

ENHANCING DIGITAL PAYMENT EFFICIENCY: THE ROLE OF QRIS PERCEIVED USEFULNESS AND EASE OF USE

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ABSTRACT

This study investigates the influence of perceived Usefulness and ease of use on digital payment efficiency among university students who utilize QRIS in Indonesia. Positioned within the Technology Acceptance Model, the study aims to assess the post-adoption impact of these two constructs on transaction efficiency. A quantitative method was employed using Structural Equation Modeling (SEM) with SmartPLS 0.4 on a sample of 100 students. The instrument's reliability and validity were confirmed through outer loading, Cronbach's alpha, composite reliability, and AVE tests. Results indicate that perceived Usefulness has a more substantial effect ($\beta = 0.546, p < 0.001$) than ease of use ($\beta = 0.335, p < 0.01$) in enhancing payment efficiency. The model achieved a good fit (SRMR = 0.069; NFI = 0.796) and an R^2 of 0.716 for digital payment efficiency. These findings highlight the behavioral mechanisms through which students perceive payment efficiency and underscore the importance of utility perceptions in driving system performance. The article discusses these findings using theoretical reasoning from TAM and empirical evidence in fintech behavior studies to demonstrate how QRIS adoption can be optimized among digital-native users.

Keywords: QRIS, Digital Payment Efficiency, Perceived Usefulness, Ease Of Use, Technology Acceptance Model

ABSTRAK

Penelitian ini mengkaji dampak persepsi Kegunaan dan kemudahan penggunaan terhadap efisiensi pembayaran digital di kalangan mahasiswa yang menggunakan QRIS di Indonesia. Dengan menggunakan Model Penerimaan Teknologi, penelitian ini bertujuan untuk menilai dampak pasca-adopsi dari kedua konstruksi tersebut terhadap efisiensi transaksi. Metode kuantitatif digunakan menggunakan Structural Equation Modeling (SEM) dengan SmartPLS 0,4 pada sampel 100 mahasiswa. Keandalan dan validitas instrumen dikonfirmasi melalui beban luar, alfa Cronbach, keandalan komposit, dan uji AVE. Hasil penelitian menunjukkan bahwa perceived Usefulness memiliki efek yang lebih kuat ($\beta = 0,546, p < 0,001$) daripada kemudahan penggunaan ($\beta = 0,335, p < 0,01$) dalam meningkatkan efisiensi pembayaran. Model ini mencapai kecocokan yang baik (SRMR = 0,069; NFI = 0,796) dan R^2 0,716 untuk efisiensi pembayaran digital. Temuan ini menyoroti mekanisme perilaku di mana mahasiswa memandang efisiensi pembayaran dan menggarisbawahi pentingnya utilitas yang dirasakan dalam mendorong kinerja sistem. Artikel ini membahas temuan menggunakan penalaran teoretis dari TAM dan bukti empiris dalam studi perilaku fintech untuk menunjukkan bagaimana adopsi QRIS dapat dioptimalkan di kalangan pengguna digital.

Kata Kunci: QRIS, Efisiensi Pembayaran Digital, Kegunaan Yang Dirasakan, Kemudahan Penggunaan, Model Penerimaan Teknologi

I. INTRODUCTION

In today's era of digital transformation, the shift from cash-based payments to electronic payments is not only a convenience but also a necessity. Along with the accelerated adoption of financial technology in developing countries, improving the efficiency of digital payment systems is becoming an important strategic goal for companies (Wang, 2024; Xia et al., 2023). In Indonesia, the introduction of QRIS (Quick Response Code Indonesian Standard), introduced by Bank Indonesia, reflects a significant national step towards standardizing and simplifying digital transactions for both consumers and merchants (Pontoh et al., 2022; Puspitasari & Salehudin, 2022; Shintaro & Bhirawa, 2024). Given its broad applicability and integration across various sectors, QRIS is a driver of efficiency, critical to maximizing financial transactions in Indonesia (Gunawan et al., 2024; Lutfi et al., 2021).

Digital payment efficiency refers to the speed, convenience, and reliability of conducting transactions electronically (He, 2021; Nguyen & Ha, 2025). Efficiency in this domain is not only technical but also behavioral, depending on user perception and willingness to adopt the technology. Among the most studied psychological constructs in technology adoption is perceived Usefulness, i.e., the belief that a system improves performance. When users find QRIS useful and easy to use, they are more likely to adopt it, thus leading to more efficient transactions (Ramdhani et al., 2024; Wijayanto et al., 2024). Likewise, trust plays a significant mediating role; users who trust QRIS are more likely to use it, thereby increasing transactional speed and adoption (Puspitasari & Salehudin, 2022).

Despite widespread implementation of QRIS, adoption and consistent usage vary significantly across user groups and regions. Numerous studies have highlighted the importance of usability and perceived convenience in the widespread adoption of fintech (Nangin et al., 2020). However, there is still a lack of focused research examining how these factors, especially in the context of Indonesia's QRIS, directly affect digital payment efficiency as an outcome, not just adoption intentions. Furthermore, most previous studies isolate a single driver, without examining interactive effects or mediating influences such as trust, promotional incentives, or user demographics

According to the author's search results, a few of research in Indonesia has quantitatively examined how perceived Usefulness and ease of use together determine QRIS payment efficiency using behavioral and structural modeling to improve student groups' outcomes. This study contributes new empirical insights into how these two constructs interact to influence transaction outcomes beyond mere adoption. Existing studies demonstrate that QRIS significantly enhances operational efficiency for MSMEs by reducing transaction time and errors (Kilay et al., 2022; Markowitz et al., 2020) and facilitates improved cash reconciliation through integration with digital systems (Hindrayani, 2019). Moreover, adoption among MSMEs has been linked to increased sales turnover and improved competitiveness, especially in sectors such as food and beverages (Hindrayani, 2019; Kilay et al., 2022).

This study addresses that gap by analyzing the role of perceived Usefulness and ease of use (convenience) in improving digital payment efficiency among QRIS users. This research contributes new evidence by integrating the two core variables in a behavioral efficiency framework, rather than just an adoption framework. As such, it also recognizes the broader economic impact of QRIS and highlights barriers such as technical limitations and user literacy (Kilay et al., 2022), which must be addressed for more inclusive adoption.

The relevance of this research is further strengthened by Indonesia's financial inclusion agenda, where QRIS plays a crucial role in connecting micro, small, and informal businesses to the digital economy. With increasing transaction volumes and government support encouraging a cashless ecosystem, optimizing user experience and system efficiency is crucial for both service providers and policymakers.

Therefore, this article aims to evaluate how perceived Usefulness and ease of use affect the efficiency of digital payments, using QRIS as a case study. The literature review outlines the theoretical framework and previous studies on payment systems and the acceptance of behavioral technology (Chen et al., 2020). Methods present the empirical strategy and data analysis. Results are discussed in terms of policy and practical implications, followed by a conclusion that highlights contributions and outlines future research directions.

II. LITERATURE REVIEW

Digital payment systems have become an integral part of the financial ecosystem, particularly in countries seeking to enhance financial inclusion and reduce reliance on cash transactions. The implementation of QRIS (Quick Response Code Indonesian Standard) in Indonesia marks a significant innovation in unifying various payment methods under a single national standard (Pontoh et al., 2022; Puspitasari & Salehudin, 2022). As the scale and frequency of digital transactions grow, the efficiency of these systems is not just focused on technology adoption; it also involves the effective management of data. The shift reflects an evolution from the question of "who is using" to "how effectively is it being used", demanding a deeper understanding of the behavioral and technological drivers behind digital payment efficiency (Chen et al., 2020).

The most influential variables discussed in the literature are perceived Usefulness and ease of use, derived from the Technology Acceptance Model (Davis, 1989). Perceived Usefulness refers to the belief that a system improves performance, while ease of use captures the level of effort required to operate the system. Several studies have demonstrated that these perceptions have a direct influence on the intention to adopt a QR code payment system, such as QRIS, which in turn affects the efficiency of the transaction process (Ramdhani et al., 2024; Wijayanto et al., 2024). In a recent study, users who find QRIS useful and easy to use are more likely to integrate it into their daily financial routines, resulting in more efficient and frequent usage.

Some literature highlights that these behavioral factors do not operate in isolation. For example, trust and perceived enjoyment serve as mediators that amplify the impact of perceived Usefulness on actual use (Puspitasari & Salehudin, 2022). Similarly, promotional activities and performance expectations interact with these perceptions to influence user behavior, especially among younger digital natives. This aligns with previous theories in behavioral finance and the UTAUT model (Venkatesh et al., 2003), which emphasize the combined influence of various beliefs and environmental factors in predicting technology adoption and use.

A narrower body of literature focuses on operational outcomes, particularly for small and medium-sized enterprises (SMEs) and the informal business sector. Kilay et al. (2022) found that QRIS adoption reduced transaction time and improved error handling, thereby increasing SME productivity. Mancini Griffoli & Adrian (2019) further noted that integration with digital bookkeeping allows for a more accurate and timely reconciliation process. These findings suggest that digital payment systems, when deemed valid, can yield measurable benefits in business efficiency and financial accuracy, moving beyond convenience to value creation.

While a large body of literature confirms the relevance of perceived Usefulness and convenience, there is insufficient synthesis linking these concepts specifically to the efficiency outcomes of digital payments. Most research assesses adoption intentions, not success. Additionally, few studies explore how the dual presence of usability and ease of use interacts to influence actual transactional outcomes in sectors such as MSMEs (Kilay et al., 2022). The combined effect remains an under-explored area in both theoretical modeling and empirical practice.

A comparison of previous studies reveals that some works emphasize attitudinal outcomes (e.g., behavioral intentions), while others focus on process performance (e.g., transaction speed). However, few studies combine these streams. This fragmentation presents a challenge to policymakers and system designers seeking efficient outcomes. The inclusion of factors such as age and digital literacy adds another layer of complexity: while younger users benefit more from ease of use, older populations may rely more on trust and technical support, requiring segmented strategies.

Therefore, this literature synthesis reveals two directions: (1) that usability and perceived ease of use remain foundational variables in digital finance adoption models, and (2) that their collective and interacting effects on digital payment efficiency, not just adoption, deserve expanded empirical attention (Nangin et al., 2020). This synthesis supports a multidimensional view, where QRIS efficiency depends on system quality and user perceptions, which are mediated by demographic and contextual variables.

The existing literature strongly supports the role of usability and perceived convenience in driving digital engagement. However, a research gap exists in linking psychological factors to post-adoption performance outcomes, such as transaction speed, reconciliation accuracy, and user satisfaction. Future studies should integrate behavioral constructs with operational metrics to build a more holistic understanding of digital payment efficiency. This article contributes to the growing body of work by empirically testing constructs in the behavioral efficiency framework, using the QRIS system as a practical case study in Indonesia's digital economy (Judijanto & Husnayetti, 2024).

Based on previous literature reviews, both perceived Usefulness and ease of use are consistently found to be important determinants in improving the performance and efficiency of digital payment systems. Users who perceive that payment systems such as QRIS are helpful and easy to use tend not only to adopt them but also to use them more efficiently and consistently in their daily transaction activities (Chaveesuk et al., 2022; Mavlutova et al., 2022; Wijayanto et al., 2024).

As explained by Davis (1989) in the Technology Acceptance Model (TAM), perceived Usefulness and ease of use are the two main predictors of user attitudes and behaviors towards new technologies. In the context of digital payment efficiency, this understanding is extended to not only the intention to use but also the real results of use, such as transaction speed, error reduction, and user comfort and satisfaction (Patil et al., 2020; Purohit et al., 2022).

Therefore, the hypothesis in this study is formulated as follows:

H1: Perceived Usefulness has a positive effect on Digital Payment Efficiency through QRIS. Supported by findings that perceived Usefulness increases transaction speed, accuracy, and convenience (Nurdin et al., 2023; Saroy et al., 2023).

H2: Ease of Use has a positive effect on Digital Payment Efficiency through QRIS. Easy-to-use systems accelerate adoption and improve the efficiency of the transaction process (Nangin et al., 2020; Pontoh et al., 2022; Tang et al., 2021).

I. RESEARCH METHODOLOGY

This study utilizes a quantitative research approach to investigate the influence of perceived Usefulness and ease of use on digital payment efficiency in the context of QRIS usage among university students. The population in this study consists of 1.500 undergraduate students of Simalungun University who actively use QRIS as a means of payment. The sample size was determined using the Slovin formula with a 10% margin of error. A sample of 100 respondents was selected through simple random sampling

Measurement of research variables is based on validated instruments adopted from previous research. Indicators of perceived Usefulness and ease of use were adapted from the Technology Acceptance Model (TAM) developed by Davis (1989) and further validated in the context of QRIS adoption by Wijayanto et al. (2024) and Purohit et al. (2022). Meanwhile, the digital payment efficiency construct is measured using indicators synthesized from recent fintech and digital transaction research (Mavlutova et al., 2022; Nurdin et al., 2023). All variables were measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree) (Anjaria, 2022).

Descriptive statistics were used to analyze the demographic characteristics of respondents and to understand the general distribution of responses. Measures such as mean, standard deviation, and frequency distribution were used to summarize the data (Méndez-Suárez et al., 2023).

To test the research hypotheses, Structural Equation Modeling (SEM) was applied using SmartPLS version 0.4. This model was chosen for its robustness in analyzing complex relationships between latent variables, especially in studies with relatively small sample sizes and non-normal data. SEM-PLS is also well-suited for predictive research and theory testing in information systems and technology acceptance studies, as supported by (F. Hair Jr et al., 2014).

This model includes two independent variables (perceived Usefulness and ease of use) and one dependent variable (digital payment efficiency). In addition, this study considers gender and frequency of QRIS usage as control variables, as they may affect user perceptions and efficiency outcomes, in line with previous findings from Patil et al. (2020) and Rudolf (2024).

II. RESULTS AND DISCUSSION

This study involved 100 respondents of Simalungun University students who use QRIS as a digital payment tool. Based on gender, the majority of respondents were female, comprising 60 people (60%), while men totaled 40 people (40%). This indicates that the use of QRIS is relatively evenly distributed between the two gender groups, although female students are more likely to adopt it.

When viewed by faculty of origin, respondents came from five different faculties. Students from the Faculty of Economics are the largest group, comprising 27 individuals (27%), followed by students from the Faculty of Teacher Training and Education (FKIP), with 23 individuals (23%), and the Faculty of Agriculture, with 22 individuals (22%). Furthermore, there are 17 respondents (17%) from the Faculty of Engineering, and 11 people (11%) from the Faculty of Law.

This distribution indicates that QRIS has been utilized cross-disciplinarily by students from diverse academic backgrounds. This data also reflects the significant potential for utilizing digital payment systems in a diverse campus environment, encompassing both study programs and demographic characteristics (Méndez-Suárez et al., 2023).

Prior to hypothesis testing, a diagnostic check was conducted to evaluate the adequacy and reliability of the measurement model (Figure 1). The results of the outer loading analysis revealed that all indicators exceeded the minimum threshold of 0.70, confirming strong convergent validity across the three constructs: Perceived Usability, Ease of Use, and Digital Payment Efficiency. Specifically, all indicators for perceived usefulness (X1.1 to X1.5) range from 0.832 to 0.845, while the ease-of-use indicators (X2.1 to X2.5) range from 0.750 to 0.864. Similarly, indicators for digital payment efficiency (Y1.1 to Y1.5) ranged from 0.765 to 0.854. These results meet the criteria outlined by Hair et al. (2019), indicating that each observed item makes a meaningful contribution to the corresponding latent variable.

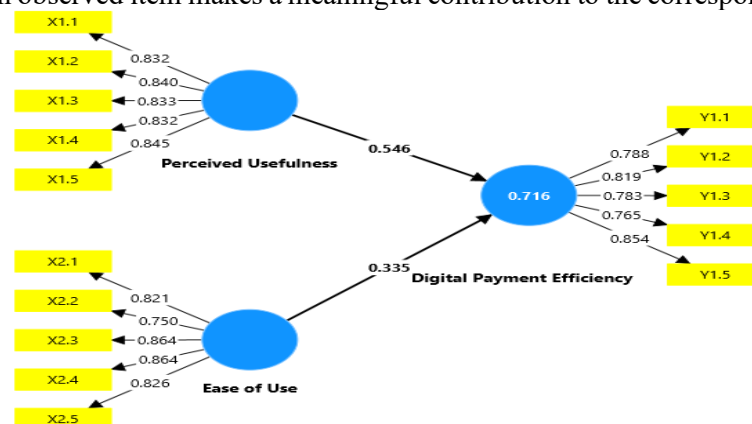


Figure 1. Outer Loading

Source: Results Data processing, 2025

Table 1. Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)	Average variance extracted (AVE)
Digital Payment Efficiency	0.861	0.865	0.900	0.644
Ease of Use	0.883	0.889	0.915	0.682
Perceived Usefulness	0.893	0.894	0.921	0.700

Source: Results Data processing, 2025

Table 1 shows that additional diagnostic checks were conducted through the evaluation of construct reliability and validity. Cronbach's Alpha values for all constructs were above 0.86, while Composite Reliability values exceeded 0.90 for each variable, indicating strong internal consistency (Hair et al., 2021; Sarstedt et al., 2020). In addition, the Average Variance Extracted (AVE) values ranged from 0.644 to 0.700, thus exceeding the minimum of 0.50 recommended for adequate convergent validity. These results indicate that the constructs are reliable and valid for further structural analysis.

Table 2. R Square Table

	R-square	R-square adjusted
Digital Payment Efficiency	0.716	0.711

Source: Results Data processing, 2025

From Table 2, a statistical perspective, the R-square (R^2) value for Digital Payment Efficiency was found to be 0.716, indicating that the combined influence of perceived Usefulness and ease of use explains 71.6% of the variance in digital payment efficiency. This level of explanatory power is considered substantial, especially in behavioral modeling. In addition, the adjusted R^2 value of 0.711 confirmed the model's stability, indicating that the number of predictors used was not excessive and was not biased by overfitting.

Table 3. Model Fit Table

	Saturated model	Estimated model
SRMR	0.069	0.069
d_ ULS	0.575	0.575
d_ G	0.455	0.455
Chi-square	236.789	236.789
NFI	0.796	0.796

Source: Results Data processing, 2025

To assess the robustness of the model (see Table 3), a sensitivity check was conducted through the evaluation of model fit. The SRMR value of 0.069 is below the threshold of 0.08, indicating an acceptable global fit (Sarstedt et al., 2020). In addition, the NFI value of 0.796 indicates a reasonably good model, suitable for exploratory studies with medium sample sizes. The incremental model difference measures, d_ ULS (0.575) and d_ G (0.455), are low, further confirming that the theoretical model fits the empirical data well.

In conclusion, the diagnostic results, statistical evidence, and theoretical reasoning converge to confirm that perceived Usefulness and ease of use significantly affect the efficiency of digital payments. Among them, perceived Usefulness exerts a more substantial influence, suggesting that user value judgments are more important than system simplicity alone. These findings suggest that to increase the effective use of QRIS, stakeholders should not only ensure the ease of the system but also continue to strengthen its usability through education, incentives, and practical improvements that demonstrate real-world benefits.

Table 3. Path Coefficient

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
Ease of Use -> Digital Payment Efficiency	0.335	0.335	0.111	3.005	0.003
Perceived Usefulness -> Digital Payment Efficiency	0.546	0.548	0.114	4.786	0.000

Source: Results Data processing, 2025

The structural model (inner model) was tested using path coefficient analysis (see Table 3). The results show that both hypotheses are supported. First, the path from Perceived Usefulness to Digital Payment Efficiency has a standardized coefficient of 0.546, with a t-value of 4.786 and a p-value of 0.000, which indicates a highly significant and positive effect. This suggests that when students perceive QRIS as applicable, i.e., improving speed, accuracy, and convenience, they are more likely to use it efficiently. These findings are consistent with the Technology Acceptance Model (TAM) by Davis (1989), as well as empirical evidence from Purohit et al. (2022) and Mavlutova et al. (2022), which emphasize perceived Usefulness as a core post-adoption system performance (Judijanto & Husnayetti, 2024).

Secondly, the effect of Ease of Use on Digital Payment Efficiency is also statistically significant, with a path coefficient of 0.335, a t-value of 3.005, and a p-value of 0.003. Although its effect is relatively lower than perceived Usefulness, ease of use remains a critical predictor of efficient use. This is in line with the findings by Tang et al. (2021), who argued that simplification simplifies the learning curve and improves system efficiency, especially among young users such as university students.

DISCUSSION

The results of this study show that perceived Usefulness (PU) and ease of use (EOU) have a significant effect on the efficiency of digital payments using QRIS among university students. This finding is consistent with the Technology Acceptance Model (TAM), which states that PU and EOU are the main determinants of technology acceptance (Davis, 1989). The path coefficient values of 0.546 for PU and 0.335 for EOU prove that both have a direct contribution to the efficiency of using QRIS, with PU as the most dominant factor.

This result is reinforced by the study of Purohit et al. (2022) and Mavlutova et al. (2022), which show that the perceived benefits of digital systems largely determine continued use and increased efficiency. Meanwhile, EOUs that are easy to understand, quick to use, and not technically complex have also been shown to accelerate adoption and effectiveness, as found in studies by Tang et al. (2021) and Venkatesh et al. (2003) within the UTAUT framework.

The high correlation between PU and EOU ($r = 0.936$) supports the assumption that ease of use reinforces perceived benefits. This finding is consistent with the results of Pontoh et al. (2022) and Shintaro & Bhirawa (2024), which demonstrate a synergistic relationship between this approach and satisfaction, as well as the efficient use of digital payment systems (Rudolf, 2024).

This study's focus on post-adoption efficiency outcomes extends the contributions of the literature, which previously stopped at the intention to use. For example, Judijanto & Husnayetti (2024) and Judijanto & Husnayetti (2024) demonstrated that QRIS accelerates transactions and reduces reconciliation errors, findings that are also reflected in this study.

In the Indonesian context, where QRIS is being adopted as the national standard for digital payments, these findings become relevant. Gunawan et al. (2024) emphasize that QRIS encourages financial service competition and system efficiency. Meanwhile, Puspitasari & Salehudin (2022) and Lutfi et al. (2021) demonstrate that digital education and literacy can enhance perceptions of benefits and convenience, particularly among university students.

Statistically, the R^2 of 0.716 indicates that PU and EOU can explain more than 71% of the variation in QRIS usage efficiency, which is a substantial explanatory power (Danks et al., 2024). The model also passed the fit test with SRMR = 0.069 and NFI = 0.796, indicating that the model structure fits the empirical data (Alwabel & Zeng, 2021).

All of these results confirm that improving the efficiency of QRIS is not enough by presenting sophisticated technology, but also requires a strategy to strengthen the perception of benefits and convenience for users. In other words, system design and educational approaches must work in tandem to maximize the performance and sustainability of QRIS usage among the digital generation.

III. CONCLUSION

This study aims to analyze the effect of perceived Usefulness and ease of use on the efficiency of digital payments using QRIS among university students. Using a quantitative approach and SEM-PLS analysis, the results show that both variables significantly influence digital payment efficiency, with perceived Usefulness having a more substantial effect ($\beta = 0.546$) compared to ease of use ($\beta = 0.335$). These findings validate the Technology Acceptance Model (TAM) in the context of post-adoption system efficiency and underscore the significant role of behavioral factors in determining how effectively users interact with fintech systems.

Based on these results, it is recommended that system developers and policymakers not only focus on the technical robustness of QRIS but also on increasing users' perceived value and simplifying system interactions. Practical strategies, such as user training, promotional campaigns, and design enhancements, can increase adoption and optimize daily use, especially for digitally savvy populations, including college students. Clear communication of the benefits of QRIS can reinforce its perceived Usefulness and support more efficient and sustainable usage behavior.

This study is not without limitations. The sample was limited to students from a single university, which may affect its generalizability. Future research could include diverse demographic groups or cross-institutional samples, and also examine additional variables such as trust, perceived security, or digital literacy as potential moderating factors. A longitudinal approach may also better capture changes in behavior over time, improving our understanding of efficiency as a dynamic outcome of digital payment adoption.

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