ISSN: 2710-0588

Research on Customized Passenger Travel Behavior Intention based on Structural Equation

Fan Yang[1], Zhiyong Wang[2]

[1]Department of Traffic & Transportation, Chongqing Jiaotong University, Chongqing 400074, China

[2]Chongqing Highway Passenger Transport Network Ticket Center Co., LTD, China

Abstract

Customized passenger transport has become one of the important travel tools in recent years because it can meet the diversified travel needs of passengers. Chongqing Pleasant Line company opened customized passenger transport as the research object. The relationship between latent variables and travel behavior intention was analyzed. The structural equation model was constructed based on the TPB and TAM models, and 402 valid data were collected. The empirical analysis was carried out using SPSS software, which provided an important basis for satisfying passengers' travel behavior intention.

Keywords

Customized Passenger Transport; Structural Equation; Travel Behavior; Behaviral Intention.

1. Introduction

By December 2021, the country's highway transport passenger turnover was 362.75 billion person-kilometers, down 21.8% year on year. Data show that in 2021, the annual business passenger volume of 8.3 billion people was completed, down 14.1% year on year, in which the passenger volume of railway, waterway and civil aviation increased by 18.5%, 9% and 5.5% year on year respectively, and the passenger volume of highway decreased by 26.2% year on year [1]. There are many reasons for the sharp decrease of highway passenger traffic year by year; The rapid development of air and railway transportation has made the passenger volume of large buses plummet. In addition, people's demand for road passenger transport is more diversified, and the range of online car booking is only limited to cities. For inter-city travel, "black car" has become the first choice of transportation. Although the "black car" travel is more convenient, but this kind of illegal operation seriously damaged the social travel order, the safety of passengers also lost the corresponding protection. Relevant departments will adopt corresponding measures to integrate the information of enterprises, vehicles and drivers that have been given passenger service qualifications by relevant departments, so as to provide passengers with diversified travel needs. Customized passenger transport services emerge at the historic moment. Customized passenger transport service mode can be divided into pick-up mode and service process. The shuttle mode mainly includes door-to-door shuttle, fixed point shuttle, short distance shuttle and other ways to shuttle passengers.

The main steps of customized passenger transport service process are shown in Figure 1 below:

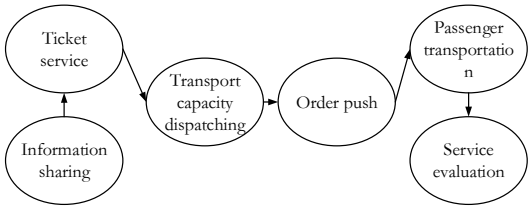

Figure 1. Process of customizing passenger service

ISSN: 2710-0588

2. Customized Passenger Travel Behavior Analysis Model

2.1. Model Assumption

This study integrated related concepts of Theory of planned behavior (TPB) and Technology acceptance model (TAM). Perceived usefulness, perceived ease of use, behavioral attitude, subjective norms, autonomous choice control, and behavioral willingness are selected as the core latent variables of the travel behavior analysis model. The following hypothesis is proposed for the path relationship of each latent variable, in which "+" represents a direct positive influence. As shown in Figure 2:

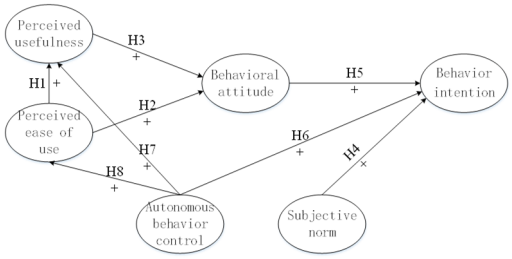

Figure 2. Customized passenger travel behavior hypothesis model

2.1.1. Model Variable Determination

The customized passenger travel behavior model contains 6 latent variables, and 3-7 observational variables are set for each latent variable. The observed variables corresponding to the 6 latent variables of perceived utility, behavioral attitude, autonomous choice control, perceived ease of use, behavioral willingness and subjective norms are identified by symbols PU, PE, ATU, SN, CT and BI.

3. Travel Behavior Survey

3.1. Questionnaire Survey

Customized passenger travel behavior survey design adopts Likert five-point scale method for measurement, that is, the numbers 1, 2, 3, 4, 5 represent "strongly disapprove, disapprove; Disapprove of; It doesn't matter; Be more in favor of Agree very much ", the questionnaire mainly involves the investigation of passengers' basic information characteristics, customized passenger transport basic information and travel behavior intention. In order to ensure the reliability and authenticity of the data, the questionnaire distribution mainly involved the random distribution of questionnaires near each customized passenger station and the distribution of questionnaires on the wechat official account. A total of 450 questionnaires were collected.

3.2. Questionnaire Collection and Processing Data

The collected questionnaires mainly identify invalid questionnaires and judge their feasibility. Blank questionnaires with more missing contents can be easily identified. The questionnaire also needs to be removed for those who choose one option in the full text of the questionnaire, fill in the answer at will, or have multiple questionnaires with the same answer. Finally, 402 questionnaires were collected and tested for reliability and validity.

3.2.1. Reliability and Validity Analysis

(1) Reliability analysis

Reliability is the degree to which the results are consistent when the same object is repeatedly measured using the same method. Cronbach coefficient is usually used as the index of reliability analysis. Cronbach coefficient was established in 1951 to evaluate the internal consistency of the questionnaire. The higher the reliability coefficient is, the more consistent, stable and

ISSN: 2710-0588

reliable the test results are. It is generally believed that the reliability coefficient should be between 0 and 1, and the reliability coefficient formula is as follows:

$$\alpha = \frac{K}{K-1}(1-\frac{\sum_{i=1}^{k} S_i^2}{S_p^2}) \quad (1)$$

Where:

K -- The number of observed variables contained in a latent variable

S_i^2 -- variance of each measurement item

S_p^2 -- total variance

The reliability test steps are as follows:

① Open the SPSS software and import the survey data collected in advance into the software.

② Choose Toolbar - Data - Scale - Reliability Analysis, and click Import all measurement items into the statistical column requiring reliability measurement, check out the indicators required by the paper in the statistical options, and read Kronbach coefficient.

Through observation, it is concluded that the coefficient of each measurement item is greater than 0.7, among which the coefficient of "PU3" is the lowest, which is 0.759. The Kronbach coefficients after deleting the items were all higher than 0.983, and the overall Kronbach coefficient was 0.984. Nunnally [2] believes that the coefficient greater than 0.7 indicates high consistency, indicating good consistency and high reliability of the questionnaire.

(2) Validity analysis

Generally, factor analysis is used to test validity analysis. Before factor analysis, we need to determine whether the data is suitable for factor analysis. At this time, SPSS KMO test and Bartlett spherical test are used to test the correlation between variables.

The validity test steps are as follows:

①Open the SPSS software, import the data into the software, and check whether the measurement items have missing values to prevent data errors.

②Select toolbar -- Analysis -- dimensionality reduction -- factor, import all measurement items into the statistical column that needs to measure validity, and check "KMO and Bartlett sphericity test" in the statistical options to obtain KMO and Bartlett sphericity test values. As shown in the following table:

Table 1. KMO and Barelett sphericity test value**s**

Test mode	Indicator	Value
KMO test	KMO sampling appropriateness measure	0.985
Bartlett sphericity test	Approximate chi-square	15080.227
	degree of freedom	276
	significance	0.000

Through observation, KMO value is 0.985 and Bartlett sphericity test value is 0.000. It is generally believed that KMO detection value greater than 0.7 and Bartlett spherical test P value less than 0.5 are suitable for factor analysis [3], indicating that the questionnaire item setting is very effective and suitable for factor analysis.

ISSN: 2710-0588

4. Construction of Travel Behavior System

4.1. Confirmatory Factor Analysis

The indexes of the structural equation model calculated by AMOS are shown in the table below:

Table 2. Test values of each index of structural validity

Evaluation index	CMIN/DF	RMSEA	GFI	AGFI	CFI
Standard values	1< Φ <3	<0.1	<0.9	<0.9	<0.9
Measured value	2.89	0.05	0.91	0.923	0.91

It can be seen from the table that evaluation indexes CMIN/DF, RESEA, GFI, AGFI and CFI all meet the range of standard values [4], indicating that the model has good external quality and good suitability.

4.2. Path Coefficient Analysis

After correcting the path coefficient, the standardized path coefficient can be obtained to analyze the significance of the effect between variables. Among them, the effects of each latent variable on behavioral intention are listed in the order from small to large: Independent choice control (0.12), subjective norm (0.40**) and behavioral attitude (0.85***), indicating that behavioral attitude has the most significant effect on behavioral intention, while independent choice control has no significant effect on behavioral intention, so H6 is not valid, and the other hypotheses remain valid. The effects of perceived ease of use and perceived usefulness on behavioral attitude were respectively (0.84***) and (0.31**), indicating that perceived ease of use had a significant effect on behavioral attitude, and perceived usefulness had a significant effect on behavioral attitude. As shown in Figure 5:

As can be seen from the standardized route analysis chart, the key to whether passengers will continue to take customized passenger transport next time depends on their behavioral attitude towards customized passenger transport, and perceived usability has a significant impact on behavioral attitude, indicating that Pleasant Bank takes full consideration of passengers' quick travel and provides a very simple operating interface in software Settings. However, perceived usefulness has no significant impact on behavioral attitudes. It may be thought that passengers think that travel costs have not been reduced much, and passenger transport companies need to consider adding some passenger services that passengers think are useful, so that passengers will be more willing to continue to choose customized passenger trips next time.

5. Conclusion

This paper mainly uses TPB and TAM models to build a customized passenger travel behavior model. Through data analysis, the relationship between latent variables and latent variables, and between latent variables and measured variables is verified. It provides an important basis for passengers to choose customized passenger travel. It is found that behavioral attitude has an important effect on behavioral intention, while perceived ease of use has a significant effect on behavioral attitude and perceived usefulness has no significant effect on behavioral attitude. Therefore, the management of passenger drivers and the reduction of travel cost should be emphasized. The perceived usefulness of passengers' independent selection of customized passenger transport is not significant. It should focus on whether passengers think it is beneficial to themselves in terms of independent selection, so as to bring better travel experience.

ISSN: 2710-0588

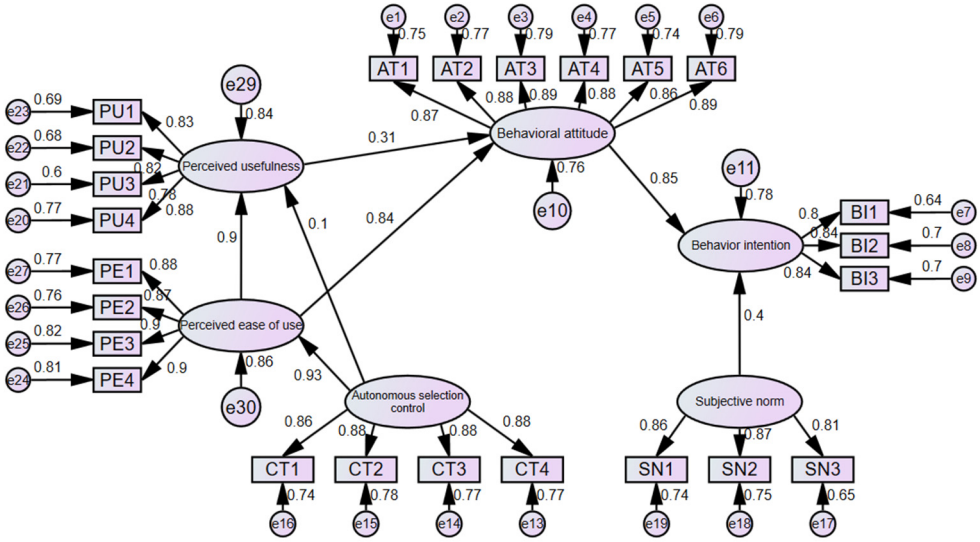

Figure 3. Standardized path diagram of customized passenger travel behavior

Acknowledgments

We thank Chongqing Communications Bureau.This work was supported in part by a grant from Chongqing Transportation Bureau Transportation Science and Technology Project “Chongqing Customized Passenger Transport Supervision System and Development Path”(2022-17).

References

[1] In research, industry research institute. The highway passenger transportation industry in China from 2022 to 2026 panoramic research and development strategy research and consulting report [EB/OL]. https://www.chinairn.com/report/20220426/100524552.html.2022-04.

[2] Nunnally J C . Psychometric Theory. 1967.

[3] Chen Jian, Li Rui, Fu Zhiyan et al. Analysis Model of Factors Influencing Passenger Satisfaction in Comprehensive Transportation Hubs [J]. Journal of Highway and Transportation Science and Technology,2021,38(11):117-125. (in Chinese).

[4] [Yang Liya, Shao Chunfu, Li Xia. Structural equation analysis of urban residents' travel mode choice.[J] journal of Beijing Jiaotong University,2011,35 (6) : 1–6.