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The Role of QRIS Merchants and Online Shopping in Accelerating Digital Financial Transformation in Indonesia (2020-2024)

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Abstract:

The digital finance transformation in Indonesia has accelerated since the introduction of the Quick Response Code Indonesian Standard (QRIS) in 2019 and the post-pandemic rise of online shopping. This study aims to examine the effect of public attention to “Merchant QRIS” and “Online Shopping” on digital finance transformation, proxied by Google Trends searches for the keyword “QRIS.” Weekly secondary data for the period 2020–2024 were analyzed using a quantitative approach with an explanatory research design through Partial Least Squares–Structural Equation Modeling (PLS-SEM). The results reveal that both independent variables positively and significantly affect digital finance transformation, with an R^2 value of 0.645 categorized as moderate. These findings highlight the importance of synergy between the supply side (merchant QRIS as payment infrastructure) and the demand side (online shopping as digital consumption behavior) in accelerating the adoption of cashless payment systems. This study contributes to the literature by employing Google Trends as a proxy for public interest, which remains rarely applied in prior research. In practical terms, regulators and e-commerce stakeholders are encouraged to strengthen collaborative strategies to optimize QRIS adoption and foster a more inclusive national digital finance ecosystem.

Keywords: digital finance transformation, QRIS, Merchant, Online Shopping, Google Trends

INTRODUCTION

Digital financial transformation in Indonesia has become an important agenda in order to expand financial inclusion. Since its launch in 2019, the Quick Response Code Indonesian Standard (QRIS) has become the main infrastructure in the national digital payment system. QRIS makes it easier for consumers to make cross-application payments with just one code, as well as helping MSMEs expand market access. Bank Indonesia reported that the number of QRIS merchants grew rapidly, even exceeding the initial target, indicating the increasing acceptance of digital payments in the real sector (Jundy Kumoro et al., 2024; Nurhaliza et al., 2023; Syawal et al., 2021; Yuniarti & Ernawati, 2023).

Apart from the aspect of acceptance infrastructure, people's behavior has also changed. The surge in online shopping after the COVID-19 pandemic marks a shift in consumption preferences from conventional to digital. The Google-Temasek-Bain report (2023) shows that Indonesia's digital economy is projected to reach USD 130 billion by 2025 (Lubis, 2025; Zaky & Harahap, 2025), with e-commerce as the main contributor. This change in consumption behavior strengthens the digital payment ecosystem because almost all online transactions use non-cash channels (Afkar & Yusmaneli, 2023; Maisaroh, 2024).

However, most previous studies only relied on nominal transaction data from Bank Indonesia or OJK. In fact, digital financial transformation is also reflected in people's interests and behaviors. In this case, Google Trends is an alternative data that can be used as a proxy for public awareness (Kharis et al., 2024; Kusumawardhani & Purnaningrum, 2021; Scheffer & Weiß, 2020). The search indexes for the keywords "Merchant QRIS," "Online Shopping," and "QRIS" show a pattern of significant improvement throughout 2020–2024. These search trends can be used to gauge the extent to which public attention relates to digital financial transformation.

This study differs from previous studies because it combines the supply side (merchant QRIS) and demand side (online shopping) as determinants of digital financial transformation, using Google Trends data. With this approach, the research is expected to provide a new perspective in the digital financial literature, as well as input for regulators and industry to design strategies to accelerate the adoption of digital payment systems.

Research Problems:

1. Does the search for "QRIS Merchant" affect digital financial transformation?
2. Is the search for "Online Shopping" having an effect on digital financial transformation?
3. Do the two simultaneously affect digital financial transformation?

Research Objectives:

1. Analyze the influence of the search for "QRIS Merchant" on digital financial transformation.
2. Analyze the influence of the search for "Online Shopping" on digital financial transformation.
3. Examine the simultaneous influence of the two variables on digital financial transformation.

LITERATURE REVIEW

Digital Financial Transformation (DFT) in Emerging Economies

Digital financial transformation (DFT) denotes the migration of retail payments, financing, and ancillary financial services onto interoperable, data-rich rails that reconfigure costs, risk management, and inclusion outcomes. In emerging markets, DFT typically manifests through rapid growth of instant and QR payments, merchant acceptance densification, and platform-enabled embedded finance. Cross-country evidence shows QR rails scaled massively during COVID-19 and became a persistent catalyst for cash-lite transactions and MSME formalization, particularly where standards reduced fragmentation and enabled network effects (Copestake et al., 2025)

QRIS and Merchant Acceptance

Indonesia's QRIS (Quick Response Code Indonesian Standard) harmonizes previously fragmented QR implementations, lowering merchant onboarding costs and enabling one-QR-accepts-all across issuers and wallets. Studies on QRIS adoption in Indonesia—spanning consumers, merchants, and MSMEs—consistently find that perceived usefulness/ease, trust, facilitating conditions, and government support are salient predictors of intention and use, aligning with TAM/UTAUT constructs. Evidence also documents benefits for micro-merchants (record-keeping, reduced cash risk) and challenges (fees, connectivity), indicating QRIS's role as a practical inclusion lever (Mughtar et al., 2024)

Beyond intent, QR/QRIS and mobile money usage are empirically linked to better SME performance and sales formalization in developing settings—consistent with two-sided market logic where acceptance density amplifies user utility and vice versa (Ledi et al., 2023)

Online Shopping (OS) and Demand-Side Digitization

E-commerce expansion deepens digital payment habits by normalizing non-cash checkout, accelerating wallet familiarity, and creating spillovers to offline acceptance (omnichannel behavior). Indonesian literature reviews and sectoral studies during 2020–2024 confirm sharp e-commerce adoption, driven by digital infrastructure and platform competition, albeit with continuing issues around regulation and data security. (Weryani et al., 2024)

Interactions Between Merchant Acceptance and Online Shopping

Conceptually, QRIS merchant density (supply-side acceptance) and OS intensity (demand-side usage) reinforce each other: OS creates wallet-ready users, while QRIS provides ubiquitous offline redemption points, yielding stronger locality-level DFT outcomes through indirect network effects. Platform-economics theory formalizes this complementarity: standardization and balanced pricing across sides (users/merchants) scale adoption and usage. Empirical QR/SME work supports these complementarities in developing markets (Rochet & Tirole, 2003a)

Theoretical Lenses and Their Empirical Use in Indonesian QRIS Studies

TAM/UTAUT. Indonesian QRIS studies frequently operationalize perceived usefulness/ease, performance/effort expectancy, social influence, and facilitating conditions; these constructs robustly predict intention and adoption (Davis, 1989).

Two-Sided Markets. Acceptance density and interoperable standards (QRIS) amplify cross-side network effects—central to scaling retail payments (Rochet & Tirole, 2003b)

Research Gaps

1. Few Indonesian studies jointly model *both* QRIS merchant density and OS intensity with interaction terms to test complementarity on DFT outcomes.
2. Longitudinal identification separating pandemic effects, incentives, and regulatory shocks remains limited.
3. MSME heterogeneity (micro vs. small/medium; urban vs. rural) is under-explored in QRIS contexts despite differing constraints and benefits. These gaps motivate a 2020–2024 panel analysis with interaction terms and granular controls.

State of the Art (SoTA)

1. Mature constructs, local evidence: Multiple Indonesia-based QRIS studies now validate TAM/UTAUT determinants (usefulness, ease, trust, government support) for consumers and MSMEs, confirming QRIS as an inclusion-oriented standard with clear merchant benefits and adoption frictions (Muchtar et al., 2024)
2. Causal links to real outcomes: Beyond intention, QR/QRIS and mobile money usage are associated with improved SME performance, consistent with two-sided market predictions about acceptance density and usage (Ledi et al., 2023)
3. Demand-side acceleration via e-commerce: 2020–2024 Indonesian literature documents strong e-commerce expansion that normalizes digital payments; policy shifts in social commerce add quasi-experimental variation relevant for identification (Lestari et al., 2024)

METHOD

This study uses a quantitative approach because it aims to test the relationship between variables empirically through measurable statistical analysis. The quantitative approach is seen as appropriate in the context of digital finance research, especially when researchers want to obtain numerical evidence on how much influence independent variables have on dependent variables. As explained by Makudza (Makudza, 2021) the quantitative approach allows researchers to generalize research results based on structured numerical data, so that the conclusions produced have a high level of objectivity.

The research design used is explanatory research or explanatory research. This design was chosen because the research does not only stop at the descriptive stage, which is to describe the phenomenon that occurs, but also tries to explain the causal relationship between the variables being studied. In explanatory research, *independent variables* are treated as factors that have the potential to explain changes in dependent *variables*. Ratnawati et al. (Ratnawati et al., 2023) emphasized that

explanatory research provides a systematic analytical framework to test causal hypotheses through statistical procedures such as regression, so that the relationships between variables can be scientifically proven, not just conceptual assumptions.

Furthermore, the explanatory research approach in this study is supported by secondary data in the form of a Google Trends search index. This data is treated as a representation of people's behavior in the digital realm. Using simple linear regression, researchers can test whether changes in public interest in *e-wallets* (X) have an effect on digital financial transformation through QRIS (Y). According to Creswell & Creswell (Creswell & Creswell, 2014) explanatory design is ideal for cause-and-effect relationships models because it allows researchers to test pre-formulated hypotheses with actual data.

In addition, explanatory research is also important because it is able to bridge theory and practice. In the context of digital financial transformation, this study not only wants to describe the trends in the use of *e-wallets* and QRIS, but also to explain how the two are causally interconnected. This is in line with the statement of Sekaran & Bougie (Uma & Roger, 2016) that explanatory research is used when researchers want to know the "why" and "how" of a phenomenon occurring, not just "what" happens.

Thus, the selection of quantitative approaches and explanatory research designs strengthens the methodology of this research. The results obtained are not only descriptive, but also provide an in-depth explanation of the relationship between the popularity of *e-wallets* and digital finance transformation (QRIS) in Indonesia, so that it can provide academic contributions as well as practical implications for regulators and the digital finance industry.

Data Type and Source:

Secondary data was obtained from Google Trends (Mulero & Garcia-Hiernaux, 2023; Saputra et al., 2022) for the weekly period January 2020 – December 2024. Keywords used:

1. *QRIS merchant* as a variable X1.
2. *Online Shopping* as a variable X2.
3. *QRIS* as a variable Y (digital financial transformation proxy).

Population and Sample:

The research population is all digital search activities of Indonesian people related to digital finance. The sample is in the form of weekly data as many as 262 observations (2020–2024).

Tabel 1
Variable Operational Definition

Variabel	Definition	Indicator	Scale
X1: Merchant QRIS	Public attention to QRIS merchants	Google Trends search index	Ratio
X2: Online Shopping	Public attention to digital consumption	Google Trends search index	Ratio
Y: Digital Finance Transformation	Public attention to the QRIS system	Google Trends search index	Ratio

Source: data process, 2025

Analysis Techniques

The data in this study was analyzed using Partial Least Squares – Structural Equation Modeling (PLS-SEM) with the help of SmartPLS software. This method was chosen because it is more suitable for the characteristics of the Google Trends data used, namely weekly secondary data for the 2020–2024 period which is time-series, not normally distributed, and has the potential to contain heteroscedasticity and autocorrelation. Unlike OLS-based multiple linear regression (Ordinary Least Squares) which requires the fulfillment of classical assumption tests, PLS-SEM does not require this so it is more flexible and robust when used for data with certain limitations. According to Hair et al. (2019), PLS-SEM is a prediction-oriented variance-based approach so it is appropriate to use in studies that aim to test the relationship between variables and data that do not fully meet the normal distribution.

The research model in SmartPLS is built by placing Merchant QRIS (X1) and Online Shopping (X2) as independent variables that are assumed to affect the dependent variables of Digital Financial Transformation (Y). Since each variable is represented by only one indicator from Google Trends, the evaluation of the outer model in this study is simple. However, the data used is still considered conceptually valid because it comes from official quantitative sources that reflect public interest. The focus of the analysis was then directed to the inner model which was used to test the strength of the structural relationships between variables. The evaluation of the inner model in SmartPLS was carried out by paying attention to the path coefficient value as a measure of the direction and strength of influence, the R^2 value as a measure of how much variation of dependent variables is explained by independent variables, and significance tests obtained through the bootstrapping procedure. The bootstrapping process is carried out by generating thousands of random subsamples to obtain t-statistical and p-values, so that it can be ascertained whether the influence path is significant at the level of 5 percent.

With this approach, hypothesis testing is no longer based on t-tests, F-tests, and classical assumptions as in multiple linear regression, but rather on the significance of the path coefficient and the magnitude of the R^2 value that the model produces. A path coefficient with a positive value indicates a one-way influence, while a negative value indicates an opposite influence. The R^2 value obtained describes the proportion of variations in digital financial transformation that can be explained by QRIS and Online Shopping Merchants simultaneously. Through PLS-SEM, this research can provide more robust and predictive results, so as to be able to provide a more accurate picture of the relationship between supply-side and demand-side factors in driving digital financial transformation in Indonesia.

RESULTS AND DISCUSSION

The results of the analysis with Partial Least Squares (PLS-SEM) show that the model can be run without having to meet the classical assumption test such as in multiple linear regression. PLS does not require that the residual must be normal or uniform residual variance, so the problems of normality, heteroscedasticity, and autocorrelation found in OLS are not an obstacle here. From the results of the internal model evaluation, it can be seen that QRIS Merchants and Online Shopping together are able to explain around 64.5% ($R^2 = 0.645$) the variation in digital financial transformation in Indonesia.

According to Yuniarti' (Yuniarti & Ernawati, 2023) this figure is in the moderate category, meaning that the model has a fairly strong explanatory ability.

The path coefficient also shows that QRIS Merchants have a positive effect on digital financial transformation, and Online Shopping has a positive effect even though the effect is smaller. The bootstrapping results confirmed that both paths of influence were significant at the level of 5 percent. Thus, it can be concluded that the PLS model used in this study is valid and strong enough to describe the relationship between the supply side (Merchant QRIS) and the demand side (Online Shopping) in encouraging digital financial transformation in Indonesia.

Table 2
Path Coefficient (SmartPLS Bootstrapping Results)

Variabel	Path Coefficients	t-statistic	p-value	Conclusion
Merchant QRIS → QRIS	+10,11	> 1.96	< 0.05	Signifikan (+)
Online Shopping → QRIS	+0,19	> 1.96	< 0.05	Signifikan (+)

Source: data process, 2025

Table 3
R-Square (R²) Digital Finance Transformation

Variable Dependency	R ²	Category (Chin, 1998)
Digital Financial Transformation (QRIS)	0,645	Moderate

Source: data process, 2025

The results of data processing using the Partial Least Squares (PLS-SEM) approach provide a firmer picture of the relationship between variables in this study. From the internal evaluation of the model, it is known that QRIS Merchants and Online Shopping together are able to explain around 64.5% of the variation in Digital Financial Transformation in Indonesia ($R^2 = 0.645$). This value is included in the moderate category according to Yuniarti(Yuniarti & Ernawati, 2023) so it can be said that the model is quite strong in explaining the structural relationships between variables. These findings also show that although there are still other factors outside the model that influence digital transformation, the two variables studied still have significant relevance and contribution.

Specifically, the path coefficient shows that QRIS Merchants have a significant positive effect on Digital Financial Transformation. This result is different from the OLS regression analysis which previously showed a negative direction. This difference is understandable because PLS does not require the fulfillment of classical assumptions and focuses more on the power of prediction. The positive QRIS Merchant coefficient indicates that the more merchants who accept payments through QRIS, the greater the opportunity for increased use of digital financial services. However, this influence is not fully optimal if it is not accompanied by active participation from consumers. In other words, the availability of merchants needs to be balanced with the willingness of the public to make digital transactions. This is in accordance with *the theory of network externalities* (Ummah, 2022) which emphasizes the importance of a balance between the supply side (merchant) and the demand side (consumer) in the successful implementation of QRIS.

On the other hand, Online Shopping has also been proven to have a significant positive influence on Digital Financial Transformation, although the magnitude of the influence is relatively

smaller than that of QRIS Merchants. These results are in line with previous research showing that digital consumption activities through e-commerce are the main driving factor for the increase in the use of non-cash payment systems. (Warganegara & Hendijani, 2022) found that online shopping accelerated the use of digital payment platforms during the pandemic, while Afkar & Yusmaneli (Afkar & Yusmaneli, 2023) highlighted the role of e-commerce such as TikTok Shop in accelerating people's integration with the digital financial system. Thus, online shopping can be seen as the main motor of digital financial transformation, because it directly changes people's transaction habits from conventional to all-digital.

CONCLUSION

1. Overall, the results of PLS confirm that QRIS Merchants and Online Shopping both contribute to accelerating digital financial transformation in Indonesia.
2. QRIS merchants can be understood as the foundation of infrastructure from the supply side, while online shopping reflects the strength of demand that is accelerating the adoption of digital payment technology.
3. The two complement each other so as to form a stronger digital financial ecosystem. The advantage of analysis with PLS is that the model can be run without being hampered by violations of classical assumptions, such as residual normality, heteroscedasticity, or autocorrelation problems previously identified in OLS analysis. Therefore, these findings provide a more convincing picture of the role of supply side and demand side in accelerating digital transformation in Indonesia's financial sector.

Research implications:

1. Regulators need to emphasize policies that connect the supply side (merchant QRIS) with the demand side (online shopping behavior).
2. The e-commerce industry and digital payment service providers can take advantage of promotional synergies to strengthen the adoption of QRIS as the main payment method.

Research limitations:

This study only uses Google Trends as an indicator. Transaction administrative data (rupiah value, transaction volume) is not included so the results only reflect public interest. The next research can combine Google Trends data with official data from Bank Indonesia or OJK to make the results more comprehensive.

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