ATTITUDNAL ANALYSIS OF FACTORS INLFUENCING OUT-OF-CITY TRAVEL

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ABSTRACT

Attitudes and perceptions of travellers have been found to influence the trip making behaviour of travellers with respect to their choice of mode and destination. The attribute preferences of out-of-city travellers from two cities in India were studied. The travel attributes considered were 'Travel Cost', ' Travel Time', 'Privacy', 'Comfort', 'Accessibility', 'Intercity Connectivity' and ' Safety'. Three methods viz. mean scores, Scaling theory of successive categories and factor analysis were adopted for analysis It was observed that higher importance to 'safety' and 'privacy' was attributed by mode users across the distance bands considered. It was noted that as the distance of travel increased, 'travel time' and 'travel cost' found place amongst the influencing variables. The ease of travel characterised by privacy', 'comfort' and 'intercity connectivity' were found to have an important role in travel for distance between 250 km and 1000 km. Upgrade services in travel modes were found to be selected by users when the travel distance increased beyond 1000km. An understanding of hierarchy of preferences is necessary for designing a sustainable transportation system.

Keywords: Attitudinal Variables, System variables, Scaling theory, Factor Analysis, Out-of-city travel, India

1.0 INTRODUCTION

A trip that is made to a place located outside the municipal limits of a city, with any purpose and by any mode either for a short or long duration, with or without a temporary stay requirement is defined as a out-of-city trip. This type of travel includes decisions at three levels namely, destination choice, mode choice and accommodation type, if required. Trip making behavior, pertaining to the choice of mode and destination has been found to be influenced by socio-demographic characteristics and attitudes and perceptions of the travellers (Johansson et al., 2005). Number of studies has been done regarding the role of attitude on the preference for a destination and mode chosen for a trip. Transport Research Series (2006) has studied the travel behaviour of visitors to Scotland in order to understand the role of customer satisfaction and service quality in mode choice. It was hypothesized that personal factors, system factors and external factors (destination specific factors) influence the choice of a mode. It was concluded that distance was the most frequently cited attribute affecting the decision making when choosing recreation objects. The role of transportation supply variables such as cost, frequency, time, accessibility, comfort and reliability in the choice of a mode have been highlighted by Capon et al., (2003). Economic driven reasons have been identified as the mode selection criterion for visits involving Visiting Friends and Relatives (VFR) by Cohan and Harris (1998). An empirical analysis of intercity business trips incorporating trade-offs between improved security levels and increased travel times have been taken up by Srinivasan et al., (2006). A stated preference survey was conducted and it was observed that individual who hold positive impressions about security measures are more likely to fly but the utility of air mode decreases with increasing inspection and boarding time. The effect of destination attributes on inter city mode choice behaviour was studied by Chiang et al., (2003). It was observed that transfer quality at the destination was one of the factors which influenced the traveller's mode choice decision. However, travel time and travel cost had been given the least preference by the travellers. Hanqin (2003) investigated Hong Kong residents' preferences toward destination choice of outbound leisure travel. A factor analysis was used to identify the dimensions of destination selection attributes and the one way analysis of variance with Duncan's multiple range tests was run to test the difference among specific groups of travellers. It was found that the dimension of safety is the top concern for Hong Kong residents when they choose travel destinations. Respondents with different demographic backgrounds were found to have different destination attribute preferences.

It is observed from the studies that the there is a need to assess the attitudinal preferences of the travellers pertaining to out-of-city travel and the level of importance accorded to transportation supply variables which influences their choice of mode. In this respect, this paper discusses the level of importance given by out-of-city travellers to attitudinal factors and travel attributes with respect to the mode chosen for the travel and distance to be travelled.

2.0 STUDY AREA AND DATA

The data used for the study have been collected from two locations in North India (Delhi and Roorkee) (Meena, 2009) with the purpose of understanding the behaviour of travellers with respect to out-of-city travel and mode choice behaviour of travellers. The relative locations of the study area are shown in Figure 1.The survey was conducted in two educational institutions in Delhi and Roorkee namely, Indian Institute of Technology Roorkee and Indian Institute of Technology Delhi among the faculty, staff and students. A total of 787 data samples (6.4% of the total) were collected, the identification criteria being a random selection from amongst the various groups. A face-to-face interview was conducted to collect out-of-city travel information using Personal Digital Assistants (PDAs).

The respondents rated travel and attitudinal factors like travel time, travel cost, privacy, comfort, accessibility from home, inter-city connectivity and safety on a 5- point Likert type scale. The level of importance defined as 'Less Important', 'Moderately Important', 'Important', 'Highly

Important' and 'Extremely Important' increased with scale. The actual travel distance for out-of-city trips from Roorkee and Delhi were classified into five distinct categories namely 26-100 km, 101-250 km, 251-500 km, 501-1000 km and greater than 1000 km. Travel modes considered were air, train, bus, rented car (taxi), self-driven car (SDC) and two-wheeler (TW). The categorized sample is shown in Table 1.

Figure 1: Map showing the study locations

Table 1: Sample Size

Mode / Distance Band	Air	Bus	Train	Taxi	Self Driven Car	Two Wheeler	Total
25-100 km	-	41	6	7	7	4	65
101-250km	-	79	49	13	4	2	147
251-500km	4	75	82	9	6	-	176
501-1000km	9	6	125	-	-	-	140
>1000 km	52	-	207	-	-	-	259
Total	65	201	469	29	17	6	787

The demographic profile of the data is given in Table 2.

Table 2: Demographic Profile of Respondents

Description	Sample (%)	Description	Sample (%)
Gender		**Education Status**	
Male	97.46	Upto Degree	48.44
Female	2.54	Degree and PG	40.96
Age		Higher than PG	10.66
12- 25	49.87	**Occupation**	
25-60	48.60	Faculty	10.65
60 +	1.53	Staff	25.53
		Students	63.82

3.0 METHODOLOGY

Three analysis techniques, Mean scores, Scaling Theory of Successive Categories and Factor Analysis have been used to estimate the relative importance the users attribute to different factors. The average of the scores given by the respondents to the various travel attributes on the 5-point Likert type scale indicates the Mean scores. The Scaling Theory of successive categories, proposed by Thurstone in 1928 (Maurin, 1998) has been used to quantify the scores of various attributes based on perceived relative importance ratings. This method of analysis makes use of the assumption that the distribution of responses to a stimulus is normal on the psychological continuum. Relative weights related to the level of importance of each of the attributes were found out using the following procedure:

1. Arrange the raw frequency data in a table where the rows are instances (questions) and the columns the categories. Columns should be in rank order, with Column 1 representing the least favourable category, etc
2. Compute relative cumulative frequencies for each row, and record these in a new table. The last column of this new table will consist of 1's and may be omitted
3. Treating these values as leftward areas under a Normal (0, 1) curve, go to a table of the normal distribution and find the z values for these areas. Record these in a new n by (m-1) table. This is the z_{ij} array for the computations which follow.
4. For each row i in the z_{ij} array, compute the row average, $\overline{z_i}$
5. For each column j in the z_{ij} array, compute the column average. Call these column averages b_j,
6. Compute a grand average of all the values in the z_{ij} array. This is readily done by simply averaging the column averages. Call the grand average X.
7. Compute X*= sum from j = 1 to m-1 of (bj -X) squared
8. For each row, compute Y_i = sum from j = 1 to m-1 of (z_{ij}-z_i) squared

9. For each row, compute the square root of (X /Y_i). This is an estimate of the standard deviation of the response for the question. This is the score (weight) of the particular attribute.

Factor Analysis was performed using the statistical software, Statistical Package for Social Sciences (SPSS), Version 6.0 (Fiddler et al., 2007). The factor analysis was conducted on the pooled data set of responses from travelers in the various distance bands. Principal component analysis and varimax rotation with Kaizer normalization were used to identify the factor dimensions. Factor loadings of 0.5 were used as the criteria for item exclusion. Those components having an eigen value greater than 1.0 have been identified as the components of the various attributes.

4.0 ANALYSIS OF ATTRIBUTE IMPORTANCE

Respondents have marked the relative importance for different attributes on a qualitative scale based on the travel mode used by them for travelling a certain out-of-city travel distance. The analysis, therefore, has been done with respect to the travel distance and the travel modes that are found competing with each other in that distance band. The results are discussed in the following sub-sections.

4.1 DISTANCE BAND 26-100 KM

Bus is observed to be the major and dominating travel mode in this distance band. All other modes are competing at a level of 6-10%. Air based mode is not used in this distance band and hence not considered for comparison purposes. The attribute preferences observed using the mean values of scores, scaling theory and factor analysis are given in Table 3. According to mean scores, ‘safety’, in general, is rated at higher importance as compared to other attributes by all travellers, irrespective of their travel mode. Bus and two-wheeler users accorded highest importance to ‘safety’, whereas other mode users placed it at a higher level only. ‘Travel time’ is another factor that is generally rated at a higher level by most of the travellers except those travelling by train, who rated ‘travel cost’ at higher level than ‘travel time’. Self-driven car users have given equal importance to ‘comfort’ and ‘intercity connectivity’ as given to ‘travel time’. The scaling theory of successive categories, when quantifying the scores on a scale of 0-1, indicate a preference for ‘privacy’ by the bus, two-wheeler and train users. ‘Safety’ appears to be given higher importance by self-driven car users while taxi users indicate ‘intercity connectivity’ as their preferred attribute. ‘Safety’ is given importance by all mode users, other than self-driven car users. Self-driven car users attach additional importance to ‘comfort’ and ‘travel cost’ whereas taxi users also gave additional importance to ‘comfort’. The factor analysis of seven attributes produced two components which accounted for 62.96%, 81.39% and 84.81% of the variance in the data for the bus mode, self-driven car and train mode users. The factor analysis was not performed for taxi and two-wheeler modes on account of insufficient data. All the positive factor loadings were found to be greater than 0.60 indicating a good relationship between the items and the grouping to which they belong to. The bus, self-driven car and train users have accorded highest loading by factors ‘accessibility’ and ‘intercity connectivity’ on component-1. The component-2 is loaded highly by factors ‘privacy’ and ‘comfort’ in case of self-driven car users, whereas, it is loaded negatively by ‘travel cost’ in case of bus users. The case of train users show a mixed loading on component-2, wherein ‘travel cost’ and ‘ privacy’ are causing negative effect and ‘ safety’ and ‘travel time’ causes positive effect.

4.2 DISTANCE BAND 101- 250 KM

Bus is found to be the predominant travel mode by users in this distance band followed by train. The comparative analysis of results from mean scores, scaling theory and factor analysis are shown in Table 4. According to the mean scores, ‘safety’ is accorded the highest score by all mode users. The second priority has been given to ‘travel time’ by all mode users. The factor analysis of the seven factors produced two components which accounted for 58.06%, 79.76% and 63.52% of the variance in data of bus, taxi and train users. The results from the analysis using scaling theory indicate that ‘safety’ is given the highest preference by self-driven car and two-wheeler users while ‘privacy’ is given the highest importance by bus, train and taxi users. ‘Safety’ has been given a higher priority by bus, train and taxi users. Factor analysis indicate that ‘comfort’, ‘accessibility’ and ‘ intercity connectivity’ get heavily loaded on component -1 in case of bus and train users while ‘travel cost’, ‘travel time’ and ‘ privacy’ are found loading heavily on component-2 for train and taxi users. ‘Accessibility’ and ‘safety’ load heavily on component -2 for taxi users, while a negative loading of ‘safety’ is observed on component -2 in case of train users.

Table 3: Preference Scores for 26-100 km Distance Band

Attributes	Mean Scores					Scaling Theory of Successive categories					Factor Analysis					
											Bus		SDC		Train	
	Bus	SDC	Train	Taxi	TW	Bus	SDC	Train	Taxi	TW	FL (1)	FL (2)	FL (1)	FL (2)	FL (1)	FL (2)
Travel Cost	2.85	2.43	3.33	3.00	2.50	0.064	0.130	0.118	0.006	0.099		(-) 0.899				(-) 0.771
Travel Time	3.39	3.29	2.67	3.14	3.25	0.067	0.107	0.118	0.009	0.118	0.697		0.942			0.742
Privacy	1.88	3.00	1.83	2.29	1.75	**0.475**	0.073	**0.280**	0.037	**0.334**	0.723			0.925	0.662	(-) 0.681
Comfort	3.05	3.29	2.83	2.86	3.00	0.058	0.148	0.116	0.009	0.068				0.885	0.665	0.737
Accessibility	3.10	3.14	2.50	3.00	3.00	0.094	0.054	0.089	0.012	0.068	0.885		0.950		0.986	
Intercity Connectivity	3.15	3.29	2.50	3.00	3.00	0.113	0.107	0.089	**0.888**	0.068	0.899		0.942		0.986	
Safety	**4.37**	**3.71**	**3.83**	**3.57**	**4.25**	0.128	**0.380**	0.191	0.039	0.245	0.567		0.541	0.617		0.875

4.3 DISTANCE BAND OF 251-500 KM

In case of travellers in the 251-500 km band, it is observed that train and bus modes are competing with each other with an equal share for both modes while a lesser share by taxi, self-driven car and air modes. The mean values of the preferences of the travel attributes and the scores calculated as per the scaling theory of successive categories are given in Table 5. The mean scores indicate that highest preference is accorded to 'safety' by all mode users. 'Travel time' was accorded higher preference by all mode users. An equal importance was accorded to 'comfort' and 'accessibility' by self-driven car users while 'intercity connectivity' was given equal preference to 'travel time' by taxi and air mode users. The results from scaling theory indicate that 'safety' was given highest preference by all mode users except by self- driven car users who considered 'travel cost' as an important attribute. 'Privacy' was given higher preference by bus, train and taxi users while 'comfort' and 'intercity connectivity' were given higher preference by air mode users. The factor analysis of the seven attributes produced three components in case of bus, self -driven car, taxi and Air mode users, while two components were identified in the case of train mode, the details of which are shown in Table 6. The factor analysis indicated higher loadings of 'accessibility' and 'intercity connectivity' on component-1 for bus and self-driven car users. 'Comfort',' accessibility' and 'privacy' are loading heavily on component-1 for taxi users, while 'comfort' loads heavily on component-1 for train users. 'Safety' is heavily loaded on one of the components for bus and taxi users. 'Travel time' and 'Travel cost' have been heavily loaded on component -3 by self-driven car users, while 'travel cost' load heavily on component-2 for taxi users. Equal and higher loading on 'travel cost' and 'accessibility' are observed on one of the components for air mode users. Negative loadings are also observed, of 'travel cost' for bus users and 'travel time' for air mode users.

Table 4: Preference Scores for 101-250 km Distance Band

Attributes	Mean Scores					Scaling Theory of Successive categories					Factor Analysis					
											Bus		Train		Taxi	
	Bus	**SD Car**	**Train**	**Taxi**	**TW**	**Bus**	**SD car**	**Train**	**Taxi**	**TW**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**
Travel Cost	2.61	2.75	2.86	2.54	2.50	0.128	0.045	0.083	0.196	0.117		0.719		0.582	0.914	
Travel Time	3.44	4.00	3.51	3.77	4.00	0.113	0.084	0.099	0.075	0.107		0.645	0.720		0.924	
Privacy	2.04	2.50	1.92	2.77	2.00	**0.273**	0.033	**0.407**	**0.266**	0.107		0.737	0.642		0.801	
Comfort	3.13	3.25	3.08	3.62	3.00	0.096	0.032	0.084	0.104	0.080	0.734		0.863		0.756	
Accessibility	2.95	3.00	3.00	3.15	3.00	0.095	0.023	0.085	0.041	0.080	0.784		0.854			0.896
Intercity Connectivity	3.08	3.25	3.08	3.23	3.00	0.113	0.032	0.090	0.076	0.080	0.756		0.870		0.650	
Safety	**4.29**	**5.00**	**4.27**	**4.77**	**4.50**	0.183	**0.752**	0.153	0.241	**0.428**	0.552			-0.732		0.855

Table 5: Preference Scores for 251-500 km Distance Band

Attributes	Mean Scores of Attributes					Scores using Scaling Theory of Successive categories				
	Bus	**SDC**	**Train**	**Taxi**	**Air**	**Bus**	**SDC**	**Train**	**Taxi**	**Air**
Travel cost	2.67	2.33	2.70	2.44	2.50	0.092	**0.608**	0.135	0.069	0.098
Travel Time	3.39	3.67	3.63	3.44	3.75	0.093	0.042	0.133	0.109	0.000
Privacy	2.00	3.17	2.38	2.22	3.50	0.237	0.052	0.153	0.198	0.073
comfort	3.08	3.67	3.33	3.11	3.75	0.083	0.042	0.115	0.086	0.160
Accessibility	2.92	3.67	3.20	3.22	3.25	0.075	0.081	0.102	0.064	0.069
Intercity Connectivity	2.97	3.50	3.20	3.44	3.75	0.089	0.041	0.109	0.068	0.160
Safety	**4.24**	**4.50**	**4.33**	**4.78**	**4.75**	**0.331**	0.134	**0.253**	**0.406**	**0.439**

Table 6: Factor Analysis of Attributes for 251-500 km Distance Band

	Bus			SD car			Taxi			Train		Air		
	FL (1)	**FL (2)**	**FL (3)**	**FL (1)**	**FL (2)**	**FL (3)**	**FL (1)**	**FL (2)**	**FL (3)**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**	**FL (3)**
Travel cost			-0.547			0.892		0.970			0.910	0.973		
Travel Time		0.784				0.936		0.865		0.708			-0.938	
Privacy			0.744	0.567	0.726		0.896			0.688		0.743	0.646	
Comfort			0.668	0.554	0.653		0.942			0.833			0.922	
Accessibility	0.949			0.920			0.918			0.720		0.973		
Intercity Connectivity	0.965			0.948	0.97				0.817	0.745				0.977
Safety		0.857		0.687		0.612			0.861	0.625			0.637	0.670

4.4 Distance Band of 501-1000 km

In case of travellers, travelling in the 501-1000 km band, it is observed that train mode predominates over bus and air modes. The comparative analysis of results concerning the preferences of the travel attributes are shown in Table 7. The mean scores of the analysis indicate highest priority to 'safety' by bus and train users while 'travel cost' has been accorded the highest preference by air mode users. A higher priority to 'travel time' was observed for all mode users with 'privacy' being accorded equal status by air mode users. However, the scaling theory results indicate that 'privacy' followed by 'safety' are important attributes for bus and air users while train users indicated more importance to 'travel cost' followed by 'travel time'. The factor analysis of the seven attributes has identified two components. Higher loadings of 'accessibility' and 'inter-city connectivity' are observed for bus users by one of the components and of 'privacy' on another component. 'Comfort' and 'intercity connectivity' loads heavily on one of the components for train users. 'Travel cost' loads heavily on component -2 for train and air mode users. 'Comfort' and 'safety' load equally on one of the components for air mode users.

Table 7: Preference Scores for 501-1000 km Distance Band

Attributes	**Mean Scores**			**Scaling Theory of Successive categories**			**Factor Analysis**					
							Bus		**Train**		**Air**	
	Bus	**Train**	**Air**	**Bus**	**Train**	**Air**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**
Travel cost	2.50	2.44	**2.89**	0.201	**0.398**	0.118	0.859			0.870		0.979
Travel Time	3.83	3.51	2.56	0.068	0.339	0.056		0.736	0.674			0.889
Privacy	2.17	2.16	2.56	**0.255**	0.087	**0.394**		0.826	0.669		0.625	0.737
comfort	3.50	3.20	2.00	0.066	0.030	0.056	0.807		0.752		0.898	
Accessibility	3.33	3.02	2.22	0.087	0.037	0.055	0.963		0.645		0.760	0.596
Intercity Connectivity	3.00	3.10	2.22	0.082	0.030	0.157	0.904		0.768		0.760	0.596
Safety	**4.50**	**4.38**	1.56	0.241	0.079	0.166		-0.902	0.504		0.887	

4.5 Distance Band of greater than 1000 km

In case of travellers travelling for distances greater than 1000 km, it is observed that train mode predominates over air mode. The mean values of the preferences and results from scaling theory and factor analysis are given in Table 8. The mean scores of the attributes indicate that 'safety' is a most preferred attribute followed by 'travel time' for the users of both modes. The results from the scaling theory indicate a higher preference for 'safety' by air users, which is closely followed by 'travel cost' and 'travel time' while train users attach importance to 'travel time' and 'travel cost'. The factor analysis of attitudinal preferences of the users in the travel band of greater than 1000 km has yielded two components for train and air users. The factor analysis results indicate higher loadings of 'comfort' and 'intercity connectivity' on one of the components and 'travel cost' on the other component for train users. In case of air mode users, higher loadings were observed of 'accessibility' on one of the components by air mode users and of 'safety' on the other component. Negative loading of 'travel cost' is observed on one of the components for air mode users.

Table 8: Preferences for greater than 1000 km distance band

Attributes	**Mean Scores**		**Scaling Theory of Successive categories**		**Factor Analysis**			
					Train		**Air**	
	Train	**Air**	**Train**	**Air**	**FL (1)**	**FL (2)**	**FL (1)**	**FL (2)**
Travel cost	2.69	2.56	0.361	0.197		0.760		-0.777
Travel Time	3.59	4.02	**0.452**	0.151	0.621		0.614	
Privacy	2.41	2.52	0.070	0.114	0.633			0.519
comfort	3.24	3.46	0.029	0.106	0.727		0.711	
Accessibility	3.10	3.31	0.018	0.085	0.617		0.858	
Intercity Connectivity	3.29	3.63	0.030	0.102	0.764		0.762	
Safety	**4.41**	**4.42**	0.040	**0.245**	0.659			0.770

5.0 Findings of the Study

The preferred attributes identified by the three methods of analysis for different travel modes in different travel distances are summarized in Table 9. The relative choices made for an attribute in different distance bands are shown in Figure 2.

Table 9: Major Attributes preferred in Distance Bands for different Travel Modes

Distance Band (km)	2W			SDC			Taxi			Bus			Train			Air		
	M	**ST**	**F**	**M**	**S**	**F**	**M**	**S**	**FA**	**M**	**ST**	**F**	**M**	**ST**	**F**	**M**	**S**	**F**
26-100	7,2	3,7	-	7,2	7,4	2,5	7,2	6,7	-	7,2	3,7	5,6	7,1,2	3,7	7,	-	-	-
101-250	7,2	7,1,2	-	7,2	7,2	-	7,2	3 7	5,7	7,2	3,7	5,6	7,2	3,7	6,	-	-	-
251-500	-	-	-	7,2	1,7	5,6	7,2	7,3	1,4,7	7,2	7,3	5,6	7,2	7,3	4,	7,2,6	7,4	1,5,4
501-1000	-	-	-	-	-	-	-	-	-	7,2	7,3	5,6	7,2	1,2	1,	1,2,3	3,6	1,2,7,
> 1000	-	-	-	-	-	-	-	-	-	-	-	-	7,2	7,1	1,	7,2	7,1	5,7,1

Factor Codings : 1 – Travel Cost, 2- Travel Time, 3- Privacy, 4- Comfort, 5- Accessibility, 6- Intercity Connectivity, 7 – Safety
MS: Mean Scores; ST: Scaling Theory; FA: Factor Analysis

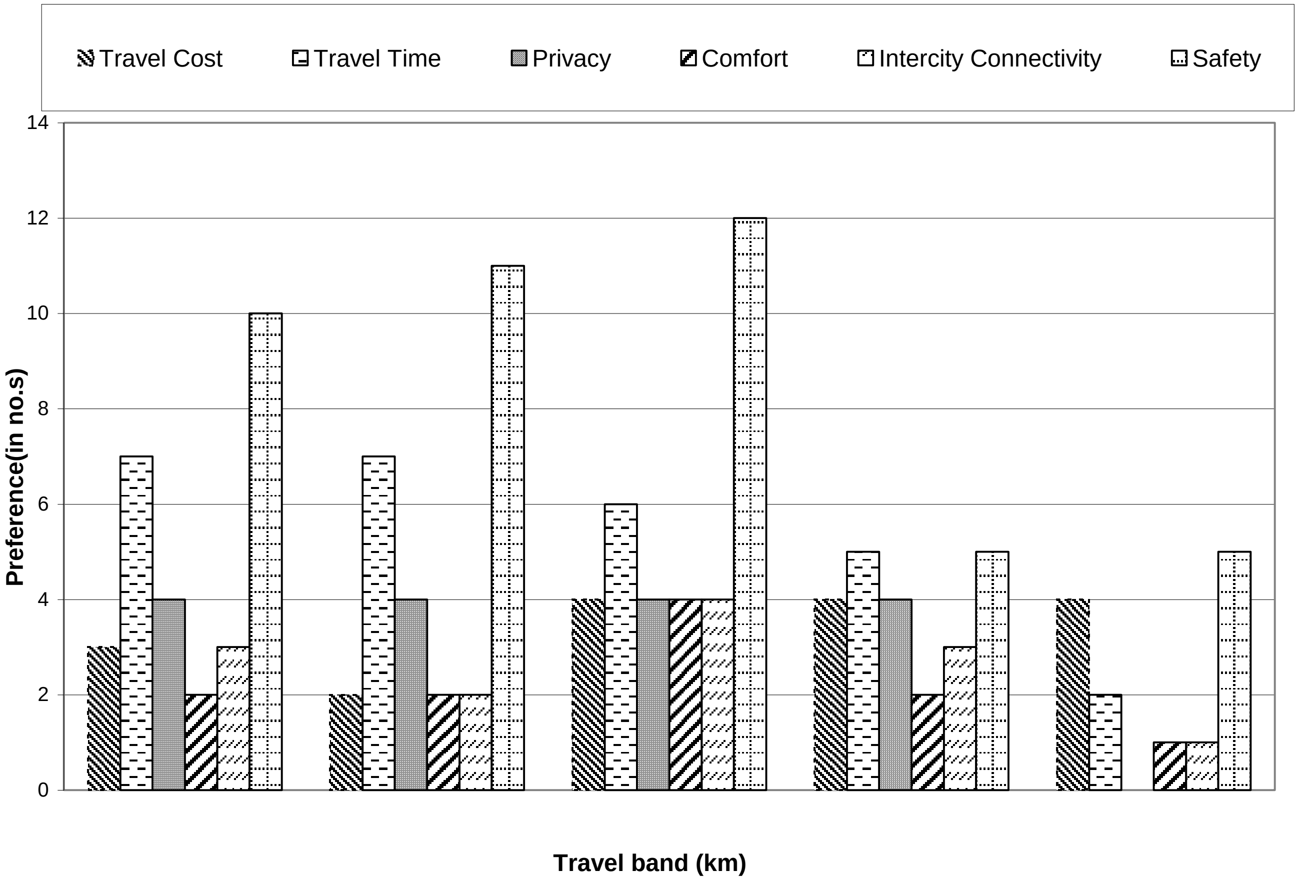

Figure 2: Most Preferred Attributes with respect to Travel Distance

The analysis indicates that in the distance band of 26-100 km, all the mode users gave highest importance to 'safety', higher importance to 'travel time' and importance to 'privacy'. Travel attributes such as 'travel cost' and 'comfort' have been found to have very less influence on the mode choice behaviour of travellers in this distance band. This may be due to short distance travel that can be covered within 0.5-2.0 hours, thus making 'cost' and 'comfort' immaterial. Similar preferences are observed in the distance band 101-250 km. This suggests that out-of-city travel of upto 250 km should be analyzed as one category, if it is an attitude mapping study. In case of travel mode choices, the two distance bands should be treated separately as mode choices are found varying and controlled by mode availability, system attributes and economic status of the traveller (Meena, 2009). In the distance band of 251-500 km, 'safety' is the most influencing variable for mode choices followed by 'travel time', 'travel cost', 'privacy', 'comfort' and 'intercity connectivity' which appear as important influencing variables, unlike in the previous distance band. This is obvious because the travel time increases beyond the 'ease of travel' limits, ranging between 04.00 – 08.00 hours depending upon the travel mode (excluding air). The traveller, therefore, starts giving importance to the attributes, which contribute to the ‘ease of travel’. In the distance band of 501-1000 km, ‘travel cost’, ‘travel time’ and ‘privacy’ are identified as important influencing variables among the various mode users. Basically public transport modes like bus and train and air are competing with each other in this distance band. The traveller is found optimizing at two levels, one system attribute level (travel time and travel cost) and the other ‘ease of travel’ level (safety and privacy). Comfort during travel is probably derived indirectly through travel cost by way of opting higher services. For travel in distance band of ‘greater than 1000 km’, ‘travel cost’ and ‘safety’ are identified as the important influencing attributes by the users of the two travel modes i.e. train and air, which competes in this distance range. It is also observed that personalized modes are more preferred for short distance travel probably on account of their characteristics such as faster and more private travel. ‘Travel Cost’ has been identified to be a consistently favourite attribute by train and air users. Though the travel by train entails lesser cost when compared to those by other modes, the importance given by air mode users to ‘Travel Cost’ is surprising. On closer scrutiny of the data, it was observed that a majority of the respondents in the category of users using the air mode have been reported as work related trips which would have been paid for by their parent institutions, with certain restrictions. Even in case the air travel cost is borne by the travellers themselves, they try to economize on that by opting for travel in economy class. Probably, the time has not come in India where air travel can act effectively as an alternative to other long distance travel modes. Higher loading statistics of low-fare airlines substantiate the above fact. Hence irrespective of their usage of the air mode, the users consider ‘Travel Cost’ as an important attribute.

6.0 Conclusions

The results of the analysis indicate that there is an overwhelming majority of the users who give importance to the concept of ‘safety’ and ‘privacy’ while choosing their travel mode. It is observed that as the distance band increases, ‘travel time’ and ‘travel cost’ finds place amongst the influencing variables and become important (solely) above 1000 km. ’Travel cost’ and ‘comfort’ are not influencing the mode choices, if travel is done upto 250km. ‘Ease of travel’ defined by ‘privacy’, ‘comfort’ and ‘intercity connectivity’ play an important role in travel for distance between 250 km and 1000 km. These lose measurable importance for travel above 1000 km by way of selection of upper grade services available in travel modes, which is indirectly indicated by higher importance given to ‘travel cost’. Examples to such selections may be upper air-conditioned services in trains and relatively higher cost seat in economy class travel by air.

Different preferences are observed on use of the three methods. This can be attributed to the fact that the scaling theory is based on normal – distribution, which imposes considerable limitation on applicability of cases where one-zero proportions are involved. The scaling theory has been found to be less reliable method for identifying the preferences of mode users when compared to factor analysis. Moreover it would be pertinent to note that factor analysis has a more robust mathematical basis when compared to the mean values of the scores and the scaling theory. Hence factor analysis results could be more reliably interpreted when compared to the other methods. More robust models such as the Rasch model and hyperbolic cosine unfolding Quasi-Rasch model (Transactions of the Rasch Measurement, 2002) would be more appropriate for analyzing attitudinal preferences. These would be examined to reach a method that gives rational results. This is a part of a research methodology, which is taken up as an academic interest, to arrive at the decision making process of travellers travelling out-of-city with respect to choice of destination, mode choices and stay options available. The examination of attitudinal factors is part of that study and a section of that is being discussed in this paper. It can be concluded that for designing a socially desirable and environmentally sustainable transportation system in line with people's preferences, transportation planners must increase their understanding of the hierarchy of preferences that drive individuals' choice in out-of-city travel.

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