

RESEARCH ARTICLE

THE IMPACT OF APP-BASED TAXI SERVICES ON TRAVEL BEHAVIOR WITH IN THE URBAN TRANSPORT SYSTEM

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ABSTRACT

The objective of the present research was to see the impact of app-based taxi service on travel behavior. In addition, we also wanted to look at variables such as convenience, time efficiency, affordability and others which contributed to travel behavior. The sample for this study consisted of 200 participants, all of whom were known to be app-based taxi users. However, the research was carried out with 157 participants in total. The sampling method used was non-probability convenient sampling, and according to the results, the hypothesis was proven, at significance of 0.05, showing that travel behavior such as convenience, time, affordability are all impacted by both the app based taxi system and public transport system, with the taxi system having made transport more reliable and safe as compared to the public transport system of Pakistan.

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INTRODUCTION

This paper highlights how the app-based taxi system has changed the travel behavior of commuters in Pakistan. Pakistan being the 5th largest populous country in the world having 220 million of population (worldometers, n.d.) which contributes 0.31% to the world economy (statisticstimes.com, n.d.) has successfully managed to have direct and indirect use of transportation. According to 2017 census there are 32 million households in Pakistan (www.riazhaq.com/, 2019) which showed that there has been a sharp rise in the ownership of private vehicles which contributed to 9% per household in terms of cars and 53% in terms of motorbike (www.riazhaq.com/, 2019) whereas the increasing working and commuting population of Pakistan has already put a great pressure on the urban transportation system (Seyal, 2017) which has tremendously changed the travel behavior with in Pakistan. To facilitate the growing population (Seyal, 2017) public transport system was not able to justify the utmost need of the travelers and commuters which was subsequently altered with app-based taxi system to bridge the gap between public and private taxi services in Pakistan. The transport system is divided into different modes of travelling, which calls for generalized daily economic exchanges such as shopping, providing services and other traveling activities to support the economy and household.

The most highlighted problem of congestion on the roads and the immense influx of commuters/passengers have aggravated the need for small vehicles such as motor-cars and motorcycle due to their economical price and affordability. These two modes of transports are highly preferred in recent times to avoid the traffic congestions on the roads (Junaid, 2014) which is quite evident in Pakistan. Nearly, 7500 motorcycles are sold per day which has made Pakistan the 5th largest motorcycle market (Seyal, 2017) supporting travel/commute providing mobility which has been essential to maintain a healthy link between transport system and commuters/passengers. Nearly 70% of the inland transport burden is shared by the existing road network of Pakistan connecting all the cities both urban and rural which was being established through the development of automobiles sector providing local and national transport services.

Hypothesis: The objective of the present research was to see the impact of app-based taxi service on travel behavior. In addition, we also wanted to look at variables such as convenience, time efficiency, affordability and others which contributed to travel behavior.

Operational definition

App-based Taxi service: By means of an app-based taxi system is careem/uber/bykea/swvl/airlift, these app-based taxi services can be booked easily with the help of the smartphones at any point of time.

Travel Behavior: As per the objectives how convenient, time efficient, benefit to health and fitness, satisfying experience, affordable and good value, provide safety and employment and how reliable an app-based taxi services are in comparison to the public transport system.

Urban Transport system: An urban transport system is defined as the set of transport infrastructures and modes that support urban movements of passengers and freight (securipedia.eu, 2021) It generally expresses the level of accessibility. For the purpose of research, only the urban movement of passenger is focused to understand the travel behavior of commuters/passengers in an urban transport system.

Literature Review

This literature will take us to through a diverse perspective of knowledge to identify which factors are responsible for altering the existing travel behavior in an urban transport system. While many variables play an important role in demotivating the passengers' attitudes towards public transport system and opting for an app-based taxi services as per their need and convenience. As per statistics the sales of passenger cars and motorcycles have soared at 20% per year (Seyal, 2017) which need a stable, efficient and effective transport system. In the absence of said system various problems can be experienced (Junaid, 2014) which was the outcome of not providing a well-established and reliable system. Since the largest urban city of Pakistan i.e., Karachi lacks in infrastructure, routes, time management and above all the overall condition of the existing road network is almost exhausted (Mangi, 2020).

Moreover, in the developing countries it has been observed that the modal shift (a comparative advantage of one entity in a similar system) in adopting an app-based taxi system in contrast to public transport system has become more convenient and efficient with the help of motorcycles and motorcars with customized transit facility which have become a traditional system to avoid congestions, time wastage and lack of security. The main reason of the massive increase in the private owned cars on the road is the emergence of micro financing especially car leasing option which has only made possible in the absence of an efficient transport system in the country. With the continued progress of urban centers, the immediate demand has increased almost ten-fold, to facilitate people on the roads. Commuters raised several concerns approaching the much-needed development in the contemporary transport system in Pakistan. Due to the wrecked transport system (Mangi, 2020) the commuters were made to think to find a sustainable transport system (Sochor, 2015) where they do not have to face the horrific conditions which have made the remaining system more vulnerable subsequently affecting the mental and physical health of the commuters. The studies have shown that the noise pollution and the traffic congestions are among the major environmental concerns. Road rage has also increased significantly along with the psychological issues being stuck for several hours of the day. Most of the area is now covered with settlements having quite a few options left for the further development in the rotted infrastructure. Considering the demographics of the urban centers and the while keeping in mind the problems and devastating outcomes have resulted in the increased problems

of catering elderly commuters who can't wait that long while travelling.

Movement of patients has also become too difficult to get to the destinations due to the having elderly people and patients (Sochor, 2015). The urbanization and population have highlighted the worst conditions of the transportation system and the idea of privatization of the transportation sector (Imran, 2009) was pertinent to ensure a sustainable transport system but the implementation of that system was not that easy to established. The development of rural to urban migration has also put a tremendous pressure thus accentuated the need of more authentic and reliable travel system. Therefore, the public transport system which is predominantly governed by the private sector and holds scanty involvement in the augmentation of the urban transport system failed in meeting the travel demand (Qureshi, 2007) through a sustainable transport system that led people towards using an app-based taxi system to experience. A system which provides door to door service keeping the commuters' away from misery of going to the bus stops and to wait (Yasin, 2018) similarly, the same option eased the local problem of allowing women in the moment of need. The app-based taxi system provides a new and advanced travel experience ranging various determinants for example, reliability of services that can be availed anytime through the mobile phones which also compliments time saving factor thus increasing the efficiency of the app-based taxi system.

The app-based taxi provides an efficient and reliable transportation system also a truly new experience of cleanliness and comfort (Qureshi, 2007) which allowed most of the domestic households to go out and enjoy. Another important determinant to be considered is the well-informed trip along with the driver's details, not only that the app-based taxi systems have customer support system to be contacted whenever needed. Unlike transport system the app-based taxi system contributes explicitly in availability of the vehicle which was most needed to meet the travel demands and frequency of the travel trips with in the urban transport system. The app-based taxi system is successfully set a standard of delivering equal opportunity to all the passengers with a sheer commitment and economical fare. The trip price is calculated in a way to accommodate the passenger with a variety of information (Wenjie, (2014, June).) thus not concealing anything in the calculated fare. The growing travel trend in Pakistan has been greatly impacted by the emergence of technology which gives the passengers the comfort of selecting different app-based taxi apps, these apps provide such convenience to the passengers ranging from the selection of the routes, time slots and the choice of vehicles (Junejo, 2020). The app-based taxi services in Pakistan have conquered the public transport system predominantly in the urban centers providing employment opportunities both part-time and full-time with a vast fleet of domestic vehicles administering the massive influx of rides with security and reliability (Junejo, 2020).

The overall concept of an app-based taxi service holds a holistic approach of satisfaction, starting from calling the cab and selecting the vehicle, with the introduced technology of GPS the travel route is tracked throughout the trip which has made people more relaxed and secure (Wenjie, (2014, June).)The economic point of view is also well-connected to

the rising unemployment rate in Pakistan, through the app-based taxi services the vehicles owners have started utilizing the app, not only that the owners have also rent their vehicles on full/part time to be used as a taxi with associated with the app thus contributing to the overall economy of the country.

METHODOLOGY

Sample Participants: The sample for this study consisted of 200 participants, all of whom were known to be app-based taxi users. However, when the respondent's data was reviewed, many were eliminated, which left the researcher with 157 participants in total. Elimination of data was based on incomplete questionnaires.

Sample Method: The sampling method used was non-probability convenient sampling, since the survey was forwarded to anyone who used the app-based taxi system within Pakistan.

Components of the instrument used: An extensive questionnaire was designed to understand the travel within the urban transport system keeping in mind the modes and reasons of travel. The questionnaire provided the respondent an opportunity to express their view about travelling. At first the respondent had to state the purpose of travelling whether it was personal or professional or both later on the first part of the questionnaire was designed to understand the frequency of the travelling keeping in mind the reason of the travel. The scale was constructed in a way to understand the frequency in contrast to the trip done. Both frequencies were accounted as Most and Least using the following scale; the mode of travel consisted of own car, motor bike, bus/coach, local taxi/rickshaw, uber/careem/bykea/svwl/airlift and not applicable against the general reasons ranging from to do shopping, commute to work, travelling during work hours, travel locally for leisure, travelling to visit relatives and friends locally and daily travelling to nursery or schools to drop children. The second part of the questionnaire consisted of three parts arranged in a way, at first to understand the use of public transport system or an app-based taxi system gauging it on various factors stated below even if the respondent doesn't use the public transport system or an app-based taxi service at all,

Public transport system

-) Using public transport is convenient
-) Using public transport is time efficient
-) Using public transport benefits health and fitness
-) Using public transport is a satisfying experience
-) Public transport is affordable and good value
-) Using public transport is the safest travel choice
-) I feel it's my responsibility to use public transport to support those employed in this service
-) Public transport is reliable
-) App-based Taxi services
-) Using app-based taxis is convenient
-) Using app-based taxis is time efficient
-) Using app-based taxis benefits health and fitness
-) Using app-based taxis is a satisfying experience
-) App-based taxis are affordable and good value
-) Using app-based taxis is the safest travel choice

-) I feel it's my responsibility to use app-based taxis to support those employed in this service
-) App-based taxis are reliable

The above factors were being evaluated with a Likert scale with the options of strongly agree, agree, neutral, disagree and strongly disagree. The respondents were free to chose any of the option from the Likert scale even in the case of not currently using both the systems.

The last part of the questionnaire was:

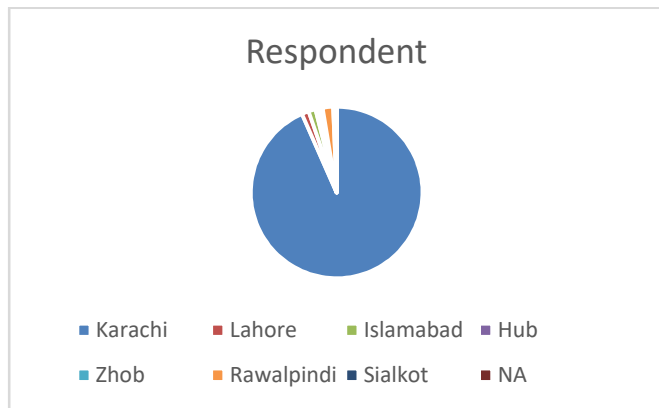
-) The app-based taxi system has resulted in more cars on the roads of Pakistan
-) The app-based taxi system has resulted in decrease in public transport
-) The app-based taxi system has created an improvement in the transport system
-) The app-based taxi system has resulted in increase in traffic on the roads
-) The app-based taxi system has resulted in increase in pollution on the roads
-) The app-based taxi system has resulted in increase in breakdown of emergency services
-) The app-based taxi system has resulted in increase in need for more roads and space which we don't have

Administration of Instrument: Once the survey form was made, social media was the main method of distribution for the survey. Once the survey had been distributed, the participants would fill out the form and give a prompt to the researcher after which the researcher would thank them for participating in the study.

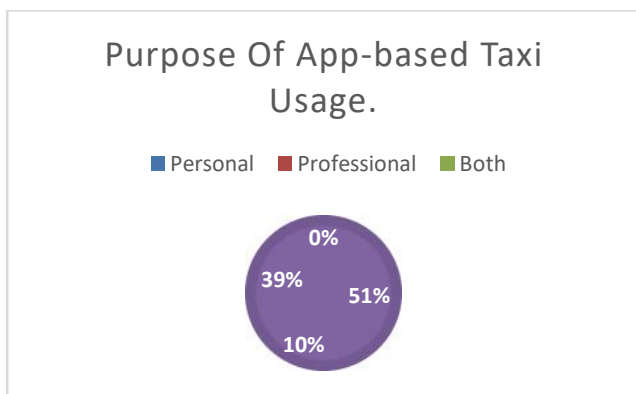
Ethical Considerations: In this research ethical guidelines were taken into consideration to maintain the privacy and identity of the respondents by keeping their responses close-ended. Anwell-communicated consent was the part of the questionnaire for their understanding about the pre and post and all the intermediate steps in conducting the said research. It was also made clear to the respondents that they can contact the researchers for any questionnaire related query. The objectives were clearly stated in the first part of the research after that their personal and professional travel behavior responses were recorded. Respondents were also made clear about keeping their identity and responses confidential however, the percentage of the data recorded might be used in supporting the research.

RESULTS

The objective of the present research was to see the impact of app-based taxi service on travel behavior. In addition, we also wanted to look at variables such as convenience, time efficiency, affordability and others which contributed to travel behavior. Therefore, this section is focused in administering extensive explanations on the detailed analyses of the variables. In the results section descriptive results were initially explained referring to the various variables under consideration. Eventually, data was analyzed with the formulation of hypothesis and completed with references.



Graph 1. The following pie chart represents the different localities from which the sample has been collected. The sample was not targeted in terms of gender, socioeconomic status and other human-related variables since our research targeted travel behavior



Graph 2. The following pie chart represents the reason why people used App-based taxis across Pakistan

Most of the sample is from Karachi as can be seen, since the researcher also lived in Karachi and had easy access to a majority of the population. Since the survey was online, the researcher was able to also gain access to other parts of the country to gather data. Since this too influences travel behavior, understanding how many participants of the sample relied on Careem/Uber/Swvl for their personal and professional needs was also important.

Table 1. This table displays data with regard to travel behavior

Most frequently	N=157(% of Sample) Travel Behavior	Least frequently
29	Shopping	15
19	Travel to work	12
33	Travel whilst at work	12
28	Local leisure travel	18
27	Visiting friends and relatives locally	17
9	Taking children to school or nursery	9

All variables including going to shop, commute to work, travelling during work hours, travel locally for leisure activities, travelling to visit relatives and friends locally and daily travelling to nursery or schools to drop children. This table displays the frequency with which app-based taxi service is used for these travel behaviors. It can be seen that using app-based taxi service (careem/uber/bykea/swvl/airlift) is most frequent while at work while it is least used when taking the children to school.

Table 2 (both a and b) displays information about travel behavior and the frequency of use of different modes of transport within Pakistan. One of the variables to take into notice is the use of one's own car for visiting friends and relatives as well as travel to work, which has the highest frequency as compared to other vehicles. Additionally, bus/coach and local taxi/rickshaw is not the most relied on form of transport within Pakistan. Therefore, when taking into account the data holistically, we can say that having one's own car and using app-based taxi system is used a lot more frequently as compared to other forms of transport. A one-way ANOVA was conducted to see the impact of app-based taxi services were taken into account such as shopping, travel to work, travel while at work and more. There was a significant effect of the app-based taxi service on travel behavior, shown in both ANOVAs conducted; one to see the most frequent use of app-based taxi service and one where there was the least frequent use of app-based taxi service. In the most frequent condition, the F-ratio value is 46.10511. The p-value is $< .00001$. The result is significant at $p < .05$. In the least frequent condition, the F-ratio value is 154.48938. The p-value is $< .00001$. The result is significant at $p < .05$, proving the hypothesis.

If we look at the spread of data with regard to the public transport system, we can see that 33% of participants believe that public transport is not a safe choice, 34% believe it is not that time efficient and 34% of the sample believe that it does not benefit health and fitness in any way. 26% of the sample even believe it is not a reliable form of transport. However, in terms of convenience, 39% of the sample rely on it and 44% believe that it is affordable and of good value, which means other than the public transport system being a 'necessary evil', it also carries some benefits which can be worked and improved on. This spread of data shows the reliance and convenience that comes with the app-based taxi system. 57% of the population reported that app-based taxis are convenient, in addition, 47% reported that they are time efficient. However, 28% of the population believe that it does not benefit health and fitness in any way and a negligible number of participants disagreed with all these statements. The influence of app-based taxis on travel behavior can be seen through the trend of how many participants have agreed to the following statements. 46% believe that it has resulted in more cars on the road, while 50% that our transport system has improved due to the addition of such third party public transport apps. However, 37% agree and 21% strongly agree that it has impacted our roads quite negatively resulting in increased traffic jam. Keeping in mind all these results, a detailed discussion will create a strong conclusion for this research.

DISCUSSION

The purpose of this research was to conduct a survey which would help us understand the impact of app-based taxi services on travel behavior. This aim was proven by the results mentioned above. One of the first things seen in the research was the use of online survey. This has both advantages and disadvantages. Firstly, the aim was to understand the travel behavior of the commuters/passengers and to take the feedback and to measure the shift of public transport system. A widely used result oriented electronic survey was opted (Lazar, 1999).

Table 2a. This table is a spread of data with regard to what is most frequently used in terms of travel behavior

Thinking about travel YOU undertake on a daily or weekly basis, please tell us the main mode of travel YOU use 'MOST' frequently for the following activities. Please only tick one box per activity. If any activity does not apply to you, please tick 'Not applicable'.	Own Car		Motor-Bike		Bus/Coach		Local Taxi/ Rickshaw		Careem/ Uber/ Bykea/ Swvl/ Airlift		Not Applicable	
	N	%	N	%	N	%	N	%	N	%	N	%
[Shopping]	83	61%	14	10%	3	2%	9	7%	21	15%	6	4%
[Travel to work]	62	45%	14	10%	15	11%	9	6%	16	12%	23	17%
[Travel whilst at work]	45	34%	16	12%	11	8%	7	5%	26	20%	28	21%
[Local leisure travel]	86	65%	14	11%	9	7%	2	2%	21	16%	1	1%
[Visiting friends and relatives locally]	95	71%	15	11%	2	1%	5	4%	17	13%	0	0%
[Taking children to school or nursery]	59	44%	14	11%	7	5%	3	2%	4	3%	46	35%

Table 2b. This table is a spread of data with regard to what is least frequently used in terms of travel behavior

Thinking about travel YOU undertake on a daily or weekly basis, please tell us the main mode of travel YOU use 'LEAST' frequently for the following activities. Please only tick one box per activity. If any activity does not apply to you, please tick 'Not applicable'.	Own Car		Motor-Bike		Bus/Coach		Local Taxi/ Rickshaw		Careem/ Uber/ Bykea/ Swvl/ Airlift		Not Applicable	
	N	%	N	%	N	%	N	%	N	%	N	%
[Shopping]	25	19%	29	22%	45	34%	7	5%	12	9%	13	10%
[Travel to work]	16	12%	25	19%	46	35%	8	6%	9	7%	28	21%
[Travel whilst at work]	15	11%	24	18%	43	33%	8	6%	10	8%	32	24%
[Local leisure travel]	21	16%	22	17%	55	43%	6	5%	13	10%	11	9%
[Visiting friends and relatives locally]	21	16%	24	18%	55	42%	9	7%	13	10%	9	7%
[Taking children to school or nursery]	14	11%	18	14%	40	31%	6	5%	6	5%	45	35%

Table 3a. Shows ANOVA of the most frequently used transport systems within Pakistan

Source	df	SS	MS	F	P
Between groups	4	17967.47	4491.876	46.1051	.05
Within groups	25	2294	91.76		
Total	29	20261.47	4583.627		

Table 3b: Shows ANOVA of the least frequently used transport systems within Pakistan

Source	df	SS	MS	F	P
Between groups	4	6010.667	1502.667	154.4893	.05
Within groups	25	400.8333	16.0333		
Total	29	6411.5	1518.7		

To keep it handy and straightforward, an online survey was conducted to avoid the cost and the hassle of reaching out to people. Taking their interview was not favorable due to COVID conditions, whereas the electronic feedback was seen as a well-organized idea to reach the sample (Couper, 2000). For a collection of big surveys, it's been observed that by doing it online has increased its significance with the increasing number of sample size (Watt, 1999). Online surveys are time efficient and the respondents are directly submitting their responses into the research database for further evaluation making the sampling process quick and efficient. Another reason of opting an online survey in that online surveys are among newly developed strategies to tap those who are out of reach (Rice, 2017), before that reaching out to the respondent was a tiring process, starting from the availability of the respondent till

recording of their responses; for them online survey was the appropriate strategy to adopt. On other hand few limitations were also observed which was not experienced in the paper based surveys, even though ethical measures are taken into consideration but still few participants did not share their details due to the privacy issue or they do not want to be contacted (Andrews, 2007) later on it was also speculated that the respondent who was recording he response could misled the research by providing false entries (Cho, 1999). Few participants were reluctant in sharing their details because of the fact of it might get used by other online reports and surveys. Secondly, the data for personal and professional use of app-based taxi service was collected because we needed to map out how important travel behavior is in the sample's personal and

Table 4a: The table displays travel behavior with regard to the public transport system

Public Transport system	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
[Using public transport is convenient]	13	9%	58	39%	42	28%	24	16%	12	8%
[Using public transport is time efficient]	7	5%	27	19%	43	30%	49	34%	19	13%
[Using public transport benefits health and fitness]	7	5%	15	10%	55	38%	50	34%	19	13%
[Using public transport is a satisfying experience]	3	2%	32	22%	45	31%	42	29%	23	16%
[Public transport is affordable and good value]	21	14%	64	44%	45	31%	12	8%	3	2%
[Using public transport is the safest travel choice]	7	5%	11	8%	44	31%	48	33%	34	24%
[I feel it's my responsibility to use public transport to support those employed in this service]	9	6%	36	25%	63	44%	26	18%	10	7%
[Public transport is reliable]	5	3%	31	22%	53	37%	37	26%	17	12%

Table 4b. The table displays travel behavior with regard to the app-based taxi transport system

App-Based Taxi System	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
[Using app-based taxis is convenient]	44	30%	83	57%	15	10%	1	1%	3	2%
[Using app-based taxis is time efficient]	25	18%	66	47%	37	26%	9	6%	3	2%
[Using app-based taxis benefits health and fitness]	6	4%	29	21%	57	42%	38	28%	7	5%
[Using app-based taxis is a satisfying experience]	17	12%	72	52%	44	32%	5	4%	1	1%
[App-based taxis are affordable and good value]	11	8%	66	47%	43	31%	18	13%	2	1%
[Using app-based taxis is the safest travel choice]	16	11%	42	30%	56	40%	21	15%	5	4%
[I feel it's my responsibility to use app-based taxis to support those employed in this service]	12	9%	48	34%	57	41%	17	12%	6	4%
[App-based taxis are reliable]	18	13%	52	37%	54	39%	9	6%	6	4%

professional life. One of the pieces of data seen in the results is related to how frequently Careem and Uber are used whilst at work. Therefore, when seeing it in the light of how frequently one can use it in their professional life, we can see that app-based taxi services have made their space within the in-field

work environment. For example, many non-profits, who previously depended on their own transport vehicles, offer create 'corporate packages' for their employees to travel to and from work. This comes from the understanding that the shift of travelling behavior from public transport system to app-based

Table 5: This table displays the impact of app-based taxi system on travel behavior

Influence of App-Based Taxi System	Strongly Agree		Agree		Neutral		Disagree		Strongly disagree	
	N	%	N	%	N	%	N	%	N	%
[The app-based taxi system has resulted in more cars on the roads of Pakistan]	39	26%	69	46%	28	19%	13	9%	0	0%
[The app-based taxi system has resulted in decrease in public transport]	20	14%	56	39%	39	27%	26	18%	4	3%
[The app-based taxi system has created an improvement in the transport system]	25	17%	74	50%	32	22%	15	10%	1	1%
[The app-based taxi system has resulted in increase in traffic on the roads]	26	18%	59	40%	48	33%	13	9%	1	1%
[The app-based taxi system has resulted in increase in pollution on the roads]	27	18%	55	38%	53	36%	10	7%	1	1%
[The app-based taxi system has resulted in increase in breakdown of emergency services]	12	8%	39	27%	62	42%	30	21%	3	2%
[The app-based taxi system has resulted in increase in need for more roads and space which we don't have]	30	21%	53	37%	47	33%	12	8%	2	1%

taxi system customized transiting facility has become the top facility to be given to the commuter, meaning that the commuter is allowed to get the vehicle wherever they want and whenever they want. (Okamura, 2012). Another question which arises is why public transport is relied on so less in Pakistan. Yes, for a better transport system, a well-developed and well managed transport system needs a road network that allows the commuters/passengers to travel with few traits which are necessary. It's been observed that the overall condition of the urban transport system in Pakistan, a developing country shows that the transport system is not satisfactory, the quality of existing roads are not good enough to support the massive vehicles transport every day (Vasconcellos, 2014). People are used to of travelling via variety of vehicles which need an authentic transport system, the marred condition of the existing road network is a threat to the vehicles which ultimately lead to the higher maintenance cost. Therefore, the shift from local transport system to an app-based taxi system was brought forward as the utmost needed solution to the numerous problems face by the commuters/passengers as a collective effort in the form of a cultural solution which said that the group of people solves their problems collectively (Trompenaars, 1998) this cultural alteration has emerged in the form an app-based taxi system, a system which provides convenience in a way when the local transport system shows no progress and the number of cars have significantly increased the app-based taxi system provides the opportunity to all those car owners whose car can be utilized if not used by owners (Wallsten S. , 2015).

The commuters/passengers were always in a great misery of facing high fares of local taxi and transport available in the locality. Not only that they were forced to pay high fares because there was no other parallel system to facilitate them but with the advent of an app-based taxi system the commuters/passengers were being provided with a convenient system of booking a ride through the smart phone and the concept of shared economy (Wallsten S. , The competitive effects of the sharing economy: how is Uber changing taxis., 2015) was introduced.

The new app-based taxi services have significantly reduced the current traffic congestion issues (Zhang, (2016)) as the free cars are being utilized which can further be used for single and double ride, this has significantly reduced the number of cars on the road. On the other hand, the number of commuters/passengers using public transport system has also reduced, leaving the existing transport system in the perpetual state of underdevelopment.

In support of this, a study was conducted where a wide range of open sample was selected to determine day to day travel response behavior (Pas, 1995), the survey was floated randomly to get the unbiased response from all over Pakistan which could determine the changing travel behavior shift from public transport system to the app-based taxi system. As (Golob, 1987) pointed out that diverse sampling can provide a synchronous pattern between the travel variations which allows the researcher to better understand the ravel behavior of commuters/passengers allowing them to choose between personal and professional use so that the data set will provide a synchronized result of dependent variable with the reason of travelling. From the result its quite clear that the commuters/passengers always go for total time of the trip included the waiting time and travel time (Dell'Olio, 2011) which holds a tremendous shift and lack of reliability on the public transport system, on the other hand an app-based taxi systems provided their customers with such great level of comfort and ease (Wallsten, 2015) now passengers do not have to wait for their ride, their ride is just a tap away with the help of smart phones. Undoubtedly, the competition in among the app-based taxi services have made these app rides so flexible and up to the standard which has left the public transport far behind to develop. That is not to say that Pakistan did not try it best to counter the app-based taxi system. The government of Pakistan formulated a comprehensive 2-year national transport policy which will lessen the travel time along with the efficiency and reliability to boost the economy (Asian Development Bank and Government of Pakistan, 2003). Keeping in mind the figures given in the results, the following recommendations are proposed:

The app-based taxi services have provided the passengers with a high level of commitment, efficiency, safety and reliability which has increased the competition among different app-based taxi services resulting in over burdening the existing transport system and over shadowing the public transport system. To counter that government should intervene and limit the registration of cars in app-based taxi services and heavy taxes must be imposed on keeping more than one vehicle per household. There should also a limit on micro financing and car leasing options through firms and banks allowing even a middle-classed commuter to invest in a car resulting in an increased number of cars on the road per day. Furthermore, app-based taxi services have tapped almost everyone with a smart phone belonging to all classes of the society which suspects the use of local transport system by the lower-middle class only leaving behind the local transport system in the current state of misery.

Finally, the exploration of the impact of this research. This research will conclude the shifting of commuters/passengers from the local transport system to an app-based taxi service due to various factors on which travel behavior is gauged. The existing local transport system failed to provide few basic opportunities to the commuters which has resulted in a consistent decline of public transport system leaving behind no option for the commuters/passengers to shift their travel mode for personal and professional reasons. Therefore, this research talks about how convenient and efficient app-based taxi services are and now these taxi services are providing a quality service which a local transport system can never offer. Keeping the passengers well informed throughout their ride by allowing them to track the ride and rate the driver and services which is not possible in public transport system. The research also talks about the problems of waiting time and travel time of public transport system with no fix timings and bus spots which keeps the commuters/passenger in constant stress but the relief which passengers have experienced after travelling via app-based taxi service is worthy of the fare charged. Furthermore, the occupancy and availability of the local transport system had left people with no other option to lookout for another transport system which can provide stability and sustainability.

Conclusion

This research set out to understand the travel behavior of the commuters/passengers in an urban transport system. While there are various factors which were taken into consideration for the purpose of this study. According to the result of this research it is quite evident that commuters/passengers are more interested in travelling through an app-based taxi service which provides them with a convenience in planning their trip and reliability and efficiency in fulfilling their travel need with the satisfaction in the fare charged for the trip. However, there are consequences of these app-based taxi in an urban transport system which has resulted in more cars on the road thus resulting on more traffic jams which has led to a deterioration of the urban transport system.

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