

The Comparison of ATM/Debit Card, Credit Card, and E-Money Transactions in Indonesia Before and After the Covid-19 Pandemic Period January 2018 - August 2023



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ABSTRACT: The use of various electronic payment media found an unexpected momentum when the world experienced the COVID-19 pandemic. The public's usage of electronic payment media has increased, contributing to social limitations because shopping may be done remotely via mobile devices or other remote access. The purpose of this research is to analyze the differences in transactions of Payment Using Cards and Electronic Money in Indonesia before and after the COVID-19 pandemic. The data source is the Central Bank's Indonesian Banking Statistics, with monthly data ranging from January 2018 to August 2023. The data set covers the quantity, volume, and value of ATM/Debit Card transactions, as well as hypothesis testing using the Mann-Whitney U Test. All retail payment instruments, notably ATM/Debit Cards, Credit Cards, and Electronic Money, saw a significant decline during the beginning of the pandemic but thereafter experienced an increase in transaction volume and value. After the pandemic, the average number, volume, and value of ATM/Debit Card, Credit Card, and Electronic Money transactions increased significantly compared to before the pandemic. The development of electronic payments in Indonesia after the pandemic is empirical evidence that a less-cash society in Indonesia has been formed and has progressively grown in the last five years.

KEYWORDS: ATM, Credit Card, Covid19, Debit Card, E-money

I. INTRODUCTION

The COVID-19 pandemic has significantly impacted the banking sector's performance in developing Asian countries (Xie, Chang, Hafeez, & Saliba, 2022). The COVID-19 outbreak has had a significant reduction in bank performance and stability (Shabir, Jiang, Wang, & Isik, 2023). This impact necessitates banks and regulators to respond following the outbreak using various digital innovations. In the last five years, several digital banking innovations have evolved in Indonesia and have accelerated during the COVID-19 pandemic. The COVID pandemic has been a catalyst for the changes that will take place in banks' operational models and their digitization, both locally and internationally (Boufounou, Mavroudi, Toudas, & Georgakopoulos, 2022). The majority of these innovations will alter front-end service processes that connect directly with consumers, boosting the bank's customer experience and offering direct bank services.

The COVID-19 pandemic situation and significant digital transformation are propelling the widespread usage of mobile payments in the world (Al-Qudah, Al-Oqaily, Alqudah, & Ghazlat, 2023). The development of digital banking will reduce the use of cash and make the payment process more apparent to bank customers. It also enables banks and merchants to cooperate to process payments and exchange other data in the digital ecosystem. The success of innovative payment solutions, particularly post-pandemic, has left customers with no compelling reason to switch from the services of financial institutions and banks since payment systems have now altered to meet their needs. This research aims to look at the development of electronic payments in Indonesia over the last five years, divided into two time periods, namely January 2018 to February 2020 as the period before the pandemic and March 2020 to August 2023 as the period during and after the pandemic.

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II. LITERATURE REVIEW

A. *Automated Teller Machine*

The first Payment Instrument Using Cards (APMK) are Automated Teller Machine (ATM) and debit cards. ATMs are electromechanical devices enabling authorized customers to withdraw cash from their accounts and/or access other services such as balance inquiry, funds transfer, or deposit acceptance using a machine-readable plastic card. ATM cards are typically also debit cards that can be utilized in the same card. However, there are also debit cards that are not equipped as ATM cards. The Bank of Indonesia's APMK regulations states that a debit card is an APMK that can be used to pay for obligations resulting from economic activity, such as spending transactions, where the cardholder's obligations are immediately fulfilled by directly reducing the cardholder's deposits at banks or other institutions other than banks that are authorized to collect funds in accordance with applicable laws and regulations.

ATM (Automated Teller Machine) is an electromechanical device allowing authorized users to withdraw cash from their accounts and/or access other services such as balance checking, funds transfer, or deposit acceptance using a machine-readable plastic card. ATMs can be operated either online or offline, having real-time access to an authorization database (BIS, 2003). A more technical definition of ATM is mentioned by Batiz-Lazo (2007), with reference to articles by Revell (1983) and McAndrews (1991), ATM is a technology used for banking services, which is a machine that incorporates a video display, a keyboard, a printer (to provide transaction records or summary statements) and other software and hardware that allows individuals to use a debit card, credit card or certain tokens to make cash withdrawals and/or deposits, balance inquiries, balance transfers (between accounts of the same customer, customer and bank or customer and third party) and other services, for which the user may be charged a transaction fee.

B. *Credit Card*

The credit card is another card payment tool. Credit cards offer significant advantages over all forms of money, including the fact that they are pocket-sized, portable, reasonably safe, and have no intrinsic value. Credit cards also provide time to pay bills in exchange for a bank-established fee. Credit cards, according to Kundan (2023), allow holders to borrow money or buy goods without paying for them directly with the help of a smart card. Referring to Bank Indonesia regulations PBI APMK No.11/11/PBI/2009 as amended by PBI No.14/2/PBI/2012 regarding the implementation of payment instrument activities using cards, credit cards can be used to pay for obligations arising from an economic activity, such as shopping transactions and/or cash withdrawals, provided that the acquirer fulfills the cardholder's payment obligations first. The cardholder is required to pay the acquirer in full at the agreed-upon time, either by lump sum settlement (charge card) or by installment payments.

According to Horvath et al. (2021), the severity of the local pandemic strongly impacts credit usage, which diminishes over time. According to Sing et al. (2023), uncertainty caused by the pandemic has a negative impact on the utilization of digital banking services. Furthermore, this study highlights that the use of debit and credit cards at PoS (Point of Sale) has substantially contributed to the expansion of digital banking services throughout the pandemic. Cevik's research (2022) concluded that this pandemic shock—measured by the number of new infections and deaths due to COVID-19—negatively impacted consumer spending as measured by debit and credit card transactions.

C. *Electronic Money*

Bank Indonesia expressly or first regulated electronic money in 2009, with the issue of Bank Indonesia Regulation Number 11/12/PBI/2009 concerning Electronic Money. The regulation was amended twice, with Bank Indonesia Regulation Number 16/8/PBI/2014 and Bank Indonesia Regulation Number 18/17/PBI/2016. The previous three PBIs are no longer in effect and have been replaced by Bank Indonesia Regulation Number 20/6/PBI/2018 on Electronic Money.

According to PBI Number 18/17/PBI/2016, electronic money is defined as a payment instrument that satisfies the following requirements: (a) it must be issued based on the value of money deposited to the issuer beforehand; (b) it must be electronically stored in a media server or chip; and (c) the value of electronic money managed by the issuer does not qualify as a deposit under the terms of the banking law. Electronic Money Value is the value of money stored electronically in a media server or chip that can be moved for the purpose of payment transactions and/or fund transfers. Electronic Money can be distinguished based on: (a) Electronic Money value storage media in the form of: (1) server-based, namely Electronic Money with storage media in the form of a server; and (2) chip-based, which refers to electronic money that uses chips as storage media; and (b) recording of user identity data in the following forms: (1) unregistered, which refers to electronic money that has not been registered or recorded with the issuer; and (2) registered, which refers to electronic money that has been registered and recorded with the issuer.

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A more popular terminology for one type of electronic money is E-wallet. According to Kee et al. (2022), an E-wallet is a device that can perform online transactions using a computer or smartphone and works similarly to a credit or debit card. According to Prasetya, Mohamed, Shuhidan, and Wasistha (2021), the function of an E-wallet is comparable to that of E-banking or mobile banking, but an E-wallet allows for easy and convenient payment access. Thus, the usage of E-wallets can aid in the reduction of the coronavirus that causes COVID-19 to spread. Trisnowati et al. (2020) examined the development of E-money in Indonesia in relation to the COVID-19 pandemic. According to the results of her research, there is a considerable difference in the number of electronic and money transactions before and after COVID-19.

III. RESEARCH METHOD

This research uses secondary data from the Central Bank of Indonesia's Banking Statistics. The data is collected on a monthly basis from January 2018 to August 2023. ATM/Debit Cards, Credit Cards, and Electronic Money are the electronic payment media analyzed, with indications including the quantity, transaction volume, and transaction value. The descriptive statistics analysis method was utilized to see the development pattern of electronic payments during the last five years. Using the Mann-Whitney U Test, compare the average difference before and after the pandemic.

IV. RESULTS AND DISCUSSION

A. The Development of Electronic Payments in Indonesia 2018 - 2023

The number of ATM cards was 167.32 million in January 2018 and is expected to rise over the next five years, reaching 277.88 million in August 2023. The number of cards is roughly equal to the population of Indonesia. It demonstrates that ATM cards have become the most prominent payment medium, and there is also a tendency for people to have several ATM cards based on their savings account ownership in various banks. The majority of cards are ATM cards that also function as debit cards that may be used to shop. ATM cards, which are only used at ATM terminals, are on the decline. Because of their limited functionality, these cards are becoming less popular and are expected to disappear in the future. Figure 1 shows ATM transaction volume for total, cash withdrawal, and shopping from January 2018 to August 2023.

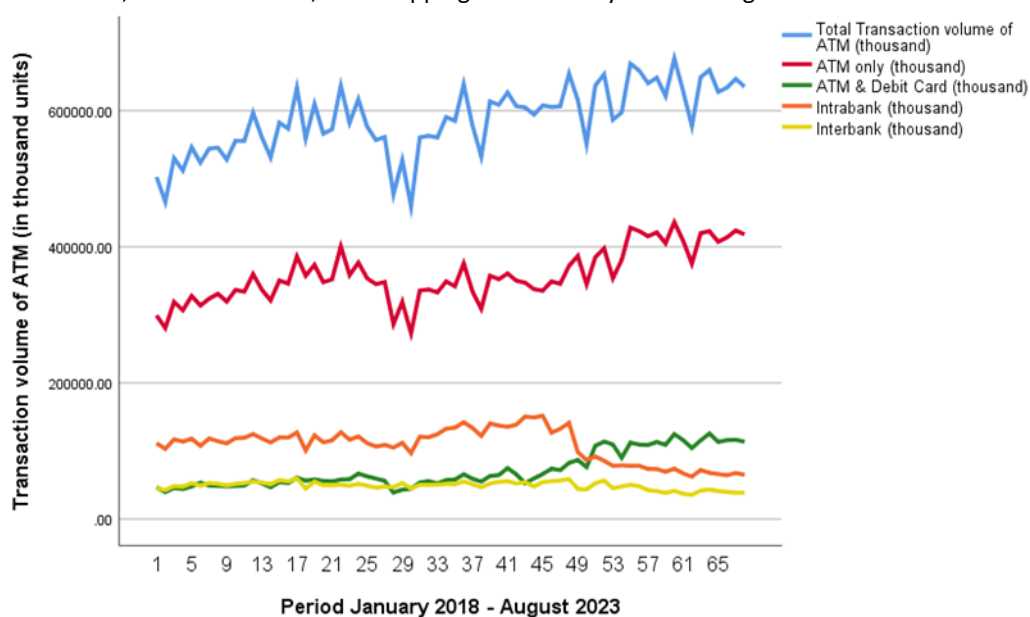


Figure 1. ATM transaction volume

The volume of ATM transactions was recorded at 502.61 million in January 2018 and continued to rise over the next five years, reaching 635.23 million in August 2023. ATM transaction volume consists of four types: ATM card transactions only, ATM card transactions as well as debit card transactions, intrabank ATM transactions, and interbank ATM transactions. The volume of ATM-only transactions is relatively the highest compared to other types of transactions. It demonstrates that the use of ATM terminals remains dominating for transaction purposes, such as withdrawals, transfers, or other types of transactions that can be done using ATMs that must be visited to their location.

During the COVID-19 pandemic, which began in the 27th month, or March 2020, ATM transaction volume fell precipitously. The pandemic's lowest point in transaction volume occurred in July 2020, with 560.64 million transactions. ATM transaction

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volume increased again when the pandemic ended. From 2022 to August 2023, transaction volume surpassed transaction volume prior to the COVID-19 pandemic. The increase in transaction volume was primarily attributable to the usage of ATMs, with other types of transactions declining, even after the pandemic. Another indicator of development is the value of ATM transactions, which for the same period can be seen in Figure 2 below.

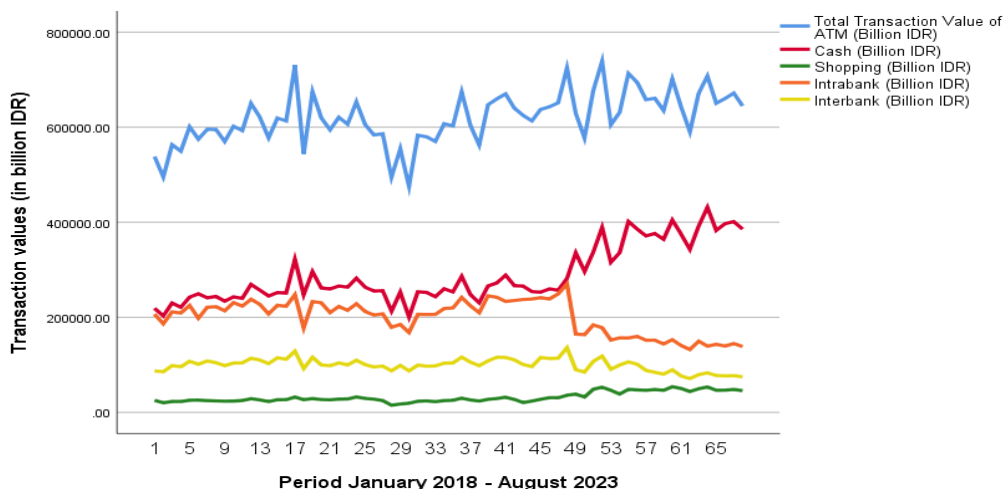


Figure 2. ATM transaction value

The value of ATM transactions in January 2028 was 538.22 trillion Rupiah, with the average transaction value exceeding 600 trillion each month during the last five years. Depending on the type of transaction, the value of ATM transactions in billions of Rupiah exhibits a distinct development pattern. Cash transactions climbed fast from 2022 to 2023, while shopping transactions, intrabank transactions, and interbank transactions decreased. During the pandemic, the lowest point in ATM transaction value occurred in June 2020, when it was 475.15 Trillion Rupiah. It is especially true in the midst of the COVID-19 outbreak. ATM transaction values, both total and per type of use, have fallen. The use of ATMs for cash and shopping resulted in a drastic decrease in transaction value. Compared to other categories of use, the usage of ATMs for cash withdrawals increased the most after the pandemic.

From January 2018 to August 2023, the amount of credit card transactions fluctuated between 17.4 million and 17.82 million cards. The number of credit cards decreased during the COVID-19 pandemic, and after the disaster situation improved, the number of credit cards climbed again, with the last number in August 2023 already exceeding the highest number of cards before the pandemic. The highest number of credit cards was 17.78 million at the beginning of the pandemic in April 2020, and then it dropped dramatically until it reached a low of 16.51 million in December 2020. The development of transaction volume in thousands of transactions is the most interesting indicator noticed from the development pattern before and after the COVID-19 pandemic, as shown in Figure 3 below.

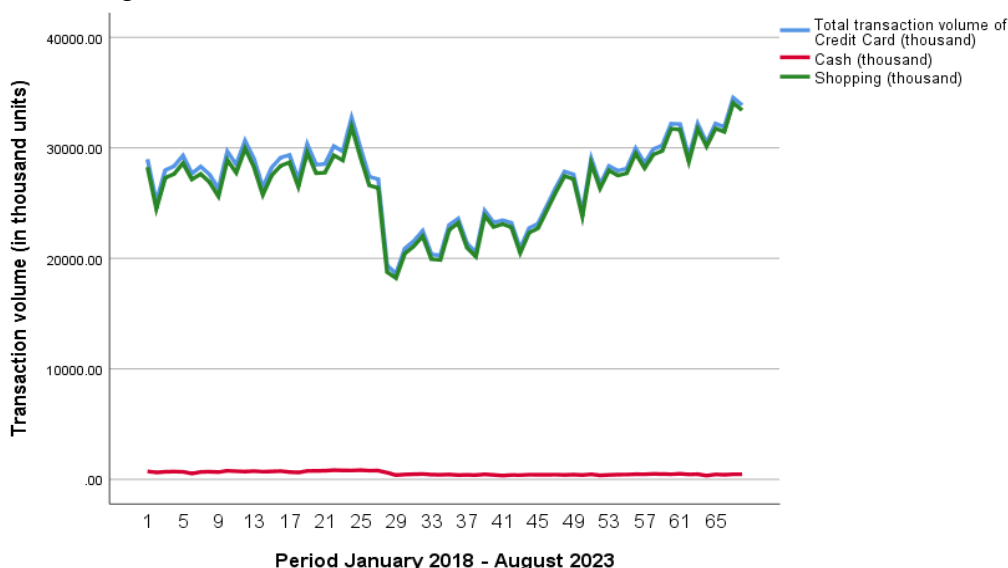


Figure 3. Credit card transaction volume

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During the COVID-19 pandemic in early 2020, credit card transaction volume fell precipitously. The highest point for transaction volume before the pandemic was 32.725 million transactions before plummeting sharply to 18.602 million transactions in May 2020. After 2022, the volume of credit card transactions climbed fast again, with the transaction volume in August 2023 already exceeding the pre-pandemic peak of 33.875 million transactions. The volume of cash credit card transactions is substantially higher than the volume of shopping transactions. It is apparently because the usage of credit cards for shopping has dropped due to alternative shopping payments with electronic money or debit cards, which expanded significantly after the pandemic. The development of transaction volume corresponds to the growth of transaction value in billions of Rupiah. As shown in Figure 4.

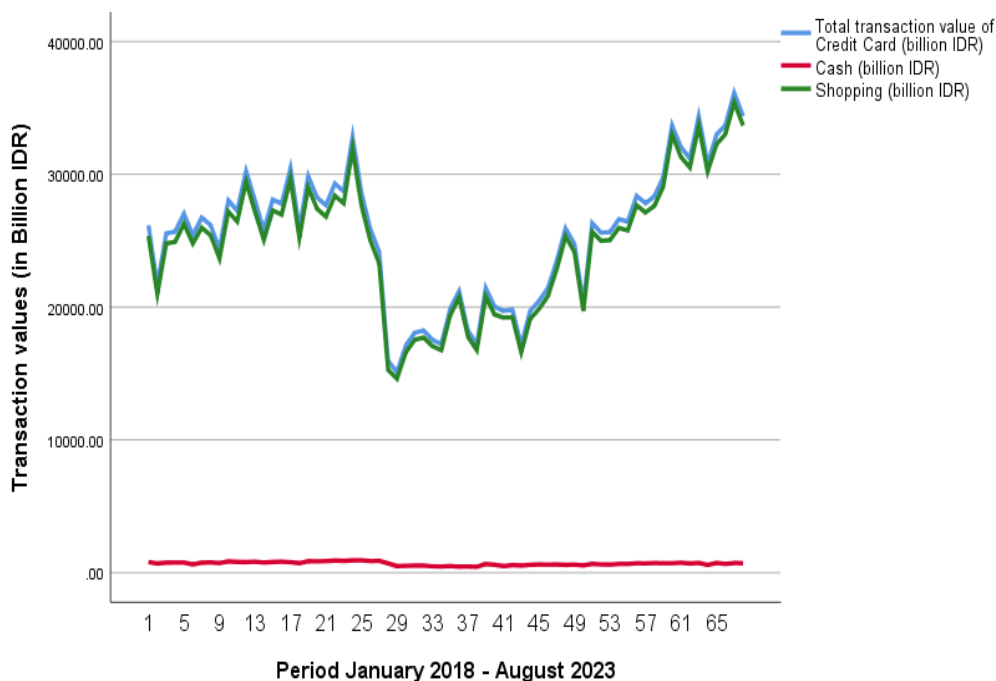


Figure 4. Credit card transaction value

When the COVID-19 pandemic began in the 25th to 30th month, or early 2020, the value of credit card transactions dropped dramatically. It was 26.158 trillion Rupiah in January 2018 and continued to rise to a pre-pandemic peak of 32.830 trillion Rupiah in December 2019. During the pandemic, the lowest transaction value was 15.089 trillion Rupiah in May 2020. It demonstrates that credit card users did not use their credit cards for cash or shopping transactions during the beginning of the pandemic in 2020. The value of transactions climbed again after the first four months after the COVID-19 pandemic announcement, with the value of transactions in the second quarter of 2023 already exceeding the pre-pandemic peak of transaction values.

In comparison to APMK, such as ATMs and credit cards, electronic money has grown at the fastest rate in the last five years. It is conceivable because electronic money is a relatively new electronic payment medium when compared to ATMs and credit cards, which are classified as long-standing electronic banking. The characteristics of electronic money, which are small transactions and can be utilized for online shopping, such as in E-marketplaces, have also contributed to the community's acceptance of electronic money. The ease with which electronic money can be used without the need for a bank account increases the use of electronic money. Electronic money consists of three types of usage or ownership requirements: unregistered electronic money, registered electronic money, and electronic money for Digital Financial Services (LKD). The use of electronic money increased during the early pandemic period. The amount of electronic money was 97.16 million in January and continued to rise until the beginning of the pandemic, reaching 412.06 million in April 2020. The amount of electronic money at its peak following the pandemic was 1.028 billion in October 2022. The amount of electronic money continues to increase along with the rise of online shopping that uses electronic money. In the last five years, the simplicity of online transactions has resulted in a massive expansion in the use of electronic money. The growth in the number of electronic money units is in line with the increase in transaction volume, as shown in Figure 5 below.

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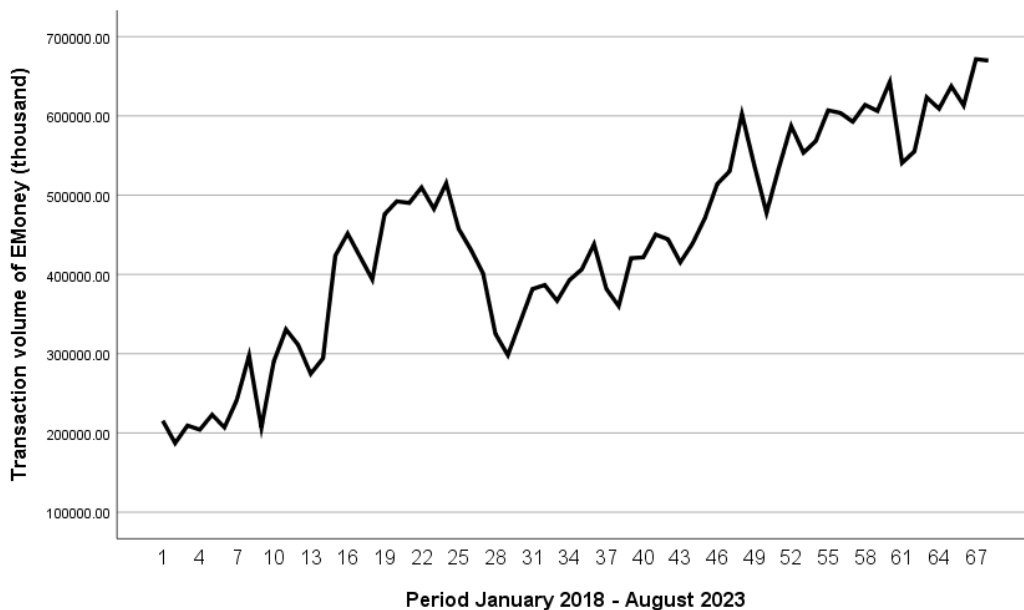


Figure 5. E-money transaction volume

The volume of electronic money transactions was 36.69 million units in January 2018, and it continued to rise fast until August 2023, when it reached 66.98 million units. The nearly doubled increase outpaced the growth of APMK, namely ATMs and credit cards. A particularly interesting thing related to the COVID-19 pandemic is that the volume of electronic money transactions reduced drastically at the beginning of the pandemic, precisely at the beginning of the disaster in early 2020. The transaction volume climbed dramatically by the end of 2020. This development shows that people are starting to use electronic money for online shopping purposes intensively. The growth in transaction volume is also accompanied by an increase in transaction value, as seen in Figure 6 below.

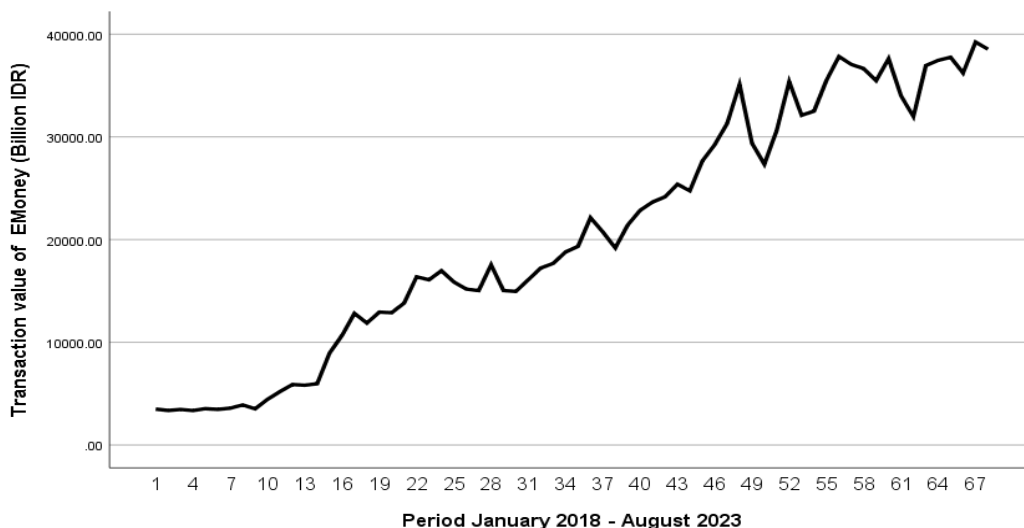


Figure 6. Transaction value of E-money

The value of shopping transactions with electronic money in January 2018 was recorded at only 3.4 trillion Rupiah, and it has grown significantly over the last five years to reach 38.54 trillion in August 2023. The transaction value remained generally stagnant or did not increase during the beginning of the pandemic, notably in the first three months of 2020. Following that, because it is relatively easy to use for online shopping, people began to actively and intensely use electronic money throughout the pandemic.

B. Differences in Electronic Payment Transactions Before and After COVID-19

The COVID-19 pandemic has become an essential momentum that has accelerated the use of electronic payment systems in various countries, including Indonesia. This research examines the differences in the average volume and value of APMK,

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electronic money, and RTGS transactions before and after the COVID-19 pandemic. The pandemic is utilized as an independent variable with a nominal measurement scale of 0 before the pandemic, from January 2018 to February 2020, and 1 during and after the pandemic, from March 2020 to August 2023. Table 1 shows the difference test before and after using the Mann-Whitney U Test.

Table 1. Hypothesis testing results with Mann-Whitney U Test

	<i>Null Hypothesis</i>	<i>Sig.</i>	<i>Decision</i>
1. ATM			
a.	The distribution of ATM unit is the same across category pf pandemic Covid19	0.015	Reject H_0
b.	The distribution of ATM transaction volume is the same across category pf pandemic Covid19	0.000	Reject H_0
c.	The distribution of ATM transaction value is the same across category pf pandemic Covid19	0.005	Reject H_0
2. Credit Card			
a.	The distribution of credit card unit is the same across category pf pandemic Covid19	0.000	Reject H_0
b.	The distribution of credit card transaction volume is the same across category pf pandemic Covid19	0.020	Reject H_0
c.	The distribution of credit card transaction value is the same across category pf pandemic Covid19	0.016	Reject H_0
3. E-Money			
a.	The distribution of E-Money unit is the same across category pf pandemic Covid19	0.000	Reject H_0
b.	The distribution of E-Money transaction volume is the same across category pf pandemic Covid19	0.000	Reject H_0
c.	The distribution of E-Money transaction value is the same across category pf pandemic Covid19	0.000	Reject H_0

H_0 = The Null Hypothesis, the significance level is 0.05

ATM transaction volume and value differed on average before and after the pandemic, with 560.334 million versus 604.376 million for volume and 599.67 trillion Rupiah versus 632.507 trillion for value. The Mann-Whitney U Test results reveal that the quantity, volume, and value of ATM transactions before and after the COVID-19 pandemic are significantly different, with a significance level (α) smaller than 0.05.

ATMs for cash withdrawals have been in use for a longer period of time than other APMKs, even with electronic money. Cash withdrawal is ATMs' main feature to fulfill their users' cash needs. When large-scale social restrictions were imposed in March in response to the COVID-19 pandemic, ATM users found it difficult to conduct transactions using ATMs. During the pandemic, the volume and value of transactions decreased as a result. The hypothesis test results also demonstrate differences in the average number, volume, and value of transactions before and after the pandemic. This research is in line with the research of Suder, Wojtowicz, Kusa, & Gurgul (2023), which states that the total value of ATM withdrawals during the pandemic period was significantly lower than before. According to Gupta (2022), the utilization of cash transactions through ATMs has decreased due to the implementation of online banking and E-wallets. After the pandemic, ATM volume and transaction growth increased as users were able to make transactions at ATMs or with debit cards for shopping purposes.

An ATM is an electromechanical device allowing authorized users to withdraw cash from their accounts and/or access other services such as balance inquiry, funds transfer, or deposit acceptance using a machine-readable plastic card. ATM cards can be used as debit cards as well. In accordance with Bank Indonesia's APMK regulations, a debit card is an APMK that can be used to pay for obligations resulting from economic activity, such as spending transactions, where the cardholder's obligations are immediately fulfilled by directly reducing the cardholder's deposits at banks or other institutions other than banks that are authorized to collect funds in accordance with applicable laws and regulations.

The volume and value of credit card transactions differ from ATM volume and value in that the average volume and value of credit card transactions after the pandemic are lower than before the pandemic, whereas ATMs are the opposite. Before the pandemic, there were 28.65 million credit card transactions; after the pandemic, there were 26.15 million transactions. Before the outbreak, the transaction value was 27.363 trillion Rupiah, and 24.24 trillion Rupiah after the transaction. The results of hypothesis testing with the Mann-Whitney U Test test show that the number of cards, transaction volume, and transaction value of credit cards are significantly different before and after the COVID-19 pandemic.

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Compared to ATMs or electronic money, credit card use behaved differently at the beginning of the pandemic. At the beginning of the pandemic, the volume and value of credit card transactions plummeted substantially. On average, the volume and value of credit card transactions after the pandemic are actually lower than before the pandemic. This condition demonstrates that during the COVID-19 pandemic, Indonesians tend not to use bank credit card facilities to make payments or shop. There are two possible reasons for the decline. First, due to their limited repayment capacity, Indonesians are more cautious in using credit facilities. Large-scale social restrictions in Indonesia at the beginning of the pandemic are regarded to be one of the contributing factors, as people are unable to shop at outlets that provide credit card payments. According to Horvath, Kay, & Wix (2023), the pandemic's severity has a strong impact on credit card repayments.

The second cause is that people are starting to switch to other types of payments, such as mobile banking or electronic money, which are often unaffected by societal limitations during the pandemic. Online transactions and electronic money have become the main choices of Indonesians in making transactions. According to Adams, Bord, & Katcher (2021), the primary reason for the initial reduction in credit card balances in mid-2020 was a decrease in purchase volume. Furthermore, when spending on credit cards increased again, three additional factors came into play: higher revolving balance payments; an increase in purchases paid before the close of the statement; and the issuance and use of new cards.

The pandemic has had a greater impact on the volume and value of electronic money transactions than on ATMs and credit cards, particularly in terms of transaction value. The average transaction volume prior to the pandemic was 347.65 million transactions, which jumped to 500.78 million transactions after the pandemic, with a transaction value prior to the pandemic of 8.59 trillion Rupiah rising to 28.07 trillion Rupiah after the pandemic. The results of hypothesis testing demonstrate that only the volume and value of electronic money transactions differ significantly, whereas the amount of electronic money does not differ on average before and after the COVID-19 pandemic.

Electronic Money has experienced significant development in Indonesia from year to year and experienced extraordinary transaction growth during the COVID-19 pandemic disaster. The growth of electronic money is driven by its advantages or characteristics, which are intended for small-value payment transactions (micropayments) and fast and massive transaction processing. These characteristics of E-money cause its growth rate to be greater than that of ATMs and credit cards. The average test results demonstrate a very significant difference between before and after the pandemic. This research confirms the research of Septianurmayanti & Prasetyo (2023), which states that the volume and nominal value of E-Money transactions in Indonesia differed significantly before and after the implementation of PSBB. The COVID-19 pandemic is positively correlated with the volume and nominal value of E-Money transactions.

According to Kee et al. (2023), COVID-19 can be stopped from spreading by social distancing, which allows the use of E-wallets or mobile-based electronic money. As a result, E-wallets are gaining popularity in order to assist in the smoother and more efficient online spread of COVID-19 via social distancing enabled by E-wallets. Furthermore, E-wallets are becoming increasingly popular as a means of facilitating smoother and more efficient online transactions. Bank customers primarily use card payment instruments for retail or individual transactions that meet their daily needs. Such payments eventually have an impact on the interbank payment system for transaction settlement at the aggregate level. Such interbank payments necessitate the use of a specific electronic payment system. Real Time Gross Settlement (RTGS), a payment settlement process carried out per transaction and in real-time, was introduced to the public by Bank Indonesia.

V. CONCLUSION

This research generally shows that electronic payment media and systems in Indonesia have evolved remarkably quickly over the last five years, including drastic changes before and after the COVID-19 pandemic. All retail payment instruments, namely ATMs/Debit Cards, Credit Cards, and Electronic Money, had a significant decrease during the beginning of the pandemic but thereafter experienced an increase in transaction volume and value, except for RTGS transaction volume. The average number, volume, and value of ATM/Debit Card, Credit Card, and Electronic Money transactions increased significantly after the pandemic compared to before the pandemic, whereas the volume of RTGS transactions decreased, but the value of transactions increased, with the average difference remaining significant.

The results of this research show that electronic payments in Indonesia are fast rising, which has been hastened by the COVID-19 pandemic. This phenomenon demonstrates empirical evidence that a less-cash society is emerging in Indonesia. People in the digital era have various choices for media or payment systems that are increasingly rapid, practical, and instantaneous based on their demands or consumption/shopping patterns. The rapid development of digital transactions necessitates the supervision and regulation of Indonesia's payment system by Bank Indonesia and the Financial Services Authority. The rapid expansion of electronic money is due to the practicality of using electronic money with small transaction

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amounts (micropayments), both chip-based and server/mobile. One of the implications of the growth of electronic money is the review of the maximum balance limit policy, both for unregistered and registered electronic money.

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