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Paratransit Public Transport Satisfaction Level of Common People: Hyderabad city, Pakistan

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Abstract: Public transport including formal and informal (Paratransit) transport plays an important role in all major cities throughout the world. One of the important issue regarding this type of transport is passenger's satisfaction. In context of Pakistan, only few studies were conducted on the satisfaction studies regarding public transport. Furthermore, quality of public transport service as per consumers' desires is an important issue nowadays. This study aims to assess the citizen's perceived satisfaction regarding the quality of Paratransit public transport as well as to provide guidelines in order to improve the conditions of transportation system. Sample size for the present study was selected as 384 and an online questionnaire survey methodology with simple random sampling was implied to collect the desired data. Respondents filled Likert-scale based questions focusing demographics of the area, and R programming associated with R studio utilized for data analysis. In addition, statistical correlation was also implied to describe the relationship of various factors on overall public transport satisfaction level of people. Study is significant in terms of indicating the alarming situation of public transport in Hyderabad city and providing the public transport satisfaction related statistics, which allows policy planners to make the transport policies as per public interest.

Keywords: Quality of Public Transport, Social Satisfaction, R Programming, Transportation Policy

1. INTRODUCTION

Transportation systems play a key role in order to promote the sustainable development (Miller, *et al.,* 2013; Zou, *et al.,*2014). Rapid urbanization and population growth in urban areas emphasis to look upon the provision of adequate public transport so that urban transportation problems can be resolved (Olayiwola, *et al.,* 2014). Nonetheless, the transport facilities should be given according to the demands of the travelers, thus transportation planners and policy makers should incorporate the knowledge of the overall quality of public transport perceived by the citizens. (Nyongesa *et al.,*2014;Le-Klahn, *et al.,* 2014). In addition, the increase of investment towards public transportation also increases the trends of measuring satisfaction regarding the performance of public transport (Friman and Fellesson, 2009).For the third world countries, public transport services considered of two forms, formal public transport services which include rails and buses; informal public transport services which includeminibusses, vans, taxis, suzukis, and auto-rickshaws (Kumar, *et al.,* 2016). In developing countries, a major proportion of people, especially the low-income people, pre dominantly rely on such formal and informal (Paratransit) transport services (Rahman, *et al.,* 2017). In Pakistan, public transport is usually provided by the private operators and the government plays a role to control fares and routes. Private operators prefer the usage of small vehicles, like Mini Buses, Auto-Rickshaws, etc, and contribute to maximizing the informal public transport services for the commuters

(Imran, 2010). Despite fair and route control, this public transport system needs some quality assessments of various transport modes (Mini Buses, Suzuki Pick-ups, and Auto-Rickshaws) used on the basis of public perception (Javid, *et al.,* 2013). This study intends to assess the public satisfaction about the available transportation services, which may provide guidelines to help the improvement of the current transportation system. The research aimed 1) to determine the public satisfaction regarding the overall performance of public transport services 2) to identify the most influencing indicators of the public perceived satisfaction regarding public transport services. The present research is imperative in a sense that, it determines the overall user satisfaction with available public transport facilities and highlights the significant indicators influencing the people satisfaction level in order to provide guidelines to the Public transport service providers, i.e. government, policymakers and the private sector.

2. MATERIAL AND METHODS

The former capital of province Sindh Pakistan, which is known as Hyderabad city, was selected as a study area for this research (Talpur, *et al.,* 2017). It is crowded by 1,732,693 inhabitants and considered as one of the major city among the top 10 cities of Pakistan (Pakistan Bureau of Statistics. Government of Pakistan, 2017). It has a land share of about 300 square kilometers(Talpur, *et al.,* 2016) and lies between 25° 22′ 45″ North and 68° 22′ 6″ east on the globe (Mahesar, *et al.,* 2017). The geographical location of Hyderabad

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Sindh, Pakistan can be seen in **(Fig. 1.)** which was prepared with the help of Arc GIS software.
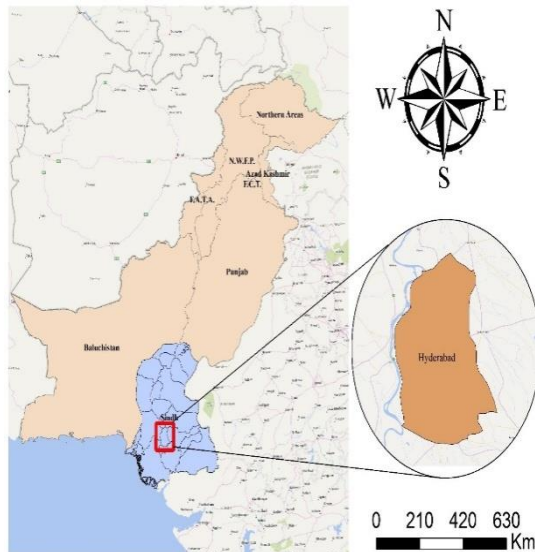

Fig. 1. Geographical location of Hyderabad District, Sindh

For the present study, online-based questionnaire survey method was adopted (Bachok *et al.,* 2015). The questionnaire was prepared online and the link was shared on Facebook and on emails to the target population. The self-structured questionnaire consisted of two sections, Demographic details and individual's satisfaction level. A five-point Likert scale was adopted for recording the satisfaction based scores (Morton, *et al.,* 2016 Beaumont, 2012; Wong, *et al.,* 2017), which varied from "1=strongly dissatisfied" to "5=strongly satisfied" (Lai and Chen, 2011). Respondents were allowed to record their responses during the period of three months, September 2017 to November 2017. Simple random sampling techniques were applied and a received number of 384 responses (n=384) were selected as a sample size for the present study (Imam, 2014). A number of fifteen indicators were presented in Likert-scale based questions in order to record the scores from respondents. Responses for a separate dependent indicator named "overall performance of public transport service" was also received in order to use for further analysis. Thereafter, Descriptive statistics (Le-Klahn *et al.,* 2014) accompanied with Statistic correlation was utilized to analyze the gathered data (Sabir, *et al.,* 2014)(Bewick, *et al.,*2003). At the end, correlation values were used to measure the most influencing factors affecting the overall public transport satisfaction.

R Programming software package:

The software package R is an analytical tool that can be used for various types of data analysis. It provides full access to general public as "Open Source"

and also constantly being updated with the most current functions by the strong community of researchers around the world (Shaffer, *et al.,* 2008). In order to deal with R programming language in a more efficient way, R-studio software is also common among research analysts and statisticians. R studio is an open source integrated development environment (IDE) application for the user, which is also available as "Open source (Kshirsagar, 2016). For the data analysis of present research, the available latest version of R software package accompanied with R-studio was downloaded from www.r-project.org/ and www.rstudio.com/ respectively. The important Programming commands used for analyzing the data can be seen in **(Fig. 2.).**

```
1  Data= read.delim(file.choose(), header = T)
2  Data= read.table(file.choose(), header = T, sep = "\t")
3  View(Data)
4  summary(Data)
5  table(Data$Gender)
6  cor(Data$OP,Data$RC)
7  mean(Data$RC)_
```

Fig. 2. Programming commands used for Data analysis

3. RESULTS AND DISCUSSION

According to the descriptive study participants involved in the current study, 28.6% were female respondents whereas; 71.3% were male respondents.

Table. 1. Demographics of respondents

Demographic Attributes	Frequency	Percentage
Gender		
Female	110	28.65%
Male	274	71.35%
Age		
20 or Below 20	67	17.5%
21-30	302	78.6%
31-40	15	3.9%
Education level		
Bachelor or Higher	282	73.4%
College (Intermediate)	87	22.7%
Diploma	5	1.3%
High School	10	2.6%
Household Income		
Less than or 20,000	158	41.2%
21,000-30,000	98	25.5%
31,000-40,000	81	21.1%
More than 40,000	47	12.2%

In addition, 78.6% respondents fall under the age of 21-30 years, and 17.5% respondents were 20 or below 20 years old, however, small portion 3.9% were 31-40 years of age. A large proportion of respondents 73.4% have a bachelor or higher education, 22.7% respondents have an intermediate level, and a tiny fraction of 1.3% have Diploma, only 2.6% respondents were high school graduates. Majority of the respondents 41.2% earn less

than or equal to Rs. 20,000, 25.5% respondent's monthly income Rs. 21,000-30,000, 21.1% Respondents earning lies in between Rs. 31,000-40,000 and only 12.3% monthly income more than Rs. 40,000 **(Table. 1).**

By using R programming, Mean scores for all the indicators of Paratransit public transport satisfaction were determined and arranged in **(Table 2)** accompanied with the frequency of respondents as per the given specified grading from '1' to '5'. Score for

1.72, and Physical conditions of vehicle (PC) was recorded 1.63 at the same time. Access to Routes and schedule info rmation (RSI) and Walking time to access stop (WTS) scored same as 1.84. Besides, mean score value for Ticket and fare collection system (TFS) was scored 1.88 and overall mean satisfaction value for Paratransit public transport was recorded as 1.65 which is very low.

Table 1. Satisfaction level of respondents regarding Paratransit Public transport modes

Level Of Satisfaction (Indicators)	Number Of Respondents(Who Specified Grades)					Mean Score Values
	1	2	3	4	5	
Route coverage (RC)	168	113	48	55	00	1.97
Punctuality of service (PS)	189	118	45	32	00	1.79
Travel time reliability (TTR)	196	102	66	20	00	1.77
Frequency of service (FS)	143	159	51	26	5	1.93
Travel cost (fare)-(TC)	109	164	61	45	5	2.15
Crew attitude (driver& conductor)-(CA)	168	103	62	30	21	2.04
Safety and security at stop and travelling (SS)	211	97	46	30	00	1.73
Waiting time at Bus/Suzuki Stop (WTBZS)	191	127	41	15	10	1.77
Comfort level (comfort)	240	67	46	31	00	1.66
Convenience level (CL)	177	146	51	10	00	1.72
Physical conditions of vehicle (PC)	213	125	20	26	00	1.63
Access to Routes and schedule information (RSI)	180	128	45	21	10	1.84
Walking time to access stop (WTS)	166	148	35	35	00	1.84
Ticket and fare collection system (TFS)	180	116	47	35	6	1.88
Physical conditions of public transport stops (PCPTS)	267	72	25	10	10	1.50
Overall performance of public transport service (OP)	200	143	15	26	00	1.65

According to **(Table 2.)** the least mean score value about the satisfaction level of respondents is 1.50 for Physical conditions of public transport stops (PCPTS) indicating the lack of maintenance of public transport stops by concern agencies. Besides this, the highest satisfaction level was found 2.15 for Travel cost (fare)-(TC) indicator. Instead, it is the highest mean score value but it still cannot be considered as almost satisfied value because the score was based on five points Likert-scale. The interesting fact found in the present study was all mean score values were below the satisfaction level indicating the poor management of para-transit public transport services. Based on respondent's grades, the mean score value for Route coverage (RC) is came out 1.97, whereas, mean score value for Punctuality of service (PS) was calculated as 1.79. The respondents respond for Travel time reliability (TTR) as 1.77score, and respond for Frequency of service (FS)estimated as 1.93. However, mean score value for Crew attitude (driver and conductor)-(CA) was derived as 2.04, and Safety and security at stop and traveling (SS) was SS, COMFORT, CL, PC, RSI, and PCPTS. Instead, OPscored 1.73. Moreover, the mean value score for waiting time at Bus/Suzuki Stop (WTBZS) was 1.77, and the Comfort level (comfort) of respondents was 1.66. Furthermore, Convenience level (CL) score was

The results of correlation were also obtained from R programming and presented in **(Table.3)** which indicates that OP has a strong relation with TTR, and has a moderate correlation with rest of the indicators. Results indicating the need of immediate action to improve the Travel time reliability (TTR), Safety and security at stop and traveling (SS) Comfort level (comfort) Physical conditions of vehicle (PC) Access to Routes and schedule information (RSI) and Physical conditions of public transport stops (PCPTS). The strongly correlated indicators were found as the most influenced indictors, which effectively influence the level of satisfaction of passengers.

4.   CONCLUSION

The study is a milestone in ongoing research because it includes the utilization of a modern tool of statistical analysis 'R programming' in order to provide significant results for future policy frame works. Results obtained from the analysis proved that all indicators of the presenter search had a positive correlation with over all public transport satisfaction. Among all these dimensions, travel time reliability, safety and security at stop, comfort level, convenience level, physical condition of vehicle, access to route and schedule information and physical condition of public transport

Table 3. Correlation of Overall Satisfaction Level with other Indicators

OP	RC	PS	TTR	FS	TC	CA	SS	WTBZS	COMFORT	CL	PC	RSI	WTS	TFS	PCPTS
	0.477	0.499	0.516	0.404	0.446	0.485	0.573	0.407	0.54	0.573	0.642	0.516	0.452	0.411	0.692
Pearson Correlation is significant at the 0.01 level (2-tailed).															

stops showed a strong correlation and considered as the most influencing factor regarding the overall public transport satisfaction level. In order to reduce the passenger shift for public transport to private transport, improvement of public transport services is needed. Present study indicated the alarming situation of public transport and results showed that public transport facilities in Hyderabad is far left behind in terms of service quality.

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