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ORIGINAL ARTICLE

The Analysis of QRIS Usage and Its Impact on the Velocity of Money in Indonesia

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Abstract

QRIS, or Quick Response Code Indonesian Standard, represents one of the key evolutions in the payment system in Indonesia, utilizing QR Code technology to enhance payment system efficiency. QRIS has gained popularity in supporting payment systems in Indonesia and ensuring the velocity of money within the country. The velocity of money plays an important role in enhancing the effectiveness of monetary policy through its influence on the predictability of major monetary aggregates and money demand. This study aims to analyze the impact of QRIS usage on the velocity of money in Indonesia. The study employs a quantitative approach, using quarterly time series data (2019 Q1 - 2023 Q4) and incorporating several additional variables that can influence the velocity of money. The findings indicate that QRIS affects the velocity of money in the long term, as demonstrated through the Error Correction Model, a method capable of analyzing both short-term and long-term economic phenomena and evaluating the consistency of empirical models with economic theory. Based on these empirical results, it is recommended that the government of Indonesia enhance QRIS infrastructure to foster greater confidence and trust among citizens, thereby accelerating transactions.

Introduction

The rapid development of globalization has significantly impacted various sectors. As we know, technology is advancing rapidly, including in the evolution of payment systems in Indonesia [1,2]. This progress has given rise to Financial Technology (FinTech), which integrates financial services with technology, transforming traditional business models into modern ones. Previously, payments were made face-to-face using cash, but now, transactions can be conducted remotely and completed within seconds [3–5]. One of the most widely adopted innovations is digital payment services based on QR codes, commonly known as QRIS (QR Code Indonesia Standard). QRIS is the standardized QR code payment system for Indonesia, developed by Bank Indonesia in collaboration with the Indonesian Payment System Association [6,7].

Increasing the efficiency of QRIS transaction usage leads to faster and more efficient payments. By using smartphones and payment applications connected to QRIS, customers can make payments simply by scanning a QR code. This reduces the need for cash and avoids dependence on time-consuming transactions such as credit card payments [8,9]. On a broader scale, the efficiency of QRIS transactions can reduce administrative costs and increase productivity, which in turn can drive economic growth [10,11]. Furthermore, QRIS plays a vital role in increasing financial accessibility for individuals and businesses previously underserved by the traditional banking system. Through QRIS, users can easily open a digital wallet and make financial transactions without having a bank account. This helps drive inclusion finance in remote areas and expand access to financial services, such as bill payments, money transfers, and purchasing

goods and services. With better accessibility, economic activity can increase and drive broader economic growth [12,13].

QRIS has provided significant stimulus for the Micro, Small, and Medium Enterprises (MSMEs) sector in Indonesia. By using QRIS, MSMEs can accept electronic payments easily and cheaply. This helps MSMEs reduce dependence on cash transactions and increase consumer confidence. In addition, QRIS also allows MSMEs to connect with digital platforms and wider business ecosystems, thereby opening up greater market opportunities. Through the growth of the MSME sector, QRIS can be a significant driver of economic growth [14,15].

In line with this idea, QRIS has received strong support from the Indonesian government, through Bank Indonesia which has promoted the use of QRIS as a national payment standard. This is reinforced by Bank Indonesia regulations number 11/12/PBI/2009 [16] and number 16/8/PBI/2014 [17]. The use of QRIS can continue to grow with integration with other technologies, such as e-commerce, IoT (Internet of Things), and artificial intelligence. Government support and technological innovation can accelerate the circulation of money towards economic growth in the future [18–20].

The use of QRIS significantly impacts the evolution of buying and selling transactions and is closely linked to the velocity of money. According to Mishkin [21], the velocity of money refers to the average number of transactions per year (turnover) of one unit of currency used to purchase the total goods and services produced in the economy. Fisher & Serletis [22] further noted that the velocity of money is related to the money transactions in circulation relative to the total production of goods and services. This concept is particularly relevant in the context of economic development in Indonesia, where the use of QRIS as a form of electronic money affects the velocity of money. The balance of the velocity of money plays a crucial role in ensuring the effectiveness of monetary policy by influencing the predictability of major monetary aggregates and money demand [23,24].

Recent research by Nampewo & Opolot [25] investigated whether short-term interest rates affect the velocity of money in Uganda, with real income also being a key variable in their study. The velocity of money is influenced by several independent variables, as noted by Sun [26] who examined the positive and statistically significant effect of real income on the velocity of money in the United States. Similarly, Khan & Gill [27] explored the relationship between real income and the velocity of money in Pakistan. Mubin & Pambudi [28] further analyzed the impact of electronic money on the velocity of money in Indonesia, finding that, in the long term, electronic money, income levels, and interest rates have a significantly positive effect, while in the short term, electronic money has only a slight impact on the velocity of money. However, these studies focused on electronic money in general rather than on a specific type. Therefore, this study will concentrate on the usage of QRIS as the primary method to analyze the exchange of electronic money in relation to the velocity of money in Indonesia, while also examining other independent variables such as interest rates, GDP, and exchange rates as supporting factors that could influence the velocity of money in the country.

Based on the research background, problem justification, and identified gap, this study aims to analyze the usage of QRIS in relation to the Velocity of Money in Indonesia. It is observed that while the usage of QRIS in Indonesia continues to rise, it may either reduce the Velocity of Money or keep it stable. Furthermore, previous research has not specifically addressed the type of electronic money that affects the Velocity of Money. This study contributes to the existing literature by providing empirical evidence on the impact of QRIS on the Velocity of Money, offering insights into the broader implications of digital payment adoption in Indonesia's monetary system.

Materials and Methods

Data and Variables

This study employs a descriptive method with a quantitative approach. Descriptive research involves data collection aimed at testing hypotheses or answering questions regarding the current status of research subjects. The quantitative approach emphasizes the existence of variables as research objects, which must be defined through the operationalization of each variable.

The type of data utilized in this study is time series data covering a period of five years, with quarterly data from Q1 2019 to Q4 2023. As shown in Table 1, the variables examined include one dependent variable, namely the velocity of money, and four independent variables: interest rates, real income, exchange rates, and the usage of QRIS.

Table 1. Operational definition of variables.

Status	Variable Name	Symbol	Definition	Units
Dependent	Velocity of Money	VoM	Velocity of Money is calculated by dividing GDP by M1.	Billion Rupiah
Independent	Interests Rates	IR	Interest Rates are based on the fixed rates set by Bank Indonesia.	Percent
	Gross Domestic Product	GDP	Gross Domestic Product is measured using GDP at current prices.	Billion Rupiah
	Exchange Rates	ER	Exchange Rates are based on the JISDOR Rupiah Exchange Rate to the Dollar.	Percent
	Usage of QRIS	QRIS	The usage of QRIS is measured by the transaction volume of QRIS from ASPI.	Million Rupiah

Method

In this study, the analysis method employed is the Error Correction Model (ECM). The ECM method is chosen due to its capability to analyze both short-term and long-term economic phenomena, as well as to assess the consistency of empirical models with economic theory [29,30]. Furthermore, the application of the ECM method in this study is justified by the nature of the research data, which consists of time series that are often non-stationary. This non-stationarity can lead to questionable regression results, commonly referred to as spurious regression. In economic analysis, the ECM can elucidate why economic agents experience imbalances, a phenomenon known as disequilibrium.

This study utilizes Domowitz-El Badawi's Error Correction Model [31], which is characterized by the inclusion of an Error Correction Term (ECT). According to this model, the ECM method is considered valid if the coefficient of the ECT is positive and statistically significant. The ECM equation model of this study is written in Equation 1.

$$VoM_t = \beta_0 + \beta_1 IR_t + \beta_2 GDP_t + \beta_3 ER_t + \beta_4 QRIS_t + \beta_5 ECT + \mathrm{u}_t \quad (1)$$

In this model, The variable VoM represents the dependent variable, while IR, GDP, NT, and QRIS symbolize the independent variables. The constant is denoted by β_0, the coefficients are represented by β_1 to β_4, and the error term represent by u. The ECT, a key component of this equation, indicates that the ECM method is valid if the coefficient of the ECT is negative and statistically significant.

Results and Discussion

Descriptive Statistics

Descriptive statistics, as presented in Table 2, provide information on the VoM, IR, GDP, ER, and QRIS in Indonesia on a quarterly basis from 2019 Q1 to 2023 Q4. The statistics indicate that there are a total of 20 observations for each variable in this study. From 2019 Q1 to 2023 Q4, the average VoM in Indonesia was 198.5258 million rupiah, with a minimum value of 16.07851 million rupiah and a maximum value of 230.1364 million rupiah, resulting in a standard deviation of 16.07851 million rupiah. The average usage of QRIS was 1.26E+08 million rupiah, with a maximum value of 2.43E+08 million rupiah and a minimum value of 8,266,809 million rupiah, along with a standard deviation of 55,416,127 million rupiah.

Table 2. Descriptive statistics.

Variable	Mean	Median	Max.	Min.	Std. Dev.	Obs.
VoM	198.5258	203.1364	230.1043	167.6898	16.07851	20
IR	4.65	4.75	6	3.5	1.036822	20
GDP	4.29E+09	3.82E+09	5.96E+09	3.59E+09	7.35E+08	20
ER	14643.95	14511.75	15946	13810.5	560.7907	20
QRIS	1.26E+08	1.27E+08	2.43E+08	8266809	55416127	20

Stationarity Test

The stages prior to conducting regression with the ECM test begin with determining whether the variables used are stationary at 1st difference. If the data is not stationary, a false regression (spurious) will be obtained. Conversely, if the data is stationary at level, Ordinary Least Squares (OLS) regression can be applied. However, if the data is not stationary at level, it is necessary to assess its stationarity through a degree of integration test. At this stage, a unit root test is performed using the Augmented Dickey-Fuller (ADF) method. Based on Table 3, it is observed that all variables are stationary in 1st difference, as the probability value for all variables is below 0.05.

Table 3. Stationarity test using ADF-test.

Variable	1st Diff.	
	Stat.	Prob.
IR	-3.107152**	0.0493
GDP	-6.246499***	0.0001
ER	-5.201743***	0.0012
QRIS	-4.742005***	0.0019

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Cointegration Test

The cointegration test in this study utilizes the Engle-Granger (EG) test, which can be conducted if the data is not stationary at the level. The results of the cointegration test are presented in Table 4, where it can be concluded that the probability value of the ECT variable (0.0132) is less than the significance level of 5% (0.05), indicating that the ECT variable is stationary. Based on these probability results, it can be interpreted that there is cointegration between the variables. This means that the ECT variable is stationary in the unit root test at the level, confirming that the dependent variable and the independent variable are cointegrated. Consequently, the ECM model is considered valid, allowing the analysis to proceed to the next stage.

Table 4. Cointegration test using Engle-Granger test.

Input	Prob.	Conclusions
ECT	0.0132	There is cointegration

ECM Model Estimation

The ECM model for short-term results is shown in Table 5. The constant value of 2.751773 can be interpreted to mean that if the variables IR, GDP, ER, and QRIS are equal to zero, then the VoM is 2.7517 percent. The R^2 value of 0.9591 indicates that the variables of interest rate, real income, QRIS use, and exchange rate explain 95.91% of the variation in money circulation, while the remaining 4.09% is attributed to other variables not included in the estimation model. Based on the results of the simultaneous test, which assesses the significance of the independent variables collectively affecting the dependent variable, the estimated probability value (F-Statistic) is 0.000000, which is less than α = 5% (0.05). This indicates that the independent variables significantly affect the dependent variable with a confidence level of 95%.

The results of the short-term equation estimation show that changes in the use of QRIS and GDP have a significant effect on the VoM, while IR and ER do not significantly impact the VoM. The large ECT coefficient of -0.28804 suggests that the difference between the velocity of money and its equilibrium value will be adjusted by -0.28804 within one quarter.

Table 5. ECM in short term.

Variable	Coef.	Prob.
C	2.751773***	0.0000
D(IR)	0.179978	0.4125
D(GDP)	0.000000032***	0.0000
D(ER)	-0.002085	0.2818
D(QRIS)	-0.002632***	0.0079
ECT(-1)	-0.28804**	0.0471
R-squared	0.9591	
F-stat. (Prob.)	0.0000***	

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

The ECM model for long-term results is shown in Table 6. The constant value of 287.6141 can be interpreted to mean that if the IR, GDP, ER, and QRIS are equal to zero, then the VoM is 287.61 percent. Based on the results of the long-term equation estimation, the R^2 value is 0.7981, indicating that the IR, GDP, ER, and QRIS explain 79.81% of the variation in money turnover, while the remaining 20.19% is attributed to other variables not included in the estimation model.

The results of the simultaneous test, which assesses the significance of the independent variables collectively affecting the dependent variable, yield a probability value (F-Statistic) of 0.0000, which is less than α = 5% (0.05). This indicates that the independent variables significantly affect the dependent variable with a confidence level of 95%.

Table 6. ECM in long term.

Variable	Coef.	Prob.
C	287.6141***	0.0001
IR	1.014963***	0.0001
GDP	1.40E-08***	0.0010
ER	1.01198**	0.0166
QRIS	1.00E+00**	0.0447
ECT (-1)	-0.28804**	0.0471
R-squared	0.7981	
F-stat. (Prob.)	0.0000***	

Note: *** and ** indicate significance at the 1% and 5% levels, respectively.

Discussion

The Interest Rate Level has a significant effect on the velocity of money in Indonesia for the period 2019 Q1 to 2023 Q4. This is supported by a significance level of 0.0001, which is well below the threshold of 0.05. Consequently, it can be concluded that the interest rate level has

a significant positive effect on the velocity of money. Specifically, an increase in interest rates can lead to a higher velocity of money, while a decrease in interest rates can result in a lower velocity. The implication of this finding is that policymakers should carefully consider interest rate adjustments, as they can directly influence economic activity by affecting how quickly money circulates in the economy. A well-calibrated interest rate policy could stimulate economic growth by enhancing the velocity of money [32–34].

Real income also significantly impacts the velocity of money in Indonesia during the same period, as evidenced by a significance level of 0.0010. Since this value is less than 0.05, it indicates that real income has a significant positive effect on the velocity of money. Changes in real income can thus influence the velocity of money in Indonesia; an increase in real income can lead to a higher velocity, while a decrease can result in a lower velocity. This finding suggests that economic growth, reflected in rising real incomes, can enhance the efficiency of money circulation [32,35]. Policymakers should focus on strategies that promote real income growth, as this could lead to a more dynamic economy with increased spending and investment.

The exchange rate also has a significant effect on the velocity of money in Indonesia for the period 2019 Q1 to 2023 Q4, supported by a significance level of 0.0166. Since this value is below 0.05, it can be concluded that the exchange rate has a significant positive effect on the velocity of money. Fluctuations in the exchange rate can thus influence the velocity of money; an increase in the exchange rate can lead to a higher velocity, while a decrease can result in a lower velocity. The implication of this finding is that exchange rate stability is crucial for maintaining a healthy velocity of money [36,37]. Policymakers should monitor exchange rate movements closely and implement measures to mitigate excessive volatility, as this can have direct repercussions on economic activity and money circulation.

The use of QRIS (Quick Response Code Indonesian Standard) has a significant effect on the velocity of money in Indonesia for the period 2019 Q1 to 2023 Q4, as indicated by a significance level of 0.0447. Since this value is less than 0.05, it can be concluded that the use of QRIS has a significant positive effect on the velocity of money. Changes in QRIS usage can therefore affect the velocity of money; an increase in QRIS usage can lead to a higher velocity, while a decrease can result in a lower velocity. This finding highlights the importance of digital payment systems in enhancing the efficiency of money circulation [38–40]. Policymakers and financial institutions should promote the adoption of QRIS and similar technologies, as they can facilitate faster transactions and improve overall economic activity.

Conclusions

Based on the results of the ECM test, it can be concluded that each variable tested significantly affects the velocity of money in Indonesia for the period 2019 Q1 to 2023 Q4. This aligns with the author's hypothesis, which posits that interest rates, real income, exchange rates, and the use of QRIS have a substantial impact on the long-term velocity of money. Notably, the introduction of QRIS, an online payment system initiated by the Indonesian government, has significantly influenced the velocity of money during this period, reflecting the evolution of the payment landscape in Indonesia.

In light of these findings, the author recommends that the government implement more comprehensive policies and regulations regarding QRIS and electronic money. Such measures would enable the government to effectively manage these systems, ensuring that QRIS and electronic money contribute positively to the velocity of money rather than hinder it. Currently, these payment methods are primarily recognized by younger generations, highlighting the need for the government to promote awareness and accessibility among all age groups.

To facilitate this, the Indonesian government should undertake initiatives to educate citizens about QRIS and electronic payment systems, ensuring that these technologies are accessible and user-friendly for everyone. Additionally, the government should invest in the necessary infrastructure to support QRIS as a mainstream payment method. This includes ensuring the availability of QRIS at all commercial banks and integrating it into various online shopping platforms. By doing so, the government can enhance the adoption of QRIS, ultimately fostering a more efficient and inclusive financial ecosystem that benefits all citizens.

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References

[1] Najib M, Fahma F. Investigating the Adoption of Digital Payment System through an Extended Technology Acceptance Model: An Insight from the Indonesian Small and Medium Enterprises. *International Journal on Advanced Science, Engineering and Information Technology* 2020;10:1702–8. https://doi.org/10.18517/ijaseit.10.4.11616.

[2] Hardi I, Afjal M, Khan M, Idroes GM, Noviandy TR, Utami RT. Economic Freedom and Growth Dynamics in Indonesia: An Empirical Analysis of Indicators Driving Sustainable Development. *Cogent Economics & Finance* 2024;12. https://doi.org/10.1080/23322039.2024.2433023.

[3] Anshari M, Almunawar MN, Masri M. An Overview of Financial Technology in Indonesia. *Financial Technology and Disruptive Innovation in ASEAN* 2020:216–24.

[4] Ulfah CF, Suriani S. Digital Economy Dynamics: How E-Money, Debit Cards, Inflation, and Exchange Rates Shape Money Demand Stability in Indonesia. *Grimsa Journal of Business and Economics Studies* 2024;2:39–51. https://doi.org/10.61975/gjbes.v2i1.37.

[5] Muksalmina M, Ahmadsyah I, Dianah A. Understanding E-Money Preferences Among Students: A Case Study at FEBI UIN Ar-Raniry, Banda Aceh, Indonesia. *Grimsa Journal of Business and Economics Studies* 2023;1:1–11. https://doi.org/10.61975/gjbes.v1i1.11.

[6] Prawitasari D, Badiani FD, Rachmawati SD, Ningrum FP, Mufidah NL. QRIS in Indonesia: A Comprehensive Literature Review on Adoption, Challenges, and Opportunities. *Revenue: Jurnal Manajemen Bisnis Islam* 2024;5:91–102. https://doi.org/10.24042/revenue.v5i1.22760.

[7] Hasibuan AN, Fadhillah A, Setyono J, Windari W. Determinant of Intention to Use the Quick Response Code Indonesian Standard at Indonesian Sharia Bank. *Journal of Hunan University Natural Sciences* 2024;51. https://doi.org/10.55463/issn.1674-2974.51.8.4.

[8] Lisana L. Factors Influencing the Adoption of Mobile Payment Systems in Indonesia. *International Journal of Web Information Systems* 2021;17:0–10. https://doi.org/10.1108/IJWIS-01-2021-0004.

[9] Noviandy TR, Hardi I, Idroes GM. Forecasting Bank Stock Trends Using Artificial Intelligence: A Deep Dive into the Neural Prophet Approach. *The International Journal of Financial Systems* 2024;2:29–56. https://doi.org/10.61459/ijfs.v2i1.41.

[10] Rachman A, Julianti N, Arkoyah S. Challenges and Opportunities for QRIS Implementation as a Digital Payment System in Indonesia. *EkBis: Jurnal Ekonomi Dan Bisnis* 2024;8:1–13. https://doi.org/10.14421/EkBis.2024.8.1.2134.

[11] Nida R, Alfirdaus Z. Driving Economic Growth via QRIS Adoption in Indonesia with Trust Moderating Variable. 2024 3rd Int. Conf. Creat. Commun. Innov. Technol., IEEE; 2024, p. 1–6. https://doi.org/10.1109/ICCIT62134.2024.10701217.

[12] Susanti M, Kresnha Reza H. Added Value and Ease of Using Quick Responses Qris Indonesian Standard (QRIS). *International Journal of Science, Technology & Management* 2022;3:715–23. https://doi.org/10.46729/ijstm.v3i3.518.

[13] Ahassan TF, Blokhina T, Kouadio JA. Financial Innovation: The Impact of Mobile Money on Innovative Economic Growth, 2021, p. 27–38. https://doi.org/10.1007/978-981-16-0953-4_3.

[14] Nita NA, Bangsawan S, Pandjaitan DRH. MSME Business Growth in Indonesia: is the Indonesian Standard Quick Response Code (QRIS) a Major Factor? *INOVASI: Jurnal Ekonomi, Keuangan, Dan Manajemen* 2024;20:257–70. https://doi.org/10.30872/jinv.v20i2.1770.

[15] Gunawan H, Sinaga BL, WP SP. Assessment of the Readiness of Micro, Small and Medium Enterprises in Using E-Money Using the Unified Theory of Acceptance and Use of Technology (UTAUT) Method. *Procedia Computer Science* 2019;161:316–23. https://doi.org/10.1016/j.procs.2019.11.129.

[16] Bank Indonesia. Uang Elektronik (Electronic Money) 2009. https://peraturan.bpk.go.id/Details/135361/peraturan-bi-no-1112pbi2009-tahun-2009.

[17] Bank Indonesia. Perubahan atas Peraturan Bank Indonesia Nomor 11/12/PBI/2009 tentang Uang Elektronik (Electronic Money) 2014. https://peraturan.bpk.go.id/Details/135364/peraturan-bi-no-168pbi2014-tahun-2014.

[18] Suling CF, Nurmandi A, Muallidin I, Purnomo EP, Kurniawan D. The Use of AI to Develop Smart Infrastructure in Indonesia, 2022, p. 208–17. https://doi.org/10.1007/978-3-031-05463-1_15.

[19] Ray S, Hardi I. Refining ESG Disclosure's Role in Corporate Economic, Environmental, and Social Sustainability Performance. *Indatu Journal of Management and Accounting* 2024;2:1–8. https://doi.org/10.60084/ijma.v2i1.144.

[20] Muzzakar K, Syahnur S, Abrar M. Provincial Real Economic Growth in Indonesia: Investigating Key Factors Through Spatial Analysis. *Ekonomikalia Journal of Economics* 2023;1:40–50. https://doi.org/10.60084/eje.v1i2.66.

[21] Mishkin FS. The Economics of Money, Banking, and Financial Markets. Pearson education; 2007.

[22] Fisher D, Serletis A. Velocity and the Growth of Money in the United States, 1970–1985. *Journal of Macroeconomics* 1989;11:323–32. https://doi.org/10.1016/0164-0704(89)90061-X.

[23] Ikhsan S, Hamzani U, Desyana G, Indah DP. The Impact of QRIS Payment Usage on Business Income Growth in MSMEs. *Kompak: Jurnal Ilmiah Komputerisasi Akuntansi* 2024;17:450–9. https://doi.org/10.51903/kompak.v17i2.2178.

[24] Benati L. Money Velocity and the Natural Rate of Interest. *Journal of Monetary Economics* 2020;116:117–34. https://doi.org/10.1016/j.jmoneco.2019.09.012.

[25] Nampewo D, Opolot J. Financial Innovations and Money Velocity in Uganda. *African Development Review* 2016;28:371–82. https://doi.org/10.1111/1467-8268.12218.

[26] Sun S. Does Transaction Velocity of Money Work on GDP? An Empirical Study. *SSRN Electronic Journal* 2002. https://doi.org/10.2139/ssrn.340281.

[27] Khan REA, Gill AR. Velocity of Money in Pakistan: Time Series Analysis. *Актуальні Проблеми Економіки* 2013:396–403.

[28] Mubin S, Pambudi SA. Analysis the Effect of Electronic Money Use on Velocity of Money: Evidence from Indonesia. *Jurnal Ilmu Ekonomi Terapan* 2020;5:42.

[29] Kraft PW, Key EM, Lebo MJ. Hypothesis Testing with Error Correction Models. *Political Science Research and Methods* 2022;10:870–8. https://doi.org/10.1017/psrm.2021.41.

[30] Putra HA, Fijay AH, Suriani S, Seftarita C, Ringga ES, Wintara H, et al. Understanding Short-Term and Long-Term Price Fluctuations of Main Staple Food Commodities in Aceh Province, Indonesia: An ARDL Investigation. *Ekonomikalia Journal of Economics* 2023;1:26–32. https://doi.org/10.60084/eje.v1i1.50.

[31] Domowitz I, Elbadawi I. An Error-Correction Approach to Money Demand. *Journal of Development Economics* 1987;26:257–75. https://doi.org/10.1016/0304-3878(87)90029-0.

[32] Oyadeyi OO. The Velocity of Money and Lessons for Monetary Policy in Nigeria: An Application of the Quantile ARDL Approach. *Journal of the Knowledge Economy* 2024. https://doi.org/10.1007/s13132-024-02201-7.

[33] Hardi I, Ali N, Duwal N, Devi NC, Mardayanti U, Idroes GM. Business Confidence in Indonesia: Which Macroeconomic Factors Have Long-Term Impact? *Indatu Journal of Management and Accounting* 2024;2:40–54. https://doi.org/10.60084/ijma.v2i1.203.

[34] Hardi I, Ray S, Duwal N, Idroes GM, Mardayanti U. Consumer Confidence and Economic Indicators: A Macro Perspective. *Indatu Journal of Management and Accounting* 2024;2:81–95. https://doi.org/10.60084/ijma.v2i2.241.

[35] Naufal A, Fikriah F. Regional Nexus of Economic Growth, Income Inequality and Poverty. *Ekonomikalia Journal of Economics* 2023;1:61–8. https://doi.org/10.60084/eje.v1i2.114.

[36] Hardi I, Idroes GM, Utami RT, Dahlia P, Mirza MAF, Humam RA, et al. Dynamic Impact of Inflation and Exchange Rate in Indonesia's Top 10 Market Capitalization Companies: Implications for Stock Prices. *Indatu Journal of Management and Accounting* 2023;1:51–9. https://doi.org/10.60084/ijma.v1i2.110.

[37] Garini FA, Majid MSA, Suriani S. Foreign Investment, Domestic Savings, and Exchange Rates as Drivers of Per Capita Income and Financial Sector Development in OIC Countries. *Grimsa Journal of Business and Economics Studies* 2024;2:15–25. https://doi.org/10.61975/gjbes.v2i1.42.

[38] Ciptowati L, Setiawan D. An Analysıs of QRIS Usage Behavıor Usıng UTAUT Approach. *Asia Pacific Management and Business Application* 2024;13:19–36. https://doi.org/10.21776/ub.apmba.2024.013.01.2.

[39] Naeem M, Hameed M, Taha MS. A Study of Electronic Payment System. *IOP Conference Series: Materials Science and Engineering* 2020;767:012008. https://doi.org/10.1088/1757-899X/767/1/012008.

[40] Widayat W, Masudin I, Satiti NR. E-Money Payment: Customers' Adopting Factors and the Implication for Open Innovation. *Journal of Open Innovation: Technology, Market, and Complexity* 2020;6:57. https://doi.org/10.3390/joitmc6030057.