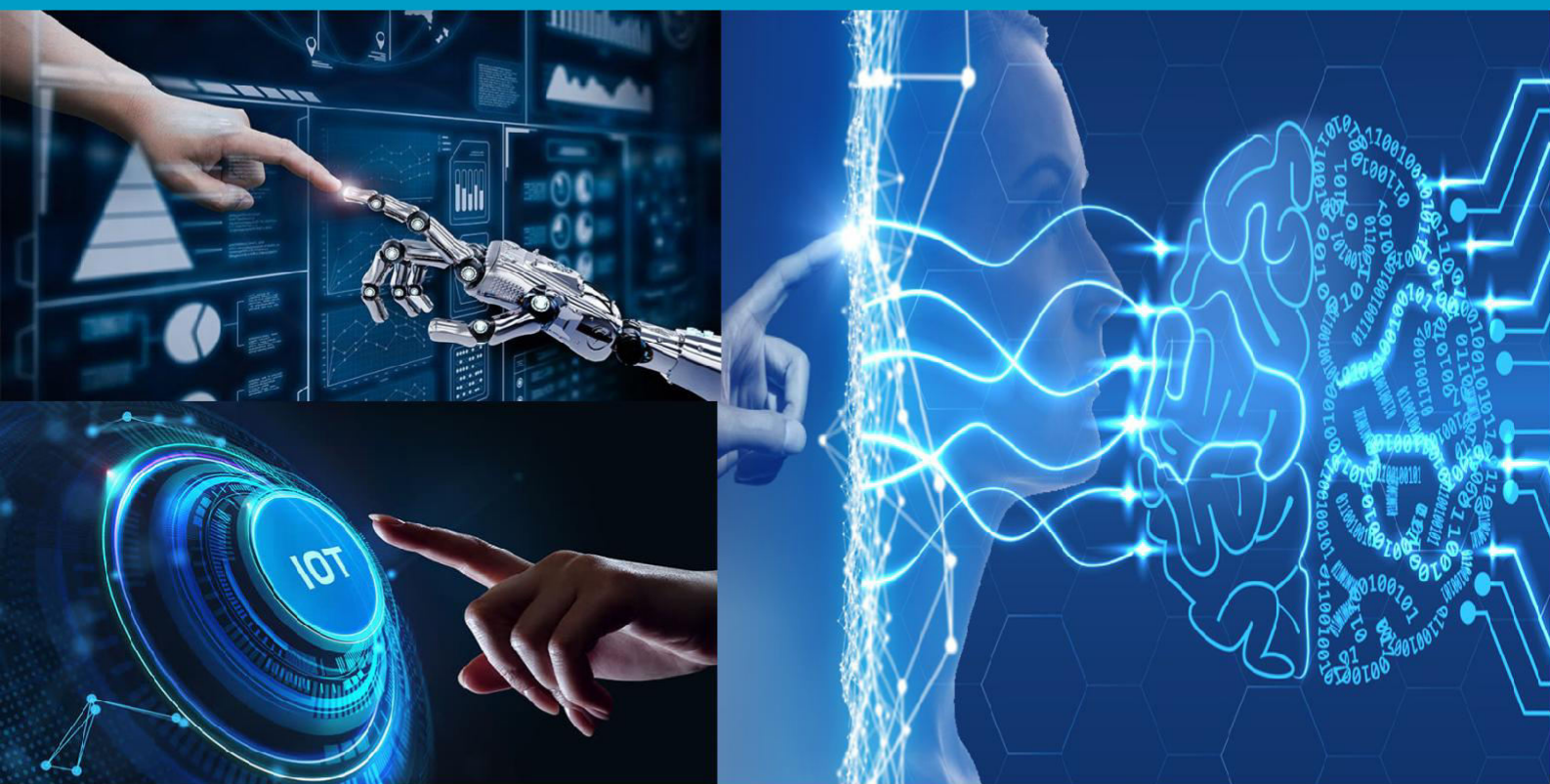




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Impact of Private Vehicle on Public Transportation System

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ABSTRACT: Rising fuel prices have a profound impact on the lives of many Nagpur people. As a result of rising oil prices, travel costs for private car users are rising. The impact of the new public transport system NPTS incorporates public transport the most effective way to solve the urban transport solution such as traffic congestion, simultaneous traffic incidents, traffic pollution and lack of energy resources etc. Designing an intelligent city bus system The city of Nagpur, a key entity in the ITS (Intelligent Transportation System), has analysed the complete need of the public, and governments, passengers, the driver and the monitoring and administration centre. The city traffic control system to measure travel time to the connecting station is the main objective of this study. In the city of Nagpur many public transport systems run on schedule with the most common resources coming first. These services range from traffic congestion to public transportation, which is safer, cleaner and less congested. The study was conducted on the basis of the study of the impact of rising fuel prices on three types of travel patterns of Nagpur people living in urban areas. The three types of travel patterns are, workplace travel, leisure travel and personal purpose travel during the day. The study was conducted by distributing a questionnaire to respondents of private car users Nagpur city. The study found that the routes of those who used their vehicles changed after the increase in fuel prices. These changes have shown that the majority of private car users were taking steps to save money on petrol by adjusting their travel

KEYWORDS: Public transportation network, Travel pattern, Public transportation network, Fuel prices, schedule of city bus etc

I. INTRODUCTION

Nagpur is the winter capital of Maharashtra with a population of about 35 lakhs. Nagpur lies inland with the Zero Mile Marker showcasing India's local centre. Nagpur has grown very rapidly in the last few years. Nagpur also develops as an industrial and educational centre in central India with IIM, upcoming AIMS and SEZ-MIHAN, with students from all over Vidarbha heading to Nagpur for opportunities whether for Jobs or education. Infrastructure such as metro needs to be planned to meet future needs. This could mean that more people are moving to Nagpur for better opportunities. And the Nagpurians set out to find Job who might return to settle down in his hometown. Nagpur has its own city bus depot, buses already exist overcrowding and overcrowding can be very difficult to deal with in the near future. So the metro is expected to be the answer for everyone. Evaluation of the public transport system and the efficiency of passenger travel times in public transport systems is a key objective of our study at that time. With rising interest and growing demand. Such transport space becomes very important.

India's economic growth over the last decade has been phenomenal. The economic development has greatly increased lower and middle-class purchasing power. Historically India has been a country that relied heavily on public transit as the major role of transportation. This study provides a useful and practical methodology for bus transit operators to monitor and improve the quality to bus transit services. Since India's population is very large, even a small percentage increase could greatly contribute to traffic congestion, air pollution, and carbon emission. Service quality is vital for bus transit operators to increase user satisfaction and attract new passengers. A higher level of service quality increases the positive experience of traveling by bus and encourages users to shift from private cars to public transportation. Some reason for shift to private transportation could be attribute to liberalization of the automobile industry, improved economic status of the public, and availability of vehicle loans, but factor such as the quality of public transit system, metro service could also play a major role. Service quality is vital for bus transit operators to increase user satisfaction and attract new passengers. A higher level of service quality increases the positive experience of traveling by bus and encourages users to shift from private cars to public transportation. Some reason for shift to private transportation could

be attribute to liberalization of the automobile industry, improved economic status of the public, and availability of vehicle loans, but factor such as the quality of public transit system, metro service could also play a major role.

AIM: The aim of introducing or enhancing public transportation is to improve public transportation access and use of bus transit services as well as the metro. Decreasing individual transport could solve many social, environments and economic problems, such as fuel consumption, accidents, traffic congestion, and air and noise pollution.

II. RELATED WORK

Many metro Politian cities in India are going through trouble as those related to city transportation, and their interrelated impacts on the surroundings, low in cost and society's are constantly getting larger as the towns are growing of their size and populations.

(Vinod Vasudevan, Ruchika Agrawala, 2021) determine whether private vehicle ownership in large urban areas in India is influenced by the presence of high quality dedicated public transit systems. The objective of this study is a assess the relationship between the availability of high quality dedicated public transit systems and private vehicle ownership in India.

(Juan de Ona, 2021) the study centered on the perspective, of great interest for public transport operators; it provides information about their needs, preferences and attitudes, as relevant information for future strategies of attracting users. In addition, it hopes to identify the heterogeneity of their perceptions, by means of the identification of market segments based on mobility patterns and sociodemographic, contextual and geographical conditioners.

(Abdullah, 2016) conducted a survey of 150 respondents to determine perception of quality of life of residents in this TOD neighborhood. It used multistage sampling whereby certain percentage of respondents was drawn from different price level of apartments. The questionnaire asked respondents about their assessment of various characteristics of physical development such as density, land use, walkway, open space and parking. The use of public transportation and pollution problems were also covered in the survey.

(R. Kanthavel, S.K.B Sangeetha, 2021) Mention the Intelligent Transportation System as set of cutting-edge information and communication technologies used in transportation and traffic mitigation systems to improve transportation network safety, efficiency, and stability, as well as reduce traffic congestion and improve drivers experience. With an increasing population, Indian cities face air quality, the greenhouse gas pollution from the transportation industry, rising traffic accidents, and an explosion in the number of private cars, even at their current population levels.

(Ana Galelo, 2014) evaluate a TOD area, encompasses the definition of the area (case study), the description of the variables to be used, and the equations under which these variables will be tested in order to find connections between the use of the public transport line and station service areas characteristics. The study considers variables such as density, diversity from the land use side and train supply from the transport side. Besides the station characterization, the correlations between these variables were analyzed, developing a first approach using binary regressions. Furthermore, this first regression exploratory study will be verified by a multivariate regression analysis, using more variables, for a deeper testing on the relations between land use variables and transport variables.

(Samet Guner, 2018) mention a two-stage, multi-criteria decision making approach, which combines Analytic Hierarchy Process (AHP) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), is proposed to measure the quality of bus transit service. The first stage of the proposed methodology involves using AHP to determine the priority of each service quality attribute from the passengers point of view. The second stage is the adoption of TOPSIS to rank the bus transit routes based on the provided service levels.

(Widyaharia, 2014) aims to identify some locations which have potential and opportunity as TOD by 1) identifying criteria and indicators to analyze TOD potential location and its opportunity 2) analyzing TOD potential locations based on criteria and indicators related to several transportation system plans in Metropolitan Bandung Area and 3) analyzing the opportunity of TOD potential locations based on criteria and indicators related to the spatial plans. The research method applied was survey research and analysis methods.



(Urvi,2015) Curitiba is regarded as an outstanding example of Transit Oriented Development (TOD), which implies that residential, business and recreational areas should be built in a high density areas and close to public transport stations. In addition, rather than promoting segregated zoning of land uses, TOD proposes land use mix to decrease the travel distances. Roads will be constructed near new residences and businesses, each with access to a new bus-rapid transit route, the Green Line.

(Aston, 2016) aims to measure and compare the extent of transit orientation of catchment development for four separate public transport modes and 'no transit' catchments. Random sampling was used to select study sites. Automated queries were then used to develop a spatial profile. The three original 'D' variables—density, diversity and design were used to define an overall 'TOD score' to represent the extent to which urban form was transit-oriented. Google Maps was used to obtain the address of each transit stop. Geo planer V2.7 was used to obtain coordinates.

III. METHODOLOGY

It is necessary to identify the nice and accurate measures for the sustainability assessment as they may be used to increase the framework for the sustainability assessment. there are many special overall performance measures are to be had for the transportation sustainability assessment but as every type of transportation and sustainability intention requires extraordinary measures and consequently it's miles necessary to select the correct performance measures. The discussion concerning the selected signs is as follows:

3.1 Congestion Reduction it's miles related to lessen the congestion of the road and redue the specified time for the movement of the site visitors. The intention is likewise enables to lessen the gasoline consumption, journey time, gas emission and so on. for this reason following signs are taken into consideration for this purpose. Travel Time Index- (TTI) it is defined as the time required to travel the distance due to congestion. It is the ratio of peak period travel time to off peak period travel time along the stretch. Program Time Index or Buffer Index - (PTI) It represents the extra time required to travel the distance with the current traffic than the time required to travel the distance with free flow speed. It specifically reflects the extents to which 95th percentile of travel time exceeds the mean travel time for the stretch under consideration.

3.2 Safety Enhancement This aim is centered on the safety of the site visitors as well as the pedestrians. The goal especially specializes in the intense injuries and the development technology for the surveillance so that each one the section of road are covered for any emergency. Annual Severe Crashes per Kilometer It represents the crashes occurring on the link throughout the year. For the purpose the prediction model is used and the procedure outlined in Interim Roadway Safety Design Workbook is adopted. The frequency on annual basis is defined as the fatal crashes resulting in the injuries by using the prediction model. Percentage Lane-Kilometers under TMC Surveillance This indicates the estimates of presence of Intelligent Transportation System provisions for traffic monitoring and response facilities to cover along the section operated by a Traffic Monitoring Center.

3.3 Enhancing the Value of Transportation Infrastructure The impact of declining revenue collection from tax which tends to reduce on the existing corridor is tried to narrate thru this aim. the existing infrastructure is taken into consideration to be maintained while it's miles focused on series of maximum funding from the all viable and available sources connected with the proposed MRTS machine. This performance indicator attempts to outline by thinking about the development and preservation of the prevailing infrastructure device.

IV. EXPERIMENTAL RESULTS

The information is collected the usage of questionnaire. The established questionnaire became prepared and circulated a few of the attitude Metro users of Nagpur which includes provider guy, businessman, house wives and students. The respondents belong to various demographics.

Gender
38 responses

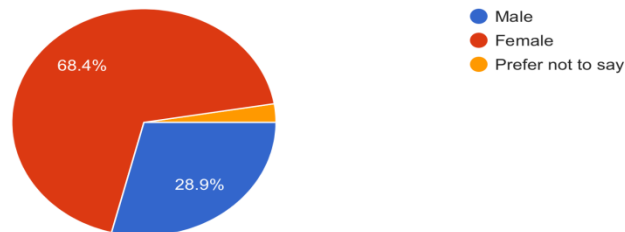


Fig 2: Gender Chart

No of male and female who responded were mostly similar. So gender has not very conclusive impact on the study.

Qualification status
38 responses

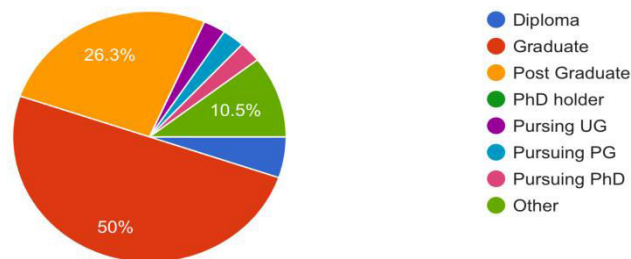


Fig 3: Qualification Status Chart

Through the research is mainly concentrated in Nagpur City and our target segment also comprised the students pursuing undergraduate. From the above chart it becomes clear that most of the respondent were students who think about Metro and are the one who would be using metro.

Preferred travelling mode
38 responses

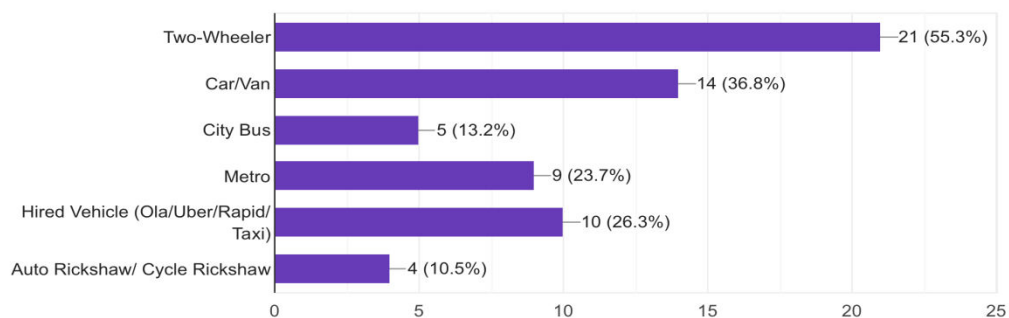


Fig 4: Preferred travelling mode Chart

From above chart, it can be stated that 81.8% of respondents use their own vehicle for transportation and only few respondent use other mode of transportations viz. City Bus, Cab, Auto and Bicycle.

How satisfied are you with your city's Metro
38 responses

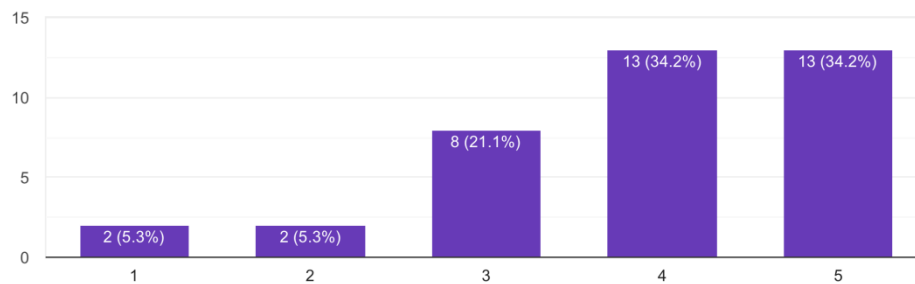


Fig 5: Satisfied by metro Chart

It is very important to identify whether people are satisfied with their current mode of transport. From the above chart it can be concluded that 68.4% of respondent agreed and were satisfied with their current mode of transportation. Also 21% of respondent were neutral and only 10.5% of responded disagree.

The following is the list of the factors that are usually important to you while using public transport

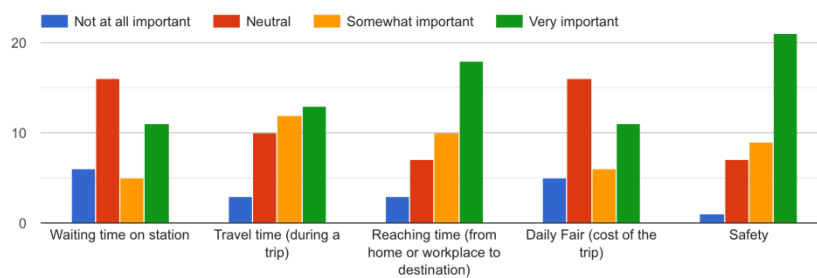


Fig 6: Factors important for public transport Chart

Safety has become one of the most important factor while travelling. About more than 52.4% respondent agreed and considered safety to be very important while less than 20% respondents were neutral and 27.6% respondents were disagreed to it. It can be concluded that people consider safety as the most important factor while travelling.

Travel cost is also one of the important factors while travelling; most of people are looking for cheaper transport now a days. According to the response 37.8% of respondents were strongly agreed and 23.4% of respondents were agree and stated that travel cost is important, while 26.4% of respondents were neutral and 4.9% of respondents disagreed and 7.6% of responded strongly disagree and state travel cost is not important. It can be concluded that respondents considered travel cost as an important factor for travelling.

Travel time is one of the basic factor in travelling as reaching the destination on time is important factor for many. It can be observed that most of respondent i.e. 49.6% agreed and said travel time is important while 30.4% of respondent were neutral and only 20% of respondents were disagree and said time is not important. Through this we can conclude Travel time is very important factor in travelling

Will you shift from personal car to Public transport if fuel price increases ?
38 responses

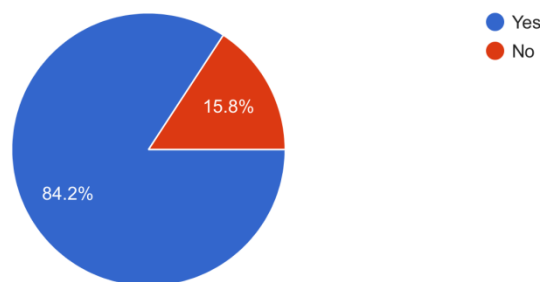


Fig 7: Shifting due to fuel rise Chart

Metro success depend on if people are willing to change their mode of transport to Metro. It was found that 84.2% of respondent agree and said that they will use Metro over their current mode of transport, while 15.8% of respondent disagree and said they won't change their current mode of transport. So it can be concluded that some people will change their current mode of transport to Metro and some won't and some haven't decided yet. This is because Nagpur people not being aware of how Metro can be helpful and also they haven't used Metro yet, this scenario might get changed after Metro start and people start using it.

V. CONCLUSION

Metro is going to be a definite plus for Nagpur citizens. The critiques and views of respondents are usually uniform. the distance being travelled each day is an important aspect for deciding the satisfaction of vacationer. This reinforces the need of public shipping like Metro for a growing town like Nagpur. The city will growth their role in the future due to the increase of their dweller, facet by means of side with the growth in their urban troubles. Many problems today have their foundation or its bigger share in the towns, as a result the towns have to be seen as the solutions to those troubles. The estimate travel time, velocity earlier than and after introducing public transport in length metropolis via simulation and IRC requirements.

This Dissertation has investigated a brand new PT advent in cities which may also lead to sustainable transport and reduce congestion issues in destinyThe findings in this study that require attention are safety, comfort, availability, and time, leading to not choosing public transport over private vehicles. So, travel agencies of public transport need to pay attention to such attributes to improve the service quality provided by then to minimize the gap between satisfaction and importance. This paper focused on understanding service quality attributes from the user's point of view. Findings have a wide application across the tier 2 cities like Nagpur. This Dissertation has investigated a brand new PT advent in cities which may also lead to sustainable transport and reduce congestion issues in destiny

REFERENCES

1. Vinod Vasudevan, Ruchika Agrawala (2021)“ Is vehicle ownership in urban India influenced by the availability of high quality dedicates public transit system” *IATSS research* 45 (2021) 286-292
2. Juan de ona, Esperanza Estevez (2021)“How does private vehicle user perceive transport service quality in large metropolitan areas? A European comparsion” *Transport Policy* 112(2021) 173-188
3. Abdullah, J., & Mazlan, M. H. (2016). Characteristics of and Quality of Life in a Transit Oriented Development

- (TOD) of Bandar Sri Permaisuri, Kuala Lumpur. *Procedia - Social and Behavioral Sciences*, 234, 498–505. <https://doi.org/10.1016/j.sbspro.2016.10.268>
4. R. Kanthavel, S.K.B. Sangeetha (2021) "Design of smart public transport assist system for metropolitan city Chennai" *International Journal of Intelligent Network 2 (2021)* 57-63
 5. Ana Galelo, A.R. (2014) "Measuring and evaluation the impacts of TOD measure searching for Evidence of TOD characteristics in Azambuja train line." *Science Direct*, 10
 6. Samet Guner (2018) "Measuring the quality of public transportation system and ranking the bus transit using multi-criteria decision making techniques" *Case Studies on Transport Policy* 6 (2018) 214-224
 7. Adler, M. W., & van Ommeren, J. N. (2016). Does public transit reduce car travel externalities? Quasi-natural experiments' evidence from transit strikes. *Journal of Urban Economics*, 92, 106–119. <https://doi.org/10.1016/j.jue.2016.01.001>
 8. Advani, M., & Tiwari, G. (2005). Evaluation of Public Transport Systems: Case Study of Delhi Metro. *Start* 2005, 2003, 8. <https://pdfs.semanticscholar.org/edf8/5468b8be20d903251ee9b22badd9da2947b7.pdf>
 9. Ahasan, R., & Kabir, A. (2020). Performance Evaluation of Public Transportation System: Analyzing the Case of Dhaka, Bangladesh. *SSRN Electronic Journal*, August. <https://doi.org/10.2139/ssrn.3560667>
 10. Anable, J. (2005). "Complacent Car Addicts"; or "Aspiring Environmentalists"? Identifying travel behaviour segments using attitude theory. *Transport Policy*, 12(1), 65–78. <https://doi.org/10.1016/j.tranpol.2004.11.004>
 11. Litman, T. (2021). Evaluating Public Transit Benefits and Costs - Best Practices Guidebook. *Victoria Transport Policy Institute*, 1–138. www.vtpi.org/Info@vtpi.org
 12. Luke, R., & Heyns, G. J. (2020). An analysis of the quality of public transport in Johannesburg, South Africa using an adapted SERVQUAL model. *Transportation Research Procedia*, 48(2019), 3562–3576. <https://doi.org/10.1016/j.trpro.2020.08.095>
 13. Nasserredine, M., & Eskandari, H. (2017). An integrated MCDM approach to evaluate public transportation systems in Tehran. *Transportation Research Part A: Policy and Practice*, 106(August), 427–439. <https://doi.org/10.1016/j.tra.2017.10.013>
 14. Ojo, T. K., Mireku, D. O., Dauda, S., & Nutsogbodo, R. Y. (2014). Service Quality and Customer Satisfaction of Public Transport on Cape Coast-Accra Route, Ghana. *Developing Country Studies*, 4(18), 142–149.
 15. Raoniar, R., & Senathipathi, V. (2016). *Public Transport Performance Evaluation Techniques -A Review Public Transport Performance Evaluation Techniques - A Review*. May 2015, 10. <https://www.researchgate.net/publication/305992592%0APublic>
 16. Rojas, F., Hawas, Y. E., Hess, L., Garrow, L. A., Peters, J. R., Kramer, J. K., Gregory, L., Brown, J. R., Brosch, G. L., & Colby, C. E. (2012). *SUBSCRIPTIONS*. 15(2).
 17. Serafini, S., Nigro, M., Gatta, V., & Marcucci, E. (2018). Sustainable crowdshipping using public transport: A case study evaluation in Rome. *Transportation Research Procedia*, 30, 101–110. <https://doi.org/10.1016/j.trpro.2018.09.012>
 18. Shah, S. A. R., Shahzad, M., Ahmad, N., Zamad, A., Hussan, S., Aslam, M. A., Khan, A. R., Asif, M. A., Shahzadi, G., & Waseem, M. (2020). Performance evaluation of bus rapid transit system: A comparative analysis of alternative approaches for energy efficient eco-friendly public transport system. *Energies*, 16(3). <https://doi.org/10.3390/en13061377>
 19. Sinha, S., Shivanand Swamy, H. M., & Modi, K. (2020). User Perceptions of Public Transport Service Quality. *Transportation Research Procedia*, 48(2019), 3310–3323. <https://doi.org/10.1016/j.trpro.2020.08.121>
 20. Sogbe, E. (2021). The evolving impact of coronavirus (COVID-19) pandemic on public transportation in Ghana. *Case Studies on Transport Policy*, 9(4), 1607–1614. <https://doi.org/10.1016/j.cstp.2021.08.010>
 21. Soto, J., Orozco-Fontalvo, M., & Useche, S. A. (2022). Public transportation and fear of crime at BRT Systems: Approaching to the case of Barranquilla (Colombia) through integrated choice and latent variable models. *Transportation Research Part A: Policy and Practice*, 155(August 2021), 142–160. <https://doi.org/10.1016/j.tra.2021.11.001>
 22. St-Louis, E., Manaugh, K., Lierop, D. Van, & El-geneidy, A. (2014). *Diferentes satisfacciones según medio de transporte*. August, 160–170.
 23. Urvi Rathod, H. P. (2015). *Transit Oriented Development : Smart Growth as a Solution for Sprawl in Surat City*. 2(3), 458–460.
 24. Verbich, D., & El-Geneidy, A. (2017). Public transit fare structure and social vulnerability in Montreal, Canada. *Transportation Research Part A: Policy and Practice*, 96, 43–53. <https://doi.org/10.1016/j.tra.2016.12.003>
 25. Verma, M., Manoj, M., Rodeja, N., & Verma, A. (2017). Service Gap Analysis of Public Buses in Bangalore with Respect to Women Safety. *Transportation Research Procedia*, 25, 4322–4329. <https://doi.org/10.1016/j.trpro.2017.05.283>
 26. Raoniar, R., & Senathipathi, V. (2016). *Public Transport Performance Evaluation Techniques -A Review Public*



- Transport Performance Evaluation Techniques - A Review. May 2015, 10. <https://www.researchgate.net/publication/305992592%0APublic> 31.
27. Rojas, F., Hawas, Y. E., Hess, L., Garrow, L. A., Peters, J. R., Kramer, J. K., Gregory, L., Brown, J. R., Brosch, G. L., & Colby, C. E. (2012). SUBSCRIPTIONS. 15(2). 32.
 28. Serafini, S., Nigro, M., Gatta, V., & Marcucci, E. (2018). Sustainable crowdshipping using public transport: A case study evaluation in Rome. *Transportation Research Procedia*, 30, 101–110. <https://doi.org/10.1016/j.trpro.2018.09.012> 33.
 29. Shah, S. A. R., Shahzad, M., Ahmad, N., Zamad, A., Hussan, S., Aslam, M. A., Khan, A. R., Asif, M. A., Shahzadi, G., & Waseem, M. (2020). Performance evaluation of bus rapid transit system: A comparative analysis of alternative approaches for energy efficient eco-friendly public transport system. *Energies*, 16(3). <https://doi.org/10.3390/en13061377> 34.
 30. Sinha, S., Shivanand Swamy, H. M., & Modi, K. (2020). User Perceptions of Public Transport Service Quality. *Transportation Research Procedia*, 48(2019), 3310–3323. <https://doi.org/10.1016/j.trpro.2020.08.121> 35.
 31. Sogbe, E. (2021). The evolving impact of coronavirus (COVID-19) pandemic on public transportation in Ghana. *Case Studies on Transport Policy*, 9(4), 1607–1614. <https://doi.org/10.1016/j.cstp.2021.08.010> 36.
 32. Soto, J., Orozco-Fontalvo, M., & Useche, S. A. (2022). Public transportation and fear of crime at BRT Systems: Approaching to the case of Barranquilla (Colombia) through integrated choice and latent variable models. *Transportation Research Part A: Policy and Practice*, 155(August 2021), 142–160. <https://doi.org/10.1016/j.tra.2021.11.001> 37.
 33. St-Louis, E., Manaugh, K., Lierop, D. Van, & El-geneidy, A. (2014). Diferentes satisfacciones según medio de transporte. August, 160–170. 38.
 34. Urvi Rathod, H. P. (2015). Transit Oriented Development : Smart Growth as a Solution for Sprawl in Surat City. 2(3), 458–460. 39. Verbich, D., & El-Geneidy, A. (2017). Public transit fare structure and social vulnerability in Montreal, Canada. *Transportation Research Part A: Policy and Practice*, 96, 43–53. <https://doi.org/10.1016/j.tra.2016.12.003> 40.
 35. Verma, M., Manoj, M., Rodeja, N., & Verma, A. (2017). Service Gap Analysis of Public Buses in Bangalore with Respect to Women Safety. *Transportation Research Procedia*, 25, 4322–4329.



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