

Perceived of ease of use and usefulness: Empirical evidence of behavioral intention to use QR code technology on Indonesian commuter lines

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ABSTRACT

This study aims to estimate the factors determining the perceived behavioral intention to use the QR code on a smartphone in the commuter line tap-in tap-out ticketing process as an alternative payment. The rapid growth of information technology in the last two decades had become a factor that encouraged individuals and groups to utilize information technology from devices or technological tools as effectively and efficiently as possible to facilitate the activities and business processes being carried out. This research used the probability sampling technique with a random sampling of 100 commuter line passengers. In addition, this research used the data analysis technique of the Structural Equation Model-SmartPLS3.0. The results indicated that perceived compatibility and enjoyment significantly affected the perceived ease of use and usefulness in the consumer's behavioral intention to use QR Code technology on smartphones as a substitution for purchasing commuter train tickets. However, the three other variables, perceived convenience, self-efficacy, and enjoyment, do not significantly influence the usefulness of using QR Code Technology on smartphones as an alternative for purchasing commuter tickets, and neither do the technological knowledge and perceived compatibility.

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1. Introduction

The core part of the existence of a cashless narrative is that there is no need for transactions using physical or non-cash money; where to achieve this, there is a need for media or tools that can replace physical money, including E-money or electronic money by using media cards or physical cards that have chip technology. Radio Frequency Identification can make transactions and payments via QR Code-based Smartphones and payments via NFC-based Smartphones (de Luna et al., 2019). Of the rapid increase in the use of cashless-based E-money or electronic money, one of the increasing factors is the public transportation sector. However, other E-money is needed to access one-to-one transportation because it has not been or is not integrated. De Luna et al. (2019) state that various types of services and the lack of a unified payment system that can unite all kinds of systems result in people needing more than one electronic money. The current use of cashless-based electronic money in Indonesia in 2022 has reached 594 million units. This number has increased rapidly compared to the data in 2010, which were only 7.9 million cashless units based on electronic money.

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The assessment of Commuter Line operations with the Commuter Line case study in DKI Jakarta (Ulkhag et al., 2019), measuring service quality conducted in 2019, found in the ticketing criteria with the ticket system sub-criteria that: (1) and vending machine and (2) Consumers give a negative value indicating that the company is less able to provide the best service for customers and must do something to achieve customer satisfaction. The research by Rini and Wijayanti (2018) with the theme of C-vim and conventional counters on the Commuter Line shows that queues often occur when purchasing or refilling at conventional or C-vim counters available at stations. Ricardianto et al. (2022) proved that service quality affects passenger loyalty through passenger satisfaction.

Payment via Smartphone or mobile payment (m-payment) is becoming a trend to replace card-based public transportation tickets as it is today due to the increasing number of Smartphone users, both Android and IOS. Lu (2019), in terms of integration, says that m-payment only needs to use a Smartphone because it can unite various types of banking products and all kinds of digital money products and can eliminate all types of card-based E-money or electronic money for transactions. One of the payments is through an M-payment based on a QR Code. QR Code itself stands for Quick Response Code which means a code that can respond quickly during the Scan or validation process. In this case, it is helpful for public transportation payments, especially during rush hour. Therefore, it can save time in purchasing transportation tickets.

Smartphones, especially QR Code Technology as in de Luna et al. (2019) and Liébana-Cabanillas et al. (2019), have proven a positive effect in their research, and the introduction of QR Code Technology on Smartphones is expected to be an alternative for purchasing tickets from conventional counters and C-vim tickets. QR Code on a Smartphone, there is no need to queue at the counter to top up balances because it can be done directly on the Smartphone. Research by Ferreira and Dias (2015) concludes that the existence of Smartphone payment technology can encourage sustainable modes of transportation not only from the side of public transportation itself. Ferreira et al. (2014) analyze payment systems via Smartphones for public transportation in Portugal. The study reveals that users find this system very useful, convenient, and safe, improving user experience more than traditional systems, and they appreciate the fact that they can directly see the ticket, travel, and account information from their Smartphone. Kim et al. (2009) state that the Technology Acceptance Model (TAM) is used as a benchmark in assessing whether society will accept a technology. Therefore, the theoretical model of TAM is very suitable for studying users' intentions to use and adopt mobile technology (Buabeng-Andoh, 2021). Previous TAM research is also related to behavioral Intention to use social media online and impacts several variables such as perceived pleasure, perceived ease of use, and perceived usefulness (Alshurideh & Kurdi, 2023).

The maturity level or product life cycle of the existing payment technology is obtained from Lerner (2013). Payment based on Smartphone QR Code technology is currently at the medium-high level, considered a stable Smartphone QR Code product that can maximize its market share. Currently, Smartphone QR Code payments have not been touched, but this does not rule out the possibility that in some other countries, Smartphone QR Code has entered a maturity phase where it has been widely used in all aspects of payment transactions, such as shopping centers, culinary centers, and public transportation in recent years. However, it must still be more effective (Fine & Clark, 2016).

2. Literature Review

2.1 Knowledge of Technology

Users are often reluctant to use technology without basic knowledge of proper technology. This variable of technological knowledge is obtained from Schmidt et al. (2009), whereas from research in Estonia, Luik, and Taimalu (2021) and Stal and Paliwoda-Pękosz (2019) conclude that consumers' knowledge of this technology influences consumers' perceived ease of use. In order to accept technology, consumers must first realize that technology exists and have a basic knowledge to operate it. Therefore, they must be aware of technology. The flow of information is expected to significantly impact the Intention to use the technology (Alhumaid & AAssali, 2023). Consumers must know about using technology and obtain it from perceived usefulness (Kariapper, 2021). Yap et al. (2022) and Al-Rahmi et al. (2019) state that knowledge of technology in technology acceptance is an indicator that must exist to see consumers realize or know that technology exists and can be used to help and it is easy to use. According to Najib et al. (2021), knowledge is related to a person's adoption behavior because adopting new technology requires special knowledge.

2.2 Perceived Convenience

Perceived convenience is adopted by Yoon and Kim (2007), where it has been widely used in technology research, which produces good acceptance of it in various fields, including the acceptance of technology. Berry et al. (2002) state that a product or service is considered convenient when it saves time for consumers. However, if the consumers feel uncomfortable, it is easier for them. Another research by Chang et al. (2013), Liébana-Cabanillas et al. (2019), Al-Bashayreh et al. (2022), Kariapper (2021), Cheng. (2015), and Chang et al. (2012) found that the relationship between the acceptance of technology usage and perceived convenience that its relationship with other factors can be modeled to evaluate the acceptance of techniques usage from perceived convenience. Wahyuni et al. (2022) revealed that the service results felt by customers when receiving services impacted company performance.

2.3 Self-Efficacy

Theoretically, Bandura (2009) adds that individual at the level of self-efficacy influenced by environmental factors tends to perform their work well. Likewise, theoretically, self-efficacy is an individual confidence in his ability to be involved in the achievement of desired goals (Luszczynska & Schwarzer, 2015; Alsa et al., 2021). Self-efficacy is also measured by emotional stability, including cognitive action, optimism, and expectation, which are proactive attitudes (Mastenbroek et al., 2014). Self-efficacy significantly impacts the organization or company's commitment (Akbar et al., 2018). Sharma and Kumra (2022) find that self-affection also plays a role as a partial mediator among mindfulness, stress, depression, and anxiety. Research in Bangladesh finds that self-efficacy has a positive relationship with ease of use and usefulness (Al-Bashayreh et al., 2022; Fatima J et al., 2017). However, park et al. (2012) state there is a finding that self-efficacy and perceived usefulness do not determine a clear correlation. Self-efficacy and perceived usefulness do not have a significant relationship (Kumar et al., 2020).

2.4 Perceived Compatibility

Previous studies conducted by Cheng (2015) and Al-Bashayreh et al. (2022) to measure the acceptance of the use of mobile phone technology find and confirm that perceived compatibility is the main predictor of perceived ease of use, perceived usefulness, perceived enjoyment, and perceived Intention to use. Other studies from Jordan, Almaiah, and Al Mulhem (2019) find that perceived compatibility is the main predictor of perceived behavioral Intention to use. Another research by Ramos-de-Luna et al. (2017) about the technology of NFC becoming mobile payment and Li et al. (2019) about health monitoring perceived compatibility has a significant relationship with perceived ease of use and usefulness. Another research finding states that perceived compatibility will act as a moderating variable to strengthen the relationship between perceived usefulness and satisfaction with environment-friendly products (Huang & Yu, 2022; Ricardianto et al., 2023).

2.5 Perceived Enjoyment

Perceived enjoyment is the level where the user's use of technology is pleasant in the user apart from the value of the technology itself (Pikkarainen et al., 2004). Perceived enjoyment is vital in the primary mechanism of the relationship between environmental stimuli and Intention to purchase (Patel et al., 2020; So et al., 2021; Tong, 2010). Subsequently, according to Holdack et al. (2022) and Almulla (2022), perceived enjoyment significantly influences perceived usefulness and directly predicts attitude and strength even more than perceived usefulness. According to Virgiawan et al. (2021), perceived enjoyment is the dominant indicator for increasing consumer engagement.

2.6 Perceived Ease of Use

According to Siagan et al. (2022a), perceived ease of use is based on the Intention of use, information sharing, and customer loyalty. The research results in Indonesia explain that perceived ease of use will increase the use of digital users in Indonesia (Husainah et al., 2023; Indrasari et al., 2022). Perceived ease of use can facilitate and make adopting technology innovations more possible (Ratten, 2014; Zuniarti et al., 2021). Users will experience the benefits of information technology in several foreign cultures with the tutor's perceived excellence (Alhumaid & AAssali, 2023). The use and interaction between users and intelligent home systems can indicate ease of use (Hubert et al., 2019; Kim & Chiu, 2019). Previous research by Polatoglu and Ekin (2001) finds that the lower the convenience or, the more complex the ease of use received by users when using the technology, the lower the level of users to use the technology.

2.7 Perceived Usefulness

Theoretically, perceived usefulness is the level of confidence in performing an activity beneficial for the service users (Zhang et al., 2014; Zuniarti et al., 2021). Information technology's advantage is the benefit obtained by perceived usefulness from information technology (Venkatesh & Davis, 2000). According to Kowalczyk (2018), perceived usefulness is how the users believe that using the innovative speaker system will increase their productivity and performance. This additional model confirms that perceived usefulness has a significant effect on the perceived Intention to use, according to Kumar et al. (2020), Li et al. (2019), Mansur et al. (2021), and Sophea et al. (2022). However, other research by Al-Bashayreh et al. (2022), Ismail (2016), and Buabeng-Andoh, (2021) finds that perceived usefulness has an insignificant effect on the perceived Intention to use.

2.8 Perceived Behavioral Intention to Use

Theoretically, perceived behavioral Intention to use is a concept of accepting or rejecting information technology to improve business performance for entrepreneurs (Moghavvemi et al., 2016). The Intention to use includes belief in one's abilities, the Intention to overcome obstacles, the Intention to be able to change, and the Intention to be able to use new technology. With a high perception of Intention from a user, it can encourage or motivate him to be able to use this technology in order to help with daily life, as stated in several previous studies such as those conducted by (Al-Bashayreh et al., 2022; Ali et al., 2013;

Buabeng-Andoh, 2021; Kariapper, 2021; Endri et al., 2020; Kumar et al., 2020; Li et al., 2019; Liébana-Cabanillas et al., 2019; Liñán & Chen, 2006; Segal et al., 2005).

The purpose of this study is to find out and get the number of hypotheses that are accepted and rejected from each variable factor in researching QR Code Technology on Smartphones as an alternative in purchasing Commuter tickets, in addition to knowing whether QR Code on Smartphones can provide convenience and benefits as an alternative for purchasing commuter tickets rather than the incumbent ticket system. The use of eight variables in one study related to m-payments with smartphones in research, especially for Commuter Line users in Jakarta, Indonesia, is expected to be a novelty and a guide for further research, to solve the problem of a better Commuter Line ticket purchasing system.

2.9 Hypotheses

The research hypothesis and conceptual model (Fig. 1) are obtained based on the previous description.

- H₁:** Knowledge of technology has a direct effect on perceived usefulness.
- H₂:** Knowledge of technology has a direct effect on perceived ease of use.
- H₃:** Perceived convenience has a direct effect on perceived usefulness.
- H₄:** Perceived convenience has a direct effect on perceived ease of use.
- H₅:** Self-Efficacy has a direct effect on perceived usefulness.
- H₆:** Self-Efficacy has a direct effect on perceived ease of use.
- H₇:** Perceived compatibility has a direct effect on perceived usefulness.
- H₈:** Perceived compatibility has a direct effect on perceived ease of use.
- H₉:** Perceived enjoyment has a direct effect on perceived usefulness.
- H₁₀:** Perceived enjoyment has a direct effect on perceived ease of use.
- H₁₁:** Perceived ease of use has a direct effect on perceived usefulness.
- H₁₂:** Perceived ease of use has a direct effect on the benefits of behavioral Intention to use.
- H₁₃:** Perceived usefulness has a direct effect on the benefits of behavioral Intention to use.

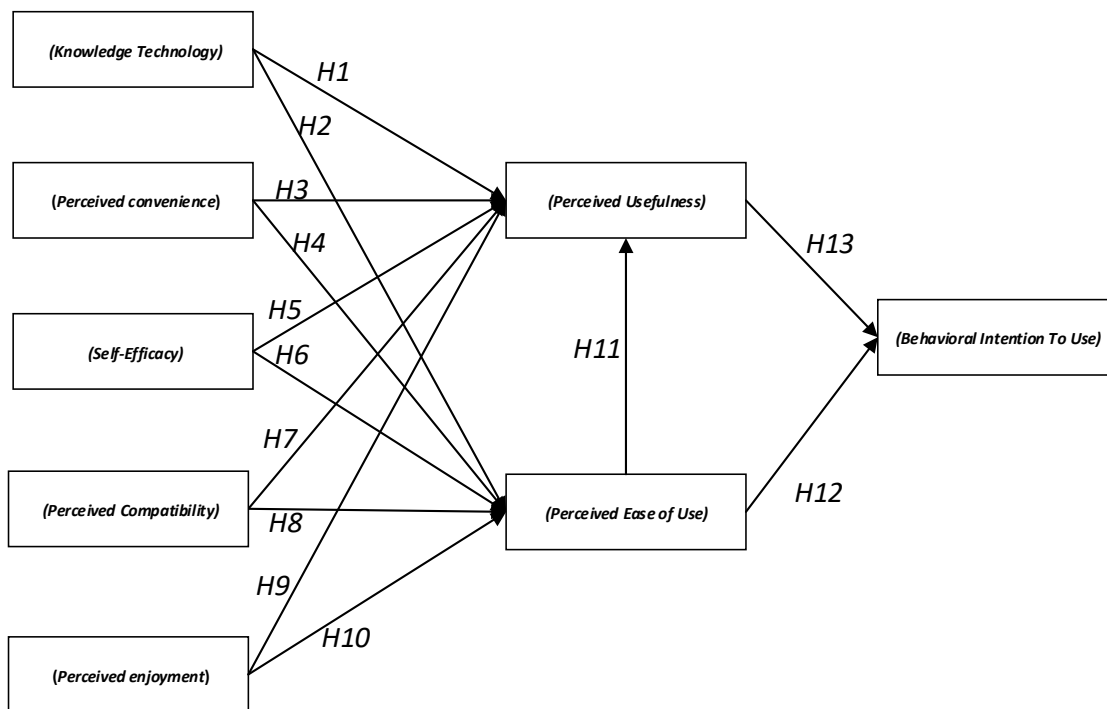


Fig. 1. Conceptual Model

3. Research Method

This research was quantitative because it was conducted to test the hypotheses concerning knowledge of technology, perceived convenience, self-efficacy, enjoyment, compatibility, ease of use, usefulness, and behavioral Intention to use. The entire variables studied are to use came from the passenger acceptance of the technology of smartphone QR Code at the commuter line gates. The research was dominated by or carried out via online questionnaire due to the pandemic factor to maintain the health of respondents and researchers. The number of

Commuter Line passengers in the Jabodetabek area in 2020 was 76.033.331 million people per year. This research obtained 100 respondents as the sample through 33 questions and a probability sampling technique. The researchers referred to the instrument indicators in determining the instrument item material. Data analysis methods or data analysis techniques were used to answer the problem formulations or to test the hypotheses formulated in the research, whereas, in this study, the authors used Structural Equation Model data analysis techniques using SmartPLS 3.0. The stages of data analysis to be carried out after obtaining the data from the questionnaire are Likert scale weight scores, convergent validity test, discriminant validity test and composite reliability test, significance value and R^2 , Effect size (F^2), Prediction relevance (Q^2). The rule of thumb in this study was t -statistics >1.96 with a p -value significance level of 0.05 (5%) based on the criteria. The use of the SEM-PLS method with the eight variables studied and related to m-payments has been used by several previous researchers (Alshboul & Al. Hamouri, 2023; Alshurideh & Kurdi, 2023; Duarte & Pinho, 2019; Liébana-Cabanillas et al., 2021; Nugroho et al., 2022; Yang et al., 2023).

4. Results and Discussion

4.1. Outer Model

Table 1
Results of Convergent Validity with AVE, Cronbach's Alpha, and Composite Reliability

<i>Variable</i>	<i>Item</i>	<i>Outer Loadings</i>	<i>Average Variance Extracted (AVE)</i>	<i>Cronbach's Alpha</i>	<i>Composite Reliability</i>
<i>(Behavioral Intention to Use)</i>	bitu1	0.877	0.840	0.904	0.940
	bitu2	0.928			
	bitu3	0.942			
<i>(Knowledge of Technology)</i>	kt1	0.827	0.648	0.736	0.846
	kt2	0.734			
	Kt3	0.850			
<i>(Perceived convenience)</i>	pc1	0.838	0.725	0.809	0.888
	pc2	0.912			
	pc3	0.801			
<i>(Perceived Compatibility)</i>	pcy1	0.833	0.750	0.833	0.900
	pcy2	0.871			
	pcy3	0.893			
<i>(Perceived Enjoyment)</i>	pe1	0.886	0.692	0.779	0.870
	pe2	0.860			
	pe3	0.743			
<i>(Perceived Ease of Use)</i>	peou1	0.734	0.719	0.921	0.939
	peou2	0.824			
	peou3	0.839			
	peou4	0.858			
	peou5	0.903			
	peou6	0.918			
<i>(Perceived Usefulness)</i>	pu1	0.902	0.780	0.929	0.947
	pu2	0.885			
	pu3	0.924			
	pu4	0.853			
	pu5	0.850			
<i>(Self-Efficacy)</i>	Se2	0.857	0.675	0.884	0.912
	Se3	0.787			
	Se4	0.755			
	Se5	0.869			
	Se6	0.833			

Based on Table 1, all the indicators of outer loading value are above 0.70, and the constructs show an Average Variance Extracted (AVE) value that is > 0.50 , with the smallest value being 0.648 for the knowledge of technology variable and the most significant value being 0.840 for the variable of behavioral Intention to use. Therefore, all the variables in this study are reliable because all variables have a composite reliability value of > 0.7 , where the reliability value is above 0.7.

Table 2

Results of Discriminant Validity Test (Fornell-Larcker Criterion)

	<i>SE</i>	<i>PCY</i>	<i>KT</i>	<i>PEOE</i>	<i>PE</i>	<i>PU</i>	<i>PC</i>	<i>BITU</i>
(Self-Efficacy)	0.821							
(Perceived Compatibility)	0.400	0.866						
(Knowledge of Technology)	0.340	0.301	0.805					
(Perceived Usefulness)	0.314	0.629	0.401	0.883				
(Perceived Ease of Use)	0.335	0.795	0.39	0.802	0.848			
(Perceived Convenience)	0.348	0.566	0.544	0.63	0.536	0.852		
(Perceived Enjoyment)	0.382	0.673	0.476	0.658	0.691	0.58	0.832	
(Behavioral Intention to Use)	0.224	0.583	0.246	0.731	0.709	0.477	0.545	0.916

4.2. Inner Model

The next step is the validity test inner model (structural model). The adjusted R_{square} value for each variable has been at a value above 0.2, considered high in such a discipline as consumer behavior. In scientific research focusing on marketing issues, an adjusted R_{square} value above 0.50 for endogenous latent variables can be used as a rough rule to illustrate that these endogenous variables can predict exogenous variables at a moderate level. According to Hair et al. (2017), the R_{square} showing a value above 0.67 indicates a strong model, the R_{square} showing a value above 0.33 indicates a medium model, and the R_{square} showing a value above 0.19 indicates a weak model form. Furthermore, the results show that the R_{squares} of perceived usefulness with a value of 0.716 or 71.6% and of perceived ease of use with a value of 0.684 or 68.4% have a robust R_{squares} model. However, it has an intermediate R_{squares} model from the perceived Intention to use with a value of 0.577 or 57.7%.

Table 3Resulted from R_{square}

Variable	R_{square}	Adjusted R_{square}	Results
(Perceived Usefulness)	0.716	0.697	High
(Perceived Ease of Use)	0.684	0.667	High
(Behavioral Intention to Use)	0.577	0.568	Intermediate

The F_{square} model is a change in the R_{square} when exogenous variables are excluded from the model by removing the exogenous variables that can affect the endogenous variables. The size of the effect equal to above 0.02 is small, equal to above 0.15 is moderate, and equal to above 0.35 is large.

Table 4Resulted from F_{square}

	<i>SE</i>	<i>PCY</i>	<i>KT</i>	<i>PEOE</i>	<i>PE</i>	<i>PU</i>	<i>PC</i>	<i>BITU</i>
(Self-Efficacy)				0.00	0.00			
(Perceived Compatibility)				0.04	0.56			
(Knowledge of Technology)				0.01	0.02			
(Perceived Usefulness)								0.18
(Perceived Ease of Use)				0.56				0.10
(Perceived Convenience)				0.16	0.00			
(Perceived Enjoyment)				0.03	0.08			
(Behavioral Intention to Use)								

Q_{square} is a relevant prediction, or in other words, it measures whether a model has a relevant predictive or not (above 0 = Good) by using a blindfolding procedure (Hair et al., 2017).

Table 5Resulted from Q_{square}

	<i>SSO</i>	<i>SSE</i>	$Q^2 (=1-SSE/SSO)$
(Self-Efficacy)	500.000	248.479	0.503
(Perceived Compatibility)	300.000	156.152	0.479
(Knowledge of Technology)	300.000	205.470	0.315
(Perceived Ease of Use)	500.000	170.552	0.659
(Perceived Enjoyment)	600.000	239.930	0.600
(Perceived Usefulness)	300.000	168.226	0.439
(Perceived Convenience)	300.000	183.625	0.388
(Behavioral Intention to Use)	300.000	108.488	0.638

4.3. Hypothetical Test

Hypothetical testing is carried out to determine whether all variables, in the end, are statistically related or have an influence as previously proposed by the hypothesis or may also reject the proposed hypothesis. The research to test the hypothesis uses

an application with the aid of Partial Least Square 3.0. This application obtains the values or results of the PLS Algorithm and Bootstrapping.

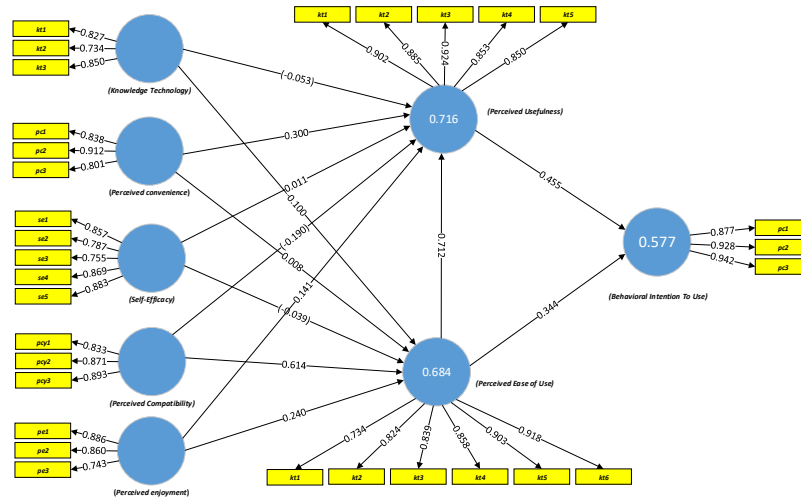


Fig. 2. Results of SmartPLS Algorithm (Outer model)

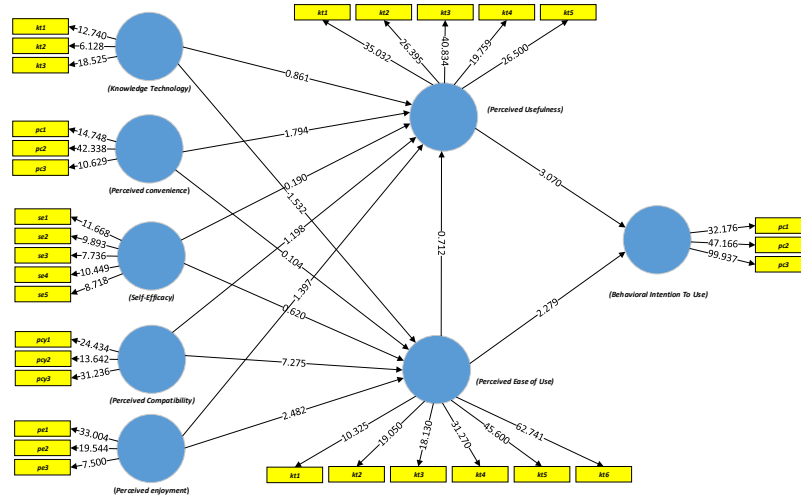


Fig. 3. Results of SmartPLS Bootstrapping (Inner model)

The first hypothesis (H₁) is, Perceived Technology has an insignificant negative effect on perceived usefulness in using QR Code Technology on Smartphones. The test results show that the original sample (O) = -0.05, p-value = 0.40, and t-statistic = 0.84. These results are compared with the specified assessment criteria, t-statistic < 1.96 and p-value > 0.05, making hypothesis H₁ unaccepted.

The second hypothesis (H₂), knowledge of technology has an insignificant positive effect on perceived ease of use. The test results show that the original sample value (O) = 0.10, the p-value = 0.15, and the t-statistic = 1.44. These results are compared with the specified assessment criteria, t-statistic < 1.96 and p-value > 0.05, making hypothesis H₂ unaccepted.

The third hypothesis (H₃), perceived convenience has an insignificant positive effect on perceived usefulness. The test results show that the original sample (O) = 0.30, p-value = 0.08, and t-statistic = 1.78. These results are compared with the specified assessment criteria, t-statistic < 1.96 and p-value > 0.05, making hypothesis H₃ unaccepted.

The fourth hypothesis (H₄), perceived convenience has an insignificant positive effect on perceived ease of use. The test results show that the original sample (O) = 0.01, p-value = 0.91, and t-statistic = 0.11. These results are compared with the specified assessment criteria, t-statistic < 1.96 and p-value > 0.05, making hypothesis H₄ unaccepted.

The fifth hypothesis (H₅), self-efficacy, has no significant positive effect on perceived usefulness. The test results show that the original sample (O) = 0.01, p-value = 0.83, and p-value = 0.21. The results are compared with the specified assessment criteria, t-statistic < 1.96 and p-value > 0.05, making hypothesis H₅ unaccepted.

The sixth hypothesis (H_6), self-efficacy, has an insignificant negative effect on perceived ease of use. The test results show that the original sample (O) = -0.04, the p -value = 0.54, and the t -statistic = 0.62. These results are compared with the specified assessment criteria t -statistic < 1.96 and p -value > 0.05, making hypothesis H_6 unaccepted.

The seventh hypothesis (H_7), perceived compatibility has an insignificant negative effect on perceived usefulness. The test results show that the original sample value (O) = -0.19, the p -value = 0.22, and the t -statistic = 1.24. These results are compared with the specified assessment criteria, t -statistic < 1.96 and p -value > 0.05, making hypothesis H_7 unaccepted.

The eighth hypothesis (H_8), perceived compatibility has a significant positive effect on perceived ease of use. The test results show that the original sample value (O) = 0.61, the p -value = 0.00, and the t -statistic = 7.61. These results are compared with the specified assessment criteria, t -statistic > 1.96 and p -value < 0.05, making hypothesis H_8 accepted.

The ninth hypothesis (H_9), perceived enjoyment has an insignificant positive effect on perceived usefulness. The test results show that the original sample (O) = 0.14, the p -value = 0.16, and the t -statistic = 1.40. These results are compared with the specified assessment criteria, t -statistic < 1.96 and p -value > 0.05, making hypothesis H_9 unaccepted.

The tenth hypothesis (H_{10}), perceived enjoyment has a significant positive effect on perceived ease of use. The test results show that the original sample (O) = 0.24, the p -value = 0.01, and the t -statistic = 2.52. These results are compared with the specified assessment criteria, t -statistic > 1.96 and p -value < 0.05, making hypothesis H_{10} accepted.

The eleventh hypothesis (H_{11}), perceived ease of use, significantly affects perceived usefulness. The test results show that the original sample value (O) = 0.71, the p -value = 0.00, and the t -statistic = 5.45. These results are compared with the specified assessment criteria, t -statistic > 1.96 and p -value < 0.05, making hypothesis H_{11} accepted.

The twelfth hypothesis (H_{12}), perceived ease of use, has a significant positive effect on the benefits of perceived behavioral Intention to use. The test results show that the original sample value (O) = 0.34, the p -value = 0.02, and the t -statistic = 2.30. These results are compared with the specified assessment criteria, t -statistic > 1.96 and p -value < 0.05, making hypothesis H_{12} accepted.

The thirteenth hypothesis (H_{13}), perceived usefulness, significantly affects the perceived Intention to use. The test results show that the original sample value (O) = 0.46, p -values = 0.00, and t -statistic = 3.25. These results are compared with the specified assessment criteria, t -statistic > 1.96 and p -value < 0.05, making hypothesis H_{13} accepted.

Table 6
Results of Hypothetical Test

		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	t (O/STDEV)	P-values	Results
H_1	(Knowledge of technology) → (Perceived usefulness)	-0.05	-0.04	0.06	0.84	0.40	Not Support
H_2	(Knowledge of technology) → (Perceived ease of use)	0.10	0.10	0.07	1.44	0.15	Not Support
H_3	(Perceived convenience) → (Perceived usefulness)	0.30	0.26	0.17	1.78	0.08	Not Support
H_4	(Perceived convenience) → (Perceived ease of use)	0.01	0.01	0.07	0.11	0.91	Not Support
H_5	(Self-efficacy) → (Perceived usefulness)	0.01	0.01	0.05	0.21	0.83	Not Support
H_6	(Self-efficacy) → (Perceived ease of use)	-0.04	-0.03	0.06	0.62	0.54	Not Support
H_7	(Perceived compatibility) → (Perceived usefulness)	-0.19	-0.16	0.16	1.23	0.22	Not Support
H_8	(Perceived compatibility) → (Perceived ease of use)	0.61	0.61	0.08	7.61	0.00	Support
H_9	(Perceived enjoyment) → (Perceived Usefulness)	0.14	0.15	0.10	1.40	0.16	Not Support
H_{10}	(Perceived enjoyment) → (Perceived Ease of Use)	0.24	0.25	0.10	2.52	0.01	Support
H_{11}	(Perceived ease of use) → (Perceived usefulness)	0.71	0.70	0.13	5.45	0.00	Support
H_{12}	(Perceived ease of use) → (Behavioral Intention to use)	0.34	0.35	0.15	2.30	0.02	Support
H_{13}	(Perceived usefulness) → (Behavioral Intention to use)	0.46	0.44	0.14	3.25	0.00	Support

Table 7
Total Effect

		Original Sample (O)	t-statistics (O/STDEV)	p-values
1	(Self-Efficacy) → (Behavioral Intention to Use)	-0.02	0.45	0.65
2	(Perceived Compatibility) → (Behavioral Intention to Use)	0.32	3.02	0.00
3	(Knowledge of Technology) → (Behavioral Intention to Use)	0.04	0.88	0.38
4	(Perceived Usefulness) → (Behavioral Intention to Use)	0.46	3.25	0.00
5	(Perceived Ease of Use) → (Behavioral Intention to Use)	0.67	6.70	0.00
6	(Perceived Convenience) → (Behavioral Intention to Use)	0.14	1.41	0.16
7	(Perceived Enjoyment) → (Behavioral Intention to Use)	0.22	2.78	0.01

4.5. Discussion

Through hypothetical testing, this study finds that five out of the 13 hypotheses are accepted and have a positive effect on the respondents, which are summarized as follows:

Compatibility is felt by passengers for adjustment. In this case, the next factor that passengers can accept is using QR Code Technology on smartphones as an alternative for purchasing tickets. The passengers themselves feel the convenience of QR Code Technology, leading to Consumers' Intention to use QR Code technology later if it is applied as a substitute for purchasing commuter line tickets. In the eighth hypothesis, it is explained that, in general, this study supports the finding by Kanchanatee et al. (2014), stating that perceived compatibility in e-marketing significantly influences the perceived ease of use. The results of research conducted by Cheng (2015) and Ismail (2016) are consistent with the findings confirming that perceived compatibility is the main predictor of perceived ease of use to determine the factors influencing the acceptance of m-learning. Other research by Ramos-de-Luna et al. (2017) and Li et al. (2019) states that perceived compatibility has a significant relationship with perceived ease of use.

The 10th hypothesis says this research is also in line with the result of general studies stating that perceived enjoyment is a variable that has statistical significance on the perceived ease of use variable (Almulla, 2022; Jasin, 2022; Rahmi et al., 2018). This research supports some studies by Al-Bashayreh et al. (2022), Alturki (2022) and Ngubelanga and Duffett (2021), Winarno et al. (2021), and also Wardana et al. (2022), saying that perceived enjoyment has a significant impact on the perceived ease of use.

The 11th hypothesis that this study is in line with the results of the analysis using the SEM-PLS analysis tool that perceived ease of use positively and significantly supports perceived usefulness (Alshurideh & Kurdi, 2023). This hypothesis also explains that the result of this research supports the finding stating that perceived ease of use influences perceived usefulness (Almulla, 2022; Ismail, 2016; Kariapper, 2021; Nugroho et al., 2022; Siagian et al., 2022b; Hapsari et al., 2021; Yusoff et al., 2009). Furthermore, this research supports the results of some other studies by Li et al. (2019), Kumar et al. (2020), Setiawan and Widanta (2021), Al-Bashayreh et al. (2022), and Buabeng-Andoh, (2021) who find that perceived ease of use influences perceived usefulness. This research is also in line with other studies that the perceived ease of use of smart homes will directly impact perceived usefulness because the ease of using intelligent homes will make our life easier and more beneficial (Hubert et al., 2019).

The result of research in the 12th hypothesis supports the studies by Jasin (2022) and Kurniasih et al. (2022) that perceived ease of use has a positive impact and is considered the central point for users to enhance behavioral Intention. The result of this research is also in line with the study on mobile hotel booking through a structural model that perceived enjoyment significantly influences consumer behavioral intention toward cellular hotel booking (Mohamad et al., 2021). Furthermore, some other researchers are in line, such as researchers by Kariapper (2021), Ismail (2016), Simanjuntak et al. (2022), and Almulla (2022) found that perceived ease of use significantly influences the behavioral Intention to use. However, there are also results of studies not in line with because perceived ease of use does not influence consumer behavioral intention (Kanchanatee et al., 2014; Pahala et al., 2021; Siagian et al., 2022b). In addition, based on research by Alshurideh & Kurdi (2023), the variable is perceived ease of use can be used to predict behavioral Intention.

In the 13th hypothesis, this research is generally in line with some studies stating that perceived usefulness significantly influences the Intention to use (Al-Bashayreh et al., 2022; Alshurideh & Kurdi, 2023). This research also supports the results of studies in Taiwan and Vietnam, stating that perceived usefulness enhances consumer behavior toward behavioral Intention (Krishnan & Koshy, 2021). This research also supports the result of a study by Taufik and Hanafiah (2019) concerning self-service technology at the International Airport of Kuala Lumpur that the use of perceived usefulness influences consumer behavioral intention. However, studies also find that perceived usefulness does not directly influence behavioral Intention (Singh & Sinha, 2020). The result of this research, according to some studies by Li et al. (2019), Kumar et al. (2020), Riyanto et al. (2021), and Buabeng-Andoh (2021), influences not significantly behavioral Intention either.

Enjoying what passengers feel for adjustment, in this case using QR Code Technology, is the next factor that passengers with the QR Code Technology can accept on smartphones as an alternative for purchasing tickets. The assessment of the passengers' convenience of QR Code Technology leads to Consumer Intention to use it later if it is applied as an alternative for purchasing commuter line tickets. These results are consistent with research by Alturki (2022), which finds that in technology adaptation, perceived enjoyment significantly influences perceived ease. The use of digital technology in online testing to assess the perception of enjoyment significantly affects perceived ease of use (Almulla, 2022). The convenience of QR Code Technology makes passengers feel its benefits when applied, and the Intention to use QR Code Technology becomes the factor acceptable to passengers when applied as an alternative for purchasing commuter line tickets. The previous research by Polatoglu and Ekin (2001) found that the lower the ease or, the more complex the ease of use perceived by users when using the technology, the lower the level of users to use the technology. Vice versa, the higher the ease or, the lower the complexity perceived by users when using the technology, the higher the level of users to use the technology.

The results of this study are also consistent with the research by Kumar et al. (2020), where perceived usefulness has a significant relationship with the perceived Intention to use the Whatsapp application as a learning and research medium. However, the remaining eight hypotheses do not show a significant relationship. Therefore, the rejection of the hypothesis with no significant effect is summarized as follows:

Knowledge of QR Code Technology assessed and perceived by passengers can be used as a medium for purchasing tickets. The basic knowledge of QR Code Technology on smartphones assessed and felt by passengers still needs to improve. In contrast, it is an unaccepted factor for the presence of QR Code Technology in purchasing public transportation tickets. Regarding the convenience and benefits passengers feel, QR Code Technology leads to Consumer Intention to use it if it is later applied as an alternative for purchasing commuter line tickets. This is proven by the research Wang and Hazen (2016). These results are consistent with the research by Stal and Paliwoda-Pękosz (2019), which finds that respondents tend not to have basic information and knowledge of QR Code Technology on Smartphones, so no significant relationship with perceived usefulness is found.

The convenience of using QR Code technology on smartphones is felt and assessed by passengers. This factor is still considered low to be accepted for purchasing public transportation tickets. However, it leads to Consumer Intention to use QR Code Technology if it is later applied as an alternative/alternative for purchasing commuter line tickets. Passenger's self-efficacy from the assessment and the perceived low performance are the factors not accepted by the presence of QR Code Technology in purchasing public transportation tickets in terms of the convenience and benefits that passengers feel about Consumers' Intention to use it if later the QR Code Technology is applied as an alternative for purchasing commuter line tickets. These results are consistent with the research on Mobile learning tourism by Liao et al. (2018) and Al-Bashayreh et al. (2022) on the reasons that influence students to accept and reject mobile learning. Commonly, self-perception of success does not significantly influence perceived ease of use and perceived usefulness.

The compatibility to adjust passengers' Intention to use QR Code Technology is a factor perceived by passengers as still needs to improve in terms of the benefits of the Smartphone QR Code if later it is applied as an alternative/alternative for purchasing commuter line tickets. From the enjoyment of smartphone QR Code technology to the adjustment to passengers' Intention to use QR Code Technology, passengers feel that the benefits of Smartphone QR Code are still low if later the QR Code Technology is applied as an alternative/substitution in purchasing commuter line tickets. Research by Ismail (2016) also finds that perceived compatibility is not significantly felt of perceived usefulness in the Intention to use a Smartphone. However, in general, this research supports the study by Siagian et al. (2022a), giving managerial implications to the provider of digital payment platforms to prove the existence of consumer behavioral intention.

5. Conclusion

This study finds that only two out of five factors or variables tested in this study have a positive and significant influence on perceived ease of use, with the two variables being perceived ease of use are perceived compatibility and perceived enjoyment. They positively and significantly affect using QR Codes on Smartphones as an alternative for purchasing commuter tickets. Concerning the factors influencing perceived usefulness, none of the five factors tested in this study has a significant influence. The three other variables, perceived convenience, self-efficacy, and enjoyment, do not significantly influence the usefulness of using QR Code Technology on Smartphones as an alternative for purchasing commuter tickets, nor do the technological knowledge and perceived compatibility. These two factors give negative but insignificant results to the benefits of using QR Code Technology on Smartphones as an alternative for purchasing commuter tickets.

Operators need to conduct comparative studies with foreign operators to obtain benchmarks that have implemented the QR code. Smartphones are a good solution for operators' short, medium, and long-term prospects. Increasing passenger awareness with QR Code technology, there is a need for socialization efforts and Education for operators and commuter line passengers. to know and realize that QR Code Technology can be used for better payments in terms of convenience, usability, and ease of use as an alternative to purchasing commuter line tickets. Practically, the results of this study also play a role in encouraging the modernization of public transportation purchases to be taken into consideration by operators as a plan for developing alternative Commuter Line ticketing using Smartphones based on QR Code Technology.

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