Improvement of Inter-Modal Public Bus Transportation for Smooth Connectivity with Nagpur Metro Stations: A Review

M. K. Gadpalliwar[1], N. H. Pitale[2] and M. S. Madankar[3]

[1]*PG student, Department of Civil Engineering, G. H. Raisoni College of Engineering, Nagpur, India.*
[2]*Asst.Professor, Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur,India.*
[3]*Asst.Professor, CSE Department, G. H. Raisoni College of Engineering, Nagpur, Maharashtra, India.*
Email:mgadpalliwar@gmail.com

Abstract-*To achieve an important modal shift from private mode to public modes, the Government of India has launched several schemes that encourage greater use of bus-based public transport system in cities. However, even after sustained efforts, the present status of city bus service in India indicates that the issues still exist in most cities, in varying extents. For analysis of improvement of public bus transportation, knowing people's perception plays vital role. This paper is effort made to review the literature available for improvement of public bus transportation.*

Keywords- *Service Quality Improvement, Public bus transportation, People's perception.*

I-INTRODUCTION

Improvement of public transport is one of the highlighted measures when it comes to the reduction of negative impacts of traffic and the improvement of the energy-efficiency of a transport system. Which is right, since the presence of an attractive public transport system is a necessary to keep people away from using cars or motorcycles. Indian cities cannot afford to have only private cars and two-wheeler for this there are public modes of transportation. But having public transportation is not enough, it must be good in quality as well as quantity. In addition to this people should be encouraged to walk and cycle and government should support investments that make cycling and walking safer. Quality is increasingly becoming a strategic issue in the Western world (Bergman and Klefsjo, 2003).

One of the main reasons for the successes of Japanese industry in the 1970s and 1980s was that the Japanese realized early that quality concept should originate from the requirements and expectations of the customers (Bergman and Klefsjo, 2003). This perception played a vital role in bringing about success (Bergman and Klefsjo, 2003). Today service quality has become more important than ever before because service providers have realized that they have to provide customer-perceived service, if they want to stay in business. As global competition increases, customers have more varieties to choose from and of course service quality will become their priority when spending their (customers) money, especially as they try to maximize the value in return as well as satisfaction for every unit of money spent.

Customer satisfaction is considered to be the most important factor whether it is for a product or a service. In case of failure to satisfy the customers the company will be replaced by others and when industries offering various services, have to be more vigilant because there is a special attitude that plays an important role attracting and retaining the customers (Khurshid, Naeem, Ejaz, Mukhtar ,and Batool,2012).

Development of any country basically depends upon its cities, as cities play a vital role in promoting economic growth and prosperity. The development of cities largely depends upon their physical, social, and institutional infrastructure. Public transport services have the main role to satisfy consumers' needs. Due to the particular type of services, consumers don't have other options to choose from.

This is not equivalent to say that quality is less important. In order to respect public transport users' expectations, quality must be an important focus for the companies responsible with delivering these services (Ancarani, Capaldo, 2001).

Along with NMC (Nagpur Municipal Corporation), the VNIL (Vansh Nimay Infraprojects Limited) co-finance the city bus services of Nagpur.

Thus, the purpose of this paper is to determine the quality of the existing bus service in Nagpur and to provide recommendations that aim to maximize the use of city buses in Nagpur.

II-LITERATURE REVIEW

Noor et.al [1] focuses on various components of satisfaction level of customer travel in public transport. For identifying the different components factor analysis has been used to evaluate 24 variables which are Safe terminal, Cheap fare, convenience fare, bus in good condition, Easy access to bus stop, Comfortable music, Efficient driver, good coverage, air-condition, easy to change buses, safe on buses, bus schedule available, bus info, friendly driver, clean bus, facilities in good condition, good coverage waiting time, convenience for elderly/ disabled, clean terminal, easy to carry loads, not crowded, safe during night, bus on time.

Sample size was 987 respondents drawn by the researcher and convenience sampling method was applied in this study. The result as shown in fig. 1 revealed that there were a slightly difference in satisfaction between minibus and bus transit. The study tells that over crowd and safety were important factors identified by the respondents which affects satisfaction level of customers in public transport.

Andreea et.al [2] investigates the perceived quality of transportation services in IASI – an important student centre from Romania. The survey was conducted using convenient sampling method where sample size was of 212 respondents. Factor analysis has been used for distinguishing the 30 variables.

Fig. 2 explains general degree of satisfaction obtained is as stated in equation:
General degree of satisfaction= 3.3+ 0.78*Drivers behaviour + 0.45*Amenities + 0.36*Technology + 0.35*Convenience+ 0.22* Controllers Behaviour.
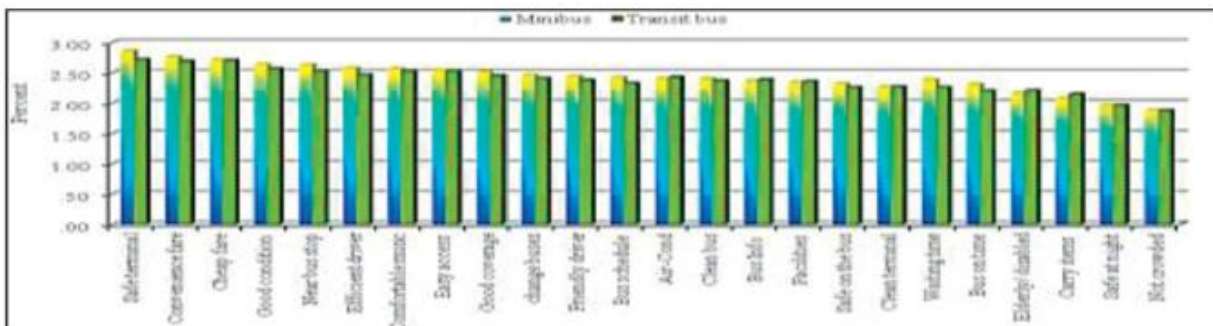

Fig1. Satisfaction service attribute quality for minibus and transit bus.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	3.311	.059		55.750	.000
Convenience_F	.355	.060	.262	5.967	.000
Drivers_F	.781	.060	.577	13.125	.000
Controllers_F	.225	.060	.166	3.783	.000
Amenities_F	.457	.060	.337	7.669	.000
Technology_F	.364	.060	.269	6.122	.000
Price_F	.030	.060	.022	.510	.611

Fig. 2 -Table of coefficients.

In results, the most important factors was determined and the findings of this research used by the transportation operators in their efforts to ensure that their service quality meets the passenger's expectations.

Aidoo et.al [3] studies the customer satisfaction in public transport. The main objectives of this study was to clarify the impact of travellers satisfaction level of individual administration segment on the general administration quality rating, the study utilizes binary logistic regression model, which is defined as (Agresti, 2007):

$$logit(y) = \ln\left[\frac{P(Y=1)}{1 - P(Y=1)}\right] = \alpha + X\beta$$

Where,
P(Y=1) - Probability of a passenger rating the overall service as being good.

[1-P(Y=1)] - Probability of a passenger rating the overall service as not-good.

α and β - Intercept and a vector of slope coefficients respectively.

X - Vector of explanatory variables representing the satisfaction level for individual service   component. Sample size was 500 respondents was in questioned by the researcher and random sampling method was applied in this study.The results of this study explained that 63.2%, 15%, 20.8% and 1% respondent responds that service quality gave by people in public transport was good, excellent, moderate and poor. It has also been concluded in this study that traffic safety was inimically influencing the customer satisfaction.

Khurshid [4] highlights the most important issue of public transport. The main aim of this study was to study the impact of service quality in public transport, to study the customer satisfaction level. Random sampling of 120 peoples were carried out. SERVQUAL model was used to frame the questionnaire. For analysing the data and getting the results regression model has been used. Analysis of males and females
responses are done separately as shown in fig.3 to understand the difference of satisfaction level. The result revealed that there was a straight relationship with significant effect on service quality and customer satisfaction.

Analysis of Dependent Variables (MALE):
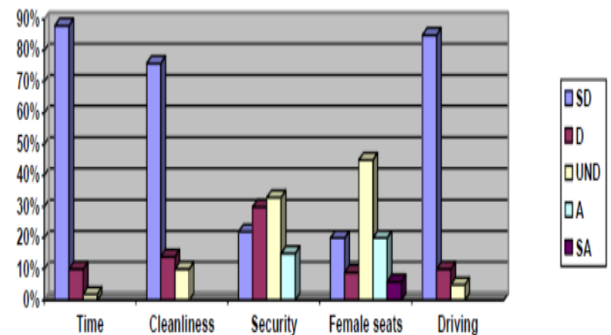
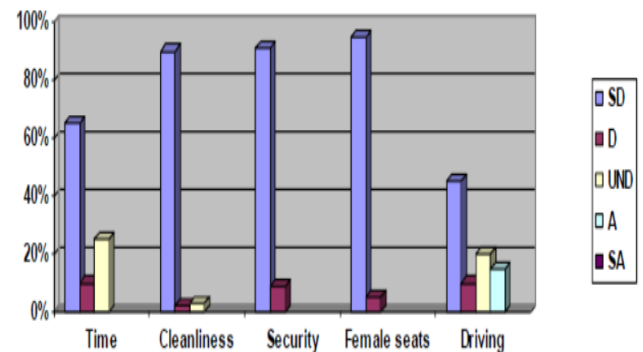**Analysis of Dependent Variables (FEMALE):**

Fig.3: Analysis of males and females.

Murambi et.al [5] used survey design and the target population was all shuttle travelers in Kitale town. The information from shuttle office stated that on daily basis about 3100 travelers use shuttles hence a sample size of 310 travelers was selected about 10% using simple sampling technique. The questionnaires were used to collect data. The obtained data was analysed using computer and presented in table using percentages. The regression analysis was used to find out the effect of travel time, availability of information at booking office and frequency of route change on customers satisfaction. The study reveals that 76% of customers' satisfaction was explained by independent variable. Travel time, information and frequency of route change were noteworthy to customers' satisfaction.

Woldeamanuel et.al [6] analyse the parametric relationship between the level of travellers' satisfaction with accessibility to public transport services and mode-related variables such as gender, age, occupation, public transport connectivity, car ownership etc using

binomial model. The study also estimates the probability of travellers" satisfaction for each survey year carried by German Mobility Panel (1997-2008) as shown in fig.4.The results indicate a remarkable relationship between the explanatory variables and satisfaction with accessibility to public transport. The probabilistic estimate also shows that there is a time variant, unprepared effect of satisfaction with accessibility.
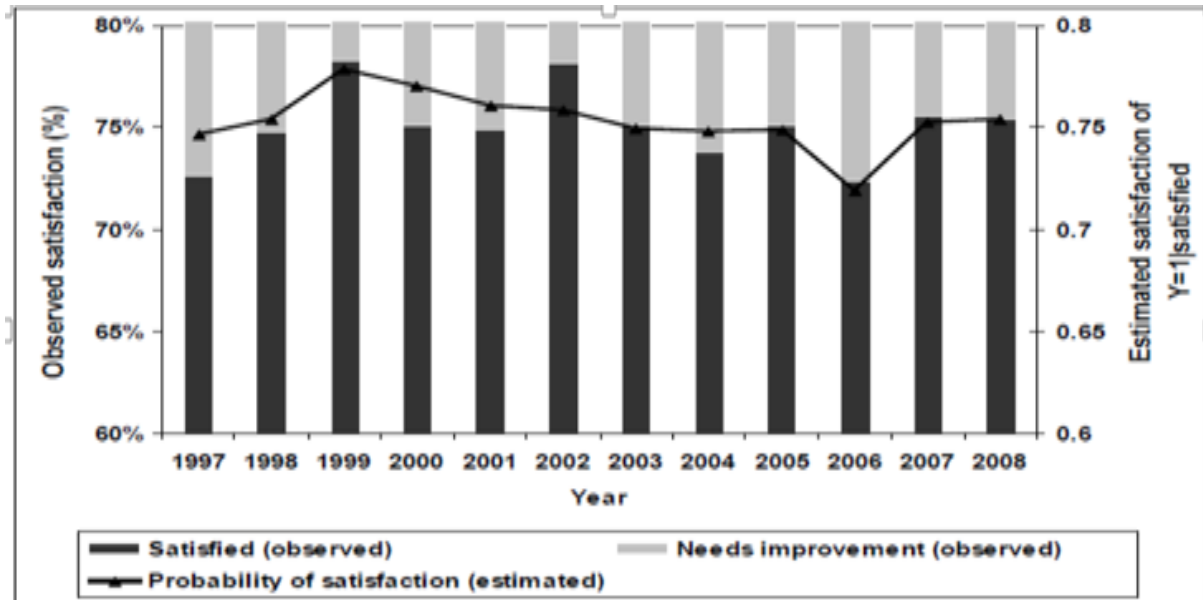

Fig. 4 Probability estimate for each year (taking the total sample of theyear)

Kavitha [7] explained for most of the developing countries, fettle transportation is holds a lead because of its contribution in national and regional, economic, social, cultural development. Transport service quality and satisfaction level have been focused in the paper. SERVQUAL approach was imposed for evaluating the difference between passenger perception and expectations of service quality. It is expected that the passenger gets formidable service in all respects. For this study, 120 respondents were taken as sample size by using convenience sampling technique and also SERVQUAL instrument was used to identify the gap between expectation and perception of passengers.

The study analysed that there was a significant positive relationship between service quality and customer satisfaction in public transport. This study also concluded that the most of the customers were satisfied with the service quality provided by public transport.

The study was carried out with grate consideration and its major finding revealed that majority of the passengers felt satisfied with the service quality provided by the public transport corporation.

DIMENSION	PERCEPTION	EXPECTATION	GAP
Tangibles	9.80	9.31	0.49
Reliability	12.68	12.71	-0.03
Responsiveness	10.13	10.05	0.08
Assurance	10.35	10.04	0.31
Empathy	12.39	12.52	-0.13

Note :(Minus gap indicates that expectations exceed their perception)

Fig.5 Mean value of Perception and Expectation and their Gap.

Eboli et.al [8] suggested tool for measuring customer satisfaction in public transport. To explore the influence of the relationship between global customer satisfaction and service quality attributes. For this structural equation model is formulated. The model was calibrated by using the AMOS 4.0 package from SmallWaters Corporation (Arbuckle and Wothke 1995). The public transport service is analysed, the bus service habitually used by University of Calabria students to reach the campus from the urban area of Cosenza (southern Italy).

Student's survey was carried out for data collection to standardise the model. The proposed model can be useful to both transport agencies and planners to analyse the correlation between service quality attributes and identify the more convenient attributes for improving the supplied transport service.

Putra et.al [9] investigates the performance of public transport services. This research method is a method of qualitative research, data analysis is used to determine the performance of public transport using Importance Performance Analysis (IPA) and know the satisfaction of users of public transport using the Customer Satisfaction Index (CSI), and to inspect the effect of satisfaction Structural Equation Modeling (SEM) is used. The results showed that the performance of public transport remains low in providing services to itsusers. Based on the calculation, the CSI value found to be 48.19% or 0.48 based on criteria CSI values range from 0.35 to 0.50 (less

satisfied) this means that the public transport user satisfaction index of the performance of public transport are less satisfied with the service.

Based on the results of SEM analysis, public transport user (Y) and performance of public transport (X) derived a mathematical equation $Y = 0,873X + 0.022$ explains that the public transport user satisfaction has a positive and significant effect on the performance of public transport, any increase in public transport performance dials will also impact the increase in satisfaction of users of public transport.

The indicators of each quadrant in fig. 4 are described as follows:
1. Quadrant I main priority (high expectations and low performance)
2. Quadrant II maintain achievement (high expectations and high performance)
3. Quadrant III, excessive (high performance and low expectations)
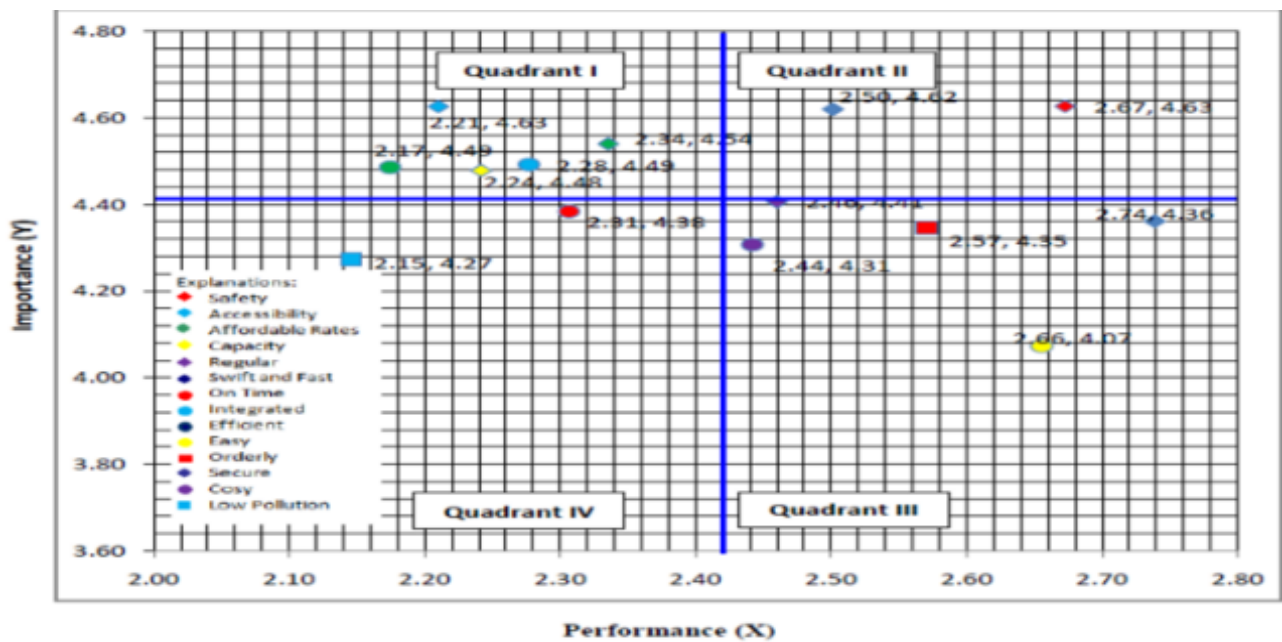4. Quadrant IV low priority (low expectations and low performance).

Fig.4Cartesian diagrams IPA.

III-RESEARCH OBJECTIVES

1. To measure overall satisfaction of public bus transport service.
2. To find out important elements of customer satisfaction of service quality.
3. To measure the level of general satisfaction of users of public bus transportation.

IV- CONCLUSION

The most important factors that determine satisfaction of beneficiaries will be determined. This research will also found useful for the public transport users as well as service providers, as they will be aware of those factors where improvement is needed. This will further help them to improve their productivity & competence. Based on the information from the research the enterprise can find out what is done well and what needs to be improved. What is done well should be developed more and the rest should become a task for further improvement. The company should focus on these norms which were appraised by customers with lower amount of points and attributed high importance.

REFERENCES

1. *Noor, H. M., Nasrudin, N., & Foo, J. (2014) Determinants of Customer Satisfaction of Service Quality: City bus service in Kota Kinabalu, Malaysia, 7(1)*
2. *Andreea, Claudia,oana. "Strategies for the improvements in the quality and efficiency of public transportation" Isai, 700506, Romania.*
3. *Aidoo, E. N., Agyemang, W., Monkah, J. E., & Afukaar, F. K. (2013) Passenger's Satisfaction with Public Bus Transport Services in Ghana: A Case Study of Kumasi–Accra Route. Theoretical and Empirical Researches in Urban Management*
4. *Khurshid, R., Naeem, H., Ejaz, S., Mukhtar, F., & Batool, T. (2012) Service Quality and Customer Satisfaction in Public Transport Sector of Pakistan: An Empirical Study. International Journal of Economics and Management Sciences, 1(9), 24-30*
5. *Murambi, David Nyongesa, and Henry M. Bwisa. "Service Quality and Customer Satisfaction in Public Transport Sector of Kenya: A Survey of Shuttle Travelers in Kitale Terminus." International Journal of Academic Research in Business and Social Sciences 4.9 (2014): 402.*
6. *Woldeamanuel, M., & Cyganski, R. (2011) Factors Affecting Travellers' Satisfaction With Accessibility to Public Transportation. Journal of European Transport and Contributors, 8(2), 1-19*
7. *Kavitha, R. (2015) Public Transport Service Quality- A Measurement. International Journal of Management and Social Science Research Review, 1(7), 113-116*
8. *Eboli, Laura, and Gabriella Mazzulla. "Service quality attributes affecting customer satisfaction for bus transit." Journal of public transportation 10.3 (2007): 2.*
9. *Putra, A., Jinca, M., Riyanto, B., & Mulyono, T. A. (2014) The Satisfaction Analysis for the Performance of Public Transport Urban Areas. International Refereed Journal of Engineering and Science, 3(8), 38-44*
10. *Ancarani, A., Capaldo, G., 2001. Management of standardized public services: a comprehensive approach to quality assessment. Managing service quality, 1(5), p. 331-341.*
11. *Bergman Bo and Klefsjo Bengt (2003), Quality, from customer needs to customer satisfaction. McGraw-Hill.*