Impacts of In-Accessible and Poor Public Transportation System on Urban Environment: Evidence from Hyderabad, Pakistan

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Abstract—**City design plays a major role in the way of life of its inhabitants. The growth of urban centers requires careful schemes to ascertain that the quality of life is not adversely influenced. The rate of motorization is increasing in Hyderabad, Pakistan due to inaccessible public transportation. An efficient public transportation system performs a critical part in sustaining and improving urban welfare by providing access to daily necessities. The basic aim of this study is to discuss the impacts of inaccessible public transportation on urban population, the environmental effect of recent urban transport designs, and the expansion in traffic congestion. Landsat images were used to highlight the existing public transportation routes and dynamic and more realistic travel distances and times were measured. Data were collected from local households and further frequency analysis was done through SPSS. The outcome of this research may assist the evolution of a sustainable and accessible transportation system for the urban population.**

Keywords-transportation; sustainability; accessibility; public transport; environmental impact

I.   INTRODUCTION

Urban public transport accessibility in the cities is raised by increasing population growth and spatial expansion [1, 2]. An improved transportation system supports lower transaction costs, permits economies of scale and specialization, widens opportunities, enhances trade, combines marketing and expands the income and welfare of society [3]. According to the 2017 census, Hyderabad's population is 1.733 million, making it the second most urbanized city of Sindh after Karachi. Recent transportation planning techniques generate unfair accessibility distribution and produce safety and environment inequalities while favoring private transportation, whereas local public transports and non-motorized means have been neglected [4]. Due to cost, distance, and congestion people face socio spatial "deprivations" which can lead to a decrease in the quality of life [5]. The urban population in Pakistan constituted 32.5% of the whole population (135.8 million) in 1998. By 2020, the urban extent of the population is expected to be over 50% of the overall population [6]. An increase in the density of cities causes an increase in the number of personal vehicles and improper planning of routes, due to which transport associated externalities are generated such as increasing congestion, pollution, consumption of non-renewable assets, and traffic accidents. Sustainable transportation systems should be embraced to adjust between the major pillars of sustainable evolution [1, 2]. Improved public transport accessibility can be seen as the core objective of transport development [7] because public transport is likely to ease urban regions significantly, with regard to accessibility and sustainability [8]. This study tries to emphasize on urban public transportation problems and their influences on regional designs of evolution, economic practicality, environment, and on the quality of life [8]. Authors in [2] recommended a few strategies for the evolution of sustainable urban transportation systems. The approach adopted in this study reflects the accessibility in terms of public transport, including its environmental and social effects.

II.   MATERIALS AND METHODS

A.   Studied Area

Hyderabad is the former capital of Sindh, Pakistan and the second largest city of the Sindh province. It consists of four Talukas, namely Hyderabad city, Qasimabad, Latifabad and

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Hyderabad Rural. It is located at 25.24°N and 68.20°E. The city faces many problems, one of which is transportation which emerges as a major one nowadays. Figure 1 shows the studied areas which are Nasim Nagar Road, Shedigoth and Wehdat Colony from Qasimabad area.
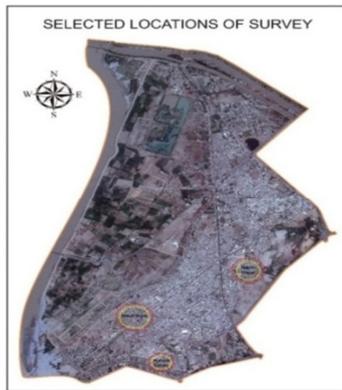
Fig. 1.   Studied area

B. Methodology

This study focuses on marking different accessibility problems of public transportation. It is based on a spatial evaluation of the current public transport routes, which is used to examine accessibility issues. Analysis of the public transport inaccessibility and its impacts on urban environment can be the origin of important data for regional strategy makers to keep sustainable evolution. Landsat images were used to highlight the current public transport routes and traffic flows in the studied areas. Accessibility was evaluated in each of the sites. For traffic volume count, various samples were taken at an interval of 5 minutes on major intersections of Qasimabad at peak times (1pm-3pm), providing helpful data with regard of the future demands of public transport in the areas and their social and environmental impacts.

C. Data Collection

Data were gathered through questionnaires on households and traffic volume surveys in order to examine the accessibility Issues towards public transport. Landsat images were used to evaluate the distances from home to public transport access areas. Three sites (Shedigoth, Nasim Nagar Road, and Wehdat Colony) were selected from Qasimabad for spatial analysis, where there was eminent usage of public transport, and 30 questionnaires were given to the inhabitants of each. Ultimately the reason was to relate recognized 'transport problems' to quantifiable information defining the impacts on urban environment.

III.   RESULTS AND DISCUSSION

Figure 2 highlights the overall existing routes of public transport at Qasimabad. Figure 3 highlights the accessibility problem of the 3 selected sites as the time taken to reach a public transport, which has an obvious effect on total travel time. The blue arrows define the distance from the spatial settlements towards public transport, whereas the red lines

show the existing public transport routes, the green dots display the stops of public transports, whereas the red areas are inaccessible by public transport. From Figure 3 we can examine the accessibility problem. Under normal conditions, the distance of a comfortable walk for most individuals towards public transport stops is 400m [8]. In the studied areas, it takes 765m from Shedigoth, 800m from Nasim Nagar Road and 300m from Wehdat Colony to reach a public transport route. These distances affect the accessibility of people towards public transportation. People take extra time to reach their destination therefore there is a need to extend public transport routes towards these areas to increase accessibility and reduce the usage of private vehicles.

Fig. 2.   Existing routes of public transport at Qasimabad. Screenshots from Google Earth, Map data: © Digital Globe
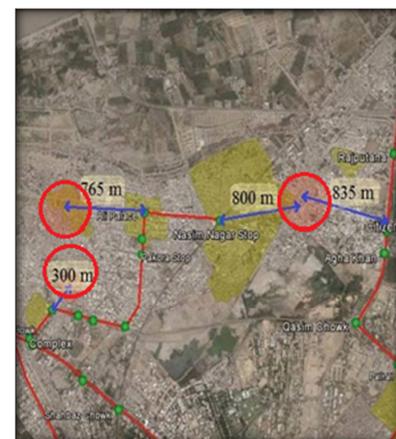
Fig. 3.   Distance of selected sites towards existing routes of public transport. Screenshots from Google Earth, Map data: © Digital Globe

A. Impacts of Inaccessible and Poor Public Transportation

Figure 4 shows the respondents' time to reach public transport and Figure 5 shows the time taken to reach a destination via public transportation. The majority of the respondents take more time in public transports because of poor conditions and accessibility as shown in Figure 6 which shows that only 28 out of the 90 respondents said that the transport routes are easily accessible.
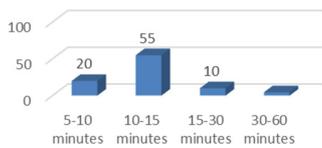
Fig. 4.   Time taken to reach public transport
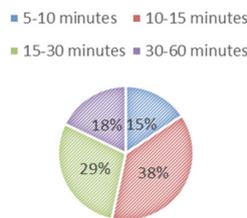
Fig. 5.   Travel time to reach destination
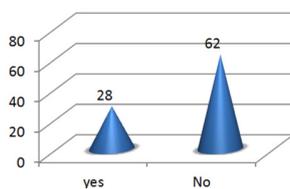
Fig. 6.   Public transport is easily accessible to reach destination

The way of transportation used by the respondents of Qasimabad Taluka to reach their destination is showed in Figure 7 which reveals that the majority of population use their own vehicle. One for the main reasons is the poor availability and accessibility of public transportation. Figure 8 elaborates the affordability of people of Qasimabad Taluka regarding the current transportation means they use. The majority of people said that the current mode is unaffordable, so there is an augmented need of reliable and accessible public transport. Only 16% of the respondents were satisfied over the current services of public transport while the 84% rest are unsatisfied as shown in Figure 9.
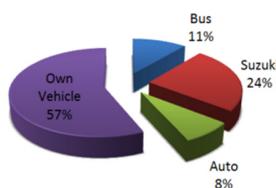
Fig. 7.   Mode of transportation used

Fig. 8.   Affordability towards current mode
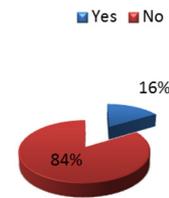
Fig. 9.   Satisfaction of people regarding existing conditions

B. Traffic Volume Count

Figure 10 shows the traffic volume count at Poonam Square, in which the total generated trips were 504. Out of these trips, 86 trips were generated from Poonam Square to Giddu Square, 181 trips were to Shahbaz Flyover, 75 to Qasim Square and 162 trips were generated from Poonam Square to Nasim Nagar Road. The yelow line shows the trips attracted towards Poonam Square. From a total of 486 trips, 125 trips were attracted from Shahbaz Flyover to Poonam Square, 146 trips from Giddu Square, 144 trips from Nasim Nagar Road, and 101 trips were attracted from Qasim Square to Poonam Square. The 5 minute sample result shows that there is heavy traffic congestion at Poonam Square during peak hours.

Fig. 10.   Trips attracted and generated at various locations from Poonam chowk. Screenshots from Google Earth, Map data: © Digital Globe
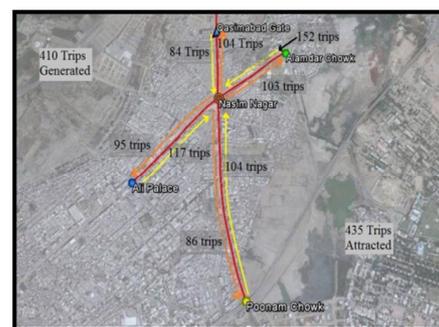
Fig. 11.   Trips attracted and generated at various locations from Nasim Nagar intersection. Screenshots from Google Earth, Map data: © Digital Globe

The traffic flow of Nasim Nagar intersection was surveyed at peak time, and the results are shown in Figure 11. From 410 total trips, 95 trips were made from Nasim Nagar Road to Ali Palace, 104 trips to Qasimabad Gate, 103 trips to Alamdar Square and 86 trips were generated from Nasim Nagar Road to

Poonam Square. The yellow line shows the trips attracted towards Nasim Nagar Road. From a total of 435 trips, 117 were attracted from Ali Palace, 84 trips from Qasimabad, 152 trips from Alamdar Square, and 104 trips were attracted from Poonam Square to Nasim Nagar Road. The 5 minute sample result shows that there is heavy traffic congestion at Nasim Nagar intersection during peak hours.

The outcome reveals that there is unplanned public transport provision in the study area. The majority of the respondents (55 out of 90) take 10-15 minutes to reach public transport, a thing that directly affects the travel time to reach destination. The majority of people (57%) use a private mode to reach their destination causing congestion and air pollution, while 84% said that the current mode is unaffordable and 84% are not satisfied with the existing conditions of public transport.

IV. CONCLUSION

Regional sustainability can be attained by adequate public transportation planning. The absence of public transport affects the social and environmental circumstances of the local population. This paper assessed public transport accessibility and its adverse impacts on the urban environment. In doing this, bad performance of public transport was inspected in Qasimabad. The result concluded that 57% of the population relied on private vehicles affecting travel time, affordability, accessibility and urban environment.

It was seen that the public transport means are poor and inaccessible. Development and extension of route facilities are required. Public transport access could be improved by increasing coverage of spatial units, considering demographic and socioeconomic factors. Besides, due to insufficiencies in the government structure, the public transport strategies are doomed to be unsuccessful. There is no proper planning to bring sustainability in transport planning and evolution projects in growing nations. A part of government rules and regulation authorities were also found to be non-operational which often generates difficulties in carrying progressed assessments and development processes. The system of current transportation planning described in this paper, provides a baseline on the way to develop policy making strategies that can contribute to the development of appropriate urban public transportation. As a recommendation, BRT system should be implemented and the proposed public transport infrastructure.

REFERENCES

[1] I. A. Qureshi, H. Lu, S. Ye, "Urban transportation and equity: A case study of Beijing and Karachi", Transportation Research Part A: Policy and Practice, Vol. 42, No. 1, pp. 125-139, 2007

[2] I. A. Qureshi, H. Lu, "Urban Transport and Sustainable Transport Strategies: A Case Study of Karachi, Pakistan", Tsinghua Science and Technology, Vol. 12, No. 3, pp. 309-317, 2007

[3] M. Soomro, D. A. C. Maunder, S. Cavill, "Effective regulation for sustainable public transport in developing countries", Transport Policy, Vol. 13, No. 3, pp. 177-190, 2006

[4] M. Imran, N. Low, "Sustainable Urban Transport in Pakistan: Threats And Opportunities", Management of Environmental Quality: An International Journal, Vol. 16, No. 5, pp. 505-529, 2009

[5] J. R. E. Russel, G. Abbas Anjum, "Public transport and urban development in Pakistan", Transport Reviews, Vol. 17, No. 1, pp. 61-80, 2007

[6] M. A. Niedzielski, E. E. Boschmann, "Travel Time and Distance as Relative Accessibility in the Journey to Work", Annals of the Association of American Geographers, Vol. 104 , No. 6, pp. 1156-1182, 2014

[7] J. Cheng, L. Bertolini, F. le Clercq, "Measuring Sustainable Accessibility", Transportation Research Record Journal Of The Transportation Research Board, Vol. 2017, pp. 16-25, 2007

[8] A. T. Murray, R. Davis, R. J. Stimson, L. Ferreira, "Public Transportation Access", Transportation Research Part D: Transport and Environment, Vol. 3, No. 5, pp. 319-328, 1998