Final Term Paper

Title

Assessment of Metro-Bus Service Lahore

Submitted by: Ahmad Osama

Submitted To: Prof, Dr. Aisha Azhar

Course: Research Methodology

Abstract

This study is conducted for the analysis of utilization. The government has cut off in the subsidy. After the decrease in the subsidy, the fares became high but there is no study available for the analysis of utilization after the end of subsidy. This is an empirical study which explores the user's utilization and identifies the factors that are important for the increase in the ratio of utilization. Every component of theory cannot be applicable on every society. The society dynamics identify which factor is important and which is not. This study will be helpful in this manner for the identification of factors that are crucial.

Table of Contents

Chapter: 1

Introduction

The system of BRT (Bus Rapid Transit) is an ultimate need for this era of development and technology. This system not only saves our time and money but is environmentally friendly as well. The BRT is spreading from developed countries to developing countries over time. This system is originated from Latin America and spreading all over the world. It is the transportation system that defines the urban development of a country and shapes the living standards of ordinary people. Metro bus system is the first mass transit project introduced in Pakistan in response to the rapid urbanization and growth. There has been an increase in private ownership of vehicles from a decade in Pakistan. It has resulted in a massive increase in traffic congestions, pollution, and road accidents. It is also a costly mode to travel daily. Targeting the middle and lower class metro bus system was supposed to be the ultimate solution to such problems. It was a massive project in Lahore, including red buses, yellow, green, and orange buses linking the entire city. However, unfortunately, the progress of this system has been quite slow. There are metro buses operational in only one part of the town, which is from Shahdra to Gajumata. And then there is Speedo bus service, which is spread all over the city and provides connectivity to the commuters to the metro bus stations.

In 2019 the rent for metro bus services was increased from Rs 20 to Rs30. So the main aim of this study is to evaluate if this increase has affected the commuters or not? No research is available on the utilization of metro bus services after the decrease of subsidies in the fares. Metro-bus Lahore is essential is this perspective, because Lahore is a hub of the biggest province of Pakistan. The study results will help to understand the aspects of other city projects.

There is diversification in Lahore city through this diversification. The results will not be based on a single version.

Significance:

This study is very important because it is conducted after the cut of subsidy. There is no clear perception is available in academic research on this point. This study is based on a systematic approach. It explores the perception of the user through an important tool. This study will be helping material for other transportation projects assessment.

Objectives

- To know the factors which are behind the utilization.
- The analysis of user utilization, after the cut of in subsidy.
- Identification of variables which increase the utilization of transportation

Research Questions

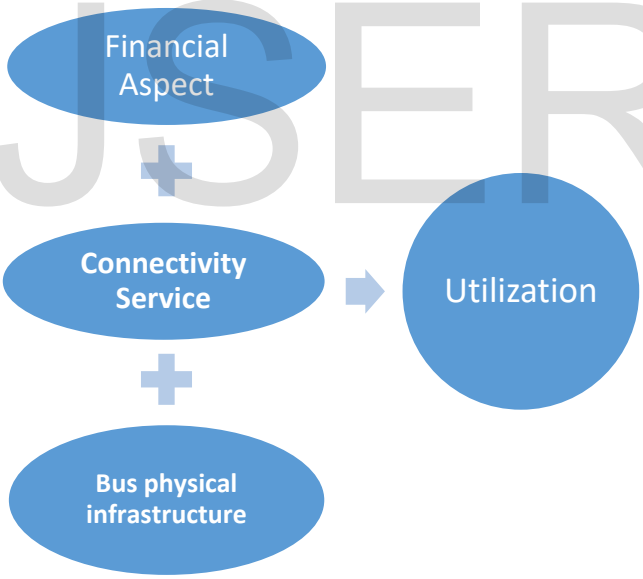
1. What factors influence the utilization of metro-bus service?
2. What factors are more important for transportation user's in Pakistan?

Chapter: 2 Literature Review

Theoretical Framework:

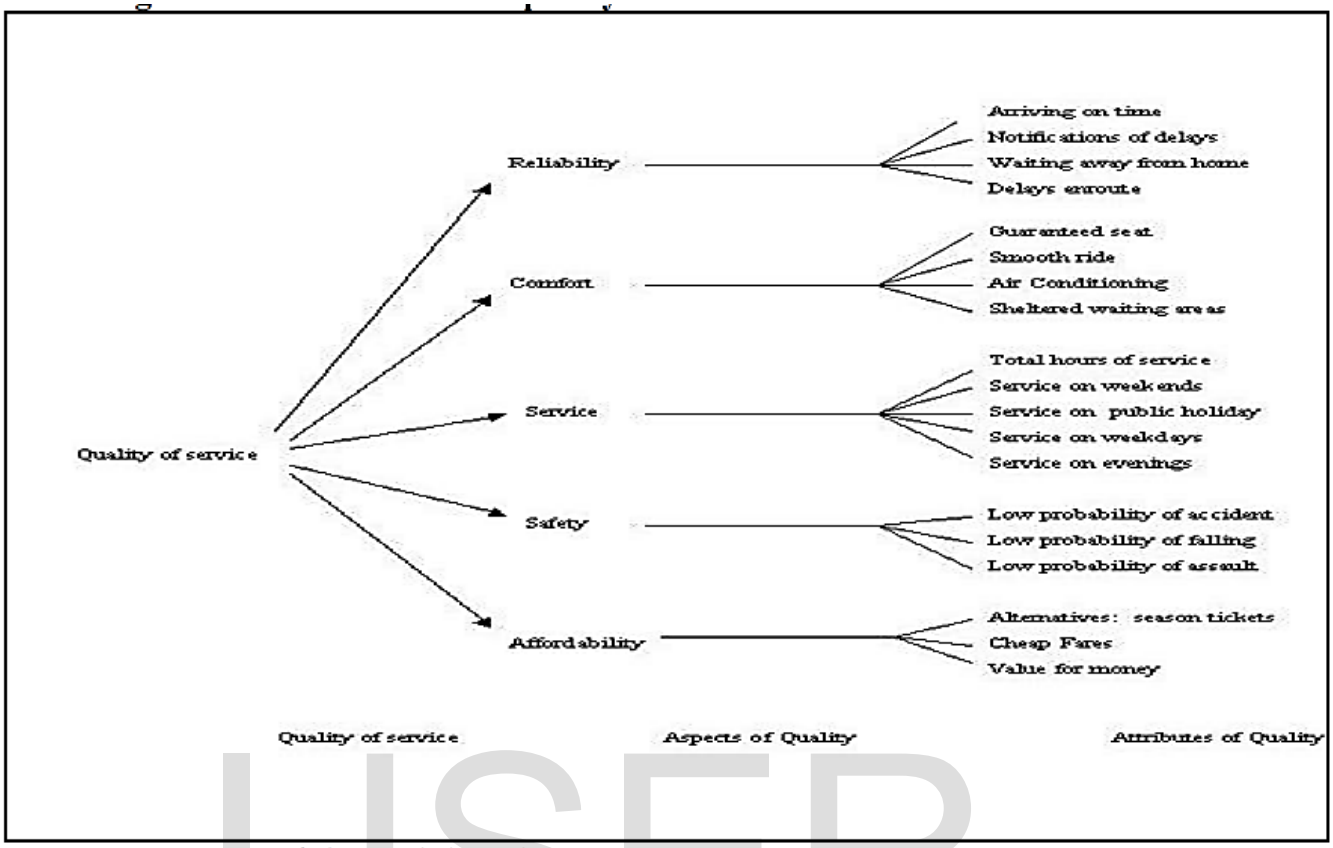
Many theories exist for transportation, but the measurement of service quality is also essential. SERVQUAL theory has used in this paper. This theory gives multi-scale dimensions for the analysis of the user's perception. SERVQUAL construct five components, those are tangibles, reliability, responsiveness, assurance, and empathy. All these components explain the quality of the product (Govinder, 2014). This research takes three variables, as shown in fig 1, from these components for the assessment of the user's perception. The financial aspect of connectivity service and bus physical infrastructure are the independent variables. These variables assess the user's utilization as a dependent variable.

Fig 1



This model does cover all aspects of this research and gives support to the variables. The previous study also supports the argument (Mcknight et al., 1985) explains the attributes of quality of service, as shown in below fig 2.

Fig 2. Clusters of Service Quality Attributes



Source: McKnight *et al*. (1986).

The above fig explains the attributes of the quality of services. Some characteristics are taken from this model for the analysis of this study. The theory and model support bounds the research in boundaries. Previous models and reviews are essential, but will this model explain the perception of metro-bus users. First of all, this model is made in developed countries, and there are considerable differences in the dynamics of developed countries and developing countries. That's why three important components derived from this model.

Metro-Bus Rise and Different Phases

Transportation services are one of the key objectives for governments. Lahore Bus Rapid Transit is one of the most important initiatives, had taken by Punjab government. It was the major project of Metro Bus in Pakistan. Metro Bus ties two opposite corners of Lahore city

Shahadra and Gajumata. There are 27 platforms and 89 buses are providing facilities to above 170,000 citizens (Ahmad & Ahmad, 2019), these figures are not fixed, in some documents, the number of commuters is listed from 140,000 to 180,000 (Lahore BRT System Study, 2016, as cited in Ahmad& Ahmad 2019). The old transportation system was grounded on buses and rickshaws. Metro-Bus was a better replacement of the old transportation system. It changed the social fabric of society, now citizens belong to middle-class families are using Metro-Bus services. The old view about bus service has been altered after the installation of Metro Bus in Lahore (Majid, Malik, & Vyborny, 2018), old transportation services were not based on the formal institutional policies. Other transportation resources were the main cause of accidents, they are still working but not in those numbers. In the urbanization, people are rational in decisions, they pick the best product or services for consumption. There is a number of perceptions about the Metro-Bus project, one group of people consider Metro-Bus as a project for political show-off, but one group encourage this initiative of the government. The perception cannot interpret the entire society ontological point of this development. This project is always criticized by the opposition parties but governing party PML-N of that time has always shown Metro-Bus project as a mark of advancement. The range of this service is very important because Metro-Bus is a public project. In the scenario of Metro-Bus, nearly residential take advantage from Metro-Bus facility. It is a drawback because the average of commuters in comparison of Lahore Population that is around 1 per cent, there is a need of feeder for the facilitation of long-distance commuters because they cannot take advantage of Metro-Bus easily (Tabassum et al 2017). The previous government of PML-N was giving subsidy for Metro-Bus. The subsidy was 2 Billion in 2015, and per fare, charges were 20 PKR in which government of Punjab was contributing 20 PKR in per fare (Zolnic, Malik, & Irvin, 2018). The crowded factor is a major negative point highlighted by commuters (Hashmi, Ullah,

& Javid, 2018). That's why women prefer other substitutes of transportation private companies are offering transportation services but they are exclusive.

Financial aspects and utilization

In this perspective, the financial aspect is vital. This aspect is strongly connected with the average user because travelers attract to cheap transportation services (Lovan, 2017). People always take priority for their savings. Economical transportation fulfills the saving aspect. Expensive transportation services do not attract and middle-class consumers. In Pakistan, lower and middle-class families are higher in numbers as compare to the elite class. The elite-level uses their vehicles and metro-bus, specially designed for the poor and lower-middle-class citizens who cannot afford higher maintenance expenditure of their cars and also prefer cheap transportation services. There is one study available in support of this variable (Guo & Wilson, 2011) explaining this issue of how low-cost transportation projects are essential as compared to expensive transportation projects. The income average suggests better decisions during the design of the project.

Role of linkages in transportation services and utilization

There is also another variable existed, what is the system of connectivity with the main transportation point? The connectivity services make a connection between long-distance users and the central transportation system. The connectivity services play an essential role in increasing the passenger's ratio in mainstream transportation structure. The purpose of this mode is very significant for the analysis of transportation structure and its efficiency for travelers (Chng, White & Skippon, 2017). The access is vital in this matter; without the easement of access, the project could face failure or decline its efficiency. A robust connectivity service structure increases the trust level in the community (Ilmi & Rao, 2018). The ability cannot measure without socio-economic factors. People are rational and their decisions after

the evaluation of different aspects. The roots, station points, and approach structures are strongly connected components of any transportation service (Ferris, Waltkins & Borning, 2009).

Infrastructure importance in transportation:

Especially transportation is purely a user product. Metro-bus project's different aspects create the difference between public and private transportation utilization ratio. This study is focusing on another independent variable, which is also essential, and that is the physical bus structure. Is this variable is more important or not? It varies from society to society. In a society like Pakistan, where poverty ratio is high, and people do not afford high fares of travelling. Will they do also prefer bus physical infrastructure. It can also be an addition to this perspective. The user perspective is critical, and its exploration cannot be understandable on the base of a single component. It is a combination of different aspects (Taylor et al., 2009). The literature supports the independent variables but what will be the result of the following independent variables? The empirical study will produce reliable results in the metro-bus case. The complexities cannot resolve without the use of empirical studies. The assessment of these variables is very important in the Pakistan context. The modern countries variable can be useful in developing countries. The existed phenomenon is right or wrong, the answer to this question will be available in the next decision of this study. This study does not neglect previous studies results. This study only conducted for the filling up the gap which did not cover in previous studies. This literature is tried to cover maximum aspects of metro-bus those considers important. After identifying the gap in the existing literature. The supportive argumentation is used for the variables. Variables are important and play a crucial role in the evaluation.

Factors influences in utilization:

The utilization is attached with the administrative acts and also with some socio-economic factors. There is still gap in the studies, which factors are more important for the analysis of satisfaction and utilization. The factors importance vary from society to society (Ali et al., 2018). The above factors are derived from the SERVQUAL model and also previous studies are highlighted these factors. The utilization cannot consider as an independent variable because satisfaction and utilization are depended on many factors.

Utilization role in transportation services

(Nair, 2017) explained the utilization as a dependent variable, this study also explained the role of cost-effective and service delivery connection with utilization. In the presence of these variables, it is important to explore any connection between these factors. The metro-bus is still functional, and thousands of people are utilizing this public infrastructure. As discussed in the above discussion, the utilization is not solely dependent on any single factor. Some factors are playing an essential role in it (Koopmans, 1949). The identification of valuable characteristics is very crucial. But in the metro-bus case, some features do attach to the utilization. Utilization of service is a very important component for the explanation of the efficiency and other characteristics of any services. Why people use services? It is a very important question. The answer to this question opens the way for the exploration of the phenomenon. Utilization is a complex term in transportation, people behaviors are not static, but there are some factors which change create the rational choice for the people for the utilization of any services (Clewlow & Mishra, 2017). Institutional arrangements create and abolish the barriers in the utilization of services, an increase in cost can decrease the ratio of utilization (Zhou et al., 2018).

Hypothesis

1. H_0: There is no association between financial aspect and utilization of metro bus.
2. H_0: There is no association between connectivity services and utilization of metro bus.
3. H_0: There is no association between bus physical infrastructure and utilization of metro. bus

The financial aspect is not only a single variable which increase utilization. Many other factors are also involved in this but for this study two other variables are used one is connectivity services and other is bus physical infrastructure for the analysis of utilization as dependent variable.

List of variables

Dependent Variable

y = Utilization

Independent Variable

a= interpret

$X_{1=}$= Financial Aspect

$X_{2=}$= Connectivity Service

X_3= Bus physical infrastructure

Chapter 3: Methodology

Methods

This study is based on the mixed method approach. This study is exploratory. In qualitative, semi structured interviews are conducted for the exploration of phenomenon because it is social phenomena people perception is more important in this perspective. Semi structured interviews were conducted for small group. Interviews were recorded in urdu language then transcription technique applied on interviews for the translation. Thematic analysis is also used on interviews and developed themes and generated codes through systematic way. Thematic analysis is being followed in the light of study (Braun & Clarke, 2006). Variables are derived from the themes and interpreted through statically tool. Primary data sources are interviews and questionnaires. A questionnaire was based on the 25 questions, these questions are linked with the dependent variable. Dependent and independent variables are included in the questionnaire. Firstly 20 questionnaires collected from the random participants. The value of Chronbach Alpha was .821. Secondary data are collected from the international journal publications. Internet source is used for the primary and secondary data.

Measurement:

The likert scale questionnaire is used in which option 1 is Strongly Dissatisfied, option 2 Dissatisfied, option 3 is Neutral, option 4 is satisfied and option is Strongly Satisfied. This tool is for the convenience because the data does interpret easily. This scale is suitable for this study.

Data Sampling:

Primary data collected from the Metro-bus stations through face to face and use internet source for questionnaires. The data is collected from the males and females. All the participants were the users of both metro-bus and speedo bus. Total 144 questionnaires collected for this study.

The stations selected at random base. The data is collected from students, employees and daily wagers.

Data Analysis:

The Statistical Package for Social Sciences (SPSS) software is used for the analysis of data. Data entered in the SPSS which is collected from the 144 participants. Pie chart, tables, and Multi Regression Analysis is used for the analysis of data

Reliability Analysis

Reliability Statistics

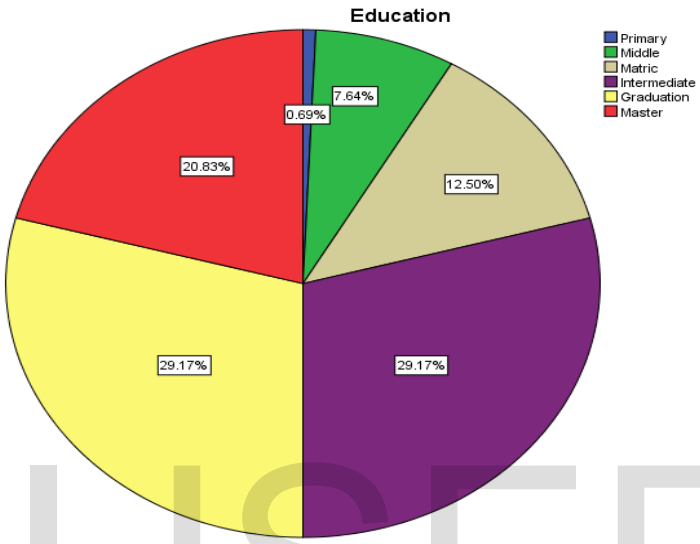
Cronbach's Alpha	N of Items
.800	25

The reliability is very important which explains the validity of variables. The questionnaire reliability is also important because it explains that the questions are reliable for this study. The Cronbach's alpha is .800. The higher number of Cronbach's Alpha value indicates toward the strong reliability (Asghar, 2018).

Chapter: 4

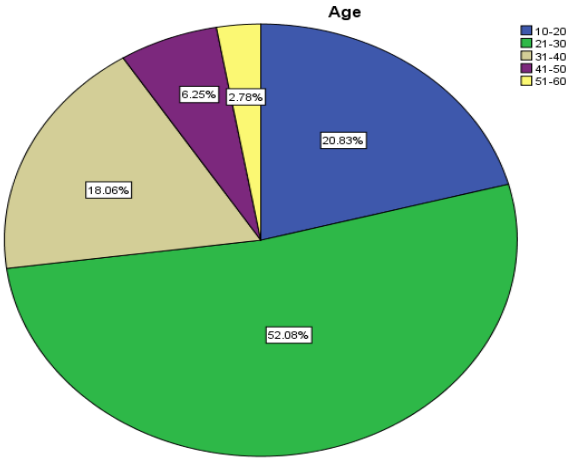
Findings

Education



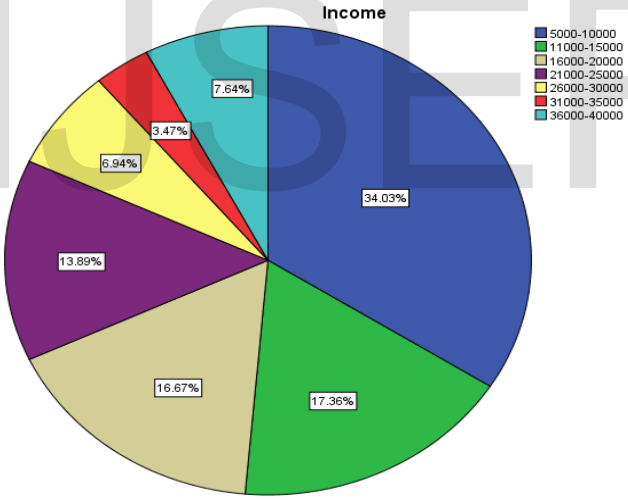
According to this pie-chart maximum number of people which is 29% of graduates and intermediates travel through metro service while minimum number which is 0.7% of people with primary education travel through it. Large number of user are highly qualified. The ratio of literacy is of metro-bus users are higher shows that, the people prefer metro-bus service for transportation. There is also diversification in this point.

Age



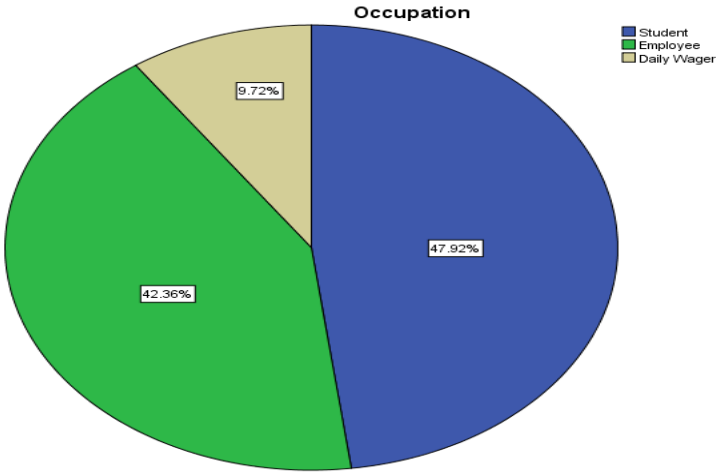
According to this pie-chart maximum number of people which is 52% of age within 21-30 travel through metro while minimum age is 51-60.

Income



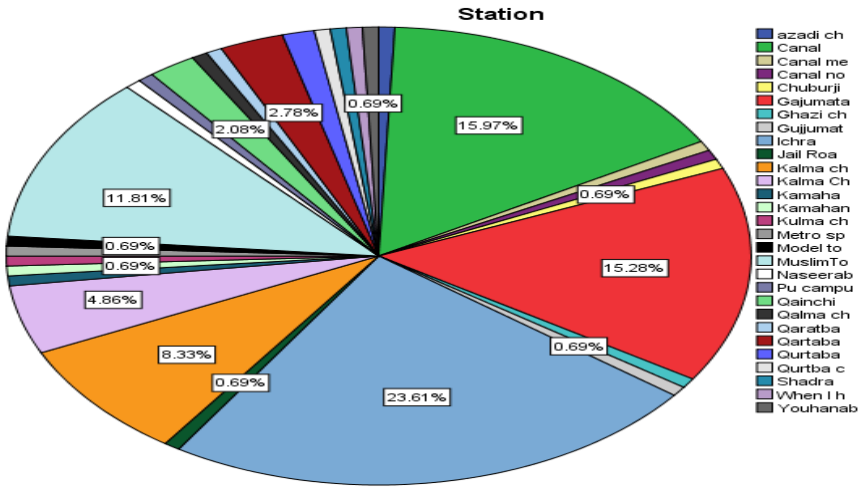
Pie-chart shows that maximum number of people which is 34% having 5000-10000 income travel through metro, large number of students are using this service. Mostly students dependent on their families. Student ratio shows that, they prefer the metro-bus service due to the compatibility between their pocket money and fares. While people with income 31000-35000 are the least which is 3.5% to ravel through it.

Occupation



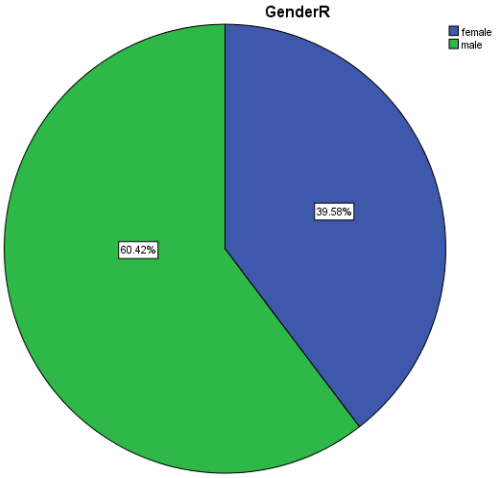
Maximum number of people which is 47.9% travel through metro and speedo bus services are students while minimum number of people which is 9.7% travel through it are daily wager. As discussed in previous discussion the large number of users are users of this service. The employees also prefer this service. Metro-bus is not specific suitable for one specific group. Citizen from different backgrounds are using this public transport.

Station



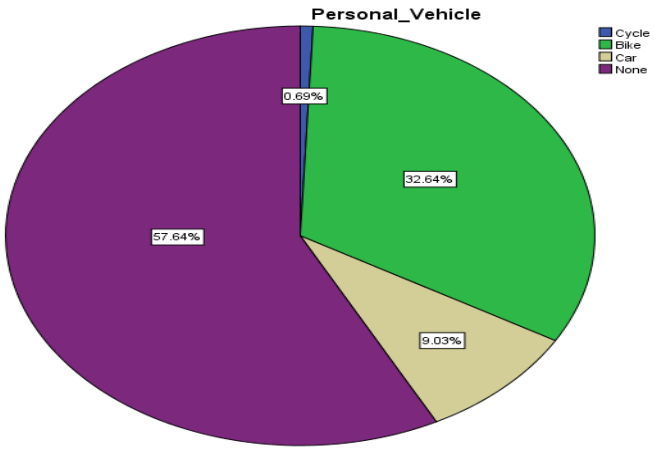
This data does not shows the which station is more utilized by the users. Because for the data collection randomly chosen the stations.

Gender



39.6% females while 60.4% of males are participated in this study.

Personal vehicle



This pie-chart shows that maximum number of users which is 57.6% do not own any personal vehicle while minimum number which is 0.69% of users are those who own cycles. There low number of people 9.03 % who own cars.

Statistics

		Station	Education	Gender	Age	Occupatiion	Income	Personal_Vehicle
N	Valid	144	144	144	144	144	144	144
	Missing	0	0	0	0	0	0	0

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Primary	1	.7	.7	.7
	Middle	11	7.6	7.6	8.3
	Matric	18	12.5	12.5	20.8
	Intermediate	42	29.2	29.2	50.0
	Graduation	42	29.2	29.2	79.2
	Master	30	20.8	20.8	100.0
	Total	144	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10-20	30	20.8	20.8	20.8
	21-30	75	52.1	52.1	72.9
	31-40	26	18.1	18.1	91.0
	41-50	9	6.3	6.3	97.2
	51-60	4	2.8	2.8	100.0
	Total	144	100.0	100.0	

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	69	47.9	47.9	47.9
	Employee	61	42.4	42.4	90.3
	Daily Wager	14	9.7	9.7	100.0
	Total	144	100.0	100.0	

Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5000-10000	49	34.0	34.0	34.0
	11000-15000	25	17.4	17.4	51.4
	16000-20000	24	16.7	16.7	68.1
	21000-25000	20	13.9	13.9	81.9
	26000-30000	10	6.9	6.9	88.9
	31000-35000	5	3.5	3.5	92.4
	36000-40000	11	7.6	7.6	100.0
	Total	144	100.0	100.0	

Personal Vehicle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Cycle	1	.7	.7	.7
	Bike	46	31.9	31.9	32.6
	Car	13	9.0	9.0	41.7
	None	83	57.6	57.6	99.3
	6	1	.7	.7	100.0
	Total	144	100.0	100.0	

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.565[a]	.319	.273	1.552	.319	6.977	9	134	.000

a. Predictors: (Constant), Personal_Vehicle, Infrastructure, FinacialAspect, Occupatiion, ConnnectivityService, Education, Age, Gender, Income

There is 31.9% of the variation in this model's dependent variable "utilization" is explained by the independent variables and controlled variables.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	151.347	9	16.816	6.977	.000[b]
	Residual	322.959	134	2.410		
	Total	474.306	143			

a. Dependent Variable: Utilization

b. Predictors: (Constant), Personal_Vehicle, Infrastructure, FinacialAspect, Occupatiion, ConnnectivityService, Education, Age, Gender, Income

Since P-Value .000 is less than 0.05 than it means that our model is significant.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.982	1.747		-1.135	.259
	Education	-.184	.144	-.122	-1.277	.204
	Age	.003	.183	.002	.018	.986
	Occupatiion	.425	.304	.154	1.401	.164
	Income	.100	.111	.103	.900	.370
	Personal_Vehicle	.205	.180	.108	1.142	.255
	Gender	.292	.360	.079	.811	.419
	FinacialAspect	.768	.239	.245	3.210	.002
	ConnnectivityService	.502	.153	.267	3.286	.001
	Infrastructure	.009	.099	.006	.087	.931

a. Dependent Variable: Utilization

- Education is negatively correlated with utilization.
- Age is positively correlated with utilization.
- Occupation is positively correlated with utilization.
- Income is positively correlated with utilization.
- Personal vehicle is positively correlated with utilization.
- Gender is positively correlated with utilization.
- One unit increase in financial aspect is likely to increase .768 unit of utilization.
- One unit increase in connectivity services is likely to increase .502 unit of utilization.
- Infrastructure is positively correlated with utilization.

Discussion

The data has collected through interviews and questionnaires from the users of metro-bus. The interviews also conducted with the officials in this regard. Through the analysis of data, it is found that the essential factors that influence the utilization of metro-bus are purely related to the socio-economic perspective. The interviews help in the identification of factors. People mostly focus on the financial aspect and connectivity services. Both elements are essential in transportation. Metro-bus project is specially designed for all classes of people. In Pakistan, the lower and middle-class people ratio is higher as compared to the elite level. The above table shows that Dependent Variable is utilization and F-Value=6.997. The table shows that the constant coefficient of the model is -1.982. It shows that the utilization of the user while keeping all other variables is .259. Education is found negatively correlated, but age and gender are found positively correlated with utilization. Occupation and personal vehicles are also found positively correlated with utilization. Financial Aspect is found significant since our p-value is .002 is less than 0.05, so we reject H0 and accept H1 and having a t-value of 3.210. Beta coefficient is .768, which indicates that 1 unit increase in the financial aspect is likely to increase .768 unit of utilization. The above table also shows that connectivity services are found significant since our p-value is .001 is less than 0.05, so we reject H0 and accept H2 and having t-value 3.286. Beta coefficient is .502, which indicates that a 1 unit increase in connectivity services is likely to increase .502 units of utilization. Bus physical infrastructure is found not significant since our p-value is .931 is higher than 0.05, so we accept H0. The results show that R2 31.9% and P-value 000 indicates that the overall model is significant and fit to best. The financial aspect and connectivity services are strongly correlated to the dependent variable utilization. People are using metro-bus service due to these factors, but on the other hand, bus physical infrastructure is not important as compared to financial aspect and connectivity

services. This model did not take all the crucial variables. So the estimated regression line for this study is as following: $y= -1.982 + .768X_1 + .502X_2 + .009X_3 + \mu$.

It is also another perception that public transport is the easement for those who cannot afford and own personal vehicles. However, in the metro-bus scenario, it seems the opposite. People also focus on bus-physical infrastructure. The findings show that the physical structure of metro-bus stations and equipment are not available in a good situation. Many elevators are not working. The people use this service, not because of its physical infrastructure. However, after the analysis of data, the data shows that financial aspect and connectivity services are the main components that increase its utilization ratio. The bus's physical infrastructure is positively correlated in the metro-bus case, but people focus more on the financial aspect. The capacity issue is observed in the metro-bus. The buses mostly over-loaded due to massive crowds. Because of the empirical study, the findings are significant because the outcome did not draw from the observations. The government step of cut off in the subsidy did not affect the utilization of metro-bus.

There is no connection between education, and utilization. All age group is travelers of metro-bus, and people belong to every age group also utilize this project. The public project makes for abundant people. In the Metro-bus case, it is significant. The repairing of vehicles and equipment could increase the ratio of travelers because the access to stations is difficult for particular persons. Government policies regarding metro-bus still need improvement.

Chapter: 5

Conclusion

Every model of developed countries cannot be implemented as it is in developing countries. The BRT (BUS Rapid Transit) is a useful public project for the society. The metro-bus still considers one of the best initiative by the government. After the analysis of data and people perceptions about the metro-bus, It can conclude that the metro-bus is useful for society but government policies and lack of look after of this project will decline the efficiency of this service. The connectivity service is also not covering the maximum number of people due to specific routes. The existing literature cannot explain the real challenges of this service. Limited studies have been conducted on this. Only government can perform efficient role in this matter. Equipment's are not available in good conditions. Mostly equipment's (elevators, wifi and other services) are not working properly. In peak times the users does not get seats in bus. The capacity and mismanagement issues are increasing day by day. In the era of urbanization the services must be in accordance with the population.

Recommendations

- The equipment's should be repaired and available in working situations.
- Buses should not be over crowded.
- Tickets should be given according to the capacity of the bus.
- Metro-bus has the capacity but there is a need of good management.
- Government should increase subsidy for real beneficiaries.
- The stations and buses should be neat and clean.

Bibliography

1. **Ahmad, S. F., & Ahmad, S. I. (2019, June). Should we Build Mega Transport Project in Cities? The Case of TransPeshawar Pakistan. International Journal of Experiential Learning & Case Studies, 4(1), 63-73. doi:dx.doi.org/10.22555/ijelcs.v4i1.2433.g531**

2. **Ali, N. M. B., Hamzah, S. F. M., Kamaruddin, K., Noor, H. M., & Borhanuddin, R. I. (2018, January). Service Quality From Islamic Perspective and Its Connection With Customer Satisfaction With Public Transportation Sector In Terengganu. In *1st Economics and Business International Conference 2017 (EBIC 2017)*. Atlantis Press.**
3. **Asghar, N. (2018). Microfinancing for poverty reduction: An empirical study of rural areas of Tehsil Gujrat-Pakistan. *IJAME*.**

4. **Babatunde, S. (2018). Government spending on infrastructure and economic growth in Nigeria. Economic Research-Ekonomska Istraživanja, 31, 997-104. doi:10.1080/1331677X.2018.1436453.**

5. **Chng, S., White, M., Abraham, C., & Skippon, S. (2016). Commuting and wellbeing in London: The roles of commute mode and local public transport connectivity. *Preventive medicine*, *88*, 182-188.**
6. **Clewlow, R. R., & Mishra, G. S. (2017). Disruptive transportation: The adoption, utilization, and impacts of ride-hailing in the United States.**
7. **Estupiñán, Nicolás; Gómez-Lobo, Andrés; Muñoz-Raskin, Ramón; Serebrisky, Tomás. (2007). Affordability and Subsidies in Public Urban Transport : What Do We Mean, What Can Be Done?. Policy Research Working Paper; No. 4440. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/7562 License: CC BY 3.0 IGO."**
8. **Ferris, B., Watkins, K., & Borning, A. (2009). Location-aware tools for improving public transit usability. *IEEE Pervasive Computing*, (1), 13-19.**
9. **Govinder, K. K. (2014). A theoretical overview of public transport service quality: a focus on bus and mini-bus taxi service in South Africa. *Journal of Social Sciences (COES&RJ-JSS)*, *3*, 301-316.**

10. **Guo, Z., & Wilson, N. H. (2011). Assessing the cost of transfer inconvenience in public transport systems: A case study of the London Underground. *Transportation Research Part A: Policy and Practice*, *45*(2), 91-104.**

11. **Hashmi, A. I., Ullah, M. G., & Javid, M. A. (2018). PASSENGERS' ATTITUDES AND PREFERENCE TOWARDS METRO-BUS SERVICE IN LAHORE. Journal of Urban and Environmental Engineering (JUEE),, 12(2), 201-209. doi:DOI: 10.4090/juee.2018.v12n2.201209**

12. **Iqbal, Razi & Todi, Padma. (2015). The Nordic Model: Existence, Emergence and Sustainability. Procedia Economics and Finance. 30. 336-351. 10.1016/S2212-5671(15)01301-5.**
13. **Koopmans, T. C. (1949). Optimum utilization of the transportation system. *Econometrica: Journal of the Econometric Society*, 136-146.**
14. **Iovan, S. (2017). Predictive analytics for transportation industry. *Journal of Information Systems & Operations Management*, 58.**
15. **Iimi, A., & Rao, K. (2018). Potential Economic and Social Benefits from Improved Connectivity.**

16. **Majid, H., Malik, A., & Vyborny, K. (2018). Infrastructure investments and public transport use: Evidence from Lahore, Pakistan. International Growth centre, C-89231-PAK-1. https://www.theigc.org/wpcontent/uploads/2018/06/Majid-et-al-2018-Working-paper.pdf**

17. **McKnight, C. E., Pagano, A. M., & Paaaswell, R. E. (1986). Using quality to predict demand for special transportation. In *Behavioural Research for Transport PolicyInternational Association for Travel Behaviour*.**
18. **Nair, K. S. (2017). Cost Effective Utilization of Transportation Services in Today's Business Environment-A Logistics Overview. *Journal of Research in Business, Economics and Management*, *8*(5), 1529-36.**
19. **Pucher, J., Markstedt, A., & Hirschman, I. (1983). Impacts of Subsidies on the Costs of Urban Public Transport. *Journal of Transport Economics and Policy, 17*(2), 155-176. Retrieved from http://www.jstor.org/stable/20052679**

20. **Saeed, S. (2018). REMAKE CITY FORM AND FUNCTION: NEO-TRADITIONAL NEIGHBOURHOOD DESIGN APPROACH IN COALITION WITH LAHORE METRO BUS SERVICE. JOURNAL og Architecture & Planning, 25(2), 7-22. Retrieved from https://jrap.neduet.edu.pk/arch-journal/JRAP_2018(SecondIssue)/02.pdf**

21. **Tabassum, S., Tanaka, S., Nakamura, F., & Ryo, A. (2017). Feeder Network Design for Mass Transit System in Developing Countries (Case study of Lahore, Pakistan). Transportation Research Procedia, 25, 3129–3146. doi:10.1016/j.trpro.2017.05.34**
22. **Taylor, B. D., Iseki, H., Miller, M. A., & Smart, M. J. (2009). *Thinking outside the bus: Understanding user perceptions of waiting and transferring in order to increase transit use*. California PATH Program, Institute of Transportation Studies, University of California at Berkeley.**
23. **Zhou, Y., Zhao, Q., Yao, L., Chen, Y., & Tang, S. (2018). The Utilization Analysis of Long-Distance Bus Based on Smart Card Data. In *CICTP 2017: Transportation Reform and Change—Equity, Inclusiveness, Sharing, and Innovation* (pp. 1676-1684). Reston, VA: American Society of Civil Engineers.**
24. **Zolnik, E. J., Malik, A., & Irvin-Erickson, Y. (2018). Who benefits from bus rapid transit? Evidence from the Metro Bus System (MBS) in Lahore. Journal of Transport Geography, 71, 139–149. doi:10.1016/j.jtrangeo.2018.06.019**

Turnitin Originality Report

Processed on: 21-Jan-2020 16:01 PKT
ID: 1244386215
Word Count: 4786
Submitted: 1

Assessment of Metro-Bus Lahore By Ahmad Osama

Similarity Index	Similarity by Source
4%	Internet Sources: 3% Publications: 0% Student Papers: 2%

1% match (Internet from 07-Oct-2014)
http://managementjournal.info/download1.php?f=03_Nadia_Asghar.pdf

< 1% match (Internet from 12-Dec-2019)
http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.736.879&rep=rep1&type=pdf

< 1% match (Internet from 12-Mar-2018)
https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1033&context=foodsci_etds

< 1% match (student papers from 22-Jul-2018)
Submitted to Sardar Vallabhbhai National Inst. of Tech.Surat on 2018-07-22

< 1% match (student papers from 29-Jan-2014)
Submitted to University of the Free State on 2014-01-29

< 1% match ()
http://bura.brunel.ac.uk/handle/2438/3620