Public transportation, particularly buses, is significantly less polluting than private vehicles [7]. By encouraging a societal shift from private car usage to public transport, cities can achieve a substantial reduction in their carbon footprints, mitigating the adverse effects of climate change. Moreover, public transport systems are energy-efficient and help decrease dependence on fossil fuels, which contributes to cleaner air, reduced urban congestion, and more pedestrian- and cyclist-friendly spaces. These positive environmental outcomes are particularly critical in densely populated urban areas that are increasingly grappling with severe environmental challenges [7].

Sustainable urban mobility also prioritizes the creation of efficient and livable urban spaces. By addressing traffic congestion, improving accessibility, and enhancing the overall quality of life, sustainable mobility initiatives make urban living more enjoyable. Well-planned and designed public transportation systems play a significant role in alleviating traffic congestion, reducing travel times, and improving overall mobility [8]. By promoting alternatives to private vehicles, public transit systems free up road space, alleviate bottlenecks, and make cities more navigable for pedestrians and cyclists. This not only lowers commuter stress but also improves air quality and reduces noise pollution, resulting in healthier, more vibrant urban environments where communities can thrive [1].

The concept of sustainable transportation, which seeks to balance economic, social, and environmental concerns, is an important expression of sustainable development within the transport sector [6]. Effective transportation planning and urban development must go hand in hand to foster sustainable growth. Public transportation serves as a pivotal element of this integration, improving access to services, businesses, and residential areas while promoting efficient urban expansion. High-quality public transportation networks encourage the development of compact, mixed-use urban areas, reducing the reliance on sprawling, car-dependent suburbs [9]. By fostering better connectivity, sustainable mobility initiatives enable the creation of resource-efficient cities, where long commutes and excessive reliance on private vehicles become relics of the past. This synergy between transportation and urban planning lays the groundwork for more connected, resilient, and sustainable cities [10].

Designing transportation systems to meet user needs is at the core of sustainable urban mobility. Public transportation must be efficient, user-friendly, safe, and accessible to cater to the diverse needs of all population groups, including elderly individuals, children, and people with disabilities. Continuous improvement is achievable through regular performance evaluations and feedback mechanisms, ensuring services are adapted to meet the changing demands of urban populations. This user-centered approach not only enhances the overall quality of public transport systems but also encourages greater usage, reducing dependence on private vehicles and fostering a culture of sustainable transportation.

In rapidly growing cities, particularly in developing regions, the demand for efficient transportation systems continues to outpace supply. Investments in mass transit infrastructure, the promotion of alternative modes of transportation such as cycling and walking, and the implementation of policies aimed at reducing car dependency are essential to meet these challenges for instance, the city of Irbid in Jordan is experiencing a surge in public transportation demand but struggles with a lack of an organized bus network. Addressing such challenges requires prioritizing transportation planning, building comprehensive and efficient networks, and integrating these systems with broader urban development initiatives to support future population growth [1, 11, 12].

Public transportation also offers a wide array of economic and health benefits. It is a cost-effective alternative to the ownership and maintenance of private vehicles, making it an indispensable option for cities with high transportation costs. Moreover, public transit systems significantly enhance road safety by reducing the frequency of accidents, injuries, and fatalities. Additionally, lower levels of air pollution resulting from public transportation led to improved public health, minimizing exposure to harmful emissions. Cities that invest in high-quality public transportation often benefit from reduced healthcare costs related to pollution and traffic accidents, further promoting the overall well-being of their residents.

The city of Irbid, the capital of northern Jordan, presents a clear example of the need for an organized and well-scheduled public transportation system. Despite its size, Irbid lacks a structured bus network or any form of mass rapid transit. In a large city with high travel demand, public transportation is a fundamental requirement for the broader transport system. At present, the public transport infrastructure in the Irbid metropolitan area is insufficient to meet the needs of its growing population, with existing bus routes failing to keep pace with the increasing demand for efficient and reliable

transportation services. Addressing these deficiencies is essential for enhancing urban mobility and ensuring that Irbid's transport system can accommodate the needs of its residents in the future [11-16].

Sustainable urban mobility provides a comprehensive and forward-thinking framework for addressing the myriad challenges associated with urban transportation. Public transportation lies at the heart of this framework, driving progress in social equity, environmental sustainability, urban efficiency, and economic vitality. By prioritizing passenger needs, integrating transportation systems with urban planning, and ensuring continuous improvements, cities can build public transit systems that serve the greater good. For growing cities like Irbid, adopting these principles can help address existing deficiencies and meet the demands of expanding populations. Thoughtfully designed public transportation is far more than a mere solution to transit issues, it is a cornerstone of sustainable, equitable, and livable urban environments, shaping the future of cities for generations to come.

3. OBJECTIVE OF THE STUDY

The primary objectives of this study are: To identify the existing situation of the public transportation in Irbid city. To analyze the results of the Likert type survey questionnaire. To have recommendations to develop the level of public transportation for the government and stakeholders. To improve life quality for people living in urban areas (Irbid).

4. RESEARCH METHODOLOGY

This study examines public transportation's role in enhancing traffic flow and improving residents' quality of life within cities. A survey was conducted to gather passengers' perspectives and measure their satisfaction based on specific criteria outlined in the questionnaire. Key variables used to evaluate customer satisfaction include the quality, reliability, safety, and security of bus services operating in Irbid city.

The study focuses on several attributes within these variables, such as bus condition, seating arrangement, noise levels, service management, travel time, service regularity, customer support, fare collection, overcrowding, comfort, safety from accidents, nighttime security, and the availability of information at bus stops.

The data collected through Likert-scale questionnaires was analyzed using SPSS to produce numerical results, including averages and percentages, to assess public transport performance. This research evaluates the current "quality of services" offered by small passenger buses in Irbid, Jordan, based on feedback from online and face-to-face surveys with both bus users and those who rely on private cars and taxis.

A total of 400 refined questionnaires were processed through SPSS, providing insights into the 26 service attributes rated by respondents based on their satisfaction with public transport in Irbid. The findings highlight the deficiencies in the existing bus services, offering actionable recommendations to relevant authorities and operators for improving service quality and encouraging increased public transport use [17, 18].

5. PROBLEM DEFINITION

Irbid is located 80 kilometers north of Amman, the capital of Jordan in the northern region of the Hashemite Kingdom of Jordan. It has an area of approximately 1,572 square kilometers.

Irbid had a population of 1.95 million in 20,190 villages and towns and serves as the primary market for these surrounding communities [19-21], surrounded by 350 villages and towns and is considered the main traditional market for the surrounding villages.

Rapid urban expansion and population growth have increased the demand for land for housing and essential services, leading to urban sprawl. This uncontrolled growth has resulted in significant challenges, such as increased traffic, loss of green spaces, and negative impacts on the environment, public health, and quality of life. Due to its strategic location, Irbid has developed into a crucial commercial and administrative hub for northern Jordan. The city center has become a focal point for commercial activities, serving not only the city's population but also residents of nearby towns and the surrounding villages.

As Irbid has grown, the number of vehicles has risen, residential areas have become more crowded, and the city center has become congested with traffic and parked cars. The limited space for pedestrians has led to an increase in CO_2 emissions, contributing to pollution levels that now impact residents more than ever before [22, 23].

6. DEFINE THE EXISTING PROBLEMS

Transportation in Irbid city – Traffic jams: Irbid city has grown rapidly, and urban growth has also continued to accelerate in the past years [3]. The most common way of getting around is by bus, most of which are fifteen- or eighteen-seater minibuses. The city has a choice of minibuses, taxis, and what is known locally as services (Car services).

Timetables are rarely in operation: buses tend to depart only when they're full. Downtown acts like a transport hub, and most routes move radially out from the town down to the edge of the city and the surrounding areas. Bus transport was founded to service streets which were located near important buildings, such as hospitals, schools, and public institutions. However, when we look at Irbid city map (Figure 1) [24], we find that a lot of neighborhoods don't have any bus route because there are no such public institutions located in the area so the most public bus route located in the main streets in the city and the people in such a neighborhood need to walk along from their home to the bus stop or to catch a bus in its route. There are a lot of areas without public transport, so the users need to use taxis in their movements or a privet car. One of the main problems facing the users is that the bus does not have a time schedule for movement or even special bus stops. Passengers need to wait in the carb of the street and wait to be picked up by the bus driver if the bus driver notices the hand gesture. People must wait for the bus, which is always late on arrival, especially during peak time. Even though the bus is full and crowded. This made buses stop anytime and anywhere, which causes a lot of traffic congestion and confusion for the other drivers on the street [23].

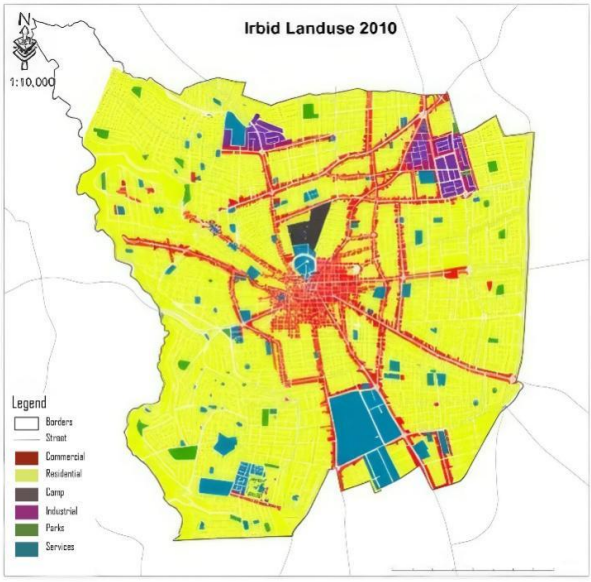

Figure 1. Irbid city land use 2010 [24]

7. SIGNIFICANCE OF THE STUDY

Urban public transportation plays a vital role in reducing both traffic congestion and environmental pollution, offering sustainable alternatives to personal vehicle use. This shift not only alleviates the burden on city streets but also enhances the overall quality of life for urban residents by promoting a cleaner and less congested environment. Transportation serves as a fundamental element in meeting people's mobility needs, connecting them to work, services, and social opportunities. To achieve this, the transportation system—comprising infrastructure, governance, vehicles, and users—must be efficiently managed to support current needs while preserving resources and opportunities for future generations, aligning with principles of sustainability [25].

The broader impacts of this study extend beyond Irbid city, as it addresses critical challenges in urban transportation that are common in developing regions. By highlighting the importance of quality public transportation services, this research contributes to several areas:

1) Enhanced Urban Mobility and Livability: Improving public transportation quality can reduce traffic congestion, lower emissions, and make cities more livable. This aligns with global sustainability goals by promoting greener and more efficient urban transport solutions.

2) Social Equity and Accessibility: The study sheds light on public transit issues that disproportionately affect vulnerable populations who rely on buses as their primary transportation mode. Enhanced bus services could increase accessibility, helping bridge social gaps and improve mobility for all demographics.

3) Economic Growth and Productivity: Reliable public transport can enhance productivity by reducing delays and promoting smoother commutes. A more efficient transit system could boost local economies by facilitating easier access to jobs, education, and services.

4) Policy and Infrastructure Development: The study provides valuable data for policymakers and transit authorities, supporting evidence-based decision-making. Findings can inform infrastructure investments and reforms, leading to more resilient and adaptable transportation systems in other cities facing similar issues.

5) Encouragement of Sustainable Practices: This research aligns with global climate and sustainability agendas by promoting a shift from private vehicle use to more sustainable public transit options, reducing the carbon footprint of urban transport systems.

Overall, the study's insights can be applied in cities facing comparable challenges, fostering the development of public transportation systems that are not only user-friendly but also support sustainable, equitable, and economically vibrant urban environments.

8. SURVEY AND DATABASE (METHODOLOGY)

Conducting user satisfaction surveys is one of the most effective ways to evaluate the quality of bus services. These surveys provide transportation authorities with direct insights into users' experiences and satisfaction levels, offering essential data to inform service improvements. Despite the crucial role of buses in urban mobility, bus services in many cities often fail to meet demand, leading to low service quality and user dissatisfaction. This unreliability is a major factor behind many people's preference for private vehicles over public transit. Survey results revealed that 96.7% of private car users would consider reducing their car usage if public transportation were more frequent and dependable, highlighting the potential for improved transit services to ease traffic congestion and reduce reliance on personal vehicles.

This study utilized an online survey instrument, with responses measured on a Five-point Likert scale. The data was analyzed using SPSS, a tool suitable for studies without distributional assumptions about the population. The findings aim to identify the key areas within public transportation that require attention.

The objective of this paper is to evaluate the quality of services offered by small buses operating in Irbid. The study is based on a survey conducted through a questionnaire, structured into three sections:

- The first section gathered general information on participants who primarily use public buses for urban travel.
- The second section focused on participants who prefer to use private cars.
- The third section included those who tend to use other forms of transportation, such as taxis or rented cars.

The study, employing an inferential research design, was conducted in Irbid city and its surrounding villages between December 2023 and February 2024. A randomly selected sample of 400 participants was chosen using the formula n = N / (1 + N × e²), which is commonly known as Slovin's formula. It's used to determine the appropriate sample size (n) needed when conducting a survey or study, given a total population size (N) and a desired margin of error (e) in the following formula.

$$n = N/(1 + N(e2))$$

where, n = number of sample size, N = number of population size (Irbid Gubernators holds a population of 1.95 million

inhabitants [21] and e = a margin of error of 5% (0.05).

If we put the value of population size and sampling error, then we will get a sample size of 399.9.

The questionnaire was composed of questions consisting of socio-economic, and trip-related information, and has asked the participants to rate the bus service attributes on a Five-point Likert-type ordinal scale.

Likert scale questions have five points, typical multiple-choice options include strongly disagree, disagree, no opinion, agree, strongly agree, and as on to the Likert item [22].

A survey was conducted, gathering responses from bus users. Twenty-six attributes were identified to evaluate road user satisfaction, and the collected data were compiled. This assessment aimed to determine the quality of small bus services and identify key attributes requiring improvement. [13, 26-28].

9. THE RESULTS OF THE QUESTIONNAIRE ANALYSIS

This study seeks to identify the main obstacles and challenges faced by users of public transportation in Irbid, a city located in northern Jordan. A field survey was conducted with a randomly selected sample of 400 participants. Among the respondents, 89.7% were between the ages of 19 and 30, 10.3% were aged 31 to 60, and 1% were over 60 years old. Notably, no participants under 18 reported using the city's bus system (Figure 2) [29-33].

The percentage of college students was 56.4%, and 30.8% were employed, 12.8% were not working, while less than 1% were retired. 56.4% of the respondents were female, and 43.6% were male. About 38.5% used their own private cars, 30.8% used the bus between 5-10 times per week, 23.1% used the bus less than 5 times per week and 7.7% used the bus more than 10 times per week. 64.1% prefer to use their cars for moving within the city, while 23.1% prefer to use the bus and 12.8% prefer to use taxis. More than 59% agreed that there are not enough parking spaces in the city, and 52% of the participants strongly agreed that the streets are very crowded and noisy.

By asking the users of private cars and taxis about the main reasons for not using the buses, the answers are as the following chart indicates.

More than 96.7% stated that they would prefer to use buses if the system of public transportation was to be developed and become better.

Part of the questionnaire focuses on the quality of the bus service. It includes questions about the bus conditions, seating arrangements, comfort, and noise level inside the bus. 33.3% strongly agree that the bus often has more passengers than available seats, making the environment inside the bus, especially in hot climates, uncomfortable. Additionally, 77.8% strongly agree that the bus is not suitable for the elderly, children, and disabled passengers. 11.1% strongly disagree that the seats are uncomfortable, 33.3% disagree, and 33.3% are neutral. Furthermore, 55.6% disagree that the buses are clean, and hygienic rules are followed (Figure 3).

33.3% strongly disagree that it is easy to carry luggage on the bus, while 33.3% agree that the driver behaves well and has the skills to drive, even though 22.2% report that drivers frequently change the route.

Another part of the questionnaire addresses reliability. It includes questions about time control and management, waiting times, bus frequency, daily travel times, and the schedule of bus movements (Figure 4). Questions also cover the safety and security of using the bus during the day and night. 44.4% strongly agree that the bus does not operate at the same time daily and lacks an accurate schedule. This inconsistency is mainly because the bus does not start its trip until it is full, even when it can pick up passengers along the route. Additionally, 44.4% agree that the bus is not available all day, especially in winter, and 44.4% strongly agree that it is not available at night after sunset. 66.7% strongly agree that the buses are not safe, especially at night, which is a concern for female passengers. About 33.3% report that the bus is unavailable on holidays or weekends. Regarding bus station quality, 55.6% agree that bus stops are accessible from the main street, while 77.8% strongly agree that bus stops do not protect users from sun or rain and are unavailable in residential areas.

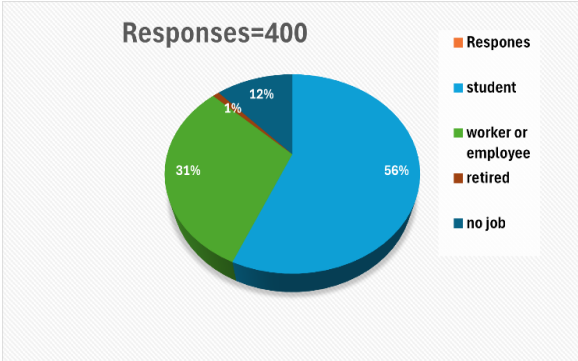

Figure 2. Responses for survey
Questionnaire analysis by the author

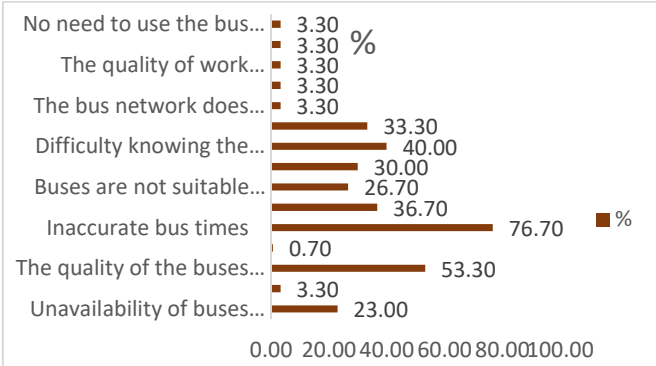

Figure 3. Results from the questionnaire analysis
Questionnaire analysis by the author

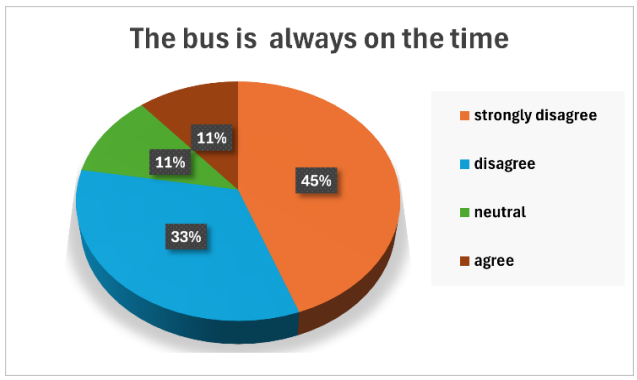

Figure 4. The bus is always on time
Questionnaire analysis by the author

Enhancing quality of life has become a key focus, with research identifying seven major factors that correlate with life satisfaction levels. These factors include: (i) access to destinations; (ii) the physical design of transport infrastructure; (iii) efficient human movement across locations; (iv) transparency in communication, finance, and planning; (v) safety in terms of human health and behavior; (vi) environmental factors like air quality and lighting; and (vii) maintenance impacts, including repair and surface quality.

Public transport-such as subways, buses, light rail, trams, shared services, and taxis-plays a central role in achieving this. Passengers prioritize factors like time efficiency, fare, and convenience over specific routes. Consequently, the future of urban transport will be both attractive and successful if it delivers a travel system that meets these expectations effectively [5].

10. RESULTS

The study conducted a field survey in Irbid city, Jordan, to identify the main obstacles and challenges faced by public transportation users. The sample consisted of 400 participants, primarily aged 19-30, with a majority being college students and females. Key findings include:

- Usage Patterns: 38.5% use private cars, while 30.8% use buses 5-10 times a week. Only 23.1% prefer buses for city travel.
- Issues Identified:
  - Overcrowding: 33.3% strongly agree that buses are often overcrowded.
  - Suitability: 77.8% believe buses are unsuitable for the elderly, children, and the disabled.
  - Cleanliness and Comfort: 55.6% disagree that buses are clean; 33.3% find seats uncomfortable.
  - Reliability: 44.4% of state buses lack a reliable schedule and are unavailable at night and on holidays.
  - Safety: 66.7% feel buses are unsafe, especially at night and for females.
  - Bus Stops: 77.8% agree bus stops lack protection from the weather and are not in residential areas.
- Improvement Potential: Over 96.7% would prefer buses if the system were improved.
- Quality of Life Factors: Satisfaction with public transport is linked to factors like accessibility, safety, environmental impact, and maintenance.

Overall, the study highlights significant dissatisfaction with the current public transportation system in Irbid, focusing on overcrowding, reliability, safety, and inadequate facilities.

Owners of public transportation are private stockholders. The government or the Municipality owns the lines and gives permission to the stockholders to buy their line and choose the direction, the beginning of the line and the end point, so, as was mentioned before there is no equal distribution of the public transportation in all the parts of the city especially the residential neighborhood without public or main commercial buildings such as malls.

11. DISCUSSION AND CONCLUSION

The suggested solution is that the Government should create a public transportation company shared by the private stockholders who own the public transportation, then produce different and equally distributed lines for the buses to operate in all the existing built-up areas of the city and have a scheduled time for the buses and specific bus stations. The buses will move on schedule and a fixed time of traveling and will have to stop at each bus stop specified for the route line. Equal distribution of the public transportation lines will help the users who live in different parts of the city to have the benefits of it, and that will encourage the building of commercial buildings in different parts of the city which will increase the chance of jobs and increase the economic functions in the city. Also, that will reduce the use of private cars, and in this case, the problems of the lack of parking spaces, noise, and pollution in the city will be decreased. The people will have more social areas in the city because they would like to spend more time haggling, wandering, and walking in the city downtown.

12. POLICY RECOMMENDATIONS

To address these challenges, a series of policies and actionable steps are proposed. Establishing a Public-Private Partnership (PPP) would allow the government to collaborate with private bus line owners to create a public transportation company that ensures equitable route distribution and adherence to operational standards. Route redistribution efforts would focus on redesigning bus routes to provide equal coverage across all city areas, including underserved residential neighborhoods, while incorporating feeder routes to connect these areas to commercial zones and downtown. Scheduled operations would introduce fixed timetables with reliable service extending to evenings, weekends, and holidays. Bus stop improvements would involve constructing well-designed, weather-protected stops strategically placed in residential areas and along major routes, ensuring safety, accessibility, and proper lighting for all users, including the elderly, disabled, and women. Fleet modernization and maintenance would bring in modern buses equipped with comfortable seating, air conditioning, and improved cleanliness, alongside a regular maintenance program to ensure safety and functionality. Safety measures such as surveillance cameras on buses and at stops, along with driver and staff training for emergency handling and customer service, would enhance passenger security. Public awareness campaigns would promote the benefits of public transportation and educate residents, university students, and professionals about new routes, schedules, and safety features. These measures are expected to yield significant benefits, including reduced private car usage, decreased traffic congestion, and lower demand for parking spaces. Additionally, improved bus accessibility could stimulate economic growth by encouraging commercial development in underserved areas, creating job opportunities, and boosting the local economy. Lastly, enhanced urban quality of life, marked by reduced noise, pollution, and overcrowding, would foster a more vibrant and livable city where residents can comfortably engage in social and commercial activities.

By implementing these policies, Irbid can create a more sustainable, efficient, and user-friendly public transportation system, ultimately improving the overall quality of life for its residents.

The intellectual contributions of this article are as follows:

1) **Empirical Analysis of Public Transportation Satisfaction**: This study provides an in-depth, data-driven analysis of public transportation satisfaction in Irbid, identifying specific areas of service quality needing improvement. This empirical evidence contributes to a clearer understanding of the user experience in public transport systems within developing urban settings.

2) **Application of Methodological Tools in Transportation Studies**: By using a Five-point Likert scale survey and SPSS analysis, the research introduces a straightforward yet effective method for assessing public satisfaction in transportation studies. This methodological approach can be replicated in similar urban contexts to evaluate public transit systems in a standardized manner.

3) **Identification of Key Quality Issues in Urban Public Transport**: The study isolates critical factors affecting passenger satisfaction, such as bus bodywork and seating comfort, stop conditions, service information, frequency, and schedule reliability. This nuanced understanding of service quality issues is valuable for urban transport research, focusing on factors beyond cost or accessibility alone.

4) **Policy Recommendations for Urban Transit Improvement**: By identifying key issues and offering potential areas of improvement, the study contributes actionable insights that can inform urban transportation policies. This serves as a guide for policymakers and operators in Irbid and similar cities, aiding in the development of more efficient, accessible, and user-friendly public transit systems.

5) **Support for Sustainable Urban Development**: The research emphasizes the role of high-quality public transportation in creating sustainable cities, aligning with broader goals of urban development. This contribution is particularly relevant for developing nations looking to balance growth with environmental and social sustainability.

6) **Framework for Future Research**: The study provides a foundation for further research into urban public transportation, especially in cities with similar economic and infrastructural challenges. By focusing on service quality in bus transportation, the article encourages future studies to explore these issues in other modes of public transit and different urban contexts.

Future studies will be about the social impacts such as safety and crowding were considered in the social criterion. Acceptability is one of the most important criteria for evaluating urban investments as projects such as transport have a direct impact on society. Security attended road system and transport system typology. The decrease was due to the impact on congestion using the car in urban areas.

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STATEMENTS AND DECLARATIONS

All data provided in this paper are legally documented, and the authors confirm that all information in the article is derived from their own research and is both authentic and accurate. The research did not receive any funding, nor did it have any financial or non-financial interests directly or indirectly related to the work submitted for publication.

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