Predicting university students’ behavioral intention toward electronic train ticketing system using Technology Acceptance Model

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Abstract. An online train ticketing system, called KAI Access, has been introduced by Indonesian Railways despite some other online platforms introduced earlier by private service providers. While the older generation may still have difficulty in using the online platform, the millennial generation, mostly university students, are faster in mastering the platform, including the online ticketing system. The purposes of this study are (1) to determine university students’ perception of the Technology Acceptance Model (TAM) variable and (2) to measure the effect of Perceived Ease of Use, Perceived Usefulness and Attitude towards Usage variables on Behavioral Intention. Questionnaires were distributed to university students who have used KAI Access. From 350 data collected, 335 data were valid for further analysis. Variance-based SEM PLS was used to determine the relationship between variables. The results show that Perceived Ease of Use and Perceived Usefulness have a direct positive and significant effect on Behavioral Intention, while Attitude towards Usage has no significant influence on Behavioral Intention. The implication for management is to provide a better ticketing system which can create users’ positive attitude to use it. Further research may compare several online ticketing service systems and involve other variables to predict consumers' attitudes and behavioral intentions.

1. Introduction

Indonesian Railways Company has introduced an online train ticketing system called KAI Access a few years ago, despite some competing online ticketing platforms run earlier by private companies. While customers have been using the system quite sometimes, how customers perceive the system has not been known yet. Previous studies highlight more on online flight ticket purchase [1], online shopping [2,3], and online hotel reservation [4]. Scant study has been conducted to understand consumer behavior in using train ticketing systems. There is a need to understand consumer behavior intention of train ticket in order to improve the system. To understand such important issue, the Technology Acceptance Model (TAM) was used to identify the determining factors perceived by customers and how those factors influence consumer behavioral intention. The TAM is used because it can reliably explain consumer attitudes and behavioral intention compared to other models and its high validity has been proven empirically in many previous studies [5-7].

TAM was first introduced by Davis to propose the concept of technology acceptance [8]. The TAM concept holds that acceptance of new information systems can be predicted based on user Behavioral Intentions (BI), Attitude toward Use (ATU) and two other internal beliefs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Davis defines Perceived Usefulness as "subjective probabilities of
prospective users who use a special application system which will improve their work performance in an organizational context" (p. 985) and Perceived Ease of Use as "the extent to which prospective users expect the target system to be easy to use" (p. 985) [8].

According to TAM, Behavioral Intention determines the actual use of existing information systems and therefore determines technology acceptance. Attitudes towards Use (ATU) and Perceived Usefulness (PU) jointly influence Behavioral Intentions (BI). BI is also indirectly influenced by Perceived Ease of Use (PEU). ATU is directly affected by PU and PEU, while PU is directly affected by PEU. Furthermore, TAM theorizes that Perceived Usefulness and Perceived Ease of Use are influenced by external variables [5,8]. Thus, PU and PEU mediate the influence of external variables on user attitudes. Therefore, the purposes of this paper are twofold; first, to determine consumers’ perception on the TAM variable and second, to measure the effect of Perceived Ease of Use (PEU), Perceived Usefulness (PU), and Attitude towards Usage (ATU) variables on Behavioral Intention (BI).

2. Method
Questionnaires were distributed to 350 university’s students in Bandung, Indonesia. The university students were selected as this group is considered as potential customers and has knowledge in using online platforms compared to the older generation. To become respondents, students must have KAI Access system in their mobile phone and has been using the platform at least once. A self-administered technique was used to collect the data. Of the 350 responds collected, 335 were valid for further data analysis. The respondents were asked to state their level of agreement of each statement for four variables: PEU, PU, ATU and BI on a five-point Likert scale (1 represents “strongly disagree”, 2 represents “disagree”, 3 represents “neutral”, 4 represents “agree” and 5 represents “strongly agree”).

Partial Least Square Structural Equation Modelling (SEM PLS) was used to measure the interrelationships among variables, while mean score descriptive statistics was used to identify the determining factors of the TAM variables. Analysis on PLS was carried out in three stages: outer model analysis, inner model analysis, and hypothesis testing. Outer model analysis was carried out to ensure that the measurements used are appropriate (valid and reliable) for measurements. Outer model analysis was tested from three indicators including; convergent validity, discriminant validity, and unidimensionality. Meanwhile, the inner model analysis or structural model analysis was carried out to ensure the robustness and accuracy of the structural model constructed. Evaluations of inner models were tested from three indicators covering; coefficient of determination ($R^2$), predictive relevance ($Q^2$) and Goodness of Fit Index (GoF).

3. Results and discussion

3.1. Respondent perception of the TAM variable
Consumer perceptions of the overall TAM variable show that the highest mean score is the PEU variable (4.31). This shows that consumers perceive the ease of use in doing transactions using online train service system as the main factor compared to other variables. Consumers also perceive Usefulness as the second important variable with a mean value of 4.23 and ATU variable is perceived as the third important (4.12). The variable with the lowest mean score is BI with a mean value of 3.91. Although BI has the lowest mean value, it is still considered good. This result indicates that consumers have a good intention to use the online train ticket service system.

3.2. Respondent demographic profile
The respondent demographic profile of this study is presented in table 1. The table shows distribution of male and female respondents, level of study, university or polytechnic attended, the purpose of buying the ticket and number of uses.
Table 1. Respondent profile.

| Profiles                    | N  | Freq. | %    | Profiles                    | N  | Freq. | %    |
|-----------------------------|----|-------|------|-----------------------------|----|-------|------|
| Gender                      |    |       |      | Purchasing ticket for       |    |       |      |
| Male                        | 157| 46.8  |      | Own                         | 164| 48.9  |      |
| Female                      | 178| 53.2  |      | Family                      | 104| 31.0  |      |
| Year of study               | 335| 35    |      | Friends                     | 67 | 20.1  |      |
| First year                  | 33 | 9.8   |      | Number of uses              |    |       |      |
| Second year                 | 241| 71.9  |      | Less than 3 times           | 84 | 25.1  |      |
| Third year                  | 17 | 5.1   |      | Between 4 - 6 times         | 121| 36.2  |      |
| Fourth year                 | 44 | 13.2  |      | Between 7 – 9 times         | 83 | 24.7  |      |
| Type of university          |    |       |      | More than 9 times           | 47 | 14.0  |      |
| State university            | 97 | 28.9  |      |                             |    |       |      |
| State polytechnic           | 113| 33.6  |      |                             |    |       |      |
| Private university          | 113| 33.6  |      |                             |    |       |      |
| Private polytechnic         | 10 | 3.0   |      |                             |    |       |      |

3.3. Analysis of measurement models

Evaluation of the measurement model includes two stages of evaluation: convergent validity and discriminant validity. Convergent validity can be evaluated in three stages, namely indicators of validity, reliability and the value of average variance extracted (AVE). Evaluation of convergent validity was started by looking at the item reliability (indicator of validity) shown by the loading factor value. Loading factor values which are less than 0.5 will be removed from the model [9]. Based on the PLS results shown in table 2, the model has a positive loading factor for each indicator and above 0.5. The internal consistency of the construct was evaluated through the Cronbach's alpha (CA) and composite reliability (CR) with a cut-off value above 0.7. The results show that there is no reliability/unidimensionality problems found in the model. Whereas, AVE values above 0.5 are highly recommended. The results of the construct internal consistency test show good results for the entire variable as presented in table 2.

Table 2. Loading, Cronbach’s alpha (CA), composite reliability (CR), and AVE

| Construct/item (mean; standard deviation) | Loading* | CR   | CA   | AVE   |
|------------------------------------------|----------|------|------|-------|
| Perceived Usefulness (4.234; 0.692)      |          |      |      |       |
| PU1: KAI Access is easy to learn          | 0.985    |      |      |       |
| PU2: KAI Access is easy to use            | 0.933    |      |      |       |
| PU3: KAI Access is easy to master         | 0.923    |      |      |       |
| Perceived Ease of Use (4.310; 0.683)     |          |      |      |       |
| PEU1: KAI Access is useful for ticket purchase transactions | 0.845 |      |      |       |
| PEU2: KAI Access improves the way to do transactions | 0.892 |      |      |       |
| PEU3: KAI Access makes transactions easier | 0.880 |      |      |       |
| Attitude Toward Using (4.124; 0.694)     |          |      |      |       |
| ATU1: Have a good feeling when using KAI Access | 0.865 |      |      |       |
| ATU2: Using KAI Access is fun             | 0.894    |      |      |       |
| ATU3: I like using KAI Access             | 0.908    |      |      |       |
| Behavioral Intention (3.905; 0.692)      |          |      |      |       |
| BI1: I would consider using KAI Access    | 0.605    |      |      |       |
| BI2: The possibility for me to trade online is high | 0.799 |      |      |       |
| BI3: My willingness to use KAI Access is high | 0.861 |      |      |       |
| BI4: My online transaction opportunities are high | 0.829 |      |      |       |

Note: *All significant at $p < 0.01$

Next stage was to assess discriminant validity based on the heterotrait-monotrait ratio method as discussed by Hair, which uses a measurement standard of 0.85 as the upper limit of the ratio [10]. They state that the distribution of the ratio value below 0.85 is valid discriminant. The construct HTMT test
shows that all distribution values are below 0.85 (between 0.439 until 0.765), so it can be concluded that the three constructs are have a valid discriminant value.

3.4. Analysis of structural models

The tests on structural models or inner models were performed to analyze the relationship between latent constructs. There are several tests for structural models covering $R^2$, Estimate for Path Coefficients, predictive relevance ($Q^2$), and goodness of fit index (GoF). The $R^2$ test result (0.364) in endogenous constructs shows moderate values [11]. A cross-validated redundancy measure ($Q^2$) was applied to assess the predictive relevance of the research model [11]. A research model with $Q^2$ statistic greater than zero is considered to have predictive relevance. Table 3 presents the results of the cross-validated redundancy $Q^2$ test. Meanwhile, the GoF test shows a large value as it is presented in table 4. This study obtains a GoF value of 0.522, which exceeds the cut-off value of 0.36 for large effect sizes of $R^2$ [11]. It indicates that the model has a better prediction power in comparison with the baseline values (GoF criteria). From testing $R^2$, $Q^2$ and GoF, it appears that the model formed is robust, so that the hypothesis test can be carried out.

Table 3. Construct cross-validated redundancy ($Q^2$).

| Construct                 | $Q^2$ |
|---------------------------|-------|
| Perceived Ease of Use     | 0.357 |
| Perceived Usefulness      | 0.299 |
| Attitude Toward Use       | 0.118 |
| Behavioral Intention      | 0.118 |

Table 4. Goodness of fit index.

| Variable                  | AVE  | $R^2$  |
|---------------------------|------|--------|
| Perceived Ease of Use     | 0.841| 0.451  |
| Perceived Usefulness      | 0.761| 0.404  |
| Attitude Toward Use       | 0.790| 0.236  |
| Behavioral Intention      | 0.608| 0.364  |
| Average score             | 0.750| 0.273  |
| $AVE \times R^2$          | 0.273| 0.522  |

3.5. Testing the hypotheses

The path analysis results as shown in figure 1 and table 5 indicate that all coefficient $\beta$ values have a significant t-value and only one path has a non-significant coefficient $\beta$ value. Variable PEU has a positive and significant effect on PU, ATU and BI of 67.1%, 43.6% and 21.9% respectively. PU variable affects positively and significantly ATU and BI by 43.6% and 20%, while the ATU variable does not significantly influence BI. Thus, out of the six hypotheses, only one hypothesis is rejected. From table 6 it can be read that the indirect effect of the PEU variable on ATU and BI is positive and significant at 17.1% and 22%, while the indirect effect of the PU variable on BI is not significant.

Table 5. Hypotheses testing.

| Path                          | Coefficient | t-value  | Result   |
|-------------------------------|-------------|----------|----------|
| H1 Perceived Ease of Use => Perceived Usefulness | 0.671       | 15.713** | Accepted |
| H2 Perceived Ease of Use => Attitude Toward Using | 0.436       | 5.703**  | Accepted |
| H3 Perceived Ease of Use => Behavioral Intention | 0.219       | 2.548*   | Accepted |
| H4 Perceived Usefulness => Attitude Toward Using | 0.436       | 5.703**  | Accepted |
| H5 Perceived Usefulness => Behavioral Intention | 0.200       | 2.429*   | Accepted |
| H6 Attitude Toward Using => Behavioral Intention | 0.141       | 1.692    | Rejected |

Note: ** Significant at p <0.01, * Significant at p < 0.05
Table 6. Direct and indirect effect.

| Path                                      | Effect          | Direct | Indirect | Total  |
|-------------------------------------------|-----------------|--------|----------|--------|
| H1 Perceived Ease of Use => Perceived Usefulness | 0.671**         | 0.671**| 0.671**  |        |
| H2 Perceived Ease of Use => Attitude Toward Using | 0.436**         | 0.171**| 0.607**  |        |
| H3 Perceived Ease of Use => Behavioral Intention | 0.219*          | 0.220**| 0.440**  |        |
| H4 Perceived Usefulness => Attitude Toward Using | 0.436**         |        | 0.255**  |        |
| H5 Perceived Usefulness => Behavioral Intention | 0.200*          | 0.036  | 0.236**  |        |
| H6 Attitude Toward Using => Behavioral Intention | 0.141           |        | 0.141    |        |

Note: ** Significant at p <0.01, * Significant at p < 0.05

Figure 1. The structural model of TAM KAI Access.

The result of consumers' perceptions of online train ticketing systems shows that the PEU variable has the highest mean value compared to the other three variables. The PEU variable also has great influence on ATU and BI compared to the PU variable on ATU and BI. This shows that the PEU variable is the most important determinant on the formation of attitudes in using the online ticketing system. Ease of Use perceived by consumers in using the online train ticketing system is a determinant for the success of the system. For this reason, PT KAI needs to always keep the online train ticket system updated; following technological developments to maintain the ease of use of their online system. The results of this study also confirm previous research conducted by Wang who state that PEU has a positive and significant influence on PU and ATU in the context of multimedia teaching adoptions among school teachers [9]. However, the results of research by Wang shows that ATU has a positive and significant effect on BI, in contrast to this current research that ATU has no significant effect on BI [9]. This indicates that the formation of consumer behavioral intention is not directly influenced by the attitude in using the online train ticket service system but by the easiness and usefulness of the online system.

The result of this research indicates that the ATU of the online train ticketing system is positively and significantly influenced by the PEU and PU. The company should use these influential factors to improve its ticketing system in terms of easiness and usefulness as these two are important indicators of the PEU and PU. The ATU does not affect the BI. However, because the ATU variable is an important variable to predict the consumer intention to behave in the future, it needs effort from the company to ensure how the online ticketing system can influence the formation of consumer attitudes toward the
use of system. The company should find ways to improve the system that can create a pleasant, enjoyable and preferred feeling sensed by consumers when using the ticketing system.

4. Conclusion
The results of this research provide some managerial consequences for PT KAI to make improvements. Firstly, consumers have found that the online train ticket service system is easy to use. The ease of use is important for consumers because it will motivate them to use the system in the future. To maintain the system convenience, it is necessary to update the system following the rapid development of technology and input from customers. There are still many complaints from consumers relating to the refund if consumers cancel tickets that have been purchased. There is no online system for ticket cancellation. Secondly, consumers have been experiencing the benefits of the system. To keep these benefits, the company needs to continuously guarantee the availability of the service system without interruption, especially during peak periods, such as holidays, when the number of tickets purchased increase dramatically. Lastly, referring to the tested hypotheses, the effect of consumer attitudes on behavioral intentions is not significant. Thus, there is a need to improve consumer attitudes towards the use of the system. This can be done by improving indicators such as fun, enjoyment and convenience of the system.

Further research may involve more than one online ticketing platform and compare those systems. It may also include external variables such as technology readiness, user experience and other variables related to technology acceptance. Future research may also involve different target groups of customers.

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References
[1] Babakhani N, Ritchie B W and Dolnicar S 2017 Improving carbon offsetting appeals in online airplane ticket purchasing: testing new messages, and using new test methods J. of Sustainable Tourism 25(7) 955-969
[2] Chiu Y P, Lo S K, Hsieh A Y and Hwang Y 2019 Exploring why people spend more time shopping online than in offline stores. Computers in Human Behavior 95 pp. 24-30.
[3] Tan G W H and Ooi K B 2018 Gender and age: Do they really moderate mobile tourism shopping behavior? Telematics and Informatics 35(6) 1617-1642
[4] He Y F, Wen P P, Lan Y Q and Miao Z W 2018 Hotel Cancellation Strategies Under Online Advanced Booking Int. Conf. on Industrial Engineering and Engineering Management IEEE
[5] Yoon C 2018 Extending the TAM for Green IT: A normative perspective Computers in Human Behavior 83 129-139
[6] Kusdibyo L, Perera H L K and Leo G 2019 Technology Adoption in Education-Based Business Services Int. J. of Applied Business Research 1(02) 124-139
[7] Muk A and Chung C 2015 Applying the technology acceptance model in a two-country study of SMS advertising J. of Business Research 68(1) 1-6
[8] Davis F D 1989 Perceived usefulness, perceived ease of use, and user acceptance of information technology MIS quarterly 319-340
[9] Weng F 2018 A TAM-based study of the attitude towards use intention of multimedia among school teachers Applied System Innovation 1(3) 36
[10] Hair Jr J F 2015 Essentials of business research methods (London: Routledge)
[11] Chin W W 1998 The partial least squares approach to structural equation modeling Modern methods for business research 295(2) 295-336