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GENDER BASED TRAVEL CHOICE BEHAVIOR ANALYSIS OF NON-LOCAL UNIVERSITY STUDENTS OF LESS DEVELOPED REGIONS

Keywords: travel choice behavior, gender, university students, developing regions

Abstract

Students constitute a major portion of travel demand of a local transportation industry. This phenomena is very much true for certain cities of the Sindh province of Pakistan. Despite less developed and relatively remote locations, each of these cities¹ hold three to four major universities, which not only accommodates 70% of the provincial higher education capacity, but also holds students from other provinces and countries. These universities have become major sources of trip generation towards multiple domestic, national and even international destinations. Commuters produced by these universities include both genders, i.e., male and female. Open research literature on the topic, both international and local, has shown that both genders, subjected to a variety of factors, differ significantly in their behavior of choosing travel modes. Majority of the previous studies have based their analysis on samples collected among students of advanced or developed economies; and very less attention has been given to less developed and developing regions. This study is motivated by such persisting research gaps. This study has focused less developed areas of Sindh province. The data has been collected through a questionnaire survey, which has been administered through trained surveyors at four different universities located at four different cities. A total of 352 responses are collected and analyzed. The results have shown that geographical factors tend to influence more than socio-economic realities for both genders.

Introduction

Universities are the centers of higher learning where youth acquire education that is not only mandatory for a brighter future; but, there they are also being taught and shaped to be a responsible, skilled and sensible citizen. Due to the necessary nature, universities attract a large quantity of students traveling from distant locations. Subsequently, universities are

¹ The cities are Jamshoro, Nawabshah, Khairpur and Sukkur

then responsible for attracting and producing huge amount of commuters, whose travel behavior significantly influences prevailing transportation traits. As a matter of fact, historically, university students have a tendency to exhibit a unique and complex travel behavior in comparison to the general population (Limanond 2010). Travel behavior of university students is further shaped by students' belonging to different social classes attributing a wide range of socio-economic structures, relative freedom in comparison to working class population and irregular class schedules, which collectively brand them a definite social group that contributes a major chunk of local transportation market. Contrary to the need, very less attention is being given to assess the travel behavior of university students. The available literature on the topic contains few of the previous studies presenting foundation work in the field. The travel behavior of university students in choosing mode and frequency of travel is influenced by a number variables. A brief review of the related previous studies addressing such variables is presented here.

Two of the relevant studies by Boyd et al. (2003) and Rodríguez and Joo (2004) examined relationship between mode choice and influencing factors in association with providing free transit pass for university students. Shanon et al. (2006) followed both of these researches and analyzed travel patterns of all commuters originating from university, rather to focus student population only. Another study by Collins and Chambers (2005) found mode specific cost, ease of access and environmental awareness as factors influencing travel choice behavior of university students. Klöckner and Friedrichsmeier (2011) further argued that mode choice was jointly determined by situational and psychological factors. Previously, Ewing et al. (2004) had defined availability, accessibility, trip characteristics and cost as situational factors in this context. While, the psychological factors included commuters' intention, beliefs, norms and associated attributes (Collins and Chambers, 2005). Zhou (2012) then attempted to converge all such studies to identify specific domains of influence which regulate, collectively and/or individually, travel choice behavior of university students. Based on sample collected from university of California, Zhou (2012) identified six variables influencing mode choices among students: (1) individual-specific factors (e.g. socio-economic and demographic), (2) psychological factors (e.g. attitudes), (3) mode-specific factors (e.g., comfort), (4) trip characteristics (specific to a mode, such as cost), (5) built environment and urban form variables (e.g., density, intersections), and (6) presence of TDM measures (e.g., parking cost).

Research context

Studies, whose brief review is provided above, have focused developed regions where transportation situations are quite stable. None of the studies have focused travel behavior of university students in developing or less developed regions, where transportation facilities are not only limited but their quality, availability and accessibility is at minimum. Such as in Pakistan, where available means of public transport is generally rated as 'inadequate' (Adeel et al. 2014; Imran 2010b). Subsequently, this study is set to fill in such gap. This study explains influence of demographic (i.e., gender), socio-economic (income/ pocket-money and household) and geographical (i.e., trip origin) factors over travel choice behavior of university students of less developed areas of Sindh province in Pakistan. However, due to space limitations, other influencing factors such as cost, safety, comfort etc., are not taken in to consideration.

The travel choice behavior is assessed with reference to the trip rate a student is making towards his/her hometown from his/her on campus residence, and preferred mode of transport. The trip rate is taken as frequency of travel to hometown in a month. For transportation modes, five commonly utilized types are considered; i.e., (i) bus, (ii) wagon, (iii) train, (iv) private car/ taxi, (v) motorbike and (vi) other, (e.g., rickshaw etc.).

Research Methodology

A comprehensive literature review, a brief account of which is presented in the introduction section, unveiled a variety factors that are found influencing travel choice behavior of university students, both local and non-local. Based on identified factors, a questionnaire survey is prepared which is then administered at four different universities located at four different cities of Sindh province in Pakistan. Only non-local students are considered for the survey. Non local students constitute more than 70% of the total university students' at all four universities. A total of 352 responses are collected, processed and analyzed by means of descriptive and frequency analysis. Analytical and logical reasoning is then performed to explain that how students, of both genders, are influenced, collectively and individually, by socio-economic and geographical factors in making their decision on frequency and mode of travel.

Selection of Respondents

A total of 352 responses are collected at four different universities of four different locations in Sindh province in Pakistan. The population distribution and associated demographics is illustrated in table 1 and table.2 respectively. Females are 32% of the total sample; which is due to the overall lower enrollment of females in universities of Sindh province. Majority of the students are single. 43.18% of students are under age of 20; 54.54% are above age of 20; while 6 students haven't reported their age.

Table 1. Selection of sample respondents

	MUET ²	QUEST ³	MUETK ⁴	IBA ⁵	Total
Female	18	74	4	17	113
Male	28	135	45	31	239
Total	46	209	49	48	352

Table.2. Demographics of respondents

	Age		Marital Status	
	< 20	>20	Married	Single
Female	43	68	8	101
Male	111	124	8	228
Total	154	192	16	329

Questionnaire Survey analysis

The collected responses are processed for exploratory data analysis by using descriptive statistics to unveil significant characteristics of data and then to develop a working hypothesis (Haining et al., 1998). Exploratory variables are socio-economic and geographical factors against which travel choice behavior of the students is evaluated. The processed data is shown in terms of relative percentage.

² Mehran University of Engineering & Technology, Jamshoro.

³ Quaid-e-Awam University of Engineering, Science & Technology, Nawabshah.

⁴ Mehran University of Engineering & Technology, Khairpur Campus.

⁵ Institute of Business Administration, Sukkur.

Influence of Socio-economic factors on travel choice behavior

Influence of income/ pocket money over travel choice behavior

Table 3 shows monthly income, trip rate and preferred trip mode distribution. The largest proportion of female population, i.e., 31.86%, is in the average income category of ‘3001 – 5000’⁶; while the largest proportion of their male counterparts (i.e., 35.90%) is under income category of ‘above 7K’. This shows the relative difference in monthly income or pocket money among genders. Despite significant difference of income, majority of the both genders tend to make trip to their hometowns at similar rate, i.e., once a month. Traveling to hometown ‘once a month’ is observed as a dominant trend among both genders, however, the ratio of male students is bit high at 44.02%, while female students are at 40.71%. The second most favorable trip rate trend for both genders is ‘once a week’.

Table 3. Monthly income, trip rate and trip mode distribution

	Female Students					Male Students				
	1000 - 3000	3001 - 5000	5001 - 7000	Above 7000	Total	1000 - 3000	3001 - 5000	5001 - 7000	Above 7000	Total
<i>Trip Rate</i>										
Everyday	3.54%	6.19%	2.65%	4.42%	16.81%	7.26%	2.56%	2.14%	3.85%	15.81%
Once a Week	0.88%	8.85%	9.73%	7.08%	26.55%	3.85%	5.56%	6.41%	12.82%	28.63%
Fortnightly	3.54%	8.85%	3.54%	-	15.93%	1.28%	2.56%	3.85%	3.85%	11.54%
Once a Month	4.42%	7.96%	14.16%	14.16%	40.71%	6.41%	7.26%	14.96%	15.38%	44.02%
Total	12.39%	31.86%	30.09%	25.66%	100%	18.80%	17.95%	27.35%	35.90%	100%

Influence of household structure over travel choice behavior

Table 4 shows the household, trip rate and trip mode distribution. The largest proposition of both genders (i.e., 47.32% females and 52.12%

⁶ Income is in Pakistan rupee.

males) is having household structure of 6-10 members. A common pattern among both genders is found that as the number of family members increases, the number of usage of high occupancy vehicles (or simply public transport) also increases. Among modes of public transport, wagon attracts the largest proportion (i.e., 36.61% female and 36.02% males), which is then followed by train (i.e., 21.43% females and 27.97 males) and bus (i.e.17.86% females and 14.83% males). Relatively less number of students prefer private car/ taxi while traveling to their hometown.

Table 4. Household, trip rate and trip mode distribution

Trip Rate	Female					Male				
	Family members					Family members				
	3	4 - 5	6-10	> 10	Total	3	4 - 5	6-10	> 10	Total
Trip Rate										
Everyday	0.8 9%	8.04 %	7.14 %	-	16.0 7%	1.6 9%	5.08 %	7.20 %	2.12 %	16.1 0%
Fortnightly	0.8 9%	7.14 %	7.14 %	0.89 %	16.0 7%	0.4 2%	3.81 %	7.20 %	0.42 %	11.8 6%
Once a Week	0.0 0%	10.7 1%	12.5 0%	3.57 %	26.7 9%	3.3 9%	9.75 %	12.7 1%	2.54 %	28.3 9%
Once a Month	2.6 8%	11.6 1%	20.5 4%	6.25 %	41.0 7%	1.2 7%	8.90 %	25.0 0%	8.47 %	43.6 4%
Total	4.4 6%	37.5 0%	47.3 2%	10.71 %	100 %	6.7 8%	27.5 4%	52.1 2%	13.56 %	100 %
Tripe Mode										
Bus	0.89 %	7.14 %	5.36 %	4.46 %	17.8 6%	0.8 5%	3.39 %	8.90 %	1.69 %	14.8 3%
Wagon	1.79 %	12.5 0%	17.8 6%	4.46 %	36.6 1%	1.6 9%	8.90 %	18.6 4%	6.78 %	36.0 2%
Train	0.89 %	7.14 %	12.5 0%	0.89 %	21.4 3%	2.1 2%	7.20 %	14.8 3%	3.81 %	27.9 7%
Private Car/ Taxi	-	6.25 %	8.04 %	0.89 %	15.1 8%	1.2 7%	3.81 %	3.39 %	-	8.47 %
Motorbike	0.89 %	3.57 %	1.79 %	-	6.25 %	0.8 5%	3.81 %	5.08 %	0.85 %	10.5 9%
Other	-	0.89 %	1.79 %	-	2.68 %	-	0.42 %	1.27 %	0.42 %	2.12 %
Total	4.46 %	37.5 0%	47.3 2%	10.71 %	100 %	6.7 8%	27.5 4%	52.1 2%	13.56 %	100 %

The undelaying fact behind such household-public transport relationship is that the largest portion of national population is middle class; therefore, most of them cannot afford an individual vehicle.

The same table 4 shows the preferred travel mode of both genders. Surprisingly, both genders are found to have similar tendency in choosing mode of transport, i.e., wagon. Wagons are medium scale 16 seater vehicle which is a popular mode for traveling a distances up to 200 kilometers. The reason for its popularity is discussed later in the next section. The second most adopted mode of transport among both genders is train; which is usually preferred for safety and comfort over other public modes of transportation such as bus and wagon. Train is also preferred for longer distances.

The patterns of using private car/ taxi are found different for both genders. Female students tends to rely more on private car/taxis then their male counterparts, who prefer to use motorbike. Female students' preference for private car/ taxi is discussed in next section. A fewer number of female students have reported using motorbikes for traveling to their hometowns. Nevertheless, it should be noted that locally in Pakistan, females doesn't ride motorbike themselves; but rather, mostly, they are accompanied by their male relatives who drive bike.

Influence of geographical factors over travel choice behavior

Data illustrated by the table 5 shows significant difference in travel patterns among genders and among students of different universities. The difference is largely attributed to the geographical location of universities and locations of hometowns of students. It must be noted that universities in Sindh province have a defined quota for each provincial district; therefore each university contains a defined concentration of students from each district. Nevertheless, allocation of quota for each district varies for each university, and therefore certain universities have higher concentration of students from certain districts and vice versa.

Majority of the female students (i.e., 50%) at MUET prefer to travel every day to their hometowns. However, majority of their male counterparts prefer to travel once a month. MUET is situated at the town of Jamshoro that is 17 Km away from Hyderabad the second largest city of the province, and therefore it is assumed that majority of the female students either originates from there or residing in nearby smaller towns. Wagon and motorbike is mostly preferred mode among female students of MUET; however, motorbike is preferred largely by everyday commuters. Surprisingly, motorbike is not as preferred in male students of MUET, even it is one of the lowest preferred mode. Train is also attaining a low percentage, which is due to the fact that main railway line is located 10 kilometer away in the town of Kotri.

The utilization of train is high by both of the genders at QUEST (i.e., 37.38% female and 28.38 % male students), for the similar fact that the main railway line passes in quite close vicinity of the university. However, female students at QUEST still found preferring wagon over train. Such preference is due to the wide availability of wagon from usually more than one operator and associated ease of waiting and travel time. Unfortunately, train schedules in Pakistan are not very strict, and therefore a lot of uncertainty is associated with them. To avoid uncertainty, female students tend to prefer wagon, which is comparatively easily available due to their frequency.

The other two universities, i.e., MUETK and IBA, are located in a region infamous for poor law and order situation, which is found predominantly influencing over travel behavior of university students especially females. In MUETK 50% and in IBA 35.29% of the females students are found traveling to hometowns through private cars or taxis. Train is the second most preferred mode among female students of IBA, which is followed by bus and wagon. However, Train is relatively less preferred by the male students of MUETK and IBA. Tendency of females towards private car and taxi shows their perception of safety in a vague situation of poor law and order in territory. It is to be noted that trains might have inexact timings but it offers higher safety than ordinary wagons and buses operating in the region.

The highest trip rate tendency stays same for both genders at IBA. However, in MUETK most of the females prefer to daily outback from their hometown to the university, while male students prefer to stay on-campus and visit hometown once a month.

Table 5. Trip characteristics of different universities

Preferred travel mode	Female Students				Male Students					
	Ever yday	Onc e a We ek	Fortni ghtly	Onc e a Mo nth	Tot al	Ever yday	Onc e a We ek	Fortni ghtly	Onc e a Mo nth	Tot al
MUET										
Bus	5.56 %	-	-	11.11 %	16.67 %	3.57 %	7.14 %	7.14 %	7.14 %	25.00 %
Wagon	5.56 %	11.11 %	-	16.67 %	33.33 %	-	7.14 %	7.14 %	25.00 %	39.29 %

Preferred travel mode	Female Students				Male Students					
	Ever yday	Onc e a We ek	Fortni ghtly	Onc e a Mo nth	Tot al	Ever yday	Onc e a We ek	Fortni ghtly	Onc e a Mo nth	Tot al
Train	5.56 %	0.00 %	-	-	5.56 %	-	10.71 %	3.57 %	3.57 %	17.86 %
Private Car/ Taxi	11.11 %	-	-	-	11.11 %	-	3.57 %	3.57 %	3.57 %	10.71 %
Motorbike	22.22 %	5.56 %	5.56 %	-	33.33 %	3.57 %	-	-	-	3.57 %
Other	-	-	-	-	0.00 %	0.00 %	-	-	3.57 %	3.57 %
Total	50.00 %	16.67 %	5.56 %	27.78 %	100 %	7.14 %	28.57 %	21.43 %	42.86 %	100 %
<i>QUEST</i>										
Bus	-	1.35 %	2.70 %	12.16 %	16.22 %	2.22 %	2.22 %	2.22 %	8.15 %	14.81 %
Wagon	-	20.27 %	9.46 %	14.86 %	44.59 %	1.48 %	11.11 %	1.48 %	17.04 %	31.11 %
Train	1.35 %	4.05 %	6.76 %	16.22 %	28.38 %	2.22 %	12.59 %	2.96 %	20.00 %	37.78 %
Private Car/ Taxi	-	5.41 %	-	1.35 %	6.76 %	0.74 %	1.48 %	1.48 %	0.74 %	4.44 %
Motorbike	-	1.35 %	-	-	1.35 %	4.44 %	5.19 %	-	0.74 %	10.37 %
Other	2.70 %	-	-	-	2.70 %	-	0.74 %	0.74 %	-	1.48 %
Total	4.05 %	32.43 %	18.92 %	44.59 %	100 %	11.11 %	33.33 %	8.89 %	46.67 %	100 %
<i>MUETK</i>										
Bus	25.00 %	-	-	-	25.00 %	3.57 %	7.14 %	7.14 %	7.14 %	25.00 %
Wagon	-	-	-	25.00 %	25.00 %	-	7.14 %	7.14 %	25.00 %	39.29 %

Preferred travel mode	Female Students				Male Students					
	Everyday	Once a Week	Fortnightly	Once a Month	Total	Everyday	Once a Week	Fortnightly	Once a Month	Total
				00%	00%		4%	%	00%	29%
Train		-	-	-	-	-	10.71%	3.57%	3.57%	17.86%
Private Car/ Taxi	50.00%	-	-	-	50.00%	-	3.57%	3.57%	3.57%	10.71%
Motorbike		-	-	-	-	3.57%	-	-	-	3.57%
Other	-	-	-	-	-	-	-	-	3.57%	3.57%
Total	75.00%	-	-	25.00%	100%	7.14%	28.57%	21.43%	42.86%	100%
IBA										
Bus	11.76%	-	-	11.76%	23.53%	3.23%	-	-	3.23%	6.45%
Wagon		-	5.88%	-	5.88%	19.35%	9.68%	16.13%	19.35%	64.52%
Train	-	17.65%	5.88%	5.88%	29.41%	-	3.23%	-	12.90%	16.13%
Private Car/ Taxi	11.76%	-	5.88%	17.65%	35.29%	-	-	3.23%	3.23%	6.45%
Motorbike	-	-	-	-	-	6.45%	-	-	-	6.45%
Other	-	-	-	5.88%	5.88%	-	-	-	-	-
Total	23.53%	17.65%	17.64%	41.18%	100%	29.03%	12.90%	19.35%	38.71%	100%

Conclusions

This paper has attempted to understand travel choice behavior of non-local male and female university students in choosing trip rate and mode when they are traveling to their hometowns. A total of 352 responses are collected from four different universities of Sindh province in Pakistan.

Traveling once a month is found as preferred trend among both genders, apart from female students of MUET and MUETK, who have tendency to travel everyday between their homes and university. The preference of travel mode is recorded for commonly available transportation mediums. Wagon as a mode of traveling is almost universally preferred among students of both genders. The popularity of wagon is due to their wide availability, and its location of operating services. To many students, wagon is more or less like door to door service, as at most of the places wagon stations are located quite near to the universities; in comparison to other public transport mode such as bus and train. As bus occupies a larger spaces, their stations are located away from the city/ town center, therefore, students availing bus or train need to engage another modes of transport to reach city centers or their homes. Wagons, however, offer relatively lesser safety; and because of this reason, the areas where law and order is persisting situation, female students prefer private cars and taxis, such as in IBA and MUETK, or trains as in case of QUEST.

In comparison to females, train is a popular mode of transport among male students. Railway infrastructure in Pakistan is in deteriorating condition, and due to which their availability and timings are quite uncertain in comparison to other available modes. To avoid uncertainty, female students are found to alter their preference to wagon, bus or private cars.

References

- [1] Adeel, M., Anthony GO, Y. and Zhang, F., 2014. *Gender, mobility and travel behavior in Pakistan: Analysis of 2007 Time Use Survey* (No. 55474). University Library of Munich, Germany.
- [2] Boyd, B., Chow, M., Johnson, R. and Smith, A., 2003. Analysis of effects of fare-free transit program on student commuting mode shares: BruinGo at University of California at Los Angeles. *Transportation Research Record: Journal of the Transportation Research Board*, (1835), pp.101-110
- [3] Ewing, R., Schroerer, W. and Greene, W., 2004. School location and student travel analysis of factors affecting mode choice. *Transportation*

- Research Record: Journal of the Transportation Research Board, (1895), pp.55-63.
- [4] Haining, R., Wise, S. and Ma, J., 1998. Exploratory spatial data analysis. *Journal of the Royal Statistical Society: Series D (The Statistician)*, 47(3), pp.457-469.
- [5] Imran, M., 2010. Sustainable urban transport in Pakistan: an institutional analysis. *International Planning Studies*, 15(2), pp.119-141.
- [6] Klöckner, C.A. and Friedrichsmeier, T., 2011. A multi-level approach to travel mode choice—How person characteristics and situation specific aspects determine car use in a student sample. *Transportation Research Part F: Traffic Psychology and Behaviour*, 14(4), pp.261-277.
- [7] Limanond, T., Butsingkorn, T. and Chermkhunthod, C., 2011. Travel behavior of university students who live on campus: A case study of a rural university in Asia. *Transport policy*, 18(1), pp.163-171.
- [8] Rodríguez, D.A. and Joo, J., 2004. The relationship between non-motorized mode choice and the local physical environment. *Transportation Research Part D: Transport and Environment*, 9(2), pp.151-173.
- [9] Shannon, T., Giles-Corti, B., Pikora, T., Bulsara, M., Shilton, T. and Bull, F., 2006. Active commuting in a university setting: assessing commuting habits and potential for modal change. *Transport Policy*, 13(3), pp.240-253.
- [10] Shannon, T., Giles-Corti, B., Pikora, T., Bulsara, M., Shilton, T. and Bull, F., 2006. Active commuting in a university setting: assessing commuting habits and potential for modal change. *Transport Policy*, 13(3), pp.240-253.
- [11] Zhou, J., 2012. Sustainable commute in a car-dominant city: Factors affecting alternative mode choices among university students. *Transportation research part A: policy and practice*, 46(7), pp.1013-1029.