

Measurement Tool for Testing the Intention to Use Automated People Mover System

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Abstract: Automated People Mover System is a transportation system mode which applies a driverless vehicle operated in a fixed certain area in order to move people automatically. As one of the busiest airports in the world, Soekarno-Hatta International Airport is the first airport in Indonesia to launch the Skytrain, as one of the Automated People Mover System. It connects three terminals and expected to improve service for passengers' mobility, provide time-less accessibility and increase punctuality. Skytrain was launched in September 2017, but the users of it seems to be below of its capacity which around 29.5%. To investigate the factors to this phenomenon, the research of the non-users' intention is needed. This research used the modified model of the Unified Theory of Acceptance and Use of Technology 2 by Venkatesh et al. to explore and define the factors. Two variables-Anxiety and Perceived Security-are proposed to the model and a Price Value variable is dropped, finally, 8 variables and 43 items are formed. The variables and items were then tested to 30 respondents and the result showed that all variables and items are valid and reliable. Therefore, measurement tool can be used for further study.

Keywords: Automated People Mover System, Skytrain, Technology Adoption, Behavioral Intention, Modified UTAUT 2

1. Introduction

Soekarno-Hatta International Airport (SHIA) serves more than 63 million passengers in a year [1] and ranked as the 17th busiest airport in the world by Airport Council International (ACI) in 2017. This number increased by 8% from 58.2 million in 2016. This increment was affected by both International and Domestic passenger in SHIA. In 2017, the number of International-bound passengers jumped to 14.71 million. The airport wrote in a press statement that the increment was a 12% increase from 2016. Meanwhile, the number of domestic passengers also increased by 7% to 48.3 million [2]. The amount of 63 million passengers also makes SHIA become the second most connected airport in Asia-pacific which becomes the tenth in the International Megahubs as well as the second Top Low-Cost International Megahubs [3]. This achievement is recognized by OAG Company-an Air travel intelligence company which based in the United Kingdom. PT Angkasa Pura II stated that the connectivity index of the airport stood at 249 which only has for points lower than Changi International Airport in Singapore [4]. This index also higher than Incheon Airport in South Korea, Kuala Lumpur International Airport in Malaysia and Hong Kong International Airport [5].

On September 2017, SHIA launched an Automated People Mover System (APMS)-i.e. Skytrain-in order to be the solution of the travel-load phenomenon. The access between three terminals now easier and takes less time. The integration of transit technologies at airport terminals requires careful planning and a good understanding of the interactions between passenger and transit flows [6]. The use of Automated People Mover (APM) technology is one of many ways to improve the passenger flows inside large airport terminals [6]. Without adequate airport terminal transit technologies, passengers would probably incur intolerable walking distances and large aircraft-to-aircraft transfer times at major hub airports [6].

Thus, the use of Skytrain is needed to handle the load-travel-mobility occurred in SHIA.

A result of the preliminary data gathering conducted on October 31st, 2018 showed a low number of Skytrain usage. The first preliminary data gathering is a survey field which shows that the Skytrain only filled with around 29.5% passenger capacity or only 52 people out of 176 capacity. The survey conducted in two separate times, in the low and the peak hours. The second preliminary data gathering is by online questionnaire to 35 respondents. The result shows the knowledge of the respondent about Skytrain and their intentions of using Skytrain. 85.7% of respondents are familiar with Skytrain, but the respondents who have tried Skytrain is only 22.9%.

Due to the low number of Skytrain users, this phenomenon needs to be risen and studied. The high technology utilization will also increase both passenger and airport's performance at the same time. Since the number of the non-users' intention to use Skytrain is high according to the preliminary data gathering, thus, identifying the factors affecting the use of Skytrain is needed.

In order to deepen the knowledge regarding the non-users' intention, the model of Unified Theory of Acceptance and Use of Technology by Venkatesh et al. in 2012 is chosen [7]. Hence, to fit the context and the need for this study, some modification is done to the model. The modification of models has been done by adding two variables which are Anxiety and Perceived Security and dropping Price Value variable. The outcome of this study is expected to find a suitable measurement tool for further research.

2. Literature Review

This study used the modified UTAUT2 Model. Reviewing the previous study about the acceptance of Automated Road Transportation System (ARTS) using UTAUT, the result showed that the three variables (Performance Expectancy,

Effort Expectancy, and Social Influence) give significant affects on Behavioral Intentions[8]. Thus, the result indicates that all three UTAUT frameworks can be applied to increase the understanding of user's behavioral intentions in the area of automated vehicles. In addition to support the use of UTAUT2 model, this research also reviewed previous study by Madigan entitled "What influences the decision to use automated public transport? Using UTAUT to understand the public acceptance of Automated Road Transport Systems". The result showed that the model can explain 58.6% of the variance in Behavioral Intentions. The strongest predictor was Hedonic Motivation and followed Performance Expectancy, Social Influence, and Facilitating Conditions[9]. According to both studies, this research finally uses the UTAUT2 to study the acceptance of the automated transportation system. Venkatesh, Thong, & Xu also stated that "compared to UTAUT, the extensions proposed in UTAUT2 produced a substantial improvement in the variance explained in behavioral intention (56 percent to 74 percent) and technology use (40 percent to 52 percent)"[7].

This research framework modified the UTAUT2 Model. The modified point located in the independent variables, dependent variable and moderating variable. The original UTAUT2 variables have seven variables which are: Performance Expectancy, Effort Expectancy, Social Influence, Facilitating condition, Hedonic Motivation, Price Value, and Habit. Hence, this study is going to eliminate one independent variable (*Price Value*), add two additional variables (*Anxiety* and *Perceived Security*), do not use an intervening variable and eliminate one moderating variable (*Experience*).

Based on the UTAUT2 Model, the *Price Value* variable is also evaluated. Because the Skytrain is free of charge, therefore the *Price Value* variable is eliminated. The additional two variables are *Anxiety* and *Perceived Security*. *Anxiety* defines as evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer) [10] and the research done by [11] stated that "Three additional constructs appeared to be significant direct determinants of intention in prior models; attitude toward using technology: "an individual's overall effective reaction to using a system"; self-efficacy and anxiety. However, UTAUT proposes that these three constructs have no significant effect on intention. Self-efficacy and anxiety being similar in their effects; these three constructs are proposed to be captured by effort expectancy construct of the model." In addition, in [12] explained that "In commercial contexts, perceived security reflects consumers' perceptions that a certain system is secure to conduct transactions. The conceptualization of perceived security in the IS literature was based on individuals' subjective perceptions of security, rather than on objective metrics of security." Several scholars argued that perceived security influences intentions to use (e.g., higher security results in higher intentions) [12].

This research implements Behavioral Intention without using any intervening variable. The use of behavioral intention is since the objective is to examine the non-user of Skytrain and how they behave towards Skytrain, whether

they want to adapt or not and the factors effect them the most. However, this study will not include Use Behavior variable since this study wants to examine only to the behavioral intention of the Skytrain. Thus, the respondent of this research will be the non-user but familiar with Skytrain.

Next, there are three moderating variables in the UTAUT2 Model which are Age, Gender and Experience. This study will drop Experience variable since the study will only be a one-time data sampling. The use of Experience variable is when the research will take a periodical data sampling or when the same data subject taken repeatedly in a certain period of time. Figure. 1. Shows the Modified UTAUT2 Model proposed in this study.

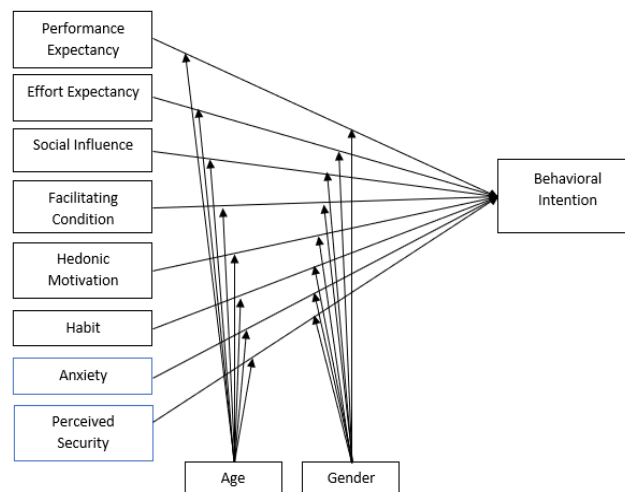


Figure 1: The Modified UTAUT2 Model

Note: The box with the blue color is a new variable added

In total there are 8 variables used in this research. The definition of each variable will be elaborated below:

Performance expectancy is the degree to which an individual believes that using Skytrain will help a person to increase their mobility in the airport. *Effort expectancy* is the degree of easiness of using Skytrain. *Social influence* is defined as the degree to which an individual perceives that important others believe he or she should use Skytrain. *Facilitating conditions* is the degree to which an individual believes that the Skytrain management or the security officer exists to support the use of Skytrain. *Hedonic motivation* is defined as the fun or pleasure derived from using Skytrain. *Habit* defined as the extent to which people tend to use Skytrain automatically because of learning. *Anxiety* is an evoking anxious or emotional reaction when using the Skytrain. *Perceived Security* is a consumer's perception that using Skytrain is secure. In the end, *Behavioral Intention* is how much people are willing or planning to use Skytrain.

3. Method

The data gathered in this research is by using an offline questionnaire. Before spreading the questionnaire, there are at least 4 steps to validate the questionnaire. The validity steps are Content Validity Test, Face Validity Test, Readability Test, and Pilot Test. The content validity done in this research is by reviewing previous journals and literature

[6, 7, 8, 9, 10, 11, 12, 13, 14, 15]that have been published in accredited or internationally reputed national proceedings or journals and adopt the questionnaire items or indicators to the current research. The second is a face validity test which was done in order to get the feedback and suggestions from the experts. In accordance to the area of this research, the expertiserequested to evaluate the questionnaire's items are the experts in the field of marketing, IT, or the expertise in the automated people mover system field. The suggestions from the expertisewereconsidered and prioritized to match the theory and knowledge applied in the field. The third is the readability test. Readability test is done to ensure the items used in the questionnaire is easy to be understood by the respondent and will not make any confusion during filling out the questionnaire. The readability test process was done by reading out the questionnaire to several respondents and at the end, the respondents gave feedback and comment on whether changes will be needed or not. At the end, the pilot test was conducted after all three processes are done. The purpose of this pilot test is to see validity and reliability as well as to see the ease and smoothness of the data collection. The result is that the questionnaire is clear and easy to be understood. The items of the questionnaire are shown in Table 1.

Table 1: Questionnaire Items

Code	Items of Performance Expectancy
PE1	I think Skytrain will be useful to my mobility in the airport
PE2	I think using Skytrain will enable me to transfer terminal faster
PE3	I think using Skytrain will enable me to transfer terminal effectively
PE4	I think using Skytrain will make it easier for me to transfer terminal
PE5	I think using Skytrain will help me to save time when I transfer terminal
Code	Items of Effort Expectancy
EE1	I think finding Skytrain's Station is easy
EE2	I think understanding the route of Skytrain will be easy
EE3	I think choosing the Skytrain's directions will be easy
EE4	I think it would be easy to get off in my expected terminal
EE5	It does not take long to learn to use Skytrain
Code	Items of Social Influence
SI1	People who are important to me think that I should use Skytrain
SI2	People who influence my behavior think that I should use Skytrain
SI3	People whose opinions that I value prefer that I use Skytrain
SI4	My friends and family prefer if I use Skytrain
SI5	I think I am more likely to use Skytrain if my friends and family used it
Code	Items of Facilitating Conditions
FC1	I have the knowledge necessary to use Skytrain
FC2	I have experience of using another technology like Skytrain before
FC3	I can get help from the security when I have difficulties using Skytrain
FC4	I think we must use Skytrain if we want to transfer terminal
FC5	I think I will use Skytrain voluntarily
Code	Items of Hedonic Motivation
HM1	I think using Skytrain will be fun
HM2	I think using Skytrain will be enjoyable
HM3	I think using Skytrain will be very entertaining

HM4	I think using Skytrain will be pleasant
HM5	I think using Skytrain will be comfortable
Code	Items of Habit
H1	I think the use of Skytrain will become a habit for me
H2	I think I will be addicted to use Skytrain
H3	If I need to transfer terminal, I think I must use Skytrain
H4	I think using Skytrain will become so natural for me
Code	Items of Anxiety
ANX1	I do not feel apprehensive about using Skytrain
ANX2	I do not feel worried about using Skytrain
ANX3	I do not hesitate to use Skytrain for fear of going in the wrong direction
ANX4	I do not hesitate to use Skytrain because of fear of losing my belonging
ANX5	The Skytrain is not intimidating to me
Code	Items of Perceived Security
PS1	I think using Skytrain is secure
PS2	I think I would feel secure with myself if I go with Skytrain
PS3	I think I would feel secure with my belonging if I go with Skytrain
PS4	Overall, I think using Skytrain is safe
Code	Items of Behavioral Intention
BI1	I intend to use Skytrain in the future
BI2	I intend to continue using Skytrain in the future
BI3	I will always try to use Skytrain if I need to transfer terminal
BI4	I plan to continue to use Skytrain frequently
BI5	I think Skytrain will be one of my favorite technology

4. Result

The Pilot Test conducted to 30 respondents by filling out the questionnaire which was processed using SPSS 23 Software. This study used the criteria of validity from Friedenberg and Kaplan as cited in Indrawati (2015:149)[16] by using the "Corrected Item-Total Correlation" (CITC) score which has to be higher than 0.3. Based on the validity test result, all the items are valid. Meanwhile, the reliability test is tested by evaluating the Cronbach-Alpha (CA) score which has to be more than 0.7 to be considered as good reliability [16]. Finally, the result both validity and reliability are valid and reliable. The result of the pilot test is shown in Table 2.

Table 2: Pilot Test Result

Item Code	CITC	CA
PE1	0.663	0.863
PE2	0.700	
PE3	0.646	
PE4	0.742	
PE5	0.677	
EE1	0.660	0.840
EE2	0.779	
EE3	0.786	
EE4	0.377	
EE5	0.624	
SI1	0.820	0.875
SI2	0.839	
SI3	0.799	
SI4	0.543	
SI5	0.586	
FC1	0.703	0.828
FC2	0.622	
FC3	0.564	
FC4	0.683	
FC5	0.678	

Item Code	CITC	CA
HM1	0.752	0.908
HM2	0.888	
HM3	0.879	
HM4	0.905	
HM5	0.449	
H1	0.795	0.874
H2	0.830	
H3	0.599	
H4	0.760	
ANX1	0.897	0.933
ANX2	0.917	
ANX3	0.817	
ANX4	0.724	
ANX5	0.764	
PS1	0.750	0.924
PS2	0.906	
PS3	0.856	
PS4	0.799	
BI1	0.647	0.888
BI2	0.733	
BI3	0.843	
BI4	0.732	
BI5	0.721	

5. Conclusion

This study revealed that the measurement tool which consists of 8 variables and 43 items are valid and reliable. Thus, this proposed measurement tool can be used for further study related with the adoption of Automated People Mover System or any other studies related with Automated Transport System.

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