

## THE MEDIATING ROLE OF TRANSACTION EFFICIENCY BETWEEN QRIS ADOPTION AND MSME PERFORMANCE IN PEKANBARU

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### *Abstract*

*Digital payment adoption has become increasingly important for micro, small, and medium enterprises (MSMEs), yet how QRIS adoption translates into business performance remains insufficiently explained. This study examines transaction efficiency as a mediating mechanism between QRIS adoption and MSME financial performance (perceived income profit margin) in Pekanbaru City, Indonesia. A quantitative explanatory survey was conducted among 118 MSMEs that actively used QRIS, selected through purposive sampling. Data were collected using a five-point Likert-scale questionnaire and analyzed using descriptive statistics, regression analysis, and the Sobel mediation test. The results show that QRIS adoption has a positive and significant effect on transaction efficiency ( $\beta = 0.830$ ,  $p < .001$ ), while transaction efficiency has a positive and significant effect on MSME performance ( $\beta = 0.792$ ,  $p < .001$ ). In contrast, the direct effect of QRIS adoption on MSME performance is not significant ( $\beta = -0.107$ ,  $p = .633$ ). The mediation test indicates a significant indirect effect (Sobel  $Z = 3.7213$ ,  $p < .001$ ), suggesting that transaction efficiency functions as the key mechanism linking QRIS adoption to business performance. The findings indicate that technological adoption alone is insufficient to generate business outcomes; its value depends on operational integration. Practically, MSMEs should utilize QRIS transaction records for bookkeeping, reconciliation, and cash-flow monitoring, while policymakers should strengthen digital financial management training.*

**Keywords:** QRIS; digital payment adoption, transaction efficiency, MSME Performance; mediation



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## 1. Introduction

Micro, small, and medium enterprises (MSMEs) play an important role in regional economic activity and are increasingly exposed to digital transformation. In Indonesia, the development of digital payment infrastructure has created opportunities for MSMEs to reduce dependence on cash-based transactions and improve the efficiency of daily business operations. One of the most important instruments in this transformation is the Quick Response Code Indonesian Standard (QRIS), which provides a standardized digital payment mechanism for merchants and consumers. The growing adoption of QRIS indicates that digital payment has become increasingly integrated into MSME transactions. In Pekanbaru, the increasing number of MSMEs further emphasizes the importance of understanding whether digital payment adoption generates benefits beyond payment acceptance itself. The research proposal underlying this study identified more than 26,000 MSMEs in Pekanbaru in 2024 and positioned QRIS as an important component of local digital transformation.

Previous studies have established several benefits associated with digital payment adoption among MSMEs. Research has examined QRIS from the perspective of technology acceptance, perceived usefulness, ease of use, trust, and other factors influencing adoption (Utami, 2025; Wardhani, Arkeman, & Ermawati, 2023). Other studies have focused on the economic consequences of QRIS adoption. (Fatmawati, Mutmainnah, & Ponto, 2024), for example, examined the relationship between QRIS use and MSME business income, while (Fauziah, Juwiyani, Lestari, Kurniawati, & Deviarti, 2025) investigated factors associated with MSMEs' digitalization through QRIS. Studies of broader digital financial inclusion have also linked digital technology with MSME performance and financial outcomes (Tandilino, Pontoh, Darmawati, & Indrijawati, 2025). These studies collectively suggest that digital payment adoption can contribute to MSME development, but they do not necessarily explain the operational process through which technological adoption becomes a business outcome.

An important issue therefore concerns the mechanism linking QRIS adoption and MSME performance. QRIS offers valuable technological features, including faster payments processing, reduce cash-handling, and automated transaction records. However, these technological capabilities do not automatically translate into higher income or profit margins. Prior studies (Rachmawaty, Amraeni, Amirullah, & Syakur, 2025; Wardhani, Arkeman, & Ermawati, 2023; Fatmawati, Mutmainnah, & Ponto, 2024) have examined direct relationship between QRIS adoption and financial performance, yet they leave the internal operational mechanism as a “black box”. They assume that technology adoption directly improves financial results without explaining the intermediate organizational the intermediate operational transformation. Recent literature

indicates that QRIS enhances transaction efficiency through faster payment execution, lower cash-handling costs, and improved record accuracy (Rachmawaty, Amraeni, Amirullah, & Syakur, 2025). Transaction efficiency represents an essential intermediate organizational mechanism through which the technological benefits of QRIS are converted into measurable business outcomes.

This perspective is crucial because existing research has frequently focused either the acceptance determinants of QRIS adoption, or its direct relationship with MSME business performance. The literature confirms that digital payment adoption matters, but it offers a limited explanation regarding the process of operational value creation. The present study addresses this mechanism gap by shifting the scholarly debate from mere technology acceptance toward operational value creation, positioning transaction efficiency as a mediating mechanism between QRIS adoption and MSME financial performance. Rather than if QRIS directly elevates financial outcomes, the study examines whether its contribution is realized through improvements in transaction speed, transaction-related costs, and transaction-record accuracy.

The study is conceptually grounded in the Technology-Organization-Environment (TOE) framework. TOE explains technology adoption within the interaction of technological characteristics, organizational conditions, and environmental factors (Tornatzky & Fleischer, 1990). In the present study, QRIS is positioned as the technological innovation, while organizational capability and the surrounding digital ecosystem provide the broader context in which the technology can generate value. The Technology Acceptance Model (TAM) is used as a complementary perspective to explain why perceived ease of use and usefulness can support acceptance of digital payment technology (Wardhani, Arkeman, & Ermawati, 2023). Importantly, TOE and TAM are not treated as separate statistical models in this study; rather, they provide theoretical support for interpreting the relationships among QRIS adoption, transaction efficiency, and MSME performance.

Accordingly, this study contributes to the literature in three ways. First, it examines QRIS adoption and transaction efficiency within an integrated empirical framework. Second, it tests transaction efficiency as a mechanism connecting digital payment adoption to MSME performance. Third, it provides empirical evidence from MSMEs using QRIS in Pekanbaru City, thereby extending the discussion of digital payment adoption from technology acceptance toward operational transformation. The objective of this study is therefore to examine the effect of QRIS adoption on transaction efficiency, the effect of transaction efficiency on MSME performance, and the mediating role of transaction efficiency in the relationship between QRIS adoption and MSME performance.

## **2. Literature Review**

### **2.1 QRIS Adoption**

QRIS represents a standardized digital payment infrastructure that enables merchants to receive payments through different electronic payment applications. From an MSME perspective, the value of QRIS is not limited to payment acceptance but also includes convenience, security, and the potential integration of transaction information into business processes. Technology adoption literature generally emphasizes perceived usefulness, ease of use, and trust as important factors influencing users' acceptance of digital payment systems. In the context of QRIS, (Wardhani, Arkeman, & Ermawati, 2023) demonstrate the relevance of QR-code payment adoption to MSME financial performance, while (Utami, 2025) specifically examines QRIS adoption and financial performance among MSMEs. These findings support the view that technological characteristics are important in understanding digital payment adoption. The present study operationalizes QRIS adoption through three dimensions: ease, usefulness, and security. These dimensions represent the extent to which MSME owners perceive QRIS as accessible, beneficial for their business activities, and sufficiently secure for transaction purposes.

### **2.2 Transaction Efficiency**

Transaction efficiency refers to the extent to which payment activities can be completed with lower time requirements, lower transaction-related costs, and greater accuracy of transaction records. In the context of digital payment, efficiency is particularly relevant for MSMEs because business owners often operate with limited financial and human resources. QRIS can potentially improve efficiency by reducing the time required to complete payments, minimizing cash-handling activities, and creating digital records of transactions. (Rachmawaty, Amraeni, Amirullah, & Syakur, 2025) found that QRIS and e-wallet adoption were associated with transaction efficiency and profitability among MSMEs. Similarly, (Nurhaliza, Putri, Atika, & Nofirda, 2023) identified QRIS as an instrument that contributes to digital business transactions among MSMEs. However, transaction efficiency should not be understood merely as a technical feature of the payment system. Its managerial value emerges when the resulting transaction information is incorporated into business processes such as bookkeeping, reconciliation, cash-flow monitoring, and operational evaluation. This distinction is central to the mediation model proposed in this study.

### **2.3 MSME Performance**

MSME performance represents the business outcomes generated through the management of business resources and activities. In this study, performance is measured using two indicators: income and profit margin. Digital payment adoption may potentially influence these outcomes through several pathways. QRIS can facilitate customer payments and reduce transaction friction, but improved payment convenience does not

necessarily result in higher financial performance. The effect may depend on how effectively MSMEs integrate the technology into their operational and financial management practices. (Wardhani, Arkeman, & Ermawati, 2023) examined the relationship between QR-code payment adoption and MSMEs' financial performance, while (Fatmawati, Mutmainnah, & Ponto, 2024) specifically investigated QRIS use and MSME business income. These studies provide evidence of the potential relationship between digital payment adoption and performance. However, the present study proposes that transaction efficiency should be considered an intermediate mechanism rather than assuming a direct relationship.

#### **2.4 TOE Framework and Technology Acceptance Perspective**

This study integrates the Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE) framework to explain how QRIS adoption drives MSME performance. (Tornatzky & Fleischer, 1990; Wardhani, Arkeman, & Ermawati, 2023). TAM provides the micro level theoretical foundation for the technological dimension, positing that perceived usefulness, perceived ease of use and security determined users acceptance of digital payment systems (Utami, 2025) (Wardhani, Arkeman, & Ermawati, 2023). TAM underpins the operationalization of QRIS adoption as an antecedent construct. However, technology acceptance alone does not guarantee business value. The TOE framework proposes that organizational technology adoption is influenced by three contextual dimensions: technology, organization, and environment (Tornatzky & Fleischer, 1990). In our theoretical framework, QRIS represents the technological innovation, while the organizational factors reflect the ability of MSMEs to integrate digital payment into daily operations, and environmental factors encompass the broader digital payment ecosystems and competitive environment.

### **3. Research Method**

#### **3.1 Research Design and Sample**

This study employed a quantitative explanatory survey design. Primary data were collected between May and July 2024 using a structured online and offline questionnaire administered to MSME owners in Pekanbaru City, Indonesia. The target population comprised active MSMEs using QRIS for customer payment transactions. A non-probability purposive sampling technique was applied with three explicit inclusion criteria: (1) officially registered MSMEs operating in Pekanbaru, (2) active utilization of QRIS payment facilities for at least six months, and (3) processing daily consumer transactions via QRIS. A total of 118 valid and complete responses were retained for analysis. The sample size of 118 meets the requirements for multiple regression and mediation analysis. Based on (Green, 1991) recommendation for regression sample size ( $n \geq 50 + 8m$ , where  $m$  is the number of predictors), the minimum required sample for two

predictors is 66. Furthermore, statistical power analysis for mediation testing indicates that  $N=118$  provides adequate power ( $>0.80$ ) to detect medium effect sizes at  $\alpha=0.05$ .

### 3.2 Measurement

All variables were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire was developed by adapting indicators from validated scales in prior digital payment and business performance literature. QRIS adoption was measured as a second order perception construct reflecting perceived ease, usefulness and security. Transaction efficiency was measured through operational speed, cost efficiency, and record accuracy; and MSME performance consists of income and profit margin improvements. Given that many MSMEs in emerging markets lack audited financial statements, self-reported performance indicators were utilized, representing a recognized measurement approach in SME research. The full operationalization of research variables is detailed in Table 1.

**Table 1. Measurement of Research Variables**

| Variable                   | Conceptual definition                                                                              | Indicators                                                                          | Measurement          |
|----------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------------|
| QRIS Adoption (X)          | Perceived acceptance and operational ease, usefulness, and security of QRIS payment infrastructure | Ease of use (2 items), perceived usefulness (2 items), perceived security (2 items) | 5-point Likert scale |
| Transaction Efficiency (Z) | Operational efficiency gained in payment processing time, costs, and transaction data accuracy     | Payment speed (2 items), Transaction cost (2 items), record accuracy (2 items)      | 5-point Likert scale |
| MSME Performance (Y)       | Perceived business performance evaluated through revenue and profit margin outcomes                | Income growth (2 items), profit margin (2 items)                                    | 5-point Likert scale |

## 4. Results and Discussion

### 4.1 Characteristics of Respondents

The study involved 118 MSME respondents in Pekanbaru City. Female respondents represented 51% of the sample, while male respondents represented 49%. The largest age group was 28–33 years, consisting of 23.7% of respondents. In terms of educational background, 49% of respondents had completed senior high school or vocational school, while 45% had diploma or undergraduate education. The business sector was strongly dominated by culinary enterprises, representing approximately 76% of the respondents. The dominance of the culinary sector in the sample also provides a relevant context for interpreting QRIS adoption. Culinary MSMEs typically involve frequent customer transactions, making payment convenience and transaction speed particularly relevant to daily operations. This pattern is consistent with (Nurqamarani, Fadilla, & Juliana, 2023), who identified the culinary subsector as one of the contexts with relatively high adoption of digital payment technologies and emphasized perceived ease of use as an important factor in QRIS adoption. Regarding business age, most respondents operated relatively young businesses, with 50 enterprises established for 0-2

years and 41 enterprises operating for 2–5 years. QRIS adoption duration also varied, with the largest group (30.77%) having used QRIS for 6 months to 1 year. The respondent profile indicates that QRIS is particularly relevant among relatively young MSMEs and consumer-facing businesses, especially the culinary sector. This context is important when interpreting the results because transaction speed and payment convenience may be particularly valuable in high-frequency, relatively low-value transactions.

The heavy concentration of respondents in the culinary sector (76%) provides a specific context for interpreting our findings. Culinary businesses are characterized by high transaction frequency, low average transaction values, and peak-hour operational pressures. In such operational environments, transaction speed and payment recording accuracy are vital to daily service delivery and cash management. Consequently, the operational benefits of QRIS are particularly pronounced in culinary MSMEs compared to business sectors with lower transaction frequencies.

#### 4.2 Descriptive Statistics and Measurement Quality

The descriptive results reveal an important difference across the three constructs. QRIS adoption recorded the highest mean score ( $M = 4.683$ ), followed by transaction efficiency ( $M = 4.589$ ), while MSME performance recorded a comparatively lower mean score ( $M = 4.089$ ). Although all three constructs were rated positively, the lower mean of MSME performance indicates that perceived technological and operational benefits do not necessarily translate immediately into broader business outcomes. This pattern is consistent with (Santosa, 2026), whose systematic review of 20 studies found that the benefits of QRIS were most strongly perceived in transaction speed and recording accuracy. The finding suggests that the benefits of digital payment technology may become visible first at the operational level before being reflected in broader financial and business performance.

Table 2. Descriptive Statistics and Reliability

| Variable               | Number of Indicators | Mean  | Cronbach's Alpha | Interpretation |
|------------------------|----------------------|-------|------------------|----------------|
| QRIS Adoption          | 6                    | 4.683 | 0.700            | Very high      |
| Transaction Efficiency | 6                    | 4.589 | 0.798            | Very high      |
| MSME Performance       | 4                    | 4.089 | 0.791            | High           |

Scale validity was evaluated using Pearson's item-total correlations. All items exhibited corrected item-total correlations exceeding the critical threshold of 0.361 ( $r_{table}$  for  $N = 118$ ,  $\alpha = 0.05$ ), ranging from 0.482 to 0.741 ( $p < 0.001$ ), confirming construct validity. Cronbach's alpha coefficients of 0.700 for QRIS adoption, 0.798 for transaction efficiency, and 0.791 for MSME performance, demonstrating satisfactory internal consistency. To address potential Common Method Bias (CMB) arising from self-reported cross-sectional data, Harman's single-factor test was executed. The unrotated factor solution revealed that the largest single factor accounted for 38.4% of the total

variance, well below the 50% threshold. Additionally, multicollinearity diagnostics indicated tolerance values above 0.30 and Variance Inflation Factor (VIF) values below 3.0 (maximum VIF = 2.21), ruling out severe multicollinearity concerns despite strong bivariate correlations.

### 4.3 Hypothesis Testing

Regression models were estimated to test the direct and indirect relationships. Model 1 evaluated the effect of QRIS Adoption ( $X$ ) on Transaction Efficiency ( $Z$ ). Model 2 evaluated the combined direct effects of QRIS Adoption ( $X$ ) and Transaction Efficiency ( $Z$ ) on MSME Performance ( $Y$ ). Complete model parameters are reported in Table 3.

Table 3. Regression Parameters, Model Diagnostics, and Mediation Analysis

| Model / Path                                             | Unstandardized B | SE    | Standardized $\beta$ | t-statistic            | p-value | R <sup>2</sup> | Adjusted R <sup>2</sup> | F-statistic (p)  |
|----------------------------------------------------------|------------------|-------|----------------------|------------------------|---------|----------------|-------------------------|------------------|
| Model 1:<br>$X \rightarrow Z$                            |                  |       |                      |                        |         | 0.568          | 0.564                   | 152.474 (< .001) |
| Constant                                                 | 0.700            | 0.316 | —                    | 2.215                  | .029    |                |                         |                  |
| QRIS Adoption ( $X \rightarrow a$ )                      | 0.830            | 0.067 | 0.754                | 12.348                 | < .001  |                |                         |                  |
| Model 2: $X, Z \rightarrow Y$                            |                  |       |                      |                        |         | 0.202          | 0.188                   | 14.583 (< .001)  |
| Constant                                                 | 0.956            | 0.706 | —                    | 1.355                  | .178    |                |                         |                  |
| QRIS Adoption ( $X \rightarrow c$ )                      | -0.107           | 0.224 | -0.061               | -0.479                 | .633    |                |                         |                  |
| Transaction Efficiency ( $Z \rightarrow b$ )             | 0.792            | 0.203 | 0.494                | 3.897                  | < .001  |                |                         |                  |
| Indirect Effect Path ( $X \rightarrow Z \rightarrow Y$ ) |                  |       |                      |                        |         |                |                         |                  |
| Sobel Test                                               | ab = 0.657       | 0.177 | —                    | Z = 3.721              | < .001  | —              | —                       | —                |
| Bootstrapping (5,000 samples)                            | ab = 0.657       | 0.172 | —                    | 95% CI: [0.328, 1.012] | < .001  | —              | —                       | —                |

#### Structural Regression Equations:

- Equation 1: Transaction Efficiency ( $Z$ ) = 0.700 + 0.830 (QRIS Adoption) +  $e_1$
- Equation 2: MSME Performance ( $Y$ ) = 0.956 - 0.107 (QRIS Adoption) + 0.792 (Transaction Efficiency) +  $e_2$

The empirical findings indicate that QRIS Adoption significantly predicts Transaction Efficiency ( $B = 0.830$ ,  $SE = 0.067$ ,  $\beta = 0.754$ ,  $p < .001$ ), establishing Path  $\alpha$ . In Model 2, Transaction Efficiency exerts a positive and statistically significant influence on MSME Performance ( $B = 0.792$ ,  $SE = 0.203$ ,  $\beta = 0.494$ ,  $p < 0.001$ ), representing Path

b. When Transaction Efficiency is included in the model, the direct effect of QRIS Adoption on MSME Performance (Path c') is substantially reduced and fails to reach statistical significance ( $B = -0.107$ ,  $SE = 0.224$ ,  $\beta = -0.061$ ,  $p = 0.633$ ).

The unstandardized indirect effect of QRIS Adoption on MSME Performance via Transaction Efficiency was calculated as  $ab = 0.830 \times 0.792 = 0.657$  ( $SE = 0.177$ ). The initial Sobel test yielded  $Z = 3.721$  ( $p < .001$ ), supporting the presence of an indirect relationship. To address the normality assumption limitation of the Sobel test, a bias-corrected bootstrapping procedure with 5,000 resamples was conducted. The analysis generated a 95% confidence interval ranging from 0.328 to 1.012. Because this confidence interval excludes zero, it provides robust empirical support for a statistically significant indirect effect through transaction efficiency.

Given the cross-sectional nature of the observational data, the statistical reduction of Path c' to non-significance should be interpreted as a full statistical mediation pattern rather than absolute temporal causality. These statistical metrics demonstrate that transaction efficiency functions as a crucial operational mechanism bridging technology adoption and business outcomes, without asserting definitive longitudinal causal inference.

#### 4.4 QRIS Adoption and Transaction Efficiency

The positive and significant relationship between QRIS adoption and transaction efficiency supports. The relatively large coefficient ( $\beta = 0.830$ ) indicates that respondents who perceive QRIS more positively also tend to report higher transaction efficiency. This finding is consistent with previous research showing that QRIS can facilitate faster transactions, reduce cash-handling activities, and improve transaction records (Rachmawaty, Amraeni, Amirullah, & Syakur, 2025). It is also consistent with the technology acceptance perspective, in which perceived usefulness and ease of use encourage technology utilization (Wardhani, Arkeman, & Ermawati, 2023).

The positive and significant relationship between QRIS adoption and transaction efficiency is consistent with the Technology Acceptance Model (TAM), particularly the role of perceived usefulness and perceived ease of use in technology acceptance. (Gunawan, Fatikasari, & Putri, 2023) found that perceived usefulness, perceived ease of use, and trust were associated with QRIS usage, while (Hasyim, Wahyudi, & Setiawan, 2024) demonstrated the relevance of security and perceived risk in explaining QRIS adoption. (Rafiani, Yunanda, & Rusmanto, 2024) similarly identified perceived usefulness, perceived ease of use, income, and perceived risk as significant determinants of QRIS usage among MSMEs. The present finding extends this perspective by shifting the focus from the determinants of QRIS acceptance to the operational consequences of adoption. QRIS adoption is not treated merely as an endpoint of technology acceptance; rather, the findings suggest that its practical value emerges when the adopted technology improves transaction processes.

The empirical result reveals that QRIS Adoption does not exert a statistically significant direct effect on MSME Performance ( $\beta = -0.107$ ,  $p = 0.633$ ) when transaction efficiency is controlled. This finding diverges from prior literature, such as (Fatmawati, Mutmainnah, & Ponto, 2024) and (Wardhani, Arkeman, & Ermawati, 2023), which reported a direct positive relationship between digital payment acceptance and business outcomes. This divergence highlights a critical operational nuance: merely displaying a QRIS barcode or accepting digital payments does not automatically generate commercial value. Without deliberate operational integration, specifically utilizing digital transaction data to accelerate cash flow turnaround, eliminate cashier change errors, and minimize physical cash management costs, technology adoption alone remains insufficient to drive broader firm performance.

#### **4.5 Transaction Efficiency and MSME Performance**

The second hypothesis is also supported, demonstrating that transaction efficiency has a positive and significant relationship with MSME performance ( $\beta = 0.792$ ,  $p < .001$ ). This finding indicates that operational improvements generated through more efficient payment transactions are associated with better perceived business performance. In other words, the value of digital payment adoption becomes more relevant to business outcomes when transaction-level improvements can be converted into operational and financial benefits. This interpretation is supported by (Nurrokhim, Khamidah, Maghfirah, Syahrenny, & Hajar, 2025), who found that QRIS interoperability could reduce MSME transaction costs through improved operational efficiency. (Saputra, Kadang, Darman, & Risendy, 2026) likewise reported that the contribution of QRIS to MSME income was associated with faster transaction processes and improved financial management. The result therefore positions transaction efficiency not merely as an operational benefit of QRIS, but as a potential mechanism through which digital payment adoption can contribute to broader business performance.

#### **4.6 Transaction Efficiency as a Mediating Mechanism**

The most important finding of this study concerns the mediating role of transaction efficiency. The direct relationship between QRIS adoption and MSME performance was statistically insignificant ( $\beta = -0.107$ ,  $p = .633$ ) after transaction efficiency was included in the model. At the same time, the Sobel test indicated a significant mediation effect ( $Z = 3.7213$ ,  $p = .000198$ ). This pattern provides evidence consistent with indirect effect, suggesting that QRIS adoption does not translate into MSME performance automatically. Instead, its contribution is transmitted through transaction efficiency.

This finding is consistent with (Gabriella & Yuldinawati, 2024), who found that the relationship between QRIS/e-commerce usage and MSME sales performance operated through competitive advantage rather than solely through a direct effect. Similarly, (Nurrokhim, Khamidah, Maghfirah, Syahrenny, & Hajar, 2025) showed that QRIS interoperability reduced MSME transaction costs through operational efficiency,

while Saputra et al. (2026) reported that the contribution of QRIS to MSME income was associated with faster transaction processes and improved financial management. To clarify the internal mechanism through which transaction efficiency converts technology adoption into business performance, three core operational dimensions must be highlighted: speed, cost reduction, and accuracy:

- a. **Transaction Speed:** Faster processing times reduce customer waiting lines at checkout, enabling high-volume MSMEs to increase order throughput per peak hour and improve sales conversion.
- b. **Cost Efficiency:** Transitioning to digital receipts eliminates physical cash transportation expenses, bank deposit fees, and risks associated with cash theft or counterfeit notes.
- c. **Recording Accuracy:** Automated payment logs eliminate manual cashier reconciliation discrepancies and provide precise, real-time records for working capital management.

The convergence of these findings suggests that the business value of digital payment technology is process dependent. QRIS provides an enabling infrastructure, but its contribution to business performance depends on whether the technology produces operational improvements that can subsequently be converted into financial and managerial outcomes. This finding provides the main contribution of the present study. Previous research has frequently examined the direct relationship between digital payment adoption and MSME income, sales, or performance. The present study instead identifies transaction efficiency as the intervening mechanism that explains how QRIS adoption can be translated into MSME performance.

#### 4.7 Interpretation through the TOE Framework

The findings can further be interpreted through the Technology-Organization-Environment (TOE) framework. From the technology perspective, QRIS provides a standardized and accessible digital payment infrastructure. However, the results indicate that technological availability alone does not guarantee improved MSME performance. The organizational dimension becomes particularly important because the benefits of QRIS need to be incorporated into daily transaction management, financial recording, reconciliation, and cash-flow monitoring.

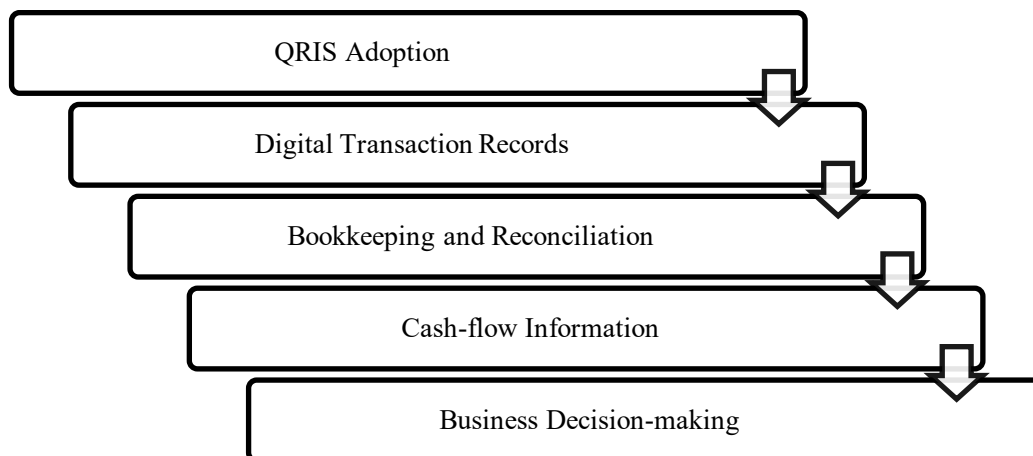


Figure 1. Digital transaction data as business information. Strategic pathway of digital transaction data as business information

This interpretation is consistent with (Faiz, Le, & Masli, 2024), who emphasized the continuing relevance of the TOE framework in explaining digital technology adoption among SMEs. (Indiani, Keshminder, Wiratama, & Amertha, 2025) similarly found that digital technology adoption in emerging-market SMEs depends substantially on organizational readiness rather than technological availability alone. In this study, transaction efficiency can therefore be interpreted as the operational manifestation of successful technology integration within the organization. QRIS represents the technological capability, while the ability to convert transaction data and payment functionality into efficient business processes reflects organizational capability. This provides an explanation for why transaction efficiency, rather than QRIS adoption itself, is directly associated with MSME performance.

## 5. Conclusion and Suggestions

This study demonstrates that transaction efficiency functions as a key indirect mechanism connecting QRIS adoption to MSME performance in Pekanbaru City. While QRIS adoption strongly enhances transaction efficiency, adoption alone does not exert a direct significant effect on perceived financial performance. The empirical findings indicate a pattern where the business performance benefits of digital payment technology are transmitted through operational efficiency improvements in speed, cost, and recording accuracy. Theoretically, this research extends technology adoption literature (TAM and TOE) by shifting the scholarly focus from technology acceptance determinants to operational value creation. It resolves conflicting evidence in prior direct-effect studies by clarifying that technological infrastructure acts as an enabler, whereas organizational process efficiency is the mechanism that generates business outcomes. Practically, MSME managers should not view QRIS merely as a passive payment channel. To realize financial gains, MSMEs must leverage digital transaction outputs for daily bookkeeping, cash-flow monitoring, and operational reconciliation. For policymakers and financial

institutions, digital inclusion initiatives should move beyond expanding merchant QRIS registration toward delivering digital financial literacy and operational cash-management training. Several methodological limitations must be acknowledged. First, the study relies on a cross-sectional design and self-reported performance measures, meaning the identified mediation pattern represents statistical association rather than absolute temporal causality. Second, the sample is heavily concentrated in the culinary sector (76%) within a single geographic region (Pekanbaru), which restricts the generalizability of the findings to other industries or broader regional contexts. Future research should employ longitudinal designs, integrate objective financial records, and utilize probability sampling across diverse industry sectors to test the generalizability of this operational mediation mechanism.

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