

THE DIGITAL PAYMENT SYSTEM: HOW DOES IT IMPACT INDONESIA'S POVERTY?

Lia Nazliana Nasution^{1,*}, Dewi Mahrani Rangkuty², and Satria Mayshandi Putra³

Abstract

Digital payments are currently well-developed and available through various methods, especially in Indonesia. Digital payments are essential in ensuring the country's economy keeps running and in helping to boost the economy. However, the impact of such payments on poverty is currently unknown. This study examines the impact of digital payments on poverty rates in Indonesia. We use the ECM (Error Correction Model) to analyze the impact of digital payments on poverty in the short and long term, using data from 2009 to 2022. The results show that an increase in digital payments through the volume of ATM and debit card transactions is associated with short and long-term poverty reduction. Meanwhile, the variable volume of credit card transactions and volume of electronic money transactions does not significantly impact poverty in the short or long term. Economic growth as a control variable also plays a role in reducing poverty significantly in the long term.

Keywords: Digital Payments, ATM/Debit Transactions, Electronic Money Transactions, Credit Card Transactions, Poverty.

1. INTRODUCTION

Nowadays, digital payments are widely used, especially during the Covid-19 pandemic. The Central Bank of Indonesia originally launched a digital payment system through the National Cashless Movement (GNNT) in 2014. Digital payments then grew significantly during the pandemic, as evidenced by the value of electronic money transactions, which grew 30.84 percent in 2022 compared to 2021 (Portal Informasi Indonesia, 2023). Databoks (2023) noted that the value of digital banking transactions in January 2022 was 3.8 quadrillion rupiah, while in the same month in 2021, it was only 2.7 quadrillion rupiah. This shows a significant growth of 40.74 percent (Databoks, 2023). The implementation of non-cash transactions continues to grow and is a logical consequence of the Indonesian millennial generation, who prefer to carry out transactions easily, quickly, and efficiently.

The outbreak of the pandemic has affected daily life and changed people's shopping behaviour through increased use of electronic payments (Muanglen & Durongkaverroj, 2023). The volume of electronic money transactions in Indonesia experienced stagnation from 2009 to 2016, in contrast to the volume of ATM card transactions, which has shown an increasing

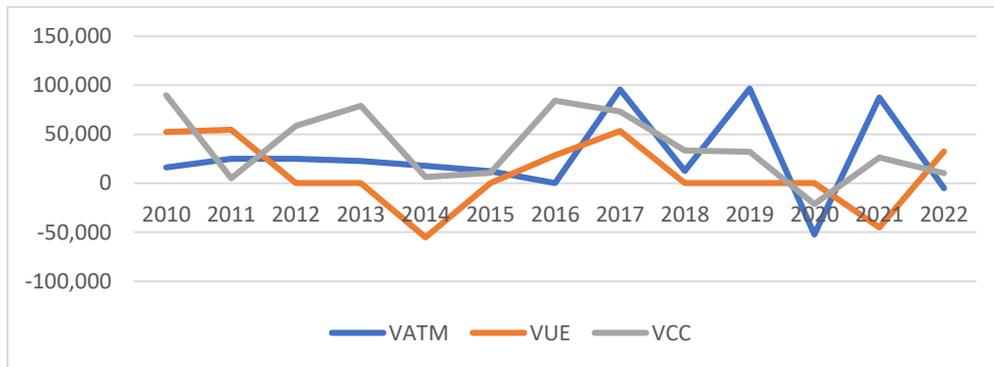
^{1, *} Dr. Lia Nazliana Nasution (Corresponding Author), S.E, M.Si is currently working as Head of the Master of Economics Department, Postgraduate Program, Universitas Pembangunan Panca Budi Medan, Indonesia. She obtained a Ph.D in Economics from Universitas Sumatera Utara Medan, Indonesia. Email: lianazliana@dosen.pancabudi.ac.id

² Dewi Mahrani Rangkuty, S.E, M.Si is currently working as a lecturer in the Department of Economic Development, Universitas Pembangunan Panca Budi Medan, Indonesia. She obtained a master's degree in Economics from Universitas Sumatera Utara Medan, Indonesia.

³ Satria Mayshandi Putra is an alumni of Development Economics. He obtained a bachelor's degree in Economic Development from Universitas Pembangunan Panca Budi Medan, Indonesia.

trend since 2009 (Figure 1). This is because people are now more familiar with using ATM cards in transactions, but have yet to become familiar with electronic money. It was only in 2017 that electronic money transactions began to be in demand as they are today, in comparison to ATM cards.

Figure 1 Growth of VATM, VUE, and VCC (percent)



Source: Central Bank of Indonesia

Note. VATM is the volume of ATM plus Debit card transactions, VUE is the volume of electronic money transactions, and VCC is the volume of credit card transaction.

It is believed that digital development and the adoption of new technologies can effectively help to reduce poverty in various countries (BAPPENAS & UNDP, 2020; Kwilinski, Vyshnevskiy & Dzwigol, 2020; and Spulbar, et al., 2022). In the case of South Asia and Sub-Saharan Africa, it has been found that mobile technology and digital finance can reduce poverty and socio-economic inequality (Lyons, Kass-Hanna, & Greenlee, 2020). In the case of India, digital payment systems have helped increase trade with micro-enterprises through e-commerce, alleviating poverty. However, problems remain regarding the affordability of internet access.

Of course, digital payments cannot be separated from the use of networks and the internet. Indonesia has one of the largest populations of internet users in the world. As of January 2022, there were 204.7 million users, according to the We Are Social report, an increase of 1.03 percent from the previous year and 16.7 percent from 2020 (Databoks, 2022). However, Indonesia's poverty level fluctuates from year to year and even appears to experience an increasing trend when viewed in total (urban and rural). (Figure 2).

Figure 2. Trends in Indonesia's Poverty Rate (Percent)



Source: Central Bureau of Statistics

Several previous studies have found the opposite. Increasing internet use has a multidimensional impact on poverty alleviation in rural China (Yang, Lu, Wang, & Li, 2021). Research in Bangladesh shows that ICT has good capabilities for poverty alleviation despite many challenges (Chowdhury, Chowdury, Chowdury, Hossain, & Ahsan, 2021). Although the existing literature has researched the impact of digitalization on poverty, further investigation of the effect of digital payments on poverty levels is necessary. We argue that digital payment systems can reduce poverty as digital payments make it possible for people to successfully access formal financial institutions, boosting income, and reducing poverty.

This study aims to analyze the impact of digital payments on Indonesia's poverty rates. We analyze ATM transactions, credit cards, electronic money, and economic growth as control variables. First, we examine the impact of electronic money on poverty. Previous research has discussed the impact of mobile money on long-term poverty in Bangladesh, finding that mobile money has successfully driven various poverty alleviation initiatives (Islam, Basher, & Haque, 2022). Second, we examine the impact of ATM transactions on poverty. Increasing active ATMs is believed to increase GDP and reduce poverty in developing countries (Williams, Adegoke, & Dare, 2017). This is in line with research conducted by Sakanko, David & Onimisi (2020), which showed that poverty decreases in the short term with increasing access to ATMs. Third, we examine the impact of credit cards on poverty. Credit cards are a valuable tool for consumers of all income levels. However, conversely, credit cards also increase the risk of making excessive purchases that exceed the individual's ability to pay their credit card debts promptly (Fuentes, 2014). According to Cai, Ou, Han, & Lyu (2022) who researched farmers in China, if the use of credit cards is reasonable, it will effectively relieve farmers' cash flow pressure helping them to overcome financing difficulties.

2. LITERATURE REVIEW

2.1 Digital Payments

According to data from MyGovIndia, in 2022, India will top the digital payments list with 89.5 million transactions compared to four other large countries, namely Brazil, China, Thailand, and South Korea. A study conducted in India (Gautam, Kanoujiya, Bhimavarapu, & Rastogi, 2021) found that financial technology can positively impact poverty alleviation, sustainable growth, reduction of income gaps, and economic stability. In another study in China, mobile payments were shown to help reduce the likelihood of households falling into poverty (Li, Zhang, Xiang, & Liao, 2022), while financial technology has also been shown to be effective in reducing poverty in every Chinese province, with a powerful impact on low-income provinces (Ye, Chen, & Li, 2022).

Digital payments ensure that small business owners and others in the informal sector can participate in the formal economy. It can reduce poverty and trigger economic growth (Workpay, 2023). Digital payments in Indonesia started with a cashless society program designed by the government as a preparation for the Indonesian people in facing global competition, especially the ASEAN Economic Community (AEC), which started in January 2016 (Tarantang, Awwaliyah, Astuti, & Munawaroh, 2019). The digital payment system is a transaction process using particular electronic money on a digital platform (Universitas Bakrie, 2022). Digital payments make financial transactions more efficient, fast, economical, secure, and easy to process (Abdullah, Redzuan, & Daud, 2020). Previous studies suggest mobile payments are more secure than traditional payment methods (Johnson, Kiser, Washington, & Torres, 2018). However, many consumers continue to perceive them as less secure (Shao, Zhang, Li, & Guo, 2019).

However, even though digital payments have the potential risk of being hacked, they are more secure and worth using compared to traditional payments. Governments can help to protect users with policies regulating digital payments, and financial service providers must also ensure their security (Colline, Hamsal, Furinto, & M., 2022). Digital payments have changed people's lives drastically, especially following the Covid-19 pandemic, which affected people's lifestyles, including Generation X and baby boomers (Santosa, Taufik, Prabowo, & Rahmawati, 2021). People have become accustomed to online activities such as shopping, buying food, and studying.

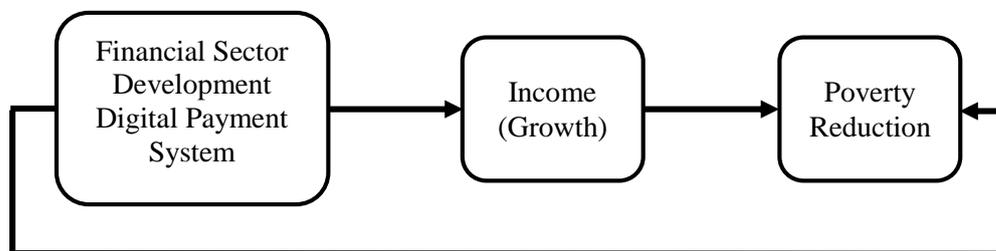
2.2 Digital Payments and Poverty

The existence of Communication and Information Technology (ICT) is an essential component for creating innovations in financial products so that it can attract the interest of people with low incomes in accessing financial services (Suidarma, 2019). Ultimately, financial innovation can increase economic growth (Mwinzi, 2014). According to several studies, ICT can significantly contribute to economic growth (Andrianaivo & Kpodar, 2011) and is beneficial for long-term economic growth processes (Makun & Jayaraman, 2020; and Pradhan, Arvin, Nair, Bennett & Bahmani, 2016), and poverty reduction (Schmied & Marr, 2016; and Bakari, et al., 2019).

In their research on European Union countries, Kwilinski et al. (2020) claim that countries with higher levels of digitization have a lower percentage of people in poverty and a lower risk of social exclusion (Kwilinski, Vyshnevskiy, & Dzwigol, 2020). In several articles, there has been a focus on the relationship between the internet and technology and the knowledge economy. This relationship is significant as growth in the percentage of internet users can enhance the transition to a knowledge economy and support poverty reduction (Pinzaru, Zbucea, & Anghel, 2014; and Massimo & Luca, 2007).

Other studies claim an interaction between internet access, mobile phones or other technologies and poverty, which is the topic of focus in several articles (May & Diga, 2015). In the case of South Asia and Sub-Saharan Africa, it has been shown that adopting new technology is essential in maintaining poverty reduction in developing countries (Lyons, Kass-Hanna, & Greenlee, 2020).

Figure 3. Analytical Framework



Adopting the relationship between financial sector development, income, and MDGs (Claessens & Feijen, 2006), we build an analytical framework explaining that financial sector development through digital payment systems can increase income, ultimately reducing poverty (Figure 3). The development of the financial sector through digital payments makes transactions faster, cheaper, safer, and more efficient, expanding access to financial services. Broad access to financial services allows poor people to plan for the future, such as providing more productive investments and better capital allocation, resulting in higher economic growth.

In turn, higher growth and higher per capita income facilitates the achievement of poverty alleviation.

According to previous research by Appiah-Otoo & Song (2021), financial development can directly impact economic growth by creating more jobs, increasing income and indirectly reducing poverty through economic growth. Ye, Chen & Li (2022) found that increasing fintech adoption by one point in high-income Chinese provinces directly reduced poverty by 10 percent, while in low-income provinces, it reduced poverty by 20 percent. At the micro level of households, Wang & He (2020) also found a direct impact of fintech on reducing poverty through increased financial access.

Other findings for nine developing countries in Asia (Perera & Lee, 2013), for Brazil (Iniguez-Montiel, 2014), and 92 developed and developing countries (Dollar & Kraay, 2002), found that economic growth can directly reduce poverty.

3. RESEARCH METHODOLOGY

3.1 Data

We collected data from Bank Indonesia and the Central Bureau of Statistics, classifying it into three categories, namely digital payments (including data on ATM use and debit cards transaction volumes, electronic money transaction volumes, and credit card transaction volumes), economic growth data, and percentage of poor population (see Table 1). We used secondary time series data collected from 2009 to 2022.

Table 1 Research Variables

Variable	Variable Indicators	Source
Digital Payments	ATM plus debit cards transaction volume (thousand transactions) Electronic money transaction volume (thousand transactions) Credit card transaction volume (thousand transactions)	Central Bank of Indonesia, 2023
Macroeconomics	Economic growth (percent)	Central Bureau of Statistics, 2023
Poverty	Percentage of poor in the population (percent)	Central Bureau of Statistics, 2023

3.2 Modelling of Error Correction Model (ECM)

The error correction model (ECM), is a model used to see the long-term and short-term effects of each independent variable on the dependent variable. ECM is used in econometric analysis for time series data, making it possible to handle non-stationary data series and to separate long-term and short-term effects.

This model is worth using when looking at the role of digital payments and poverty. Previous studies have found that digital payments can encourage economic growth and help escape poverty (Zhang, Zhang & Gong, 2022; Li, 2018; Lee, Morduch, Ravindran, Shonchoc & Hassan, 2021; and Lyons, Kass-Hanna & Greenlee, 2020). We believe that digital payments will not immediately impact poverty, but rather the impact will be noticed in the long term. For this reason, ECM is the appropriate model to use.

The ECM approach was carried out based on the results of the stationarity test of research data, namely at the first difference level using the Augmented Dickey-Fuller (ADF) method and the cointegration of the relationship between model variables. If the time series

data regression model is not stationary, it is more likely to produce incorrect regression results (Wau, 2022).

The stages of the ECM approach in this study were as follows: (1) Stationarity Test, (2) Cointegration Test, (3) ECM modelling, and (4) Classical Assumption Test. ECM modelling can be performed if cointegration between the independent and dependent variables exists. ECM tests model specifications, checking whether the data collection is appropriate. The model specifications and data collection are appropriate if the ECT (Error Correction Term) or Resid (-1) parameters are statistically significant.

Research model specifications:

$$POV_t = f(PE, \log VATM, \log VUE, \log VCC)$$

$$POV_t = b_0 + b_1PE_t + b_2\log VATM_t + b_3\log VUE_t + b_4\log VCC_t$$

Where POV stands for poverty, namely the percentage of poor individuals in the population (percent), PE is economic growth (percent), VATM is the volume of ATM plus debit card transactions (thousands of transactions), VUE is the volume of electronic money transactions (thousands of transactions), VCC is the volume of credit card transactions (thousands of transactions), α is the coefficient, t is the observation period (2009-2022), and log is the logarithm.

4. RESULTS

4.1 Data Stationarity Test Results

Before establishing the ECM model, it is necessary to test the stationarity of the data through the unit root test. The ECM model can be performed if the dependent variable is not stationary at unit root test in level. The data stationarity test was carried out using the Augmented Dickey-Fuller (ADF) test. The results are as follows:

Table 2 ADF Test Output Results

Variable	Level	Structure	Probability ADF test
POV	Unit root level	Intercept	0.0913
	1 st difference*	Intercept	0.0393*
PE	Unit root level	Intercept	0.0946
	1 st difference*	Intercept	0.0161*
LOGVATM	Unit root level*	Intercept	0.0070*
LOGVUE	Unit root level	Intercept	0.6759
	1 st difference*	Intercept	0.0071*
LOGVCC	Unit root level	Intercept	0.3558
	1 st difference*	Intercept	0.0083*

The ADF test probability values shown in Table 2 above, indicate that all variables are not stationary at unit root level but stationary at the first difference level except for the logVATM variable, which is stationary at unit root level.

4.2 Cointegration Test Results

The cointegration test is carried out by long-term regression and looking at the residual

value. The Long-term regression equation is structured as follows:

$$POV_t = b_0 + b_1PE_t + b_2\log VATM_t + b_3\log VCC_t + b_4\log VUE_t$$

The results are shown in Table 3.

Table 3 Cointegration Test Results

Variable	Coefficient	Prob.
C	52.31817	0.0003
PE	-0.109049	0.0649*
LOGVATM	-2.693904	0.0156**
LOGVCC	0.092761	0.9448
LOGVUE	-0.064027	0.6763
R-squared	0.977846	
F-statistic	99.31138	
Prob(F-statistic)	0.000000	

* Significant at $\alpha = 10$ percent

**Significant at $\alpha = 5$ percent

In the long-term regression results, it can be seen that the coefficient of the PE variable is negative and significant at $\alpha = 10$ percent. This shows that an increase in economic growth will lead to a significant decrease in the poverty rate. The LOGVUE variable has a negative sign and is insignificant because the probability value is 0.6763, which is greater than 0.05. If the volume of electronic money transactions increases, the poverty rate will decrease, but the effect is insignificant. The coefficient of the positive LOGVCC variable is also not significant (probability value $0.9448 > 0.05$), which means that when the volume of credit card transactions increases, it will increase the poverty level, but the effect is not significant. Furthermore, the coefficient of the LOGVATM variable is significant and negative at $\alpha = 5$ percent. An increase in ATM transaction volume significantly reduces the poverty rate.

The R-squared value of the Long-term poverty level equation is 0.977. This indicates that all independent variables can explain 97.7 percent of the variation in the dependent variable, while other factors outside the long-term equation model explain the remaining 2.3 percent. Furthermore, the simultaneous significance test results show a probability value of 0.0000, meaning that all the independent variables in the long-run equation jointly and significantly affect the POV dependent variable.

A unit root test was then carried out on the residual value at unit root level, with the results shown in Table 4.

Table 4 Augmented Dickey-Fuller (ADF) Test

Variable	Coefficient	Prob.
RES(-1)	-1.442325	0.0185**
C	-0.014818	0.8270

**Significant at $\alpha = 5$ percent

Based on the ADF test results, the first derivative's residual coefficient value was negative, with a probability value of 0.0185, which is less than 0.05. The Error Correction Model (ECM) model can therefore be performed, and there is cointegration between the short-term and long-term. Therefore, the ECM analysis can be continued for short-term regression tests.

4.3 ECM Results

As all data passed at the first difference, the ECM short-term regression equation was arranged as follows:

$$D(POV)_t = b_0 + b_1D(PE)_t + b_2D(logVATM)_t + b_3D(logVCC)_t + b_4D(logVUE)_t$$

The results are shown in Table 5.

Table 5 ECM Results

Variable	Coefficient	Prob.
C	-0.017989	0.9058
D(PE)	-0.055891	0.3076
D(LOGVATM)	-3.033556	0.0308**
D(LOGVCC)	-1.114099	0.5125
D(LOGVUE)	0.121628	0.4460
R-squared		0.757983
F-statistic		6.263898
Prob(F-statistic)		0.013832

**Significant at $\alpha = 5$ percent

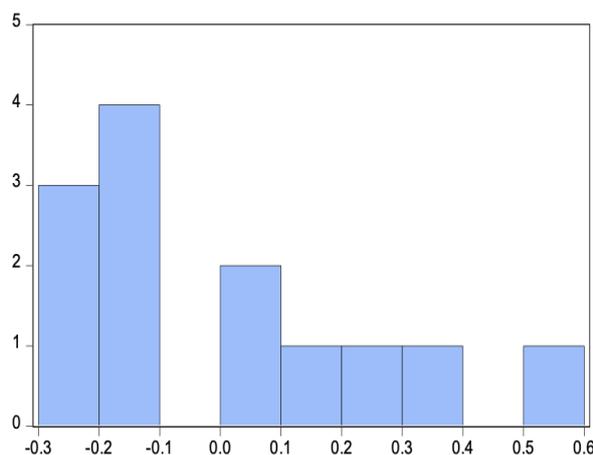
D notation shows the magnitude of the change. Table 5 above shows that only LOGVATM significantly affects the short-term poverty rate at $\alpha = 5$ percent. This means that ATM transaction volume changes will affect the poverty rate at a factor of -3.033556. The R-squared value of the short-term poverty equation is lower than the long-term equation, at 0.757983. This proves that the independent variables combined explain 75.79 percent of the variation in the dependent variable, while other factors outside the short-term equation model explain the remaining 24.21 percent.

The results of the concurrent significance test show a probability value of 0.0138. Thus, all the short-run equation's independent variables jointly and significantly affect the dependent variable POV.

4.4 Classical Assumption Test Results

4.4.1 Normality Test

Figure 4 Normality Test Results



Series: Residuals	
Sample 2010 2022	
Observation 13	
Jarque-Bera	1.639305
Probability	0.440585

The normality test results show a Jarque-Bera value of 1.639305 with a probability of 0.440585, which is greater than 0.05. Therefore, the null hypothesis of testing the feasibility of the model is rejected, meaning that the data is normally distributed.

4.4.2 Linearity Test

Table 6 Ramsey Reset Test Results

	Value	df	Probability
t-statistic	0.888091	7	0.4040
F-statistic	0.788706	(1,7)	0.4040
Likelihood ratio	1.387939	1	0.2388

Using the Ramsey reset test, the F-statistic value is 0.788706, with a probability value of 0.4040, which is greater than 0.05. Therefore, the null hypothesis is rejected, and the model is found to be linear.

4.4.3 Multicollinearity Test

Table 7 Variance Inflation Factors (VIF)

Variance	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.021704	3.220788	NA
D(PE)	0.002631	2.699720	2.698652
D(LOGVATM)	1.343838	4.014919	1.418400
D(LOGVCC)	2.643222	3.448205	2.793793
D(LOGVUE)	0.023025	2.197199	1.358418

We see that the centered VIF value of all variables is smaller than 10. So, the null hypothesis for testing the feasibility of the model is rejected; it can be concluded that the model is free from multicollinearity.

4.4.4 Heteroscedasticity Test

Table 8 Breusch-Pagan Godfrey Heteroscedasticity Test

F-statistic	0.523596	Prob. F (4,8)	0.7219
Obs*R-squared	2.697240	Prob. Chi-Square (4)	0.6097
Scaled explained SS	0.864055	Prob. Chi-Square (4)	0.9297

Based on the results of the heteroscedasticity test using the Breusch-Pagan Godfrey, the Obs*R-squared probability value is 0.6097, which is greater than 0.05. This means that the null hypothesis is rejected, the model is free from heteroscedasticity problems, or in other words, the model has homoscedasticity.

5. DISCUSSION

Currently, digital payment systems in Indonesia are available in various methods ranging from bank transfers, payment gateways, e-wallets, debit/credit cards, and e-money, among others. All of these methods help make transactions more accessible and practical. During the COVID-19 pandemic, digital payments were the most widely used. Until the new normal era, Indonesian people were also accustomed to digital payments. The recent use of

digital payment systems has played an essential role in making payment transactions, ensuring that the country's economy continues to run, and helping to develop the economy.

Table 9 Summary Output Probability Value

Variable	Equation	Probability Value
PE	Long Run	0.0649*
	Short Run	0.3076
LOGVATM	Long Run	0.0156**
	Short Run	0.0308**
LOGVCC	Long Run	0.9448
	Short Run	0.5125
LOGVUE	Long Run	0.6763
	Short Run	0.4460

Economic Growth and Poverty Rate

Based on the study results, long-term economic growth can significantly reduce Indonesia's poverty rate. In the short term, if economic growth increases, the poverty rate will decrease as the correlation was shown to be negative but the effect is insignificant. The direction of a significant negative relationship in the long-term equation aligns with research conducted by Jayadi & Bata (2016), Son & Kakwani (2004), Dollar, Kleineberg & Kraay (2016) and Fosu (2015). Economic growth creates job opportunities which can reduce the unemployment rate. Unemployment and lack of work are one of the biggest causes of poverty. Economic growth can be said to have no short-term impact on reducing poverty, but in the long term, it can reduce poverty.

Another study (Balasubramanian, Burchi & Malerba, 2023) found that economic growth is essential for alleviating multidimensional poverty. In developing regions and underdeveloped regions of the Nile River Basin, another study also showed that economic growth can reduce poverty (Lin, et al., 2022). Further research results in Sub-Saharan countries found that economic growth in developing countries can reduce poverty rates quickly (Thorbecke & Ouyang, 2022). However, these results contradict research, which states that economic growth has little influence on poverty in underdeveloped regions in Indonesia in the short or long term (Wau, 2022).

Debit/ATM Card Transaction Volume and Poverty Level

Based on the study results, the volume of debit/ATM card transactions, both in the short and long term, can significantly reduce poverty in Indonesia. Since 2018, the non-cash payment system policy has aimed at supporting the efficiency and effectiveness of government programs to support sustainable economic growth and the government's efforts to eradicate poverty. This acceleration of payment electrification is applied in distributing government social programs such as non-cash social assistance and school operational assistance funds (BOS). Of course, this will empower the people to have financial services by creating bank accounts and using debit card/ATM transactions.

The results of this study support the results of Brune, Gine, Goldberg & Yang (2011), Kusuma & Indrajaya (2020), Burgess & Pande (2005), and Williams, Adegoke & Dare (2017). Digital financial service products must be continuously improved as they can lift the poor out of the cycle of poverty. Apart from that, research conducted by Febriaty (2019) also suggests that the non-cash payment system has a proportion of influence on economic growth at 86.53 percent. Research from the World Bank revealed that economic growth can reduce poverty as growth has a negligible impact on income inequality. In the data set, income inequality

increased by less than 1.0 percent yearly. Because income distribution is relatively stable over time, economic growth tends to increase the income of all members of society, including people experiencing poverty (Adams, 2003).

Credit Card Transaction Volume and Poverty Rate

Based on the research results, the volume of credit card transactions in the long term has not reduced the poverty rate because the effect is insignificant. Likewise, in the short term, even though the direction of the relationship in the short term is negative. These results refer to credit card penetration, which remains low in Indonesia (Lintasarta, 2022). According to the Indonesian Credit Card Association, the number of credit card holders had only reached 16,513,623 people in 2021. Credit card penetration in Indonesia had therefore only reached 6 percent of the total population of nearly 273 million people in that year.

Electronic Money Transaction Volume and Poverty Rate

Based on the study results, the volume of electronic money transactions in the long term can reduce poverty rates, but not significantly. Meanwhile, in the short term, it has a positive and insignificant effect on the poverty level. It rejects the results of research conducted by Islam, Basher & Haque (2022) in Bangladesh, which indicated that households with low income outside the reach of mobile financial services, will increase consumption with access to mobile money, in turn lifting them out of poverty. Nevertheless, the negative direction in the long-term relationship indicates that electronic money can reduce poverty, although not significantly. Data-wise, the volume of Indonesian electronic money transactions continues to increase in line with the rise of digital payment systems, although this is not evenly distributed, especially in remote areas.

6. CONCLUSION AND RECOMMENDATIONS

Poverty is still a scourge in Indonesia. The COVID-19 pandemic, a workforce that has not been fully absorbed in the market, and increased commodity prices due to rising fuel prices are factors of poverty. The development of digital payments can help to reduce poverty as digital payments are considered capable of driving Indonesia's economic recovery, with a goal of poverty alleviation.

In this study, we conclude that digital payments play a role in reducing poverty in Indonesia through the variable volume of ATM/debit card transactions in both the short and long term. These results support previous studies (Sakanko, David & Onimisi, 2020; and Nasution, Ramli, Sadalia & Ruslan, 2022). Although various payment systems have recently developed rapidly, the Indonesian people still demand using ATM/debit cards. The proof is that in 2018, the number of ATM/debit cards reached 152.48 million units; in 2021, it grew to 221.3 million units, an increase of 45 percent. Likewise, the volume of ATM/debit transactions in 2018 amounted to 6.4 million; in 2021, it grew to 7.2 million, an increase of 12.5 percent.

In conclusion, economic growth can also reduce poverty in Indonesia in the long term. If a country wants to reduce poverty, it must be oriented toward economic growth (Purnama, 2017), as economic growth will open up jobs that can attract workers. Eventually, the poverty rate can be reduced (Susanto & Pangesti, 2020). Another opinion states that fast and sustainable growth is the most crucial way to reduce poverty (Department for International Development, 2008).

The pandemic has provided momentum in accelerating digitalization and utilizing it in transactions and economic activities. Due to the pandemic, digital-based payments are becoming popular and changing people's lifestyles. Convenience and fast and cheap service are the primary keys to digital payments (Widyaningtyas, 2022). In Indonesia, the digital

payment system continues to increase in volume and transaction value (Putri, 2023). Even the Deputy Governor of Bank Indonesia emphasized that digitalization can benefit people's welfare and reduce poverty and inequality (Departemen Komunikasi Bank Indonesia, 2022).

Based on these findings, we recommend policies and actions that can encourage increased digital payments in both the short and long term, especially ATM/debit transactions, credit cards, and electronic money in Indonesia. For example, expanding access and digital payment facilities to remote areas, as well as outreach to the community, especially for people at the bottom of the pyramid, is essential for the use and benefits of digital payments to be continuous so that all levels of society can enjoy them.

REFERENCES

- Abdullah, N., Redzuan, F., & Daud, N. (2020). E-Wallet: Factors Influencing User Acceptance towards Cashless Society in Malaysia among Public Universities. *Indonesian Journal of Electrical Engineering and Computer Science*, 20(1), 67-74.
- Adams, R.H. Jr. (2003). Economic Growth, Inequality, and Poverty. *Policy Research Working Paper 2972*.
- Andrianaivo, M., & Kpodar, K. (2011, April). ICT, Financial Inclusion, and Growth: Evidence from African Countries . *IMF Working Paper*.
- Appiah-Otoo, I., & Song, N. (2021). The Impact of Fintech on Poverty Reduction: Evidence from China. *Sustainability*, 13(5225), 1-13.
- Bakari, P. I., Donga, P. M., Idi, A., Hedima, J. E., Wilson, K., Babayo, H., & Ibrahim, Y. (2019, January). An Examination of the Impact of Financial Inclusion on Poverty Reduction: An Empirical Evidence from Sub-Saharan Africa. *International Journal of Scientific and Research Publication*, 9(1), 239-252.
- Balasubramanian, P., Burchi, F., & Malerba, D. (2023). Does economic growth reduce multidimensional poverty? Evidence from low- and middle-income countries. *World Development*, 161, 1-13.
- BAPPENAS & UNDP. (2020). *Teknologi Informasi dan Komunikasi: Strategi Peduli Kemiskinan*.
- Brune, L., Gine, X., Goldberg, J., & Yang, D. (2011, August). Commitments to Save: a Field Experiment in Rural Malawi. *World Bank Policy Research Working Paper No. 5748*.
- Burgess, R., & Pande, R. (2005). Do Rural Banks Matter? Evidence From the Indian Social Banking Experiment. *American Economic Review*, 95(3), 780-795.
- Cai, D., Ou, J., Han, K., & Lyu, Y. (2022). The Peer Effects of the Usage of Credit Cards in Rural Areas of China: Evidence from Rural China. *Complexity*, 2022, 1-11.
- Chowdhury, M. S., Chowdhury, M. M., Chowdhury, M. J., Hossain, M. E., & Ahsan, S. M. (2021). The Role of Information and Communication Technology (ICT) to Alleviate Poverty in Bangladesh. *American International Journal of Social Science Research*, 7(1), 8-14.
- Claessens, S., & Feijen, E. (2006). *Financial Sector Development and The Millennium Development Goals* (Vol. World Bank Working Paper No. 89). Washington, D.C: The World Bank.
- Colline, F., Hamsal, M., Furinto, A., & M., R. K. (2022). Digital Payment Adoption: Review of Literature. *Proceedings of the 2nd Indian International Conference on Industrial Engineering and Operations Management*. Warangal, Telangana, India.
- Databoks. (2022, Maret). <https://databoks.katadata.co.id/datapublish/2022/03/23/ada-2047-juta-pengguna-internet-di-indonesia-awal-2022>.

- Databoks. (2023). <https://databoks.katadata.co.id/datapublish/2023/07/05/transaksi-digital-banking-di-indonesia-tumbuh-158-dalam-5-tahun-terakhir>. Retrieved from <https://databoks.katadata.co.id>.
- Departemen Komunikasi Bank Indonesia. (2022). https://www.bi.go.id/id/publikasi/ruang-media/news-release/Pages/sp_2417922.aspx. (Departemen Komunikasi Bank Indonesia) Retrieved from <https://www.bi.go.id>.
- Department for International Development. (2008). <https://www.oecd.org/derec/unitedkingdom/40700982.pdf>. Retrieved 2023
- Dollar, D., & Kraay, A. (2002). Growth is Good for the Poor. *Journal of Economic Growth*, 7, 195-225.
- Dollar, D., Kleineberg, T., & Kraay, A. (2016). Growth still is good for the poor. *European Economic Review*, 81, 68-85.
- Febriaty, H. (2019). I. Pengaruh Sistem Pembayaran Non Tunai Dalam Era Digital Terhadap Tingkat Pertumbuhan Ekonomi Indonesia. *Festival Riset Ilmiah Manajemen & Akuntansi FRIMA-2019* (pp. 306-313). Bandung: Sekolah Tinggi Ekonomi Manajemen Bisnis Islam (STEMBI).
- Fosu, A. K. (2015). Growth, Inequality and Poverty in Sub-Saharan Africa: Recent Progress in a Global Context. *Oxford Development Studies*, 43, 44-59.
- Fuentes, Y. (2014, July). <https://scholarworks.calstate.edu/downloads/3t945s95d?locale=en>. Retrieved 2023.
- Gautam, R. S., Kanoujiya, J., Bhimavarapu, V. M., & Rastogi, S. (2021). Financial Technology and Its Impact on Poverty in India. *International Journal of Management and Humanities (IJMH)*, 6(3), 1-10.
- Iniguez-Montiel, A. J. (2014). Growth with Equity for the Development of Mexico: Poverty, Inequality, and Economic Growth (1992–2008). *World Development*, 59, 313-326.
- Islam, A. H., Basher, S. A., & Haque, A. E. (2022). The impact of mobile money on long-term poverty: evidence from Bangladesh. *Journal of Social and Economic Development*, 24, 436-455.
- Jayadi, D. S., & Bata, A. G. (2016). Peran Pertumbuhan Ekonomi dalam Menurunkan Kemiskinan di Tingkat Provinsi di Indonesia tahun 2004-2012. *MODUS*, 28(1), 87-99.
- Johnson, V. L., Kiser, A., Washington, R., & Torres, R. (2018). Limitations to the Rapid Adoption of M-Payment Services: Understanding the Impact of Privacy Risk on M-Payment Services. *Computers in Human Behavior*, 79, 111-122.
- Kusuma, A. A., & Indrajaya, I. G. (2020). Analisis Pengaruh Inklusi Keuangan Terhadap Tingkat Kemiskinan dan Ketimpangan Pendapatan Masyarakat di Kabupaten/Kota Provinsi Bali. *E-Jurnal EP Unud*, 9(5), 993-1022.
- Kwilinski, A., Vyshnevskiy, O., & Dzwigol, H. (2020). Digitalization of the EU Economies and People Risk of Poverty or Social Exclusion. *J. Risk Finance Management*.
- Lee, J. N., Morduch, J., Ravindran, S., Shonchoy, A., & Hassan, Z. (2021). Poverty and Migration in the Digital Age: Experimental Evidence on Mobile Banking in Bangladesh. *American Economic Journal Applied Economics*, 13(1), 38-71.
- Li, L. (2018). Financial inclusion and poverty: The role of relative income. *China Economic Review*, 52, 165-191.
- Lin, Y., Zhang, T., Liu, X., Yu, J., Li, J., & Gao, K. (2022). Dynamic monitoring and modeling of the growth-poverty-inequality trilemma in the Nile River Basin with consistent night-time data (2000–2020). *International Journal of Applied Earth Observation and Geoinformation*, 112.
- Lintasarta. (2022). <https://blog.lintasarta.net/article/solution/smart-city/third-party-card-management/kartu-kredit-tidak-lagi-hanya-dari-lembaga-perbankan>. Retrieved 2022

- Li, Y., Zhang, J., Xiang, Z., & Liao, C. (2022). The impact of Mobility Payment on Household Poverty Vulnerability: A Study Based on CHFS2017 in China. *International Journal of Environmental Research and Public Health*, 19, 1-20.
- Lyons, A., Kass-Hanna, J., & Greenlee, A. J. (2020). Impacts of Financial and Digital Inclusion on Poverty in South Asia and Sub-Saharan Africa. *SSRN Electronic Journal*.
- Makun, K., & Jayaraman, T. K. (2020, January 31). Spread of ICT and Economic Growth in Pasific Island Countries: A Panel Study. *Bulletin of Monetary Economics and Banking, Special Issue 2020*, 109-128.
- Massimo, G. C., & Luca, G. (2007). Technology policy for the Knowledge Economy: Public Support to Young ICT Service Firms. *Telecommun*, 31, 573-591.
- May, J., & Diga, K. (2015). Progress Towards Resolving the Measurement Link Between ICT and Poverty Reduction. *Impact of Information Society Research in the Global South*, 83-104.
- Mwinzi, D. M. (2014, October). The Effect of Financial Innovation on Economic Growth In Kenya. *School of Business, University of Nairobi*.
- Muanglen, J., & Durongkaveroj, W. (2023). A Survey to Assess Changes in Payment Transaction via Mobile Phone Behavior During the COVID-19 Pandemic. *Asian Journal of Applied Economics*, 30(1), 97-118.
- Nasution, L. N., Ramli, Sadalia, I., & Ruslan, D. (2022). Investigation of Financial Inclusion, Financial Technology, Economic Fundamentals, and Poverty Alleviation in ASEAN-5: Using SUR Model. *Abac Journal*, 42(3), 132-147.
- Perera, L. D., & Lee, G. H. (2013). Have economic growth and institutional quality contributed to poverty and inequality reduction in Asia? *Journal of Asian Economics*, 27, 71-86.
- Pinzaru, F., Zbucea, A., & Anghel, L. (2014). Knowledge Development through the Internet. *Proceedings of the International Conference on Intellectual Capital, Knowledge Management & Organisational Learning*. Sydney, Australia.
- Portal Informasi Indonesia. (2023, Februari). <https://indonesia.go.id/kategori/indonesia-dalam-angka/6855/transaksi-uang-elektronik-melejit?lang=1#:~:text=Pada%202022%2C%20nilai%20transaksi%20uang,Rp495%2C%20triliun%20pada%202023>. Retrieved Juni 2023
- Pradhan, R. P., Arvin, M., Nair, M., Bennett, S., & Bahmani, S. (2016). ICT-finance-growth nexus: Empirical evidence from the Next-11 countries. *Cuadernos de Economía*, 1-20.
- Purnama, I. N. (2017). Analisis Pengaruh Pertumbuhan Ekonomi terhadap Tingkat Kemiskinan di Sumatera Utara. *Jurnal Ekonomikawan*, 17(1).
- Putri, C. A. (2023). <https://www.cnbcindonesia.com/news/20230328190030-4-425256/wow-digitalisasi-pembayaran-di-ri-makin-marak-ini-buktinya>. (CNBC Indonesia) Retrieved from <https://www.cnbcindonesia.com>.
- Sakanko, M. A., David, J., & Onimisi, A. M. (2020). Advancing Inclusive Growth in Nigeria: The Role of Financial Inclusion in Poverty, Inequality, Household Expenditures, and Unemployment. *Indonesia Journal of Islamic Economics Research*, 2(2), 70-84.
- Santosa, A. D., Taufik, N., Prabowo, F., & Rahmawati, M. (2021). Continuance Intention of Baby Boomer and X Generation as New Users of Digital Payment during COVID-19 Pandemic Using UTAUT2. *Journal of Financial Services Marketing*, 26(4), 259-273.
- Schmied, J., & Marr, A. (2016). Financial Inclusion and Poverty: The Case of Peru. *Regional and Sectoral Economic Studies*, 16(2).
- Shao, Z., Zhang, L., Li, X., & Guo, Y. (2019). Antecedents of Trust and Continuance Intention in Mobile Payment Platforms: The Moderating Effect of Gender. *Electronic Commerce Research and Applications*, 33.
- Son, H., & Kakwani, N. (2004). Economic Growth and Poverty Reduction: Initial Conditions Matter. *International Poverty Center Working Paper*, 2.

- Spulbar, C., Anghel, L. C., Birau, R., Ermis, S. I., Treapat, L.-M., & Mitroi, A. T. (2022). Digitalization as a Factor in Reducing Poverty and Its Implication in the Context of the COVID-19 Pandemic. *Sustainability*, 1-26.
- Suidarma, I. M. (2019). The Nexus Between Financial Inclusion and Economic Growth in ASEAN. *Journal of Economics and Policy JEJAK*, 12(2), 267-281.
- Susanto, R., & Pangesti, I. (2020). Pengaruh Inflasi dan Pertumbuhan Ekonomi Terhadap Tingkat Kemiskinan di Indonesia. *Journal of Applied Business and Economic*, 7(2).
- Tarantang, J., Awwaliyah, A., Astuti, M., & Munawaroh, M. (2019). Perkembangan Sistem Pembayaran Digital pada Era Revolusi Industri 4.0 di Indonesia. *Jurnal Al Qardh*, 4, 60-75.
- Thorbecke, E., & Ouyang, Y. (2022). Towards A Virtuous Spiral Between Poverty Reduction And Growth: Comparing Sub Saharan Africa With The Developing World. *World Development*, 152.
- Universitas Bakrie. (2022). <https://bakrie.ac.id/articles/456-3-keuntungan-pembayaran-digital-yang-mana-jadi-kesukaanmu.html>.
- Wang, X., & He, G. (2020). Digital Financial Inclusion and Farmers' Vulnerability to Poverty: Evidence from Rural China. *Sustainability*, 12(4).
- Wau, T. (2022). Economic Growth, Human Capital, Public Investment, and Poverty in Underdeveloped Regions in Indonesia. *Jurnal Ekonomi & Studi Pembangunan*, 23(2), 189-200.
- Widyaningtyas, D. P. (2022). <https://unkartur.ac.id/blog/2022/03/14/berkembangnya-trend-digital-payment-system/>. (Universitas Nasional Karangturi) Retrieved 2023, from <https://unkartur.ac.id>.
- Williams, H. T., Adegoke, A. J., & Dare, A. (2017). Role of Financial Inclusion in Economic Growth and Poverty Reduction in a Developing Economy. *Internal Journal of Research in Economics and Social Sciences (IJRESS)*, 7(5), 265-271.
- Workpay. (2023, June 23). <https://www.myworkpay.com/blogs/the-rise-of-digital-payments-in-africa-transforming-the-financial-landscape>. Retrieved from <https://www.myworkpay.com>.
- Yang, L., Lu, H., Wang, S., & Li, M. (2021). Mobile Internet Use and Multidimensional Poverty: Evidence from a Household Survey in Rural China. *Social Indicators Research*, 158, 1065-1086.
- Ye, Y., Chen, S., & Li, C. (2022). Financial Technology as a driver of poverty alleviation in China: Evidence from an innovative regression approach. *Journal of Innovation & Knowledge*, 7(1).
- Zhang, J., Zhang, H., & Gong, X. (2022). Mobile payment and rural household consumption: Evidence from China. *Telecommunications Policy*, 46(3).