The Adoption of E-ticketing Apps on Intercity Buses: A Transdisciplinary Approach

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Abstract: *The acceleration and development of toll road infrastructure have caused a rapid increase in bus intercity travel. Bus entrepreneurs further offset the number of passengers by increasing the number of fleets and bus departure hours. Furthermore, to facilitate the management and booking of travel tickets, bus companies use e-ticketing apps. This research investigates the factors that affect the adoption of e-ticketing apps with a transdisciplinary approach. Data was collected by providing questionnaires to respondents using random sampling techniques, with valid data from 243 respondents. Furthermore, data processing and analysis are carried out using SmartPLS 3 software. Based on hypothesis testing, the factors constructed in the model were perceived ease of use, subjective norm, information quality, online review, and price-saving orientation, which positively and significantly affect the intention to use e-ticketing apps.*

Keywords: transdisciplinary, acceptance, adoption, online booking, application, transportation

1 Introduction

The construction of a massive toll road makes intercity and interprovincial road traffic smoother (Hidayati & Rarasati, 2023). The smooth flow of road traffic impacts the travel time of road trips, which is getting shorter than before. This leads to the duration of road travel being more predictable (Zhu et al., 2020). Intercity bus entrepreneurs further balance the shorter travel time by providing buses with much better facilities to make the journey more comfortable and safe (Javid & Sadeghvaziri, 2022). This situation makes land transportation modes in the form of intercity buses increasingly in demand by the public because ticket fares are more competitive than other modes of transportation (Woldeamanuel, 2012).

Booking travel tickets using intercity buses is generally done manually through an agent, a bus company representative who will make a reservation for seats and fleets per the destination

of prospective passengers (J. Li et al., 2019). Meanwhile, the ticket booking application has only been intended for prospective users of modes other than land transportation using buses. However, since the toll road was built massively and road trips became shorter, it is more confident that the travel time is taken (Zhu et al., 2020). The journey is getting more comfortable (Ganji et al., 2021); booking intercity bus travel tickets began to be carried out using electronic-based applications (e-ticketing apps) where prospective passengers can choose their destination, departure time, fleet, availability of facility classes, and the seat they want.

The existence of various positive things desired by these prospective passengers, coupled with the increasing number of reviews and testimonials on various social media channels regarding the comfort and advantages of land transportation facilities using buses, makes prospective intercity bus transportation users more loyal (W. C. Chan et al., 2021) in using e-ticketing apps when they want to travel outside the city. This study tries to confirm what factors influence intercity bus service users to adopt e-ticketing apps. Through a transdisciplinary approach, in-depth analysis is carried out to determine the factors with technical and non-technical influences to produce more accurate and comprehensive studies (Costa, 2022; Zaidi, 2024).

2 Literature Study

Research and reviews on the use of e-ticketing have been carried out by several researchers, where, in general, it is focused on three main things: online booking, services, and features on booking applications, and online ticket purchasing. Regarding online booking, (T. Li & Zhu, 2022) conducted an adoption study on online travel services, where adoption factors that influence it include perceived usefulness, perceived ease of use, attitude, and perceived behavioral control. Meanwhile, (Weng et al., 2017) proved that adopting mobile taxi booking apps is influenced by attitude, satisfaction, and subjective norms. Furthermore, (Azdel et al., 2023) which also focuses on the acceptance of online booking applications, stated the importance of technology readiness as a significant influence. In addition, online reviews from previous customers are one of the factors that significantly influence user acceptance (I. C. C. Chan et al., 2017), so potential new customers need to pay attention before doing activities using online booking.

One of the essential features of online booking applications is the service feature, which contains information and facilities offered by the service provider. This service is one of the considerations for potential customers when deciding to do online booking because it is related to customer trust. Related to service information, the quality of the website technically also has an influence on customers in making decisions to place orders online or not (Wang et al., 2015) because the website for customers is a storefront for service providers in the internet world.

Customers who do online booking will find online ticket purchasing to be a further transaction. Online purchasing is essential because it is related to the risk of success and failure in booking tickets, so it is very influential for customers in deciding whether to continue online booking or not. (Escobar-Rodríguez & Carvajal-Trujillo, 2014) conducted a study that found that online ticket purchasing carried out by customers is influenced by trust, habit, price saving, and facilitating condition. Furthermore, (Cordente-Rodriguez et al., 2020) prove that online purchasing tickets are influenced by perceived usefulness, ease of use, perceived risk, and social presence. Additionally, technology readiness (especially innovativeness) positively and significantly influences online purchase intentions (Mior Shariffuddin et al., 2023).

3 Conceptual Model

3.1 Perceived Ease of Use

Perceived ease of use (PEOU) is derived from the Technology Acceptance Model (Davis, 1989). In this model, PEOU is defined as a perception where the technology is simple, easy to use, and does not require much effort from the user to operate. Furthermore, (Almogren et al., 2024) emphasized that PEOU is the perception of users who feel that the technology used is easy to understand, learn, and operate so that users feel comfortable and encouraged to continue using it (Yang & Wang, 2019). Several studies show that PEOU significantly influences the use of systems, such as online booking systems (Li & Zhu, 2022) and online shopping (Islam et al., 2023). So, it can be hypothesized that:

H1: PEOU has an influence on intention to use e-ticketing apps

3.2 Subjective Norm

Subjective norm (SN) is a factor derived from the TPB Model (Theory of Planned Behaviour), which is defined as the influence felt by the user from the reference of his social group or other people before he or she acts (Ajzen, 1991). Furthermore, (Hwang et al., 2024) define SN as the influence of other parties that is significant enough for him or her to do or not do something. Subjective norms have been used in many models of adoption of the system, for example, in food delivery apps (Kim & Hwang, 2020; Kristia et al., 2023). So, it can be hypothesized that:

H2: SN has an influence on intention to use e-ticketing apps

3.3 Information Quality

Information quality (INFO) is an indicator of information from a system consisting of timeliness, structure, reliability, significance, and correctness of information (Reicks, 2001). INFO is also derived from the Information System Success Model (DeLone & McLean, 1992). Furthermore, INFO will be a vital component in the study of intention to use (DeLone & McLean, 2003), which is proven in several studies applied to e-learning (Lin et al., 2007) and virtual communities (Zheng et al., 2013). It can be hypothesized that:

H3: INFO has an influence on intention to use e-ticketing apps

3.4 Online Review

Online reviews (OR) are one of the most important sources of information for customers before deciding to use the service (Tan et al., 2018). In addition, OR influences online purchasing (Roy et al., 2019). In several studies, online reviews significantly influence customers' decisions in using online services for hotel booking (Salameh et al., 2022) and choosing a restaurant (Zhang et al., 2019). So that it can be hypothesized that:

H4: OR has an influence on intention to use e-ticketing apps

3.5 Price-saving Orientation

Price-saving orientation (PSO) is a factor derived from the UTAUT 2 model (Venkatesh et al., 2012), which is defined as an orientation to make savings in terms of price, discounts, and efforts that can be made to avoid other additional costs of a product or service (Escobar-Rodríguez & Carvajal-Trujillo, 2014). Furthermore, the use of PSO in information technology adoption research has a real influence on the intention to use factor in various e-service services such as online flight ticket booking (Escobar-Rodríguez & Carvajal-Trujillo, 2014), social commerce (Sheikh et al., 2017) and mobile shopping (Gupta et al., 2020). So that the hypotheses that can be further developed are:

H5: PSO has an influence on intention to use e-ticketing apps

Based on the hypotheses that have been prepared, the image of the conceptual model arrangement can be seen in Figure 1.

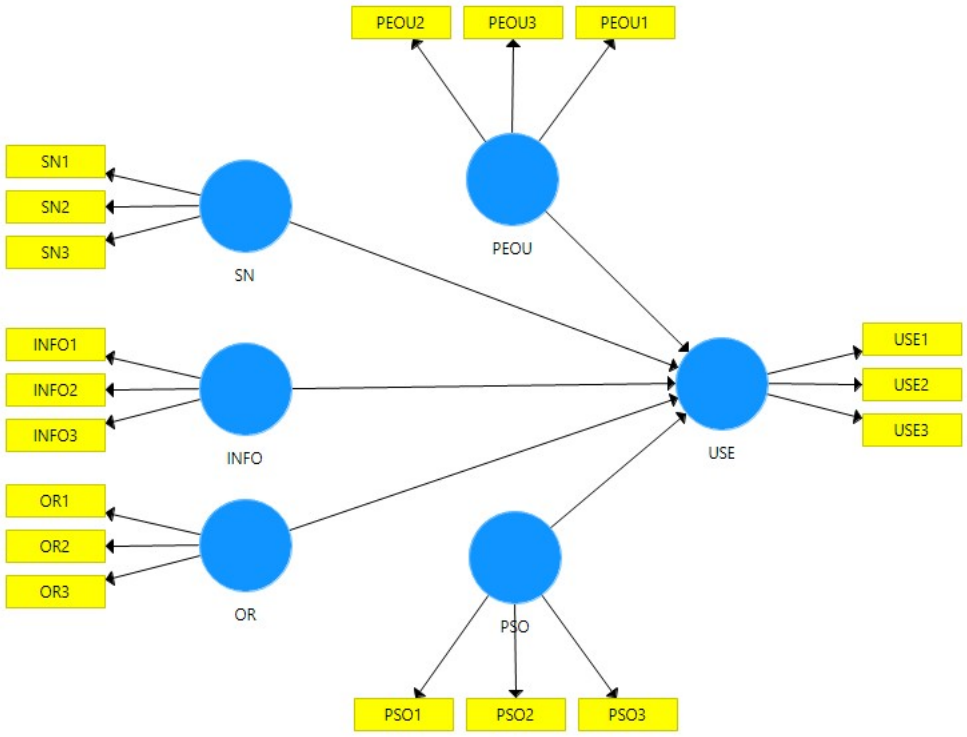

Figure 1: Conceptual Model (using SmartPLS 3)

4 Method

This research studies the causal relationship between a factor (variable) and other factors. The relationship between variables will be investigated quantitatively, where the data collected is numbers. The data collection technique was carried out by random sampling, namely providing

questionnaires to respondents who were users of e-ticketing apps from intercity buses. The random sampling was chosen to avoid biased results (Santosa, 2018). Questionnaires were submitted to respondents offline and online to simplify and speed up the data collection process. Offline questionnaires are given to respondents in print form. In contrast, online questionnaires are given to respondents through various electronic media channels, such as social media.

The questionnaire, which is a data collection instrument, contains a list of questions that have six answer choices, which order consist of strongly disagree, disagree, somewhat disagree, somewhat agree, agree, and strongly agree, where each answer choice represents the Likert Scale with a value of 1 – 6. The even-numbered answer options are designed to minimize the hesitation of respondents who have the potential to provide neutral data in the questionnaire. The list of questions in the questionnaire is an indicator of each variable that is the subject of study in the study (Sugiyono, 2021).

The data that was successfully collected from the respondents through questionnaires was then processed using SmartPLS 3 software, a data processing software based on a tested and reliable statistical method. Statistical data processing is carried out to convert data in the form of numbers from the questionnaire into other numbers that will be analyzed scientifically based on statistical testing with specific indicators. Data processing results will be the basis for further testing and analysis.

5 Result and Discussion

5.1 Outer Model Measurement

The first analysis is measuring the outer model to determine a study's feasibility through validity and reliability tests. A validity test is a way to determine the validity of quantitative research by knowing whether the indicators used can measure the latent variables. In contrast, reliability tests are carried out to determine the reliability, accuracy, and consistency of the indicators used in data collection instruments (questionnaires). The validity test used convergent and discriminant validity techniques, while the reliability test used Cronbach alpha and composite reliability (Sugiyono, 2021).

5.1.1 Validity Testing

Testing with convergent validity is carried out to determine the validity of the relationship or correlation between variables and their indicators or, in other words, between latent variables and their construction indicators. The convergent validity test was carried out in two steps: the outer loading value and the average variance extracted (AVE) value. Based on data processing using SmartPLS 3 software, it was obtained that the outer loading value for all construction indicators of the measurement model was above 0.7, and the AVE value was more significant than 0.5. According to (Ghozali, 2016), an outer loading value greater than 0.7 indicates that convergent validity has been met. Convergent validity means the relationship between the latent variable and its constituent construct indicators can be declared valid. Furthermore, the AVE value was more significant than 0.5 for all variables, indicating that the convergent validity has been met (Ghozali, 2016). This strengthens the assessment that the correlation relationship between variables and their construction indicators is valid for all latent variables.

Furthermore, discriminant validity is essentially the opposite of convergent validity, which ensures that the concept of each latent variable is different from the other variables in the measurement model. Discriminant validity is carried out using two criteria, namely the Fornell-Larcker Technique and the cross-loading criteria. The Fornell-Larcker technique is carried out by comparing the root value of AVE with the latent value of variable correlation. In contrast, the cross-loading technique compares the outer loading value on the indicator related to the cross-loading value on other constructs (Santosa, 2018). Based on the results of data processing with SmartPLS 3 software, it can be seen that the root value of AVE in all construction variables is greater than the Latent Variable Correlation value.

5.1.2 Reliability Testing

Reliability measurement was carried out using two techniques, namely the Cronbach alpha technique and composite reliability. The reliability fulfilment criteria will be met if the Cronbach alpha and composite reliability values are each greater than 0.7. The results of reliability measurements using Smartpls 3 can be seen in Table 1. Based on Table 1, it can be seen that the Cronbach alpha value for all construction variables shows a value greater than 0.7. This shows that the respondents' overall answers to the questionnaire are stable and consistent (Ghozali, 2016). Meanwhile, the composite reliability results for all variables are more significant than 0.7, which shows that the data used in the study meets the reliability requirements so that it can be continued for testing at a later stage (Sugiyono, 2021).

Table 1: Reliability Test Results with Cronbach's Alpha and Composite Reliability

Variable	Cronbach's Alpha	Composite Reliability	Information
PEOU	0,912	0,934	Reliable
SN	0,828	0,905	Reliable
IQ	0,814	0,866	Reliable
OR	0,912	0,929	Reliable
PSO	0,847	0,873	Reliable
USE	0,832	0,856	Reliable

5.2 Inner Model Measurement

The inner model measurements were analyzed to determine the relationship between exogenous and endogenous latent variables (Santosa, 2018). The analysis of the inner model measurement was carried out in two stages, namely R-Square testing and hypothesis testing in the second stage. The R-Square test was carried out to determine how much the independent variable affected the dependent variable. In the second stage, hypothesis testing is carried out to determine whether the hypothesis proposed in the study is accepted or rejected (Santosa, 2018).

Based on data processing with SmartPLS 3, an R-squared value of 0.835 was obtained. This shows that in the conceptual model studied, the dependent variable (USE) is influenced by 83.5% of the independent variables together. In comparison, other factors outside the conceptual model influence the remaining 16.5%. Furthermore, the results of hypothesis testing with a P-value

can be seen in Table 2. Based on Table 2, it can be seen that the overall P-value value is less than 0.05, which indicates that all hypotheses are accepted with significant influence.

Table 2: Structural model hypotheses

	Hypotheses	Original Sample	T-Statistic	P-Value	Supported
H1	PEOU → USE	0.192	5.740	0.000	Yes
H2	SN → USE	0.230	4.148	0.001	Yes
H3	IQ → USE	0.243	4.744	0.000	Yes
H4	OR → USE	0.132	5.667	0.000	Yes
H5	PSO → USE	0.104	3.081	0.002	Yes

5.2 Hypothesis Analysis

Perceived Ease of Usefulness (PEOU) significantly influences Intention to Use (USE), meaning that the ease of using e-ticketing apps on intercity buses will significantly influence a person's interest in using the application. This shows that when an application is designed so that users feel easy to learn, use, and understand its business processes, it will make someone more likely to use it. The results of this study are in line with research that was conducted by (Almogren et al., 2024), (T. Li & Zhu, 2022), and (Islam et al., 2023). Fundamentally, customers will tend to use an easy app compared to an app that is sophisticated but more difficult to operate or requires higher skill sets.

Subjective norm (SN) positively and significantly influences Intention to Use (USE) to use e-ticketing apps. This positive and significant influence from SN to USE aligns with the research of (Kim & Hwang, 2020) and (Kristia et al., 2023). Subjective norms are individual assessments and perceptions arising from internalizing external influences. When external parties exert influence to use a system, individuals can react by accepting or refusing to follow the influence. However, when an individual chooses to accept, he will try to use the application based on a subjective personal assessment of the application he uses.

Information quality (INFO) positively and significantly influences the use of e-ticketing apps. This is possible with obvious information contained in the application. With the sufficiency of information according to user expectations, users do not need to look for additional information from other parties or ask other people. Quality information generally contains informative and accurate information, so users feel confident using the application. The influence of information quality on adopting this application is also in line with the research of (Lin et al., 2007) and (Zheng et al., 2013).

In today's social media era, everyone who has access to the internet has the same opportunity to give an assessment or review of a product or service based on their experience. The experience is generally conveyed through social media or application facilities that many users can access. This makes many potential users of one new application look for review information before installing and using an application. If many people positively review an application, they will install and use it. So, the more positive reviews an application gets, the more potential it has to get many new users. The influence of online reviews on adopting a service product aligns with research on choosing a restaurant (Zhang et al., 2019) and online purchasing (Majali et al., 2022).

With economic principles, it is natural for a person to choose a product and service that he wants based on calculating the costs that will be incurred. If there is a product and service that are the same or almost the same, people will prefer to use products or services that provide a lower price. E-ticketing apps generally provide a choice of intercity bus services along with the prices and facilities provided. Customers will compare the following services and offers based on prices from intercity bus companies. The existence of price comparison facilities and services from transportation companies is one factor that makes users adopt the intercity bus ticket booking application. The PSO factor influencing the adoption of online ordering applications is in line with research performed by Gupta et al. (2020) on mobile shopping.

6 Limitations and Further Research

Some of the limitations of this study include the research's location, the respondents' general profile, and the limitations of selecting factors/variables. Regarding geographical location, the research was conducted in Indonesia, with most of the respondents' profiles being Generation Z, born between 1997 and 2012. Generation Z, currently between 12 and 27 years old, has excellent technological literacy, making it easy to accept and adopt new technology quickly. In addition, this study conducts a study on the relationship between independent and dependent variables directly, so it has limitations in conducting analysis. Therefore, to produce a more comprehensive study, the research can be continued by including respondents from various countries and ages as comparison material regarding the adoption rate of an application. Furthermore, selecting and assessing other variables to research with moderation studies or relationships between variables will indirectly make the resulting model more exciting and generic so that it can be applied more widely.

7 Transdisciplinary Approach

The study on adopting e-ticketing apps for intercity buses is conducted with a transdisciplinary approach, involving experts, studies, and methods from various disciplines (Benesh et al., 2015; Zaidi, 2023). The background of this research takes the setting of massive infrastructure development that impacts cultural changes in choosing transportation modes, which is a study of Civil Engineering and Transportation Engineering.

The selected variables investigated in this study also come from different scientific disciplines. Perceived ease of use (PEOU) variables come from software's technical aspects, such as informatics/computer science output. Furthermore, a subjective norm is an individual's perception that emphasizes the psychological aspects of the scientific discipline of psychology. Information quality is the nature of information in an information system, where the focus of information quality studies is the scientific domain of Information Systems. Online review is another Word of Mouth (WOM) language, a testimonial from service users submitted to online media such as social media. It comes from the study of management science. The principles of human economics in meeting the needs of life in this study are applied by selecting the Price-Saving Orientation variable as one of the latent variables. The intention to use a variable is a dependent variable that indicates the interest of humans in using something because of other factors that affect it, which is generally discussed in psychology.

The research to determine the relationship between these variables was carried out with a quantitative approach using SEM (Statistical Equation Modeling) - PLS (Partial Least Square), an application of the statistical calculation method. Through SEM-PLS and its statistical-mathematical test criteria indicators, this study proved that the proposed hypothesis in this study was proven positively and significantly for all influential variables (factors).

8 Conclusion

This study examined factors that affect user acceptance of e-ticketing apps using a transdisciplinary scientific approach. The main contribution of this research lies in the study and transdisciplinary approach to producing a user acceptance model. The transdisciplinary approach allows for an in-depth and comprehensive exploration of a problem where influential factors originating from various points of view are studied according to the complexity of the existing problem. This study proved various transdisciplinary factors' positive and significant influence on user acceptance of e-ticketing apps.

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