



## Factors that Influence the Intention to Reuse Public Transport Routes Involving Transfer in the Early Stage of Integrated Transportation System Development: MRT Case in Jakarta

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### Abstract

To improve the image of public transportation and encourage citizen to use it, the transportation infrastructure in Jakarta has been modernized by developing an integrated transportation system with MRT as the center of the integration. With the history of high preference to private vehicle use and the growing popularity of sharing ride, it is interesting to see whether the usage of public transportation will increase. Although the transportation system is being integrated, users of public transportation still need to exchange modes of transportation within the system and outside the system to finish the trip. This study aims to identify factors that can influence the intention to reuse public transportation routes involving transfer. The integration of Theory Planned Behavior (TPB) and other factors such as values, images and self-efficacy are investigated on the intentions to reuse routes involving transfers. The data is collected using questionnaires distributed in Jakarta MRT transit-oriented development and analyzed using PLS-SEM. Image and Attitude are proven not affecting the intention to reuse public transport routes involving transfer. The intention is influenced by perceived behavioral control (PBC) which is driven by self-efficacy and perceived controllability and subjective norms. This result to some extent is not consistent with the previous research about public transportation and has given another perspective about public transportation routes involving transfers especially in the early stage of integrated transportation system development.

**Keywords:** Intention to reuse; Transfer routes; Theory of planned behavior (TPB); Perceived value; Image; Self - efficacy; Perceived controllability; Integrated transportation system.



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### 1. Introduction

Transportation infrastructure in the city is a complex network that connects the cities and accommodate the activity that will have an impact on social, economic and environmental factors (Wang *et al.*, 2018). In a capital city such as Jakarta, one of the city complexities is related with the citizen mobility which will be depended heavily on the development of public transportation (Khafian, 2013). In order to support the mobility of its citizen, the government of Jakarta has provided the transportation infrastructure that allows transit quickly. The transportation such as Mass Rapid (MRT), Bus Rapid Transit/Transjakarta, Light Rail Transit (LRT), Commuter Line (KRL/Electric Train) and the Airport Train (Railink) are developed to create an integrated transportation system. The main purpose of an integrated system is to provide public transport users with a “wide spectrum” of destination choices and also with a convenient, accessible, comfortable, safe, speedy, and affordable transport system (Luk and Olszewski, 2003; Ulengin *et al.*, 2007) and when is supported by related regulation, it will encourage the use of public transportation (Chowdhury and Ceder, 2013a).

The integrated transportation system in Jakarta was in the early stage of development. Although it is being integrated, the utilization of this system has not been up to the expectation. The user of public transport unavoidably still needs to change routes to use other mode of transportation either within or out of the system to get to their destination. The question is with this integrated system that offer choices of transportation modes, does the integrated transportation system that currently is developed can encourage public transportation users to reuse modes within the integrated transportation system when it involves transfer routes. What are the factors that can influence the intention to reuse public transport routes that involves transfer?

Several previous researches have used The Theory of Planned Behavior to understand the behavior toward public transportation such as prediction to use public transportation (Heath and Gifford, 2002); social context, personal norms and the use of public transportation (Bamberg *et al.*, 2007); emotions, habits and rational choices in ecological behaviors (Carrus *et al.*, 2008); switching intention toward public transport (Chen and Chao, 2011);

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reuse public transport routes involving transfer (Chowdhury and Ceder, 2013a;2013b); case study in China (Li *et al.*, 2015); willingness to use integrated system (Chowdhury, 2016); different purpose to use public transport (Zailani *et al.*, 2016); intention to reuse public transport (Sumaedi *et al.*, 2016; Zhao *et al.*, 2016), behavioral intention to use public transport in Malaysia (Ambak *et al.*, 2016), psychosocial factors public transportation and gendered difference in using public transport (Fu and Juan, 2017). Except (Chowdhury and Ceder, 2013a;2013b), most of studies do not focus on the intention to reuse public transport routes involving transfer. And if it studies about reuse that involving route transfer, it is not done in the integrated system.

The raise of sharing vehicles has become an alternative to public transport. How sharing vehicles fit in the integrated transport system will be an interested topic to explore. This study will use The Theory of Planned Behavior and integrate other factors to study the factors that influence the intention to reuse public transport routes involving transfer in the city where preference to use private vehicle is very high and the sharing vehicles is on the rise.

## 2. Literature Review and Hypothesis Development

The Theory of Planned Behavior is designed to seek out and predict the behavior of consumers (Ajzen, 1991). TPB is an extension of the previous theory, The Theory of Reasoned Action that is used to explain the determinant factors of people behavior. In TRA, individual intentions towards behavior are influenced by two factors which are attitudes toward behavior and subjective norm. And Ajzen (1991) add one factor which is perceived behavioral control (PBC).

Fishbein and Ajzen (1975), defines intention as the likelihood of individual to perform and continue to perform the behaviors. The intention to perform a behavior can be measured by three predictors which are attitude, subjective norms and perceived behavior control.

Attitude is triggered with a behavioral belief. Perceived value, as the antecedent of attitude is the assessment of individuals to services' benefit based on what they give or reach (Rahab and Nawarini, 2015). In Schoeman *et al.* (2016), perceived value is the value that is perception of consumers about the acceptance of overall usefulness of a product's offer. Several studies have proven that perceived value has influence on the attitude are Fiandari *et al.* (2019) in the context of food; Hsu *et al.* (2019) on organic food and Malik *et al.* (2016) about working space. Since it has been proven many times, the hypothesis proposed is

**(H1)** Perceived value has influence on the attitude to reuse public transport that involve route transfer

Attitude toward behavior is the feeling of an individual about the behavior to be performed, either it is positive or negative. The attitude toward behavior will be influenced by the belief about the consequences of behavior or behavioral beliefs. The belief about consequences will ultimately lead to a specific outcome or results based on the evaluation of the individual (Mishra, 2017). Research of Ambak *et al.* (2016) reveals about the attitude in relation with bus transportation, while Lai and Chen (2011) argue that attitude can be considered as the influence for the use of public transportation. While both studies do not involve intention to re-use public transportation that involving route transfer, the research of Chowdhury and Ceder (2013a) prove that attitude has influence to it. The hypothesis will be generated as

**(H2)** Attitude has influence on the intention to reuse public transport that involve route transfer

Subjective norms are the perception of the individual against the expectation of other important people who have the impact or influence in their lives about whether their behavior can fulfil their expectation (Fishbein and Ajzen, 1975). Important persons might include the elder, close friends, husband or wife and co-working (Trisnawati, 2011). The study on subjective norms' influence to intentions to use public transportation have shown inconsistent results and specific study of intention to reuse involving route transfer is rarely investigated. The study of Chen and Chao (2011) mention that subjective norm is the most influential factor compared with attitude and PBC and the other studies from Zhao *et al.* (2011), Nordfhaern *et al.* (2014), Li *et al.* (2015), Sumaedi *et al.* (2016) and Zhao *et al.* (2016) show that subjective norms significantly influence the intention to use public transport. While the study of Bamberg *et al.* (2007), Zailani *et al.* (2016) and Fu and Juan (2017) show differently. With the inconsistent result and rarely investigated, this study would like to test the hypothesis follows

**(H3)** Subjective Norm has influence on the intention to reuse public transport that involve route transfer

Ajzen (2012), mentions that PBC is inspired by self-efficacy by Bandura (1977) who states that self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments. The impact of self-efficacy in influencing PBC for public transportation related has been proven in Chowdhury and Ceder (2013a) with the context bus transportation. However, there are many studies that show the relationship between self-efficacy and perceived behavior control such as Park and Huang (2017) in the context of hotel bookings via smartphones and Yeap *et al.* (2016) with context m-learning in higher education. The hypothesis is formed as follows

**(H4)** Self-efficacy influences the perceived behavioral control to reuse public transportation that involve route transfer

The other variable that influence PBC is Perceived Controllability. According to Brechan (2016) perceived controllability is perceived as the locus of control. While according to Ajzen (2002) in Banerjee (2016) perceived controllability is the belief that the performance of a behavior is under control of an individual. Chowdhury and Ceder (2013a) shows that perceived controllability that is mediated by PBC is able to encourage people to use transportation that involve route transfers. Lee and Chen (2010), suggests that PBC is formed by control capabilities in the TPB model. This statement is also supported by the research of Kanat and Özkan (2009). The statement of hypothesis will be as follows

(H5) Perceived controllability has influence on PBC to reuse public transportation that involve route transfer

Fishbein and Ajzen (1975) explained that Perceived Behavioral Control describes the ability of individuals to have control, feeling ease or difficult to perform the behavior. Ajzen (1991), believes that control of behavior will influence the intention to perform or not perform a specific behavior. Ajzen (2012), pinpoints that perceived behavioral control is the extent to which people believe that they can perform a given behavior if they are inclined to do so. Several studies on public transportation such as Chen and Chao (2011), Chowdhury and Ceder (2013a), Nordfhaern *et al.* (2014), Li *et al.* (2015) and Ambak *et al.* (2016) have proven that perceived behavioral control significantly influence the intention to use public transportation. Even several studies show that PBC is one of the variables that strongly influencing the intention to perform a certain behavior. Because the study on reuse public transportation involving route transfers are rare, therefore the hypothesis will be.

(H6) Perceived Behavioral Control has influence on the intention to reuse public transport that involve route transfer

The definition of image come with many variations. This study will refer the image definition to Sumaedi *et al.* (2014), that link the definition to the context of public transport. Sumaedi *et al.* (2014), defines image in the context of public land transport services as passengers' mental picture of the offering which includes symbolic meanings consumers association of a specific land transport service. Mazursky and Jacoby (1986) in Milfelner *et al.* (2011) suggest that an image can be described as an overall impression that remains in the customer's mind after using a product or service. Several studies have investigated the influence of the image on the intention to use public transport, such as Sumaedi *et al.* (2014), Şimşekoğlu and Rundmo (2015) and Zhao *et al.* (2014) inside Van Lierop *et al.* (2017) the positive image towards public transport can influence the intention to use public transport. Adapting the previous research, the hypothesis will be.

(H7) Image has influence to the intention of reuse public transport that involve the transport route

### 3. Material and Method

The research is done using quantitative approach and questionnaire as the tool to collect the data. The unit analysis is the passengers who have utilized MRT for the past 3 months and have to do route transfer to arrive at final destination. The questionnaire is distributed in *transit-oriented development* (TOD) Dukuh Atas which is under responsibility of MRT Jakarta. The location is chosen because it is a meeting point of the transfer routes using other public transportation such as bus, train, commuter line, LRT and even the online transportation.

The sampling uses the convenience sampling because the population size is not known because the integrated transportation system using MRT and its connection just started early 2019. The number of samples is determined by ten times the largest number of structural paths directed at a particular latent construct in the structural model (Hair *et al.*, 2011).

The variables in this research is measured by several indicators from previous research. Several variables using indicators based on Sumaedi *et al.* (2016) are Intention to Reuse (IR), Perceived Value (PV), Attitude (AT), Subjective Norms (SN), Perceived Behavioral Control (PBC) and Image (IG). While, Self-efficacy and perceived controllability will use the indicators based on Chowdhury and Ceder (2013a).

The measurement uses 4 Likert Scale starting from Very Disagree to Very Agree following the Chowdhury and Ceder (2013a). The use of a four- point Likert scale is to eliminate biases that have multiple interpretations and avoid the choice of midpoint which does not represent the actual opinions of respondents between agree or disagree (Viandhy and Ratnasari, 2014). Data Analysis will use PLS-SEM.

## 4. Results

### 4.1. Respondents Profile

Of 131 respondents, 13 respondents are not valid since they never use the Jakarta MRT. The respondents are dominated by the age bracket of 17-29 years (67.9%) known as millennial, female (55%) with the education dominated by undergraduate education (78.6%). Complete data can be seen in Table 1.

Table-1. Demographics of Respondents

Characteristics of Respondents	Category	Number of Respondents	Percentage
Age	<17 years old	6	4.6%
	17-27 years	89	67.9%
	28-38 years	26	19.8%
	39-49 years	6	4.6%
	> 50 years old	4	3.1%
Sex	Man	72	55%
	Woman	59	45%
Education	Elementary school	2	1.5%
	Middle School	2	1.5%
	High school	16	12.2%
	Bachelor	103	78.6%
	Others	8	6.2%
Live in	Jakarta	83	63.4%
	Bogor	2	1.5%
	Depok	9	6.9%
	Tangerang	8	6.1%
	Bekasi	22	16.8%
	Others	7	5.3%

## 4.2. Reflective Measurement Model

Measurement models has been analyzed and passed several indicators according to Hair *et al.* (2011) which include (1) Internal consistency reliability: Composite reliability should be higher than 0.70; (2) Indicator reliability :indicator loadings should be higher than 0.70; (3) Convergent validity: The average variance extracted (AVE) should be higher than 0.50 and (4) Discriminant validity: the AVE of each latent construct should higher than the construct's highest squared correlation with any other latent construct (Fornell–Larcker criterion).

Table-2. Measurement Model Test

Variable	Indicator	Loadings	Composite Reliability	AVE
Attitude	AT 1	0.865	0.884	0.718
	AT 2	0.827		
	AT 3	0.850		
Image	IG 1	0.817	0.878	0.707
	IG 2	0.780		
	IG 3	0.918		
Intention to Reuse	IR 1	0.879	0.879	0.784
	IR 2	0.892		
Perceived Behavioral Control	PBC 1	0.771	0.853	0.660
	PBC 2	0.781		
	PBC 3	0.881		
Perceived Controllability	PC 1	0.727	0.889	0.616
	PC 2	0.725		
	PC 3	0.798		
	PC 4	0.839		
	PC 5	0.828		
Perceived Value	PV 1	0.842	0.857	0.602
	PV 2	0.741		
	PV 3	0.799		
	PV 4	0.714		
Self-Efficacy	SE 1	0.823	0.901	.694
	SE 2	0.880		
	SE 3	0.787		
	SE 4	0.841		
Subjective Norm	SN 1	0.907	0.839	0.723
	SN 2	0.760		

## 4.3. Structural Model Testing Results

In inner model testing, the structural model will be tested after bootstrapping with minimum samples of 5000. The path coefficient will be determined by T-statistics value at 5% significance level which is 1.96. Any value lower than 1.96 can be concluded have no effect to the variables. The structural model is analyzed both direct and indirect path to determine whether there is mediating variable in the model. The final analysis is as below.

Table-3. Structural Model

	T Statistics ( O/STDEV )	P Values
Attitude -> Intention to Reuse	0.871	0.384
Image -> Intention to Reuse	1.116	0.265
Perceived Behavioral Control -> Intention to Reuse	2.399	0.016
Perceived Controllability -> Perceived Behavioral Control	3.993	0.000
Perceived Value -> Attitude	7.075	0.000
Self-Efficacy -> Perceived Behavioral Control	3.708	0.000
Subjective Norm -> Intention to Reuse	4.856	0.000
Perceived Value -> Attitude -> Intention to Reuse	0.855	0.393
Perceived Controllability -> Perceived Behavioral Control -> Intention to Reuse	1.934	0.053
Self-Efficacy -> Perceived Behavioral Control -> Intention to Reuse	1.820	0.069

Attitude and Image do not influence directly the intention to reuse that involving route transfer. Perceived Behavioral Control do not mediate Self-Efficacy and Perceived Controllability to intention to reuse.

## 5. Discussion

The findings show several differences compared to the previous researches in passengers' behavior toward using public transport. This study evaluates the behavior of passengers in a different context with previous research which are (1) this study evaluate behavior during the digital disruption in transportation i.e. during the raise of

sharing ride era, (2) the condition of public transportation force the passengers to change transportation mode because of route transfer, (3) most of the passengers are millennials and (4) the condition is changing routes in integrated transportation system which has not fully connected or in the early development of integration.

The model of research adapts 2 (two) main research by [Sumaedi et al. \(2016\)](#) and [Chowdhury and Ceder \(2013a\)](#). And taking into account the above condition, the results in some way show differences with the previous results which are

- 1) Attitude does not influence the intention to reuse public transport that involving route transfer. The result is different with [Sumaedi et al. \(2016\)](#) because [Sumaedi et al. \(2016\)](#) does not involve the route transfer. While [Chowdhury and Ceder \(2013a\)](#) study focus on the PBC than other variables. An investigation to identify another mediating variable that connect attitude to intention to reuse. Attitude itself is influenced by perceived value where the passengers have agreed that using MRT has a good value for money comparing the price and the speed to arrive at the next station. The passengers have agreed that with that value, they have positive attitude toward using MRT as transit before transferring to other mode of transportation.
- 2) Subjective norms have influenced significantly to the intention to reuse transportation involving route changes. The peer pressure through social media has influence to this intention. With the biggest passengers come from millennials, the influence of social media can grow the intention to reuse the public transport especially involving route transfer. The availability of sharing ride such as Gojek and Grab have lifted the barrier to increase mobility economically.) Millennials closest influencer is their friends as the source of information related the new trend. Riding MRT is considered new trend and in this digital era, the trend that is supported by their friends can become social pressure for millennials ([Curras-Perez et al., 2014](#); [Karriker and Hartman, 2018](#)).
- 3) Perceived Behavior Control has influence to the intention to reuse public transportation involving the route transfer. The passengers are confidence that they have ability to perform the behavior in the future. The self-efficacy and perceive controllability are the factors that influence the Perceived Behavior Control. Most passengers are millennials and they believe that because of the ease to get information, safety of the place, the physical and financial condition along with that the timing of MRT (every 15 minutes arrival) make them believe that they are capable to use MRT as the transit before the change to other route. They also perceive that they need 2-5 minutes to change the transportation mode when they know that the next MRT will arrive around 15 minutes.
- 4) Image is actually not an influence on the intention to reuse public transport that involve route changes. MRT is not yet considered as good image for center to change routes. It might be because of the integration has not been fully in effect. Some renovation and development are still on going. And the availability of sharing ride that can be within their control add to this situation. With access to information from their gadget, the millennials can quickly get the information about the availability of other mode of transportation.

## 6. Conclusion

First conclusion is the integration of TPB and image can predict the intention to reuse public transport involving route transfer especially in the early stage of integrated transport system in the digital era where sharing ride has become a common practice.

The image of public transport has not been proven yet to influence on the intention, however, the other variable especially subjective norm and perceived behavioral control have influenced the intention to reuse public transport that involve route changes. Ease of information, peer pressure, safety, financial and physical condition and the time bound are several factors that should be the main focus to increase the intention to reuse public transport especially involving route changes. While the value for money has influenced the good attitude toward reusing public transport involving route transfers, there might be factors that mediate attitude to intention to reuse public transport involving route changes.

For future research, longitudinal research will be beneficial to see the pattern of intention along the life cycle of integrated transportation system development, from loosely connected until fully connected and integrated. The additional factors need to be investigated as the mediating factors of attitude on the intention to reuse. Several factors might be satisfaction ([Fu and Juan, 2017](#)), habit of using cars ([Chen and Chao, 2011](#)), pro-environmental factors ([Chowdhury, 2016](#)) and norm related to the habit of using cars, anticipated feeling guilty ([Bamberg et al., 2007](#)). It is worth checking also the impact of sharing ride to the intention to reuse public transportation with route transfers. It is a complementary or a threat to public transportation. Since the millennials have entered the work force, understanding the role of digital related service to increase the usage of public transport might be worth to be explored.

The study has managerial implications for MRT management such as to expedite the development of TOD to build the image that integrated transportation system that will create benefit to the passengers who have to change routes more often. The use of social media will be one of the tools to create a new generation of public commuter in the cities where using private cars are considered more prestigious. Especially for millennials who are now entering the work force, using social media to urge the use of public transportation might have a bigger impact in influencing new users of public transport.

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