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Analysis of the Impact of Cashless Payment Systems on Indonesia's Economic Growth from 2011 to 2024

[1]Amrina Rosada*, [2]Rosita Mei Damayanti*, [3]Eka Dyah Pramusinta*

[1]Department of Development Economics, Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia
[2]Vocational School, Universitas Sebelas Maret, Surakarta, Indonesia
[3]Department of Development Economics, Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract:
The advancement of payment systems serves as a crucial driver of economic growth and plays a fundamental role in supporting the stability of the financial system. This research adopts a quantitative approach utilizing time series data. The findings indicate that Gross Domestic Product (GDP) significantly influences variables such as ATM and debit card transaction values, credit card transaction values, digital money transaction values, and the money supply. Interestingly, the study reveals a negative relationship between GDP and the value of ATM and debit card transactions in Indonesia from 2011 to 2024. Conversely, credit card transactions, digital money usage, and money supply do not exhibit a significant effect on GDP during the same period

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Corresponding Author*:
Amrina Rosada

Email:
amrinarosada.ocha23@gmail.com

DOI:

1. Introduction

Economic growth refers to the increase in a nation's ability to produce goods and services. It is crucial for understanding the economic progress of a country. An economy is considered to be growing when there is a rise in the production of goods and services. Enhanced economic growth is vital for sustainable development and the well-being of communities. Various factors are necessary to support and sustain this growth.

A significant factor influencing a nation's economy is its payment system. This system serves as a key pillar in maintaining financial stability. With the advancement of technology and innovation in payment systems, people increasingly use cards or electronic money based on applications to pay for goods and services they wish to purchase. Innovative and advanced systems make it easy for people to make payments without carrying large amounts of cash. Innovations in payment systems influence the production of goods and services, prices, and monetary policies (Rooj & Sengupta, 2020).

Society, which is presented with the speed and efficiency of digital technology, is motivated to create payment systems that can adapt to progress and take advantage of it. That's how a cashless payment system was born, which can be accessed digitally and is more economical. The various benefits obtained from this cashless payment system are even capable of replacing cash as a means of payment (Lintangsari et al., 2018).

According to (Felix, 2017), digital money is currently divided into two categories. The first category is monetary transactions that use a delivery system through the bank's own network and between banks. The 2nd type is payment using digital cash in the shape of ATM cards, debits, and credits, which are included in the category of Card-Based Payment Instruments (APMK). The process of non-cash payments is also very easy and efficient to use. The existence of non-cash payment systems or digital money encourages banks to improve their transaction infrastructure, such as providing Electronic Data Capture (EDC) machines issued by banks and QR Codes offered by non-bank institutions. EDC machines function to reduce the balance or add to the bill (for credit card holders) according to the value of the consumer's transaction when purchasing goods or services. Meanwhile, QR Codes only deduct the balance when purchasing goods or services. With the Central Bank's policy of issuing the Quick Response Code Indonesian Standard (QRIS), it is hoped that various types of QR Codes from different Payment System Service Providers (PJSP) can be unified through QR Codes. Users of electronic money services do not need a card to make transactions. This is because to make a transaction, all you need is a phone with an electronic money app and simply scan the QR Code available at merchants with the QRIS logo. In addition, there is digital money or e-money in the card form.

In a few years, cashless transactions have grown a lot because of how financial tech has gotten better (Maduwansha & Boyagoda, 2022). Especially during the COVID-19 pandemic, cashless payment systems have been a big help for people to make transactions because even though everything was locked down, people still had to buy stuff to survive. So, this study will examine the impact of payment systems on Indonesia's economic growth.

In the study titled “The Impact of Non-Cash Payments on Economic Growth in Indonesia from 2011 to 2021” by Oktavia et al. (2023), The impact of debit/ATM cards, credit cards, and e-money transactions on Indonesia's economic growth rate is explained. Another study conducted by (Ekononomi & Palangka, 2021) states that ATM card has a significant positive impact on economic growth, e-money has a significant negative impact on economic growth, and the amount of money in circulation has a direct and significant negative impact in economic growth.

Another study by Febriaty (2018) explains that e-money, ATM/debit cards, credit card transactions impact Indonesia's economic growth rate.

2. Literature Review

2.1. Economic Growth

Economic growth refers to the improvement in the economic strength of a nation, measured by its ability to produce goods and services. This growth is essential for assessing the economic development of a country. An economy is considered to be growing when there is an increase in the production of goods and services. Economic growth is a continual process that transforms the state of a country's economy to reach a better position over time. In research, GDP growth is commonly used as a measure of economic progress.

Economic growth increases long-term results and assesses the performance of an economy from one period to the next (Mumu et al., 2020). Economic growth can be measured by GDP or, for a specific region, Gross Regional Domestic Product (GRDP). Theories regarding economic growth include:

a). Economic growth according to classic theory

A country may see a decline in its economic growth rate when its population increases and resources become increasingly limited. Experts who support classical theory, such as Adam Smith, argue that economic growth is highly dependent on population growth, which in turn increases production and output. David Ricardo added that a significant surge in population can lead to a labor surplus, which has the potential to lower wages. This means that the wages earned by workers are not sufficient to meet their needs, which can lead to economic stagnation.

b). Economic growth according to neoclassical theory

Stability in a country's economic development is supported by three factors, namely labor, capital, and technology. Schumpeter argues that a country's economic progress can emerge through innovation and combinations made by entrepreneurs, which will bring improvements from the production process to the investment stage. Robert Solow explains that economic growth focuses on the production process involving human resources, capital accumulation, technology application, and the overall results of these processes. According to Solow, population change can also have positive and negative impacts. Therefore, this situation should be utilized to select and optimize the use of productive human resources.

According to Solow's theory, several actions can stimulate economic growth. Increasing the savings rate helps boost capital accumulation, which in turn accelerates economic growth. Additionally, investing in both physical and non-physical assets can further support economic progress. Fostering technological innovation can enhance productivity per worker, and creating opportunities for innovation within the private sector will significantly contribute to economic growth.

c). Endogenous Growth Theory

Subsequent theories include Solow's development model. One of these is the endogenous growth theory, which attempts to explain that the factors driving growth originate from extensive capital accumulation. Capital here includes not only physical forms, but also non-physical aspects such as knowledge and technology. Technological developments trigger innovations that in turn can increase productivity, leading to higher economic growth. New discoveries usually begin with a process of learning through experience, which can result in innovations that increase production efficiency. This efficiency has an impact on productivity improvement. Therefore, the quality of human resources is an important factor influencing the growth of the economy.

d). The theory of economic growth according to history

This theory examines economic development from prehistoric times to the industrial era, as well as the increasingly complex consumption patterns of society. According to Friedrich List, a country's economic growth can be examined from the perspective of production methods, which are the main factor, through phases ranging from hunting, gathering, animal husbandry, farming, craftsmanship, to industrial trade. library. uns. ac. id digilib. uns. ac. id According to Sombart, economic growth is driven by societal conditions characterized by diverse levels of organization and ideology. The phases of economic growth include a closed economy, craftsmanship and growth, and finally capitalism.

e). Modern economic growth theory

According to W.W. Rostow's book, The Stages of Economic Growth, there are five phases of growth in economies, which are:

1. The traditional community is in its early stages, when production activities are only to meet daily needs.
2. Pre-takeoff This is when society begins to apply the latest knowledge to the production process, both in agriculture and industry.
3. Takeoff This is when society has built and promoted stronger economic growth, maximizing investment and productive savings.
4. Maturity phase This is the stage when economic growth is steady, the number of business sectors increases, and the use of modern technology is maximized.
5. High consumption phase This is the stage when the industrial economy is dominant, real per capita income continues to rise, and the majority of society experiences increased consumption, enabling them to meet needs beyond primary and secondary necessities.

2.2 Payment System

According to Bank Indonesia Law No. 23 of 1999, a payment system refers to a framework consisting of rules, institutions, and mechanisms designed to transfer funds for fulfilling obligations arising from economic transactions. It is a vital part of a country's financial and banking structure. This system encompasses regulations, contracts, operational infrastructure, and technical mechanisms used to transmit, verify, and process payment instructions. Generally, payment systems are classified into two categories: high-value payment systems and retail payment systems (Untoro & Widodo, 2014).

The payment system is typically divided into two types: cash and non-cash payment systems. A cash payment system involves using physical money, such as paper currency and coins, for transactions. On the other hand, a non-cash payment system does not rely on physical money, but instead utilizes electronic instruments like credit cards, debit cards, bank transfers, or digital money. According to Naeruz et al. (2022), the expansion of digital payment systems, including electronic money, plays a significant role in driving economic growth in Indonesia.

3. Data and Methodology

The research was conducted to analyze the influence of gross domestic product, ATM and debit card transaction values, credit card transaction values, digital money transaction values, and money supply. This study is a quantitative study. The data used are time series data from 2011 to 2024 obtained from Bank Indonesia (BI) and the World Bank. Data will be processed using Stata 17 software. This research analyzes the impact of non-cash payment systems to economic growth in Indonesia, which is estimated using OLS (Ordinary Least Squares) regression analysis, with the following estimation model:

$$LogGDP_t = \beta_0 + \beta_1 LogATM_t + \beta_2 LogCredit_t + \beta_3 LogDigital_t + \beta_4 LogJUB_t + \varepsilon_{it}$$

Explanation :
$LogGDP$= Gross Domestic Product
$LogATM$= Debit ATM Card Transaction Value
$LogCredit$= Credit Card Transaction Value
$LogDigital$= Digital Currency Transaction Value
$LogJUB$= Money Supply
β_0 = Constanta
β_1….. β_4 = Independent variable regression coefficient
t = Year
ε = Error term

4. Result and Discussion

Classical Assumption Test Results

Normality Test

Table 1. Normality Test

Source: Processed by Stata 17

Jarque-Bera normality test: 2.146 Chi(2) .342

The normality test value in Table 1 has a P-value of 0.342, which is greater than the significance level of 0.05, meaning that the residuals are normally distributed.

Heteroscedasticity Test

Table 2. Heteroscedasticity Test

Source: Processed by Stata 17

chi2(1) = 0.05 Prob > chi2 = 0.8314

Heteroscedasticity test using the Breusch-Pagan test. Assuming H0, there is no heteroscedasticity problem, while H1 indicates a heteroscedasticity problem.

The heteroscedasticity test value, as shown in Table 2 above, is the regression p-value of 0.8314, which is greater than the significance level of >0.05. Therefore, H0 is accepted, indicating that there is no heteroscedasticity issue.

Multicollinearity Test

Table 3. Multicollinearity Test Result

Source: Processed by Stata 17

. vif

Variable	VIF	1/VIF
lJUB	42.61	0.023466
lDigital	37.12	0.026941
lATM	8.72	0.114701
lKredit	2.83	0.353207
MEAN VIF	22.82	

Table 3 explain if the VIF value of credit transaction values less than 10 indicates no multicollinearity, while the VIF values of ATM and debit card transaction values, digital money transaction values, and money supply values greater than 10 indicate multicollinearity. Meanwhile, the mean VIF of 22.82, which is greater than 10, indicates multicollinearity.

Autocorrelation Test

Table 4. Autocorrelation Test Result

Source: Processed by Stata 17

. estat bgodfrey

Lags(p)	Chi2	df	Prob>chi 2
1	1.185	1	0.2764

Assumption H0 is that there is no autocorrelation problem, while H1 is that there is an autocorrelation problem. Based on Table 4 above, the regression p-value is 0.2764, which is

greater than the significance level > 0.05, so H0 is accepted, meaning that there is no autocorrelation problem.

OLS (Ordinary Least Square) Regression Results

In this study, the data used was OLS regression. The results of the regression estimation of the effect of the non-cash payment system on economic growth in Indonesia are summarized in Table 5 as follows:

Table 5. Regression Estimate Calculation Results
Source: Processed by Stata 17

Source	SS	df	MS
Model	.344699465	4	.086174866
Residual	.024792933	9	.00275477
Total	.369492398	13	.028422492

Number of obs = 14
F (4,9) = 31.28
Prob > F = 0.0000
R-squared = 0.9329
Adj R-squared = 0.9031
Root MSE = .05249

lGDP	Coefficient	Std. err.	t	P>| t |	[95% conf. interval]	
lATM	-.3945485.	.1146665	-3.44	0.007	-.6539422	-.1351547
lKredit	.1131682	.0983976	1.15	0.280	-.1094227	.3357592
lDigital	.0550704	.0335467	`.64	0.135	-.0208174	.1309582
lJUB	.3366808	.2532244	1.33	0.216	-.2361526	.9095142
_cons	19.56887	8.281997	2.36	0.042	-.2361526	38.30405

The estimation results obtained from the OLS regression analysis as shown in Table 5 above, the estimation model is as follows:

$$LogGDP_t = 19{,}56887 - 0{,}395485\, LogATM_t + 0{,}1131682\, LogCredit_t + 0.0550704 LogDigital_t + 0.336808 LogJUB_t + \varepsilon_{it}$$

The coefficient of determination indicates the extent to which the variation in the dependent variable (Y) can be explained by all the independent variables (X). This value is typically represented by the R-Square or Adjusted R-Square. In Table 5, the R-Square value is 0.9329, which means that 93.29% of the variation in Gross Domestic Product (GDP) is explained by the variables such as ATM and debit card transaction values, credit card transaction values, digital money transaction values, and the money supply, while the remaining 6.71% is attributed to other factors not included in the model.

The F-test results, as shown in Table 1, reveal an F-probability of 0.0000, which is less than the significance level of 0.05, suggesting that the regression model is appropriate for explaining the impact of the ATM and debit card transaction values, credit card transaction values, digital money transaction values, and money supply on GDP.

The T-test results, in Table 1, show that ATM and debit card transaction values are significant because their T-probability is lower than the 0.05 threshold. On the other hand, credit card transaction values, digital money transaction values, and the money supply are not significant, as their T-probability exceeds the 0.05 significance level.

The variable for ATM and debit card transaction values has a regression coefficient of -0.395485 with a logarithmic-logarithmic relationship, indicating that for every unit increase in ATM and debit card transactions, GDP will decrease by 0.395485%.

Discussion

Between 2011 and 2024, Indonesia's GDP was negatively influenced by the value of ATM and debit card transactions. On the other hand, the variables for credit card transaction value, digital money transaction value, and money supply did not significantly impact GDP.

The ATM and debit card transaction value had a t-value of 0.007, indicating a significant effect on GDP. A study by Oktavia et al. (2023) also found that debit/ATM card transactions positively and significantly affect GDP and economic growth in Indonesia. Similarly, Ekonomi & Palangka (2021) reported that ATM card transactions have a positive and significant impact on GDP and economic growth.

In contrast, credit card transaction values had a t-probability of 0.280, suggesting they do not significantly affect GDP. Research by Oktavia et al. (2023) indicates that credit card transactions do have a significant effect on economic growth, while digital money transactions, with a t-probability of 0.135, showed no significant impact on GDP. Other studies (Oktavia et al., 2023) also observed that e-money transactions do not significantly influence GDP growth, and Ekonomi & Palangka (2021) found that electronic money has a direct negative and significant impact on economic growth. According to Naeruz et al. (2022), e-money also has a significant negative effect on economic growth.

The money supply had a t-probability of 0.216, suggesting no significant impact on GDP. Research by Ekonomi & Palangka (2021) similarly found that the money supply has a direct negative and significant impact on GDP and economic growth.

5. Conclusion

Economic growth refers to the expansion of a nation's ability to produce goods and services. It is crucial for understanding a country's economic progress. An economy is considered to be growing when there is an increase in the production of goods and services. The payment system plays a significant role in influencing a country's economy, serving as a key pillar in maintaining the financial system's stability.

As outlined in Bank Indonesia Law No. 23 of 1999, a payment system consists of a set of rules, institutions, and mechanisms used to transfer funds in order to fulfill economic obligations. It is a vital part of the nation's financial and banking infrastructure.

This study aimed to explore the effects of GDP, ATM and debit card transaction values, credit card transaction values, digital money transaction values, and the money supply on Indonesia's economy. A quantitative approach was used, with time series data from 2011 to 2024 sourced from Bank Indonesia (BI) and the World Bank. The data were analyzed using Stata 17 software, and the impact of non-cash payment systems on economic growth was examined through OLS regression analysis.

The findings indicate that GDP significantly influences the values of ATM and debit card transactions, credit card transactions, digital money transactions, and the money supply. The R-Square value of 0.9329 indicates that 93.29% of the variation in GDP can be explained by the transaction values of ATM and debit cards, credit cards, digital money, and the money supply, with the remaining 6.71% attributed to other factors not included in the model.

GDP in Indonesia from 2011 to 2024 was negatively influenced by the variables of ATM and debt card value transactions. Meanwhile, the variables of credit card value transactions, digital money value transactions, and money supply had no effect on GDP.

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