Comparing Factors Affecting Intra and Inter-City Travel Mode Choice of University Students[1]

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Abstract

With the enabling factors by globalization, people are traveling more than ever. Especially, young are traveling alone or with their peers more freely, easily and inexpensively. Even though there are studies available regarding the travel mode choice in some extend, there are gaps remain in the literature about factors affecting travel mode choice and in the university student sub-market. Part of this extensive study delves with the factors affecting travel mode choice intra and inter-city. A survey was conducted in class environment with university students in five universities in five cities in Turkey. Exploratory factor analysis results revealed three main factors for intra-city travel: Utility, Time and Psychosocial, and two main factors: Utility and Psychosocial for inter-city. Findings suggest that students weight more importance to all factors when traveling inter-city than intra-city.

Keywords: Travel Mode Choice, Intra-city, Inter-city, Students, Turkey

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Üniversite Öğrencilerine Ait Şehir İçi ve Şehirlerarası Seyahat Tercihlerini Etkileyen Faktörlerin Karşılaştırılması

Öz

Küreselleşmenin etkisi ile insanların her zamankinden daha çok seyahat ettikleri gözlenmektedir. Özellikle gençler arkadaşları ile birlikte daha özgür, daha kolay, daha ucuza seyahat etmektedirler. Literatürde seyahat türü seçimine ilişkin çalışmalar olmasına rağmen özellikle üniversite öğrencileri alt piyasasında seyahat türü seçimini etkileyen faktörlere ilişkin yapılan çalışmalar yetersizdir. Alandaki eksikliği kapatmaya çalışan bu çalışmada şehir içi ve şehirlerarası seyahat türünü etkileyen faktörler ortaya konmaya çalışılmıştır. Araştırmanın anket çalışması 5 farklı şehirde yer alan 5 farklı üniversite öğrencilerine sınıf ortamında uygulanmış ve keşifsel faktör analizi sonuçları şehirlerarası seyahat türünü etkileyen fayda, zaman ve psikososyal faktörler ile şehir içi seyahat türünü etkileyen fayda ve psikososyal faktörlere ulaşmıştır. Sonuçlar, öğrencilerin şehir içi seyahat söz konusu olduğunda tüm faktörlere daha fazla önem verdiğini ortaya koymuştur.

Anahtar Kelimeler: Seyahat Türü Seçimi, Şehirlerarası, Şehir İçi, Öğrenciler, Türkiye

Introduction

Economic, psychological and social factors affect customers' preferences almost every decision about the consumption of goods and services. Travel market is a part of service industry in which decisions are made by customers considering many factors. Indeed, in many travel choice studies undertaken with general public, the unit of analysis is the individual. In the literature, studies treat mode choice as an application of consumer choice theory grounded in the notion that people choose among alternatives to maximize personal utility or net benefit to themselves. Although student travel market worth millions of dollars business, it has not been researched sufficiently (Chadee and Cutler, 1996). In general, little is known about the travel preferences of university students (Shoham, Schrage, and van Eeden, 2004) and factors affecting these preferences.

A literature review on university student's travel mode choice shows that previous studies have focused on four main areas. They can be classified as students' travel motives and their influence on travel decisions (Kim and Jogaratnam, 2002; Klenosky 2002; Smeaton *et al*. 1998); associations between motivation and related variables (Josiam *et al*. 1999); travel patterns and favored activities (Carr 2002, Hsu, and Sung 1997, Field 1999, Kim and Jogaratnam 2003, Michael, Armstrong, and King 2003, Shoham, Schrage, and van Eeden 2004); travel satisfaction (Babin and Kim 2001, Bai *et al*. 2004). In general, studies conclude that student travelers present a profitable market with different needs and desires. This market also has different patterns of travel and motivation. Therefore, further research in this market should be undertaken with a multi-dimensional perspective (Kim, Oh, Jogaratnam, 2007) including factors affecting travel mode choice.

In order to fill above mention gap in the literature, an extensive study exploring university student's travel mode choice in general and factors affecting intra and inter-city travel mode choices has been undertaken. This paper specifically emphasizes and reports on factors affecting intra and inter-city travel choices. Furthermore, it compares the importance of factors in deciding between two different travel types.

Literature Review on Student Travel

It has been suggested that people not only use a travel mode because it provides them with the quickest, easiest and cheapest way to get to their destination, they also make a choice of mode based on feelings of excitement and pleasure (Ellaway *et al.,* 2003; Sandqvist, 1997; Steg *et al*., 2001). University students are a social group that tends to have unique and complex travel behavior. With considerable freedom in the campus environment students are essentially autonomous in their decision making relating to their daily activities with minimal control from the university authorities and their parents. They live, study, socialize with their peers; thus decisions on daily activities of students are regularly affected by their peers. At their age they are open-minded and receptive to new

ideas from colleagues with various backgrounds and mixed interests. All these factors cause university students to have complicated daily schedules, resulting in complex travel patterns (Limanond, Butsingkorn, Chermkhunthod, 2011).

According to Richards and Wilson (2003), around one-fifth of all tourism journeys in the world are made by young people aged 15–25 years, among which students account for a big percentage. The experiences of young travelers today also provide an important basis for their travel decisions later in life. Because of students' increasing numbers, and their increasing disposable income and mobility nowadays, the student segment is an attractive one to travel and tourism companies, and hence, warrants further research (Hobson and Josiam, 1992; Chadee and Cutler, 1996; Sung and Hsu, 1996; Josiam *et al.,* 1998; Field, 1999; Bai *et al*., 2004).

To understand the university student's travel behavior, it is necessary to analyze the decision-making process and factors affecting each step of the process. According to widely used models of the consumer decision-making process (Engel *et al.,* 1978; Howard and Sheth, 1969; Moutinho, 1987), customers are motivated by particular needs and desires leading to search for information, the evaluation of alternative and the choice of product. Moreover, the individual decision will be influenced by a range of personal, social, market, economic and cultural factors (Xu, Morgan and Song, 2009). Selecting the travel mode choice from which customers derive the greatest utility (or satisfaction) is subject to time and budget constraints. Also decisions about travel modes are affected by the level-of-service that is a function of the time, cost, comfort, and other attributes of the mode used and of the route traveled (Adler and Ben-Akiva 1979).

Johansson, Heldt, and Johansson (2006) tested the significance of five individual specific variables' importance for travel mode choice: environmental preferences, safety, comfort, convenience, and flexibility. Results confirmed that modal time and cost are significant for travel mode choice but respondents indicated that preferences for flexibility and comfort are also very important.

Grand (2008) explored the transportation habits of university students in the USA to develop a model of transportation mode choice for trips of 100 miles and more by investigating that whether or not there is a correlation between the urban form in which a student resides and previous use of transit, opinions of transit and willingness to use transit were it free. More specifically, the author sought to identify variables that determine the choice, measure them and quantify their effects. Three main sets of considerations were reasoned to affect the travel mode choice: 1) financial considerations, 2) availability and accessibility of service by different modes and 3) preferences for different types of transportation service, i.e., supply and demand. The author segmented market demands into business and non-business. Auto, air, bus, common carrier and rail were subjected to paired comparisons for non-business and business trips. The percentage favoring auto over common carrier was 77 per cent for non-business trips and 47 per cent for business trips. In contrast, the proportion favoring air over auto rises was 10 per cent for non-business trips and 53 per cent for business trips. The author concluded that preferences of the travel mode choice changed as distance to be traveled is increased.

Aarts, Verplanken, and Knippenberg (1997) studied the role of habit in the process of information use underlying daily travel mode choices. Based on the 'policy capturing' paradigm, 82 university students performed a multi attribute travel mode judgment task, in which they could use information about travel circumstances to make a number of judgments. Results showed that habit reduced the elaborateness of information use in judgments of travel mode usage.

In their study of Hunecke *et al*. (2001) applied the Schwartz Norm Activation Model (Schwartz, 1977) to a special kind of environmental behavior, namely travel mode behavior. Travel mode choice has become an important topic within the research of environmentally relevant behavior. The objective of Limanond, Butsingkorn, Chermkhunthod (2011) is to investigate the travel patterns of university students with a case study of a rural university in Thailand. Their study aimed to examine various aspects of travel behavior including trip generation, mode split,

travel distance, and travel time. Lastly, Ewing, Schroeer, and Greene's (2004) study is the first to examine the relationship between mode of travel to school and the full range of factors that might affect mode choice.

Klöckner and Friedrichsmeier (2011) explored travel mode choice in a student sample on four frequent trips: To the university, to work, to the favorite leisure activity, and to the favorite shop. The decision to use the car in a contrast to alternative travel modes is modelled for each individual trip using a two-level structural equation model with trip specific attributes on Level 1 and person specific attributes on Level 2. The study aimed to not only combine the two perspectives on travel mode choice but also the two levels of analysis by modeling travel mode choice both on the disaggregated trip level and the aggregated person level at the same time. According to the authors car availability was an important predictor of travel mode choice that is neither new nor surprising. The easier a car can be accessed at the point in time when the decision is made, the higher, in general, the likelihood that a car is used. Similarly, Simma and Axhausen (2001) were able to show that a car availability is a powerful predictor of both the percentage of car use and the distance travelled. Furthermore, Ben-Akiva and Boccara (1995) showed that car ownership is a more binding constraint of travel mode choice than accessibility of public transportation systems. Van Acker and Witlox (2010) showed that car ownership serves as a mediator between socio-economic/demographic variables built environment characteristics and car use.

Green, Morris and Wade (2012) studied the impact of course related travel among nursing students across the UK and overseas. Findings indicated that cost, convenience and reliability found to be key factors in choice of transport for traveling to both university and practice placements necessitating the use of a car because of the fact that paucity of public transport and unreliability.

Chen (2012) conducted a statistical analysis of the weekday travel behavior and associated activities specifically for university students. Through this empirical study, the author made recommendations on how to improve the existing travel demand models. Chen argued that findings

set the initial stage for ultimately developing comprehensive activity-based travel demand models in the university students travel market.

Nkegbe's *et al*. (2012) work utilized the multinomial logit-regression to study travel mode choice of 384 non-residential university students in Africa, specifically in Ghana. Findings showed that distance of stay, travel time to campus, mother's level of education, amount earned by mother, and amount charged to students statistically affect the possibility of walking, riding a motorbike or taking a bus to campus.

Bamberg, Ajzen and Schmidht (2003) explored travel mode choice behaviour of university students in Germany with a longitudinal study. The study focused on a high-opportunity behavior such as taking the car or bus to go to campus. It also examined the effects of an intervention designed to increase the number of students riding the bus rather than driving their cars. Results demonstrated the utility of the theory of planned behavior as a conceptual framework for predicting of travel mode choice and for understanding the effects of an intervention on this behavior. Furthermore, attitudes, subjective norms, and perceived behavioral control were found to affect the student's intentions to take the bus to the campus. Introduction of a prepaid semester bus ticket proved to be an effective intervention, more than doubling the proportion of students riding the bus to the campus, rather than driving their cars.

As can be seen from this literature review, there is no study that has investigated factors affecting inter and intra-city travel mode choice in a single study. Also, there is no study that compares the importance of factors that play role in deciding travel mode choice in two different travel types namely intra and inter-city travel. Therefore, this study aims to explore these two understudied areas together.

Methodology and Findings

In order to achieve aforementioned goals, a survey developed from the literature and findings of ten exploratory interviews was conducted in five universities in five cities in Turkey namely Istanbul, Ankara, Konya,

Kutahya and Eskisehir. Total 400 questionnaires were distributed and applied in a classroom environment, but 377 usable returns were received. Data was subjected to statistical analysis namely, paired sample t-tests, exploratory (EFA) and confirmatory (CFA) factor analysis, ANOVA, and independent samples t-tests. An earlier version of the paper was presented at a conference during which it was suggested that the missing values should be replaced with mean values before further analysis, which was done.

As can be seen in Table-1, respondents are almost evenly distributed in gender and family car ownership.

Table 1. Sample Characteristics

	N	**%**
Gender		
Female	192	50.9
Male	185	49.1
Having driver license		
Yes	168	44.6
No	209	55.4
Family car ownership		
Yes	194	51.5
No	183	48.5
University type		
Public	234	62.1
Private	143	37.9
Personal Income and/or Allowances		
Below 200 Euros	160	42.4
200 – 400 Euros	175	46.4
Above 400 Euros	42	11.2
Family Income		
Below 400 Euros	41	10.9
400 – 800 Euros	104	27.6
801 – 1200 Euros	90	23.9
1201 – 1600 Euros	39	10.3
Above 1600 Euros	103	27.3

Around 45 percent has a driver license and two-thirds are studying in public universities. Almost 90 percent of the respondents have an income or allowances below 400 Euros per month. Lastly, family income figures indicate that only ten percent of the students come from the poorest families in Turkey. On the other hand, 27 percent of university students are coming from higher income families.

Eight factors were identified from the literature and exploratory interviews. Mean scores and paired sample t-test results are shown in Table-2. As can be seen in the table, means scores are higher in all eight factors in inter-city travels. In other words, students consider these eight factors more seriously when they decide their travel modes on inter-city than intra-city travels. In order to see whether there are statistically meaningful mean differences, paired-sample t-tests were utilized. Results indicate that there are significant differences in five factors, but environmental concerns, feeling free and reducing stress factors are not statistically significant.

Table 2. Comparing Factors Affecting Intra and Inter-city Travels

Factors	**Travel Type**	**Mean**	**t scores**	**Sig. (2-tailed)**
Price	Intra-city Inter-city	3.94 4.10	-3.886	0.001
Safety	Intra-city Inter-city	4.07 4.34	-5.908	0.001
Comfort	Intra-city Inter-city	3.80 4.22	-9.243	0.001
Speed	Intra-city Inter-city	4.04 4.14	-2.373	0.018
Prestige and Status	Intra-city Inter-city	2.90 3.19	-6.146	0.001
Environmental concerns	Intra-city Inter-city	3.29 3.30	-0.14	0.889
Feeling free	Intra-city Inter-city	3.29 3.35	-1.146	0.252
Reducing stress	Intra-city Inter-city	2.99 3.04	-0.89	0.374

In order to reduce the list of factors to the basic dimensions, the data was subjected to two exploratory factor analysis by using Principal Component Analysis Extraction Method with Varimax Rotation. The first one presented in Table-3 shows the results of the intra-city travel factors and the second one is the results of the inter-city travel factors in Table-4. As tables indicate, all statistics are supporting the use of factor analysis that reduced the number of reasons from eight to three and two, respectively. KMO test scores are also at the high end of the scale indicating that sampling is adequate. The Chi-square score of Bartlett's test of sphericity are quite high with very high level of significance. Also, Cronbach's Alpha scores indicating reliability of the measurement scales are above the acceptable percentage. Even though the total variances explained by three and two components (66% and 59%, respectively) seem relatively low, Hair *et al*. (1995) argue that it is common for social scientists to consider a solution which accounts for 60% or even in some cases even less of the total variance a satisfactory solution.

Table 3. Exploratory Factor Analysis for Intra-City Travel

Components	**Individual items**	**Loadings**		
Psychosocial α**= 0.79**	*Feeling free*	0.899		
	Reducing stress	0.865		
	Environmental concerns	0.655		
	Prestige and status	0.560		
Utility α**= 0.58**	*Safety*		0.780	
	Price		0.733	
	Comfort		0.575	
Time α**= NA**	*Speed*			0,933
	Eigenvalues	3,08	1,23	1,03
	Variance explained (%)	37,9	15,5	12,9
KMO= 0.750; **Chi-Square** = 667; **sig.** = 0,0001				

First exploratory factor analysis results grouped eight items under three components for intra-city travel (Tables 3). Hair *et al*. (1995) argue that naming of the components is not scientific and it is usually left to the researcher's subjectivity. However, the factor loadings indicating the correlation of each variable and component can provide some bases since the higher the factor loading, the more representative of the component is the variable. *Utility* components represent economic factors and comfort issues. *Psychosocial* components are related with travelers' psychological well-being in, and interaction with, their social environment. *Time* stands out as a single component. The reason for this can be that cities that researched was done are known with a heavy traffic problem such as Istanbul and Ankara.

After conducting first exploratory factor analysis and refining the factor structure, the data was subjected to further analysis on AMOS to test factor structure. As can be seen in Table 4, having a $\chi 2/df$ ratio just above acceptable limits of 2 and 5 (Marsh and Hocevar 1985) and IFI and CFI values near 0,90 (Hu and Bentler, 1999) factor structure indicate an acceptable fit. However, RMSEA value is over 0,06 that is the recently accepted cut-off criteria, but some has found an RMSEA of between 0,08 and 0,10 is acceptable fit (MacCallum *et al.,* 1996). From these results, the intra-city travel factor structure is not robust enough indicating that there are more factors affecting intra-city travel modes which need further inquiry.

Table 4. Confirmatory Factor Analysis for Intra-City Travel

Chi-square/df	**CFI**	**NFI**	**IFI**	**RMSEA**
5,293	0,89	0,87	0,89	0,101

Table 5 presents second exploratory factor analysis results. As can be seen eight items were loaded under two components for inter-city travel: Utility and Psychosocial.

Table 5. Exploratory Factor Analysis for Inter-City Travel

Components	Individual items	Loadings	
	Feeling free	0.870	
Psychosocial	*Reducing stress*	0.843	
α= 0.82	*Environmental concerns*	0.758	
	Prestige and status	0.646	
	Safety		0.762
Utility	*Price*		0.554
α= 0.67	*Speed*		0.720
	Comfort		0.736
	Eigenvalues	3.39	1.32
	Variance explained (%)	42.3	16.5
KMO= 0.795; **Chi-Square** = 808; **sig.** = 0,0001			

Again after conducting second exploratory factor analysis and refining the factor structure, the data was subjected to further analysis on AMOS to test factor structure. As can be seen in Table 6, the inter-city travel factor structure is robust. In other words, findings of confirmatory factor analysis confirm factor structure assessed by the second exploratory factor analysis.

Table 6. Confirmatory Factor Analysis for Inter-City Travel

Chi-square/df	CFI	NFI	IFI	RMSEA
4,153	0,93	0,91	0,93	0,092

Several more analysis were run to see whether variables presented in Table-1 make a difference in the importance of components affecting travel mode choice. Results of independent samples t-tests (having a driver license, car ownership, and university type) and ANOVA tests

(personal income and family income), reveal no statistically significant differences, except gender. Table-7 shows results of t-tests about gender. As can be seen in the table, females statistically give more weight to components in deciding which travel mode to choose than males in all factors, except psychosocial and time components in intra-city travel.

Table 7. Independent Sample Statistics and T-tests

Factors	**Mean**	**Std.Dev.**	**t scores**	**Sig.**
Inter-City Travel – *Utility*				
Female	4,27	0.44	2,54	0.012
Male	4,12	0.67		
Intra-City Travel – *Utility*				
Female	4.02	0.61	2,85	0.005
Male	3.82	0.72		
Inter-City Travel – *Psychosocial*				
Female	4.03	0.54	3.07	0.002
Male	3.84	0.60		
Intra-City Travel – *Psychosocial*				
Female	3.18	0.88	1.26	0.21
Male	3.06	0.92		
Intra-City Travel – *Time*				
Female	4.10	0.83	1.24	0.21
Male	3.98	0.98		

Conclusion and Discussion

There are millions of university students in the world. Even though the number is vast, there are neither enough studies related to the student's travel preferences nor factors that affect travel mode choice in different travel types. After literature review, it was clear that there need to be more studies undertaken in this important market. After identifying these gaps, an extensive research project was undertaken in which these findings are a part. Integrating exploratory interview findings with the existing

literature resulted eight factors along with traveler characteristics that play role in the choice of travel mode. Eight factors were subjected to exploratory and confirmatory factor analysis which reduced these factors to three main components for the intra-city travel and two main components for the inter-city travel.

Analyses show that when university students make a choice on travel modes, they take this issue seriously regardless of travel type. Both factor analyses show that university students take two main components, namely *utility* and *psycho-social*, into consideration when they take their travelling decisions. This result supports the previous literature in the area. On the other hand, speed accepted here as *time* component stood separate in the intra city travelling. This may be a result of heavy traffic problems in the cities that the study was conducted. One of the important findings comes to surface when the gender difference is explored. Female students consider both *utility* and *psycho-social* components statistically more seriously than male students. Furthermore, *utility* components are weighted more important than *psycho-social* components regardless of gender and travel type by students. More specific results show that five (price, safety, comfort, speed, and prestige and status) out of eight explored factors indicated statistically meaningful mean differences of the factors between intra and inter-city travelling. However, safety and speed are the most important factors affecting both intra-city and inter-city travelling modes.

The findings have important implications for theory and practice. For theory, there is a need for further studies which will take multi-disciplinary approach to the area. Also, there is a need for cross-cultural studies as each society has its own values affecting the decision making process. This research has taken the consumer's perspective, but also it may be studied from suppliers and policymakers perspectives. Since travelling will be more and more with increasing globalization and new technologies, suppliers and policymakers will need more information about the customers of this industry. These types of studies may provide much needed information to all parties that have a stake in this field

to make effective and optimal decisions. Similar studies on sub-market (e.g. elderly or handicapped) could supply very important and valuable information to policy makers which in turn they could use to organize government future policies in the travel sector to have the best outcome for whole society.

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