THE MULTIGROUP ANALYSIS REGARDING USER PERCEPTION OF PARATRANSIT SERVICE

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Abstract: Paratransit is used extensively in almost all cities in Indonesia, as well as in many developing cities. The aim of this research is to explore user perceptions of paratransit operation, regarding quality of service, frequency of negative experience, and loyalty using multigroup analysis in SEM (structural equation modeling). As the previous studies by the authors found that the user of paratransit is dominated by the student, then this article intends to elaborate whether the student and non-student group have the same regression weights in the path analysis. The findings illustrate that the regression weights do not differ significantly between student and non-student, which eliminates the doubt of the bias resulted by the domination of one group among other groups. However, the other important finding from this model is the positive relationship between overall satisfaction and loyalty to use this mode in the future.

Key Words: *Structural equation modeling, Multi group analysis, User perception.*

1. INTRODUCTION

Paratransit is used extensively in almost all cities in Indonesia, as well as in many developing cities. The authors use the term paratransit in the rest of this article to refer to the mode that is owned and operated by private companies and individuals. In many cities in Indonesia, paratransit uses its local name and various types of cars, vans, and minibuses. Cervero (1998) expresses this mode as jitney. This mode is available to everyone, which is different from the US context that associates with government subsidized elderly or handicapped transport.

Traditionally, the exploration of transit is viewed from the perspective of technical performance (e.g. World Bank, 1987, among others). In addition, the studies regarding paratransit in developing countries are mainly concerned with topics such as management of the mode, benefit of minibuses (e.g. Walters, 1979), position of paratransit in the transport hierarchy (Cervero, 1998), relationship with poverty in the aspects of supply, demand, cost, and consequences (e.g. Kaltheier, 2002), relation with informality (World Bank, 2002), and unregulated transit services (Vuchic, 2005), among others.

However, the exploration should also measure the dimensions of service quality perceived by passengers, current and potential, as stated by Hensher et al. (2003) to consider the heterogeneity of the users. Unfortunately, most studies about transit's performance measurement were conducted using data from developed countries. The traced literature in researching the service quality of public transit using public perceptions in developing cities is very limited. The authors are not aware of any research studying the service quality of

paratransit in developing cities.

To our knowledge this study will be the pioneer in employing public perception to evaluate and explore the operation of paratransit. The authors' motive is to empower the citizen more, reveal their true expectations, and update the mode's suitability with the market, which used to be uncommon practice in developing countries. This motive bears a similarity to the concept of mobility management (see e.g. Litman 2003), which emphasized a constant exchange between stakeholders (Desmedt, 2000). Since the success of any business will ultimately be decided by its relevance to the market (Hensher and Brewer, 2001), it is clear that this study is an effort to update the knowledge regarding the market of paratransit.

The previous studies by the authors found that the user of paratransit is dominated by the student, i.e. more than 50% of the respondents. The authors believe that it is useful to explore whether there is difference perceptions between the student and non-student. Thus, the aim of this research is to explore user perceptions of paratransit operation, regarding quality of service, frequency of negative experience, and loyalty using multigroup analysis in SEM (structural equation modeling). Moreover, this article tries to explore the users' point of view to balance the judgment from other stakeholders. This article also aims to corroborate the authors' hypothesis regarding the existence of user loyalty to paratransit as a mode of transport in the cities of developing countries.

This article is organized in five parts. After the introduction, part 2 provides brief literature review regarding multi-group or multiple-sample analysis in structural equation modeling. A brief description of the data collection is provided in section 3. Estimation results of the models, accompanied by the significance tests, are discussed in section 4. In the last section, we discuss and conclude the findings of this study.

2. MULTIGROUP ANALYSIS IN STRUCTURAL EQUATION MODELING

Multigroup analysis for structural models is an extension of the multigroup CFA (confirmatory factor analysis) case (Hair et al., 2006). The main question addressed in a multiple-sample SEM is this: do values of model parameters vary across group? Another way of expressing this question is in terms of an interaction effect; that is, does group membership moderate the relations specified in the model? (Kline, 2005). The interest now focuses on similarities and differences between structural parameters indicating differences in relationship between the groups. Researchers often develop a theory that predicts that one or more structural relationships vary between groups (Hair et al., 2006). Typically, a hierarchy of nested hypotheses is tested and interactions (instances of differing relationships between groups) are pinpointed and tested precisely (Klem, 2000).

Kline (2005) said that perhaps the simplest way to address these questions is to estimate the same model within each of two or more different samples and then compare the unstandardized solutions across the samples. It is important to note that the unstandardized instead of standardized estimates should generally be compared when the groups differ in their variabilities. More sophisticated comparisons are available by using a SEM computer program that performs a multiple-sample analysis which simultaneously estimates a model across all samples (Kline, 2005). The method has two advantages over doing separate for each group (Arbuckle and Wothke, 1999). First, it provides a test for the significance of any differences found between groups. Second, if it can be concluded that there is no difference

between groups, or if the group differences concern only a few model parameters, multi group analysis provides more efficient parameter estimates than either of the two single-group models.

Under this model, the variances and covariances of the exogenous variables would still be allowed to differ between the groups while the regression weights are group-invariant (Arbuckle and Wothke, 1999). Models that restrict only the regression weights across groups appear in a number of statistical techniques. In analysis of variance, it is called a *main-effects* model. In analysis of variance, *homogeneity of within-group regression* is an important model assumption (Huitema, 1980; Winer, 1971; Arbuckle and Wothke, 1999).

In this study, the authors interest with the regression weights, and the authors hypothesize that the student and non-student have the same regression weights. The motivation for the group-invariant regression weights is likely that perceived factors of service quality have different variances and covariances among student and non-student. The authors also want to permit the other exogenous variables in the model to take on different variances and covariances across group. Under this multigroup, the author will evaluate whether a fixed unit change on an exogenous variable will always correspond to the same change of the endogenous variable(s). This is independent of whether the respondent is group A or group B. If the model is confirmed by the data, the same regression weights can be used for all groups, which simplifies the prediction of the endogenous variables. Another advantage to develop this multigroup model is that the regression weights themselves will be estimated more efficiently (Arbuckle and Wothke, 1999).

3. DATA

Data used in this study are the same with previous studies by the authors. The authors employed eleven-page questionnaire which has been distributed to one thousand user of paratransit in the city of Bandung, Indonesia. The data collection was conducted from 15-22 December 2005. The detail explanation regarding the method of survey, the questionnaire, and the data description has been reported in the previous article by Joewono and Kubota (2007a, 2007b, 2007c). As the way of clarity, the authors provide a list of factors and attributes of service quality as can be seen in Table 1, a list of variables of negative experience as appears in Table 2, and brief summary of data description as appears in Table 3. These tables explain the variables included in the following analyses. The value of variance and covariance used in the analysis are not provided in this article, since it takes a lot of space.

4. ANALYSIS

All analyses reported in this article are completed by employing AMOS software (Arbuckle and Wothke, 1999; Arbuckle, 2003), while all explanations are referring to literature in SEM, e.g. Thompson, 2000; Klem, 2000; Hair et al., 2006; Kline, 2005. The base model in this study employs the model reported in Joewono and Kubota (2007a). The relationship in the path analysis form is once again reported in this article as appears in Figure 1. The used of previous model is useful to clarify the difference between the model which is build with and without considering the groups among the sample. Figure 1 explains the relationship between aspects of quality of service with loyalty when all respondent are counted as one big sample.

Table 1 Factors and attributes of quality of service of paratransit (Joewono and Kubota, 2007b)

1. Availability (Av)
Wide of coverage area (Av1); Distance from and to stop (Av2); Suitability of linkage among route destination (Av3); Length of operation time in one day (Av4); Headway (influences the waiting time) (Av5); Availability of alternative mode (Av6)
2. Accessibility (Ac)
Barrier or disruption to use paratransit from pedestrian, street vendor, etc. (Ac1); Availability, completeness, and quality of stop (Ac2); The ease to enter the car (e.g., the ease to open the car-door, height of step) (Ac3)
3. Reliability (Re)
Length of waiting time in the first stop (Re1); Time punctuality (Re2); Length of staying on board (Re3); Length of transfer time (Re4); Number of delay because of car break down or other emergency case (Re5)
4. Information (Inf.)
The ease to get, availability, number, and media of information regarding the service (Inf1); Quality of information regarding the service, e.g. completeness, clarity, etc. (Inf2); Availability of information regarding route direction, e.g. map, route, etc. (Inf3); Availability of information regarding the service, e.g. fare, etc. (Inf4); Availability of information in emergency situation (Inf5)
5. Customer Service (Con)
The ease to submit complaint, request, opinion, etc. in normal day or holiday (Con1); Follow up and coordination regarding complaint, request, etc. (Con2); Crew's skill and ability including knowledge, coordination, and motivation (Con3); Crew's attitude in serving the customer, including politeness, honesty, etc. (Con4); Crew's help to the passenger, e.g. to move the luggage, etc. (Con5); Crew's help for special passenger, e.g. elderly, pregnant women, etc. (Con6); The ease for payment (Con7)
6. Comfort (Comf)
Air quality and temperature inside the car, including car noise (Comf1); Cleanliness inside the car from dust, garbage, or graffiti (Comf2); Quality and condition of material inside the care, e.g. seat, lamps, etc. (Comf3); Availability of supporting equipments, e.g. communication, entertainment, AC. etc. (Comf4); Design and arrangements of stop, the ease to move, and length of queue (Comf5); Design and arrangements inside the car, the ease to move, and sitting position (Comf6); Number of seat, which influence the crowdedness (Comf7); Comfort in trip from start until stop (Comf8)
7. Safety and security (Saf)
Overall security from criminal incident in day and night (Saf1); Availability and the ease to be observed by the officer, e.g. police (Saf2); Availability of emergency equipment, e.g. first aid, phone, etc. and the ease to use it (Saf3); Prevention from offensive action in stop or inside the car (Saf4); Overall safety from road accident (Saf5); The ease to observe the risky action of the driver, e.g. speeding (Saf6)
8. Fare
Suitability of fare structure with the mode using (Fare1); Total of expenses to use the service (Fare2); Advantage in using the mode compared to the expenses (Fare3); Saving because of using this mode compared to other modes (Fare4); Comparison the fare with your ability to pay (Fare4)
9. Environmental Impact (Env.)
Level of emission, noise pollution, and sight pollution (Env1); Level of cleanliness from dust, garbage, offensive odor, or graffiti (Env2); Level of resources consumption to operate this mode, e.g. fuel (Env3); Level of space consumption in this city for the operation of this mode (Env4); Level of congestion impact or disruption caused by this mode (Env5); Level of road accident caused by this mode (Env6); Level of road deterioration caused by this mode (Env7); Effect of this mode operation to the economic life of this city (Env8); Effect of this mode operation to the social, culture, politic in this city (Env9)

Two groups can be distinguished from the sample, i.e. the student and non-student subjects. The first analysis is the separate analysis for each group. This analysis is intended to find a suitable model for each of the group. Then, the second analysis is the simultaneous analysis using multigroup in SEM. This analysis is intended to test the hypothesis whether the perception of student and non-student perception is same or not. This first analysis is explained in more detail in section 4.1, while section 4.2 explains the simultaneous analysis.

Table 2 List of variables of negative experience, loyalty, and overall satisfaction (Joewono and Kubota, 2007c)

Variables
Difficulty in making use of stops
Unable to board as service is insufficient
The car does not operate because of a strike
Very long journey time, with/without an explanation offered
Experience a careless driver
Experience a conflict for various reasons
Difficulty in making trips because of unavailable or insufficient information
Difficulty in reaching information regarding the service
Experience an inconvenient car because of overcrowding
Experience a careless crew
Experience a car accident
Experience a criminal incident
Loyalty to use in the future, although business runs as usual
Loyalty to use in the future, when there is an improvement
Loyalty to use in the future, when there is a mode with higher standard quality and fare
Loyalty to recommend to others, although business runs as usual
Loyalty to recommend to others, when there is an improvement
Loyalty to recommend to others, when there is a mode with higher standard quality and fare
Overall satisfaction

Table 3 Data description of the respondents (n = 980) (Joewono and Kubota, 2007a)

Characteristics	Statistics
1. Sex	Male (58.3%), Female (41.7%).
2. Marital status	Married (29.3), Single (70.7%).
3. Age	< = 20-year-olds (44.8%), 21–30-year-olds (32.4%), 31–40-year-olds (15.2%).
4. Place of living	City area (80%), Municipality area (20%).
5. Family members	1 (9.8%), 2 (11.9%), 3 or more members (78.3%).
6. Education	Junior High School or less (19.9%), Senior High School (52.3%), and Diploma or higher (27.8%).
7. Job	Student (53.3%), civil servant (2.7%), entrepreneur (17.7%), employed in the private sector (9.6%), labor (6.2%), housewife (4%), other (6.6%).
8. Travel cost per trip (Indonesian Rupiah, IDR)	< 2,500 (25.3%), 2,500–5,000 (50.1%), 7,500–10,000 (18.4%), > 10,000 (6.2%).
9. Income (IDR)	< 1 million (39.4%), 1–2.5 million (36.5%), 2.5–5 million (14.7%), over 5 million (9.4%).
10. Motorized vehicle ownership	Did not own any car (50%), motorbike (32.9%), automobile (14.2%), other (3%).
11. Reason for making use of paratransit	Did not own any car in their family (47.8%), prefer to make use of paratransit (34.7%), unable to drive (17.6%).
12. Trip purpose	Study (46.9%), work (23.7%), shopping (11.7%), social activities (7.7%), and other (10%).
13. Number of trips using paratransit per day	Once (34.0%), twice (43.3%), and three times or more per day (22.8%).
14. The way to reach stop	Walking (81%), others (19%).
15. Overall satisfaction	Very dissatisfied (7.2%), dissatisfied (26.6%), neutral (50.7%), satisfied (13.5%), very satisfied (1.9%).

The typical model used in the next analyses is provided in Figure 2. It explains the selected factors in explaining the construct of overall satisfaction. The selection was based on the significance relation between the factors and the constructs. Moreover, the model also shows the relation between the construct of overall satisfaction with the aspects of loyalty. In this research, the construct of loyalty was explained by two factors with three conditions for each

factor. Different condition for each aspect of loyalty is provided as a way to test the hypothesis regarding the captive users. In addition, it is useful to find a notion regarding the specific requirement when the users have an intention to be loyal. Table 2 shows the complete list of condition for loyalty. More detail explanation of loyalty in this research can be found in Joewono and Kubota (2007b, 2007c).

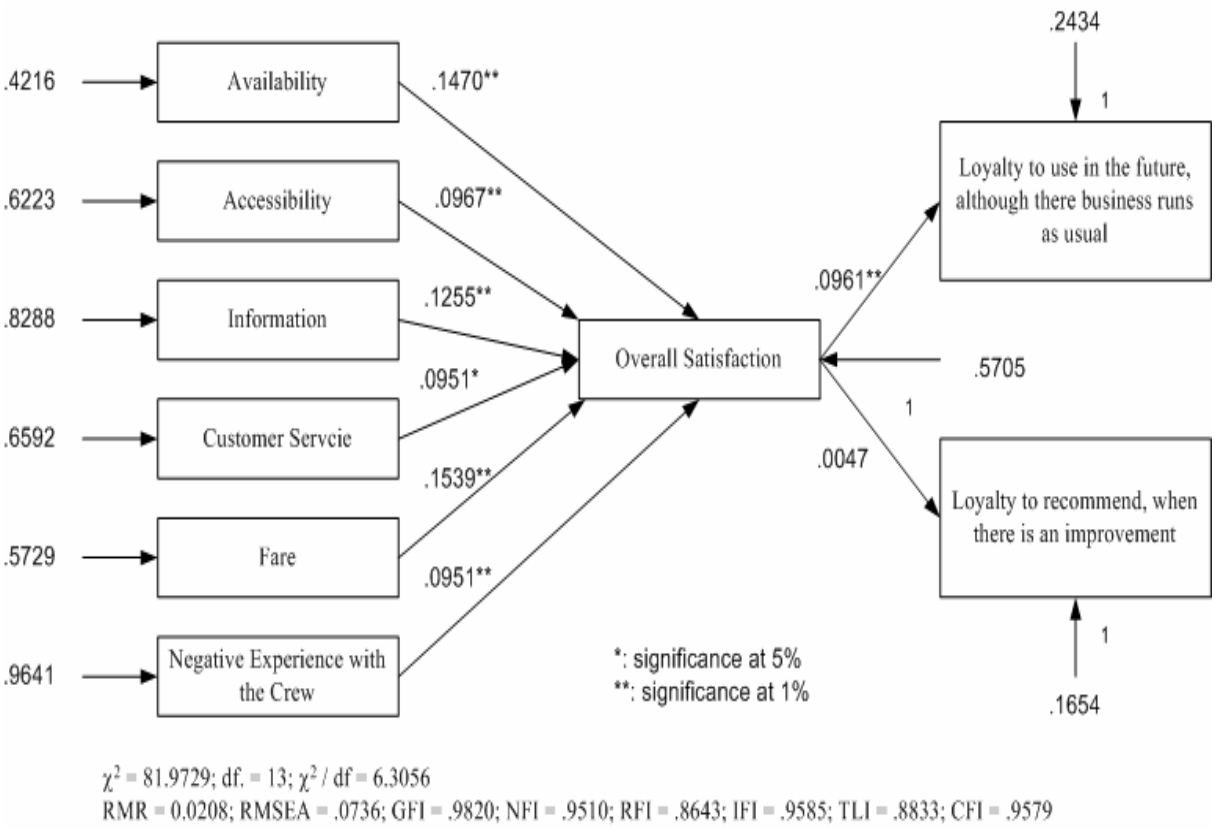

Figure 1 Relationship between aspects of quality of service with loyalty (Joewono and Kubota, 2007a)

The parameters involved in this analysis as appear in the following tables refer to the explanation in Figure 2. Each parameter in the following tables represents a specific relation. In addition, there are several notations for specific parameters as can be seen in Figure 2. The explanation of each notation in the path analysis follows a standard explanation of SEM analysis. The numbers at the tails of arrows represent the error variances, and the numbers beside the lines represent the magnitude of the effects (Klem, 2000).

As the way of clarification, path analysis consists of two types of variables, namely exogenous and endogenous. Exogenous variables are specified as causes of other variables, which their causes are unknown and thus are not represented in the model (Kline, 2005). In Figure 2, all factors which explain the overall satisfaction can be classified as exogenous. Unlike exogenous variables, presumed causes of endogenous variables are explicitly represented in the model (Kline, 2005). The variable of overall satisfaction can be categorized as endogenous variable. In addition, the variable of overall satisfaction also has a role as the cause of other endogenous variables, i.e. aspects of loyalty. This dual role is described in path analysis as an indirect effect or a mediator effect, which involve one or more intervening variables presumed to transmit some of the causal effects of prior variables onto subsequent

variables (Kline, 2005).

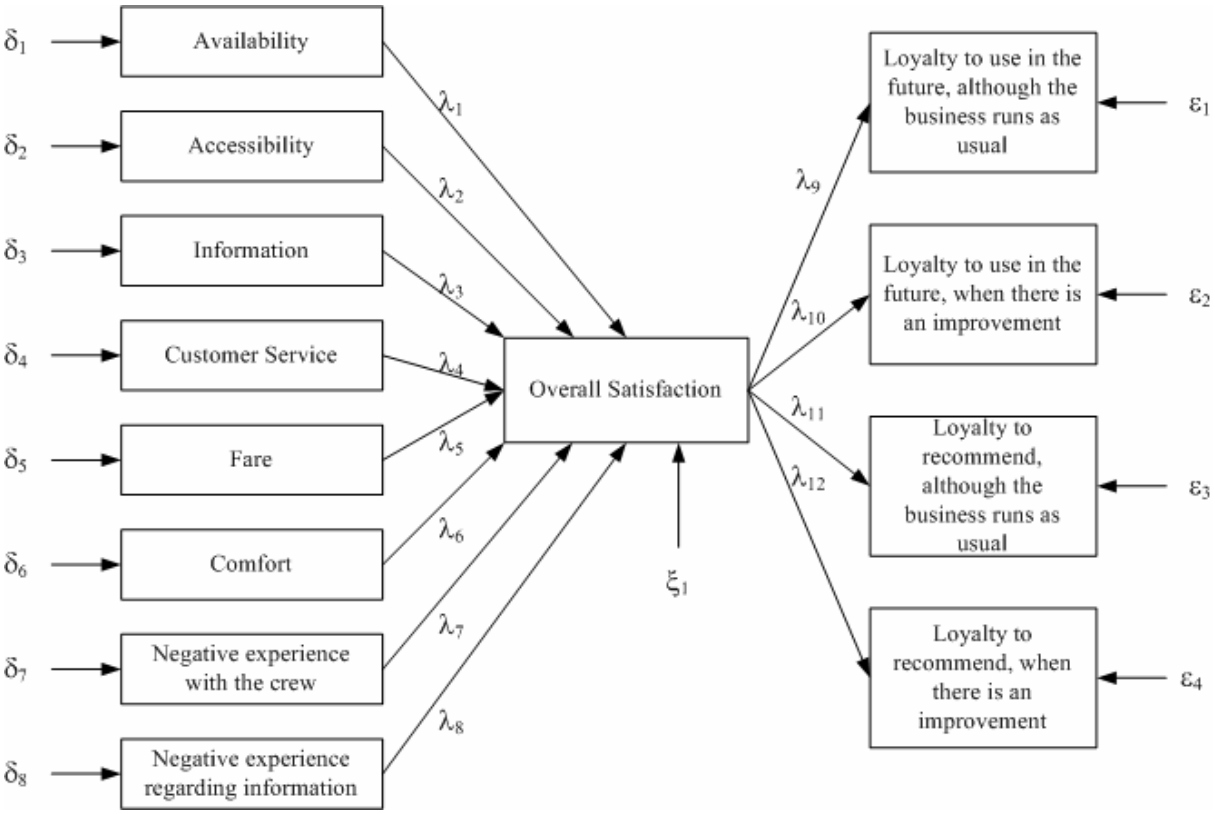

Figure 2 Structural model for the user perception of quality of service, overall satisfaction, and the loyalty

4.1 Single Analysis

In this section, single analysis is explained. Student and non-student sample were separated and the model for each sample is analyzed separately as well. Parameter estimates for student subjects and non-student subjects are provided in Table 4 and Table 5, respectively. Parameter estimates refer to the path diagram in Figure 2, which explains the notations used in the tables.

The two models have the χ^2 as much as 138.776 (df. = 21) and 126.795 (df. = 9), resulting in the models being rejected at .05. As the sample size is big, this result is not surprising, as has been discussed by Kline (2005). Both models have NC (normed chi-square) bigger than 5 for a reasonable fit, which the non-student model has a worse result. The RMR of these models are near to zero as a perfect fit. The GFI of both models are .950 and .922 for student and non-student subjects, respectively, which is a value near one, meaning the model is a perfect fit. The values of the AGFI, NFI, IFI, and CFI for the student model are .869, .817, .841, and .835, respectively. On the other hand, the values of the AGFI, NFI, IFI, and CFI for the student model are .758, .763, .776, and .771, respectively. It is clear that the student model has a better fitness, although it can be concluded that both models are a moderately good approximation of the data.

As can be seen in Table 4 and Table 5, only four from nine determinants of service quality and only two from seven determinants of negative experience, are significant at .05 in the student's model, while only three from nine determinant and one from seven determinants of

service quality are significant at .05 in the non-student's model. Moreover, three from six determinants of loyalty is significant at .01 in the student's model, as well as two from six determinants of loyalty is significant at .01 in the non-student's model. The model explains these determinants as important factors in influencing the overall satisfaction. All determinants have positive signs, which mean that the satisfaction in each determinant has a positive effect on overall satisfaction. In addition, the model reveals just the basic need among this group of users for fulfilling their mobility needs, which is shown by the lack of extra determinants, such as environmental impact and the like.

By comparing these results with the base model (as appears in Figure 1), it can be concluded that the student's model seems to have a closer similarity with the model of all respondents. It means the perception of student tends to be able to represent the perception of the whole respondents.

Table 4 Parameter estimates for student subject

Parameter		Standardized Estimate	Unstandardized Estimate	p-value
Regression Weights				
Overall satisfaction ← Availability	λ_1	.187	.246	< .001
Overall satisfaction ← Information	λ_3	.141	.137	.002
Overall satisfaction ← Fare	λ_5	.112	.134	.010
Overall satisfaction ← Comfort	λ_6	.115	.136	.017
Overall satisfaction ← Negative experience with the crew	λ_7	.097	.083	.028
Overall satisfaction ← Negative experience regarding information	λ_8	.107	.085	.013
Loyalty to use in the future, although the business runs as usual ← overall satisfaction	λ_9	.167	.106	< .001
Loyalty to use in the future, when there is an improvement ← overall satisfaction	λ_{10}	.118	.055	.007
Loyalty to recommend, although the business runs as usual ← overall satisfaction	λ_{11}	.111	.067	.011
Variances				
		Estimate	SE	p-value
Availability	δ_1	.356	.022	< .001
Information	δ_3	.652	.040	< .001
Fare	δ_5	.433	.027	< .001
Comfort	δ_6	.437	.027	< .001
Negative experience with the crew	δ_7	.836	.052	< .001
Negative experience regarding information	δ_8	.979	.061	< .001
ξ_1		.483	.030	< .001
ε_1		.134	.008	< .001
ε_2		.242	.015	< .001
ε_3		.217	.013	< .001
Goodness of fit		χ^2 = 138.776; df. = 21; χ^2 / df = 6.608 RMR = .022; RMSEA = .104 GFI = .950; AGFI = .869; NFI = .817 IFI = .841; CFI = .835		

4.2 Simultaneous Analysis

In this section, the authors try to test the hypothesis that the student and non-student group as the user of paratransit have the same regression weights in the path analysis. Under this model, the variances and covariances of the exogenous variables would still be allowed to differ between the groups while the regression weights are group-invariant (Arbuckle and Wothke, 1999). In this article, the motivation for the group-invariant regression weights is

likely that perceived factors of service quality have different variances and covariances among student and non-student. The authors also want to permit the other exogenous variables in the model to take on different variances and covariances across group.

Table 5 Parameter estimates for non-student subject

Parameter		Standardized Estimate	Unstandardized Estimate	p-value
Regression Weights				
Overall satisfaction ← Accessibility	λ_2	.106	.113	.028
Overall satisfaction ← Customer service	λ_4	.233	.234	< .001
Overall satisfaction ← Fare	λ_5	.149	.159	.002
Overall satisfaction ← Negative experience with the crew	λ_7	.102	.087	.026
Loyalty to use in the future, although the business runs as usual ← overall satisfaction	λ_9	.147	.082	.001
Loyalty to recommend, although the business runs as usual ← overall satisfaction	λ_{11}	.167	.091	< .001
Variances				
		Estimate	SE	p-value
Accessibility	δ_2	.707	.047	< .001
Customer service	δ_4	.800	.053	< .001
Fare	δ_5	.709	.047	< .001
Negative experience with the crew	δ_7	1.105	.073	< .001
ξ_1		.655	.043	< .001
ε_1		.244	.016	< .001
ε_3		.234	.015	< .001
Goodness of fit		χ^2 = 126.795; df. = 9; χ^2 / df = 14.088 RMR = .044; RMSEA = .169 GFI = .922; AGFI = .758; NFI = .763 IFI = .776; CFI = .771		

4.2.1 Equally-Constrained Regression Weights

Table 6 provides parameter estimates for multi group analysis including its goodness of fit. The model has the χ^2 as much as 99.256 with 21 degrees of freedom, resulting in the models being rejected at .05. This result is not surprising, as the sample size is big. Moreover, the model has NC (normed chi-square) as much as 2.919, which is much smaller than 5 for a reasonable fit. The RMR and RMSEA of this model are .023 and .044, respectively, which the value near to zero as a perfect fit. The GFI of the model is .978, which is a value near one, meaning the model is a perfect fit. The values of the AGFI, NFI, RFI, IFI, TLI, and CFI for this student model are .942, .940, .872, .960, .912, and .959, respectively. These values are bigger than .90, which implies a reasonable model. Thus, it can be concluded that this model is a reasonable good approximation of the data. Arbuckle and Wothke (1999) said that if the model is confirmed by the data, the same regression weights can be used for all groups, which simplifies the prediction of the endogenous variables. By considering the result that the model is confirmed by the data, it can be concluded that the regression weights do not differ significantly between student and non-student.

Reported in the top part of Table 6 are results of for the equality-constrained direct effects. As expected, only the unstandardized path coefficients are equal across the groups. For example, the unstandardized coefficient for the path Overall satisfaction ← Availability for both samples is .154. The standardized estimates for the same path are different in each sample, though it is .145 in student sample and .169 in the non-student sample. The standardized estimates for the equality-constrained direct effects are unequal because the samples are not

equally variable on these variables (Kline, 2005).

Reported in the bottom part of Table 6 are estimates for parameters that were not constrained to be equal across the groups. These estimates are for the variances, and they indicate that the model of Figure 2 (where the estimates are reported in Table 6) has somewhat similar predictive power for student and non-student user of paratransit. For example, the proportions of explained variance for the endogenous loyalty to use and loyalty to recommend variables in the student sample are, respectively .758 and .848, and the corresponding values in the non-student sample are, .756 and .821.

Table 6 Parameter estimates for multi group analysis with equally-constrained regression weights

	Unstandardized for Student and Non-student			Standardized Estimate	
	Estimate	SE	p-value	Student	Non-student
Equality-Constrained Regression Weights					
Overall satisfaction ← Availability (λ_1)	.154	.040	<.001	.118	.118
Overall satisfaction ← Accessibility (λ_2)	.098	.036	.007	.094	.091
Overall satisfaction ← Information (λ_3)	.132	.036	<.001	.137	.146
Overall satisfaction ← Customer service (λ_4)	.080	.043	.065	.074	.079
Overall satisfaction ← Fare (λ_5)	.152	.037	<.001	.129	.141
Overall satisfaction ← Negative experience with the crew (λ_7)	.098	.027	<.001	.115	.113
Loyalty to use in the future, although the business runs as usual ← overall satisfaction (λ_9)	.093	.019	<.001	.145	.169
Loyalty to recommend, when there is an improvement ← overall satisfaction (λ_{11})	.009	.015	.549	.018	.020
	Student Subjects		Non-student Subjects		
	Estimate	SE	Estimate	SE	
Unconstrained Variances					
Availability (δ_1)	.356*	.022	.486*	.032	
Accessibility (δ_2)	.543*	.034	.707*	.047	
Information (δ_3)	.652*	.040	1.018*	.067	
Customer service (δ_4)	.516*	.032	.800*	.053	
Fare (δ_5)	.433*	.027	.709*	.047	
Negative experience with the crew (δ_7)	.836*	.052	1.105*	.073	
ξ_1	.493*	.031	.656*	.043	
ε_1	.242*	.015	.244*	.016	
ε_3	.152*	.009	.179*	.012	
Goodness of fit	χ^2 = 99.256; df. = 34; χ^2 / df = 2.919 RMR = .023; RMSEA = .044 GFI = .978; AGFI = .942 NFI = .940; RFI = .872; IFI = .960; TLI = .912; CFI = .959				

Note: * p-value is less than .001

4.2.2 Un-Constrained Regression Weights

As the way of comparison and to investigate group differences further, Table 7 illustrates the result of multigroup analysis with un-constrained regression weights. Values of selected indexes for this re-specified model suggested reasonable overall model fit. The model has the χ^2 as much as 89.162 with 26 degrees of freedom, resulting in the models being rejected at .05. The model has NC (normed chi-square) as much as 3.429, which is much smaller than 5 for a reasonable fit. The RMR and RMSEA of this model are .022 and .050, respectively, which the value near to zero as a perfect fit. The GFI of the model is .980, which is a value

near one, meaning the model is a perfect fit. The values of the AGFI, NFI, RFI, IFI, TLI, and CFI for this student model are .932, .946, .850, .961, .889, .and 960, respectively. These values are bigger than .90, which implies a reasonable model.

The way the author reported the estimates is similar with the model with constrained regression weights. It can be easily found that the unstandardized path coefficients for the direct effects were different across the samples. Moreover, there is less number of significant path coefficients when compared with the constrained model. Thus, it can be concluded that the model with equally constrained regression weights is better than the unconstrained one.

Table 7 Parameter estimates for multi group analysis with un-constrained regression weights

	Student Subjects			Non-student Subjects		
	Unstandardized		Stan-dardized	Unstandardized		Stan-dardized
	Estimate	SE		Estimate	SE	
Un-constrained Regression Weights						
Overall satisfaction ← Availability (λ_1)	.219*	.055	.167	.074	.060	.057
Overall satisfaction ← Accessibility (λ_2)	.105**	.049	.099	.080	.054	.075
Overall satisfaction ← Information (λ_3)	.163*	.048	.168	.082	.054	.093
Overall satisfaction ← Customer service (λ_4)	.012	.058	.011	.179**	.065	.179
Overall satisfaction ← Fare (λ_5)	.167**	.053	.140	.139**	.053	.131
Overall satisfaction ← Negative experience with the crew (λ_7)	.115**	.037	.134	.081**	.039	.095
Loyalty to use in the future, although the business runs as usual ← overall satisfaction (λ_9)	.106*	.027	.167	.082**	.026	.147
Loyalty to recommend, when there is an improvement ← overall satisfaction (λ_{11})	.030	.022	.060	-.012	.022	-.025
	Student Subjects			Non-student Subjects		
	Estimate	SE		Estimate	SE	
Unconstrained Variances						
Availability (δ_1)	.356*	.022		.486*	.032	
Accessibility (δ_2)	.543*	.034		.707*	.047	
Information (δ_3)	.652*	.040		1.018*	.067	
Customer service (δ_4)	.516*	.032		.800*	.053	
Fare (δ_5)	.433*	.027		.709*	.047	
Negative experience with the crew (δ_7)	.836*	.052		1.105*	.073	
ξ_1	.490*	.030		.650*	.043	
ε_1	.242*	.015		.244*	.016	
ε_3	.152*	.009		.179*	.012	
Goodness of fit	χ^2 = 89.162; df. = 26; χ^2 / df = 3.429 RMR = .022; RMSEA = .050 GFI = .980; AGFI = .932 NFI = .946; RFI = .850; IFI = .961; TLI = .889; CFI = .960					

Note: * p-value is less than .001; ** p-value is less than .05

5. DISCUSSION AND CONCLUSIONS

This study tries to explore more deeply the fact of the domination of user with study as their main job, which is confirmed by the authors in several previous studies. Indeed, a good knowledge regarding the target market of the user of public transport is a success-key. Thus, this study aims to explore whether there is difference perception between the groups of user, i.e. the student and non-student, as a way to know the user in a better way.

There are two analyses completed as reported in this article. The first analysis is done by

conducting separate analysis for student group and non-student group. By comparing these results with the base model, it can be concluded that the student model seems to have a closer similarity with the model of all respondents.

The next analysis is conducted by analyzing the multiple samples simultaneously. This second analysis is also completed by two types of treatment, i.e. equally constrained regression weight and unconstrained regression weights. The result illustrates that the equally constrained regression weights model is confirmed by the data. It can be concluded that the same regression weights can be used for all groups, which simplifies the prediction of the endogenous variables. Moreover, this finding eliminates the doubt of the bias resulted by the domination of one group among other groups. Thus, it can be concluded that the regression weights do not differ significantly between student and non-student. In addition, the further analysis illustrates that the model with equally constrained regression weights is better than the unconstrained one.

Another important finding from this study is the relationship between overall satisfaction and loyalty to use this mode in the future. The relationship between overall satisfaction and loyalty to use paratransit in the future when business runs as usual has a positive value. The positive sign means that the more they are satisfied, the more loyal the users prove to be to this mode. Moreover, the relationship between overall satisfaction and loyalty to recommend the use of paratransit to others when there is an improvement has a positive value. This finding emphasizes the requirement of improvement when they promote the mode to others.

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