Indonesian Journal of Development Studies (IJDS)
2020, Volume -, Ed.-
ISSN Online:
ISSN Print:

Spatial and non-Spatial Analysis of Users and Online Transportation Service Providers in the Tembalang Higher Education Area, Semarang City

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Received: Click or tap to enter a date.
Reviewed: Click or tap to enter a date.
Published: Click or tap to enter a date.

Subject Area : Environmental and Demographic Change

Abstract

The gap between demand and supply of public transportation has the potential for online transportation companies to fill it. The ability to provide door-to-door services makes people prefer to use online transportation rather than public transportation. This study aims to analyze the demand and supply (supply & demand) of online transportation through the spatial and non-spatial characteristics found in the Tembalang Higher Education Area of Semarang City. This study uses a quantitative approach with SEM-PLS analysis method. The research data uses the perceptions of 200 user respondents and 100 respondents to online transportation providers at UNDIP and UNPAND. The modeling results show that the fit model value in PLS is 88.3%. The research findings show that with a significance level of α = 5% with a t-value> 1.96, non-spatial users have a significant effect on user spatial and provider spatial with coefficients of 2.18 and 2.20. Furthermore, non-spatial providers have a significant effect on provider spatial by 4.57. While non-spatial providers have no significant effect on user spatial with t-value = 0.01 and provider spatial has no significant effect on user spatial with t-value = 0.05. Socio-economic characteristics are the non-spatial factors of users that have the most influence on spatial users and providers. The non-spatial factors are the benefits felt by the presence of online transportation and vehicle ownership with a significance factor for the variables of 77.4% and 74.2%, respectively.

Keywords: – *Online Transportation, Higher Education Area, Public Transportation*

Introduction

The progress of a country is largely determined by the quality of higher education in achieving technological progress with effective modern management (Setiyono, 2010). Success in higher education is related to the amount of time spent on campus. Some students living in big cities face transportation problems and time constraints that make it difficult to spend more time on campus (Allen & Farber, 2018).

The trend in higher education areas is to set up campuses in suburban neighborhoods as a solution to limited land and high land prices in the city center(Ozbil et al., 2018) .

A campus that is located far from the city center is becoming a new generator / attractor of

movement, so transportation services are important things to pay attention to.

The provision of public transport services in the Higher Education Area is rarely well planned and little knowledge is generated. In general, the provision of public transportation is managed by individuals and is managed unprofessionally. This condition will certainly have an impact on the quality of the provision of public transportation services that are not in accordance with the needs of travelers and have an impact on the high use of private vehicles.

The gap between the demand and provision of public transportation infrastructure is a potential for Online Transportation companies to fill the gap. Online transportation in the order does not have a time limit or is available for 24 hours, apart from being easy to access, online transportation also provides convenient door to door services for users (Stiglic et al., 2018).

There are several studies that examine the topic of Online Transportation such as studies conducted by (Silalahi et al., 2017) where they measure the quality of online transportation services in Indonesia, (Septiani et al., 2017) who tries to integrate several theories to find the factors that influence travel behavior with case studies of online transportation services, and (Nasution, 2020) who conducted studies related to the determinants of online transportation and conventional transportation. This study is focused on the existence of online transportation in general activity settings, there has been no previous research that has concentrated on the importance of researching online transportation in the area of higher education. The urgency of this study is to determine the characteristics of users and providers of online transportation services, both spatially and non-spatially, so that they can produce policies for public transportation arrangements in Higher Education Areas in the future. In this case the study area taken is the Tembalang Higher Education Area with the hope that the results of this study can also be used in similar higher education areas.

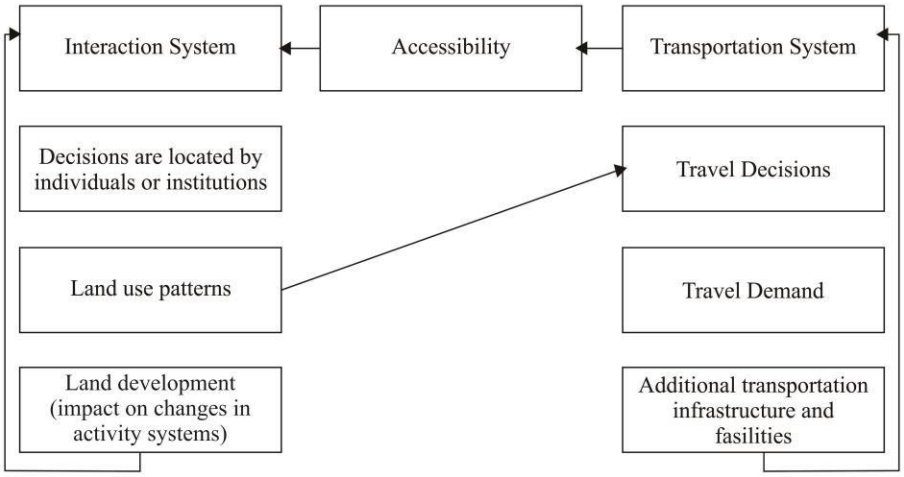
This study aims to analyze the characteristics of demand and supply of online transportation in the Tembalang area of higher education. By knowing the patterns of demand and provision of online transportation, both spatially and non-spatially, the policy plan for public transportation arrangement in the Tembalang higher education area can be carried out well.

Literature Review

Transportation Planning Theory is important for meeting the needs of the movement of everyone from one place to another. The increasing population growth of a region, the higher the demand for movement needs. This has a positive correlation with spatial land use intensity (Asadabadi & Miller-Hooks, 2017). The cycle below defines that land use leads to travel.

Travel is triggered by the user's need to make a movement, where the movement is divided into three classifications according to (Tamin, 1997), that is:

Figure 1.
Land Use and Transportation Interaction System



Source: (Meyer & Miller, 1984)

1. Based on the purpose of the movement, the movements that are often used are the main movements, with the aim of working and education, while other movements are optional and not routine.
2. Based on the time of movement, it is divided into movements during peak hours and off-peak hours.
3. Based on the type of person.

Human movement results in various interactions. Almost all interactions that require travel result in movement of traffic flows (from the spatial side). The general goal of transportation planning is to make this interaction easier and more efficient. Over time, modern transportation planning has developed with Online Transportation to make it easier for people to travel, especially in Higher Education Areas.

Public Transportation is not on Route (Paratransit)

Paratransit (rent transportation) is one of the modes of transportation provided in services in the form of drivers or applications needed to fulfill personal needs, which is currently known as online transportation. This is because online transportation (paratransit) does not have a specific route (is flexible) and is not tied to schedules and routes in using transportation services. This application-based mode of paratransit transportation includes the Go-jek, Grab, and Uber applications.

The advantage of online transportation is that transportation service providers operate using a specific application to deliver customers or goods at a rate that is adjusted based on travel time and distance (Harding et al., 2016). These factors have an impact on the increasing number of demands on the quality of service and ease of users in carrying out transportation (Maha et al., 2014).

Online transportation is also explained in previous research, which proves that online

motorcycle taxis are an important influence for students as users and drivers who benefit practically. The existence of online transportation has a positive influence among students because it facilitates their activities, especially for students who do not have private vehicles.

In addition to meeting transportation needs for mobilization, Online Transportation also provides food shuttle ordering services, goods shuttle services, and so on. Therefore, there are factors that affect students using online transportation, namely: (Tumuwe et al., 2018). Student interest; Student needs; Level of ease; Expenditure level; and the level of security.

Travel Behavior

Srinivasan (2004) explained that travel behavior affects a person's behavior in determining his travel patterns, indirectly deciding the pattern of his daily activities. According to Kitamura (2009) Measurable aspects of travel behavior are seen from four components, namely: travel time, travel frequency, travel distance, and travel cost. This defines the relationship between travel behavior and the activities it performs. Activities arising from various individuals experience differences, depending on the scope of the household and the environment. Therefore, the pattern of activities and trips undertaken will affect the travel behavior of individuals and households. Several factors influence travel behavior, namely: Based on this understanding, the demand that occurs to meet the needs of each individual is certainly different. In addition, there are also several factors that influence travel behavior, namely: spatial aspects, demographic and social aspects, economic aspects, and activity time aspects. (Ettema et al., 2007; Levinson, 1998).

Methodology

This study uses a quantitative approach with SEM-PLS analysis method. Structural equation modeling (SEM) is a multivariate technique that combines aspects of factor analysis and multiple regression analysis that allows researchers to simultaneously examine a series of interrelated dependency relationships between measured variables and latent constructs and between latent constructs (Hair et al., 1998; Sholihin & Ratmono, 2013). SEM is a multivariate analysis (factor analysis and path analysis) which is carried out at the same time to test the relationship of variables (free and dependent) and is the only method that can process unobservable or unobservable variables (Ghozali & Fuad, 2008).

This approach is used to identify the spatial and non-spatial characteristics of online transportation users (demand) and providers

Table 1

Research Sample

Number	**Name of the day**		**Sampling**	
			Users	Provider
1	Weekdays	Monday	40	20
2		Wednesday	30	20
3		Friday	30	20
4	Weekend	Saturday	50	20
5		Sunday	50	20
Total Sample			**200**	**100**

Source : Processed by researchers, 2020

(supply) in the Tembalang Higher Education Area. The variables used in this study were determined based on previous findings and research. This research will prove the effect that involves four dimensions, namely: User Spatial, Non-Spatial User, Provider Spatial, and Non-Spatial Provider. This dimension is the parent latent variable, which is further translated into several indicators or observable variables.

The research data uses the perceptions of 200 user respondents and 100 respondents to online transportation providers at UNDIP and UNPAND.

The sampling technique for respondents in this group is non-probability sampling by means of sampling using the accidental sampling method. Accidental sampling is a sampling technique based on chance, so that anyone who happens to meet the researcher can be used as a sample if it is seen as suitable for the data source. The sampling location is 3 Km2 from the midpoint of the Tembalang Higher Education Area, which is 20 villages spread over three sub-districts. Respondents are users and providers of Online Transportation services in the research study area.

Result and Discussion

The analysis model consists of four main dimensions (construct variables), namely (1) user spatial, (2) non-spatial user, (3) spatial provider, and (4) non-spatial provider. The final result of the model will identify and describe the pattern of each dimension that occurs with Online Transportation. This model uses questionnaire data given to 200 respondents who use questionnaire data for 100 respondents who provide Online Transportation in the Tembalang Higher Education Area.

Preliminary Analysis Model

The Preliminary Model of Spatial and Non-Spatial Analysis of Users and Online Transportation Providers in question is the overall variables and indicators used, which are then will be terted for conformity.

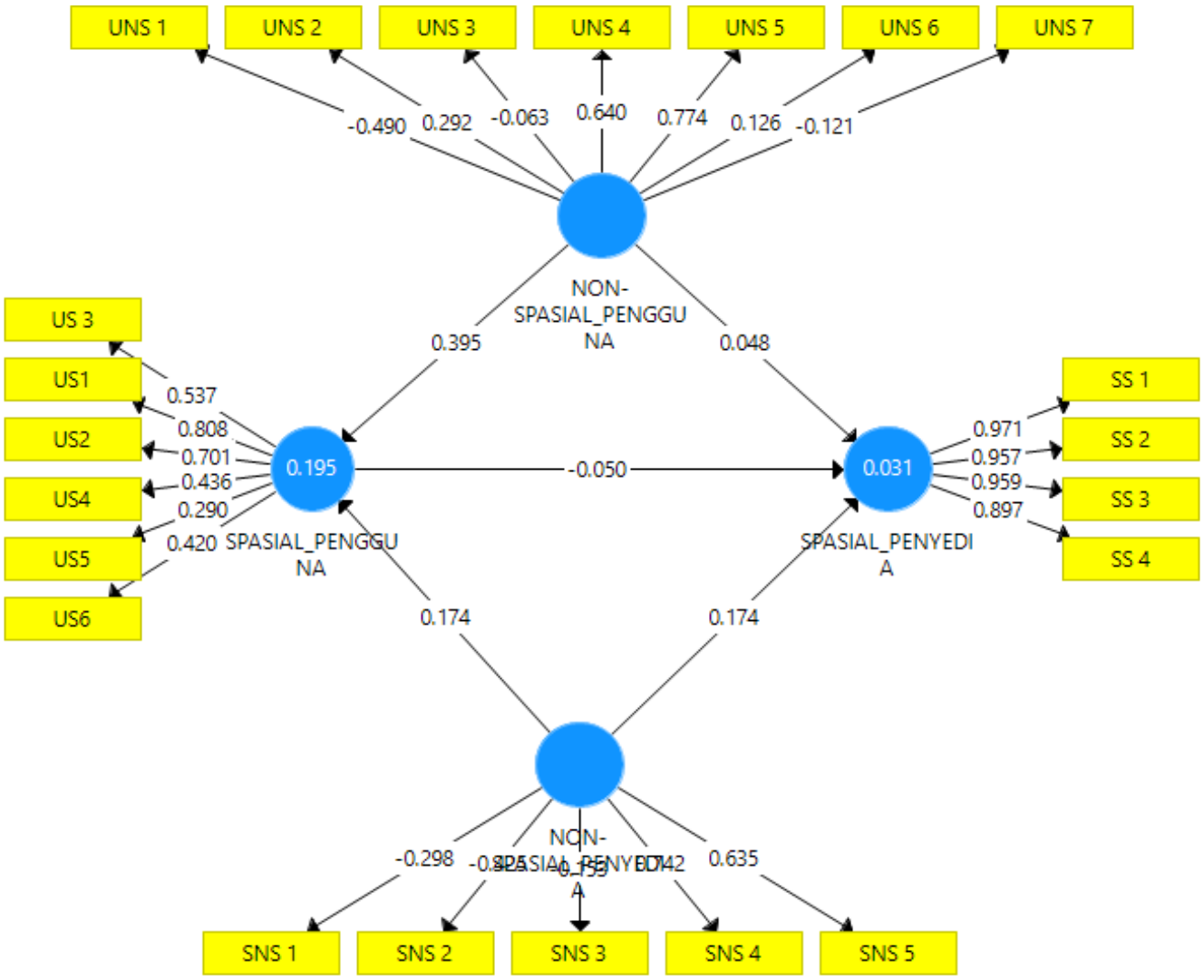
Table 2

Variables and Indicators

Spasial User		Non-Spasial Pengguna		Spasial Penyedia		Non-Spasial Penyedia	
US1	Average Mileage	UNS1	Age	SS1	Average Mileage	SNS1	Level of security
US2	Average Travel Time	UNS2	Sex	SS2	Average Travel Time	SNS2	Level of conformity
US3	Average Travel Cost	UNS3	Eduation	SS3	Average Travel Cost	SNS3	Punctuality
US4	Frequency of Travel	UNS4	Profession	SS4	Frequency of Travel	SNS4	Perceived Benefits
US5	Long time using online transportation	UNS5	Vehicle ownership			SNS5	Perceived Risk
US6	Reason for using online transportation	UNS6	Residence				
		UNS7	Income				

Source : Processed by researchers, 2020

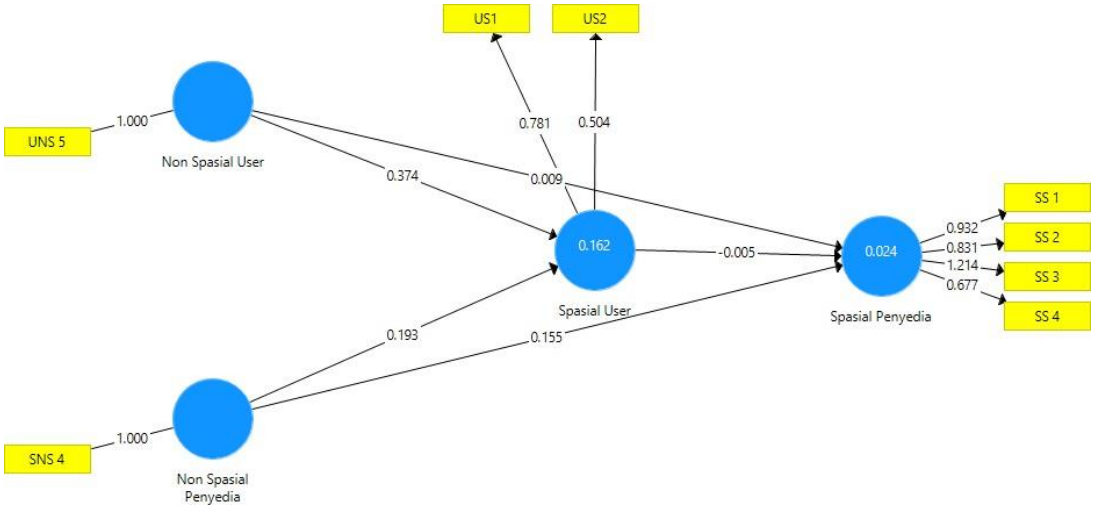
Figure 2.
Initial Method of Analysis



Source : Processed by researchers, 2020

Determination of the model uses user spatial as moderate variable, non spatial user and non spatial provider as exogenous variable, and provider spatial as endogenous variable. In the initial model, there are 6 (six) indicators for user spatial variables, 7 (seven) indicators for non-spatial user variables, 4 (four) indicators for provider spatial variables, and 5 (five) indicators for provider non-spatial variables. The test of reliability and validity of indicators is the first step taken to test that the related indicator has an influence on the latent variable (Stellamaris, 2019). After the validity test by checking the external loading of each latent variable, 14 of the 22 indicators were removed because the external loading was lower than 0.7. The maintained indicator has an external loading higher than the 0.7 threshold (Hair et al., 2014).

Figure 3.
The Final Analysis Model



Source : Processed by researchers, 2020

The Final Analysis Model

This stage begins with the model fit test (Model Fit) to generally evaluate the degree of fit or goodness of fit between the data and the model. Table 3 shows that the degree of suitability of the data with the model is 88.3%.

The final model will then carry out the model evaluation process. The first analysis consists of two commands, namely (1) an algorithm command to obtain a valid and reliable loading value / weight of the path coefficient, (2) a bootstrapping command to obtain a significance value from the loading value.

Table 3

Final Model Fit Model

	Saturated Model	Estimated Model
SRMR	0,054	0,054
d_ULS	0,104	0,104
d_G	0,101	0,101
Chi-Square	127,133	127,133
NFI	**0,883**	**0,883**
rms Theta	0,268	0,268

Source : Processed by researchers, 2020

Table 4

Final Model Weight Analysis

	Outer Loading	Cronbach's Alpha	Average Variance Extracted (AVE)
Non Spatial Provider		1,000	1,000
SNS 4	1,000		
Spatial Provider		1,000	1,000
SS 1	0,967		
SS 2	0,948		
SS 3	0,964		
SS 4	0,907		
Non Spatial User		0,962	0,897
UNS 5	1,000		
Spatial User		0,565	0,690
US1	0,900		
US2	0,754		

Source : Processed by researchers, 2020

Table 5

Final Model Path Analysis (t-Statistical Test Results)

	Original Sample (O)	T Statistics (|O/STDEV|)
Non Spatial User -> Spatial Provider	0,156	2,179
Non Spatial User -> Spatial Provider	0,154	2,202
Non Spatial Provider -> Spatial User	0,009	0,010
Non Spatial Provider -> Spatial Provider	0,298	4,573
Spatial User -> Spasial Penyedia	-0,005	0,053

Source : Processed by researchers, 2020

Next is the path assessment analysis to see the relationship between latent variables.

Valid indicators and variables can be seen in table 4 (the level of significance used in bootsrapping is 0.05). Based on the results of the evaluation of the weight of the final model, there are 2 (two) variables (US1 = Average distance traveled; US2 = Average travel time), 1 (one) variable (UNS 5 = Vehicle ownership) for non-spatial determination of users, 4 (four) variables (SS1 = average distance traveled; SS2 = average travel time; SS3 = average travel cost; and SS4 = frequency of trips) for spatial determination of providers, and 1 (one) variable (SNS 4 = perceived benefits) for non-spatial determination of providers. The next stage is to analyze the magnitude of the effect and magnitude of the effects that occur on variables and indicators with t-statistical tests (path analysis) using the SmartPLS tool (blindfolding test method).

The t-statistic test results show that with a significance level of α = 5% and t-value> 1.96, non-spatial users have a significant effect on user spatial and provider spatial with coefficients of 2.18 and 2.20. Furthermore, non-spatial providers have a significant effect on provider spatial by 4.57. While non-spatial providers have no effect on user spatial with t-value = 0.01 and spatial users have no significant effect on provider spatial with t-value = 0.05..

Non-Spatial Influence on Online Transportation

From the results of the spatial and non-spatial relationship analysis of users and providers for the implementation of Online Transportation in the Tembalang Higher Education area, it is known that the socio-economic characteristics are the most influential indicators. The non-spatial indicators are the perceived benefits (SNS 4) with the presence of online transportation and vehicle ownership (UNS 5) with a significance factor for the variables of 77.4% and 74.2%, respectively.

Conclusion

The results of this study indicate that the non-spatial aspects of users and non-spatial aspects of service providers are very influential on the existence of transportation in the network. If the transportation in the network can provide high benefits from the Provider's side, the higher the demand from the User, and vice versa. However, the vehicle ownership factor explains that the higher the people who do not own a vehicle, the higher the need for transportation in the network. The results of the analysis of the spatial effect of users on non-spatial users, spatial and non-spatial providers provide information that spatial users influence the development of transportation in the network from the supply side (perceived benefits) to meet the demand for movement by utilizing

efficient modern technological advances in the Tembalang Higher Education Area.

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