Development of Digital Payment Systems in Indonesia

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ABSTRACT

This research explores the dynamics and development of the digital payment system in Indonesia along with rapid technological transformation, including the growth of the digital finance industry and a shift in consumer behavior towards non-cash transactions. The aim of this research is to analyze the impact of the development of digital payment systems on the existence of cash in the digital economy era as well as reduce risks that may arise from the use of digital payment systems and prevent price increases due to the amount of cash in circulation. The method used in this research is a qualitative method with a phenomenological approach. Data was analyzed involving measuring and testing data by considering theoretical concepts related to the development of digital payment systems. The results of this research indicate that technological progress in the digital economy era, especially in the development of digital payment systems, has increased rapidly. The COVID-19 pandemic has accelerated the use of e-commerce and digital wallets, triggering digital transformation in the Micro, Small and Medium Enterprises (MSME) sector. Efforts from governments, regulators and service providers to maintain user security and privacy are important steps to build public trust in digital payments.

Keywords: Digital Payments, Digital Economy, Non-Cash Transactions, Development

ABSTRAK

Penelitian ini mengeksplorasi dinamika dan perkembangan sistem pembayaran digital di Indonesia seiring dengan transformasi teknologi yang cepat dengan mencakup pertumbuhan industri digital finance dan pergeseran perilaku konsumen menuju transaksi non-tunai. Tujuan penelitian ini adalah untuk menganalisis dampak perkembangan sistem pembayaran digital terhadap eksistensi uang tunai di era ekonomi digital serta mengurangi risiko yang mungkin muncul dari penggunaan sistem pembayaran digital dan mencegah kenaikan harga karena jumlah uang tunai yang beredar. Metode yang digunakan dalam penelitian ini adalah metode kualitatif dengan pendekatan fenomenologis. Data dianalisis dengan melibatkan pengukuran dan pengujian data dengan mempertimbangkan konsep teori terkait perkembangan sistem pembayaran digital. Hasil penelitian ini mengindikasikan bahwa kemajuan teknologi pada era ekonomi digital, terutama dalam perkembangan sistem pembayaran digital, telah meningkat dengan pesat. Pandemic

COVID-19 telah mempercepat penggunaan e-commerce dan dompet digital, memicu transformasi digital di sector Usaha Mikro, Kecil, dan Menengah (UMKM). Upaya dari pemerintah, regulator, dan penyedia layanan untuk menjaga keamanan dan privasi pengguna menjadi langkah penting untuk membangun kepercayaan masyarakat terhadap pembayaran digital.

Kata Kunci: *Pembayaran Digital, Ekonomi Digital, Transaksi Non Tunai, Perkembangan*

INTRODUCTION

The entry into the Industrial Revolution 4.0 era has made digital technology the main capital needed by industrial players to develop businesses. This shows that current industrial development cannot be separated from technological developments. The development of the industrial sector in line with technological advances can have a positive impact on a country's economy. By adopting digital technology, a country can push its economy towards a digital economy (Putri & Herman, 2022). In the 1980s, the digital economy began with the use of Personal Computers (PCs) and the internet as key technologies for business efficiency. The use of technology such as PCs and the internet is the beginning of the growth of e-commerce. Along with technological developments, the old digital economy has finally shifted to a new digital economy, characterized by advances in mobile technology, unlimited internet access, and the use of cloud technology in digital economic processes (Tarantang et al., 2019).

The positive impact of advances in science and technology on the development of human society. Jobs that previously required physical effort can now be replaced by automatic machines and breakthroughs in computer capacity have changed the way work in various fields seems to be able to replace the role of the human brain. The impact of technological advances on the evolution of payment systems in business transactions. This development particularly affects business relationships between parties by switching from cash to digital payment systems or electronic money (e-money). This progress changes the role of cash as a means of payment towards more efficient and economical non-cash payment methods such as interbank transfers, transfers between accounts, and the use of ATM, debit and credit cards (Janah & Setyawan, 2022).

Payment is the process of transferring money from the payer to the recipient. Digital payments, on the other hand, refer to technology-based payment methods where money is stored, processed, and received in the form of digital information. This transfer process is initialized via electronic payment means. Meanwhile, traditional payments involve cash, checks, or credit cards, while digital payments use special software, payment cards, and electronic money (Aisy & Syamlan, 2022). The main components of a digital payment system include money transfer applications, network infrastructure, and the rules and procedures that govern the use of the system. Digital payment systems provide a method of payment for purchasing goods or services via the internet (Trihasta & Fajaryanti, 2008). Mobile Banking is a banking service that allows customers to carry out banking transactions via cellphone, better known as mobile banking or m-Banking. This service is designed to make it easier for customers to carry out various financial transactions practically and efficiently. However, the efficiency and effectiveness of mobile banking is highly dependent on the availability of smartphones and internet access (Amihsa et al., 2020).

Apart from that, in developing the payment system Indonesia has introduced Quick Response Code Indonesia Standard (QRIS). QRIS is a payment system that uses delivery channels along with QR code standards to standardize payment transactions. This system is an initiative of Bank Indonesia and the Indonesian Payment Systems Association (*Asosiasi Sistem Pembayaran Indonesia*/ASPI), based on the international standard EMV Co (Europe MasterCard Visa). The main goal of QRIS is to support connectivity and interoperability between service providers, instruments, and countries, creating an open or open-source nature in the payment ecosystem (Ardana et al., 2023).

The era of the industrial revolution 4.0 marks an increase in technology that influences the payment system through various applications that people use as a means of non-cash payment. Several digital payment applications that are currently popular among the public, such as Mobile Banking, QRIS, OVO, GO-PAY, Shopee Pay and DANA, provide convenience in transactions in various activities, including payments for online motorcycle taxi services, food delivery orders, electricity/telephone bills, as well as PDAM payments. This digital payment application provides various conveniences for users in making transactions. The use of electronic money has proven to be efficient in its use, although there are still some Indonesians who still rely on cash for transactions. Bank Indonesia has previously attempted to reduce the use of cash in daily transactions, but so far electronic money users mostly come from the upper middle class and those who are familiar with technology. Therefore, equitable use of electronic money in Indonesia still needs to be improved. The less cash society program launched by the government is an effort to prepare Indonesian people to face global competition, especially in the ASEAN Economic Community (AEC) which has been agreed upon since January 2016. By minimizing the use of cash, it is hoped that it can maintain the stability of the currency value (Rifqy, 2018).

According to data released in August 2020, GoPay and OVO remain the main players in the digital payments realm, while DANA has replaced LinkAja. Active digital wallet users are dominated by GoPay. In Indonesia, 38 digital wallets are officially recognized by Bank Indonesia. In 2018, transactions using digital wallets in Indonesia reached US$ 1.5 billion and it is estimated that this will continue to increase to US$ 25 billion in 2023. GoPay, for example, is an electronic money application that allows financial transactions via the Gojek application. used by Gojek customers and driver partners. GoPay can be used for online or direct transactions with tenants who have collaborated with GoJek (Danuri, 2019). The research aims to explore the dynamics, challenges and opportunities related to digital payment systems in Indonesia. It is hoped that the results of this analysis will provide in-depth insights, support the formulation of related policies, and contribute to a better understanding of the evolution of the digital payment system in Indonesia.

METHODS

This research was conducted by adopting a qualitative method with a phenomenological approach. The phenomenological approach emphasizes the importance of real-life experiences as the primary data for understanding everyday reality. The research focuses on examining problems that arise based on actual phenomena occurring in the digital payment systems in Indonesia today. The importance of maintaining the authenticity of phenomena in a phenomenological approach encourages the development of very careful research methods, ensuring that the collected data fully reflects the real experiences of individuals related to the use of digital payment systems. The data analysis process is carried out through measurement and testing of data, considering theoretical concepts related to the development of digital payment systems in Indonesia. The results of this analysis are expected to provide in-depth insights into the issues that arise in the context of digital payments, while maintaining authenticity and relevance to user experiences in Indonesia. This approach plays a key role in understanding the dynamics of digital payment systems and contributes to the development and improvement of the effectiveness of these systems at the local level.

RESULTS AND DISCUSSION
Impact of Digital Technology on Digital Payment Systems

Digital technology, as the main pillar of the Industrial Revolution 4.0, has played a crucial role in driving digital economic growth. The Internet of Things (IoT) is becoming an important foundation, connecting electronic devices and sensors to create networks that enable real-time data exchange (Burma, 2016). Iot opens the door to greater integration between the physical and digital worlds, creating an ecosystem where devices can communicate and collaborate. Furthermore, the big role of big data cannot be ignored. This large and complex data provides deep insights into consumer behavior, market trends and business needs. With big data analysis, industry players can make smarter decisions, optimize supply chains, and identify new opportunities. This is key in increasing operational efficiency and driving innovation in the digital economy sector. Artificial Intelligence (AI) is emerging as a major driving force, changing the way business is done. In the digital economy, AI is used to automate business processes, improve customer experiences, and analyze data with unlimited levels of intelligence. AI applications such as chatbots and virtual assistants strengthen online customer interactions, while machine learning algorithms help in the personalization of services and product recommendations. Together, IoT, big data and artificial intelligence create an environment where businesses can respond more quickly to market changes, identify new market opportunities and improve operational efficiency (Lam et al., 2016). By utilizing this technology, industrial players in the digital economy can optimize their business processes, increase productivity and create added value for their customers. Therefore, Industrial Revolution 4.0, with its digital technology foundation, will not only realize economic transformation, but also shape a dynamic and innovative business landscape (Putri & Herman, 2022).

The impact of the industrial revolution 4.0 on the industrial sector is very significant, bringing about a paradigm shift in the way goods and services are produced, distributed and consumed. In line with the adoption of digital technologies such as the Internet of Things (IoT), big data and artificial intelligence, the industrial sector is experiencing a comprehensive transformation that is creating new opportunities and increasing operational efficiency. The adoption of IoT technology, for example, makes it possible to track every stage of production, speeding up workflows and minimizing human errors (Rymarczyk, 2021). This increases productivity and efficiency in the industrial sector, allowing companies to be more responsive to changing market demands. The use of big data in the industrial sector allows in-depth analysis of production, inventory and consumer behavior data. By understanding consumer trends and preferences, companies can optimize their supply chains, simplify production processes, and reduce waste, which in turn increases profitability. Artificial Intelligence (AI) plays a key role in automation and smarter decision making. In the context of the industrial sector, AI systems can predict machine failures, plan preventive maintenance and optimize resource use. This leads to more efficient asset management and increased productivity. The adoption of this technology has the potential to make a major contribution to a country's economic growth. Increasing productivity and efficiency in the industrial sector can create new jobs, increase global competitiveness, and increase economic added value. In addition, this digital transformation can produce new innovations, encourage the formation of new industries, and strengthen a country's position in the global economy. Therefore, the adoption of technology in the Industrial Revolution 4.0 not only changes the industrial sector, but also becomes a catalyst for sustainable economic growth (Duan et al., 2019).

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Transformation of Traditional Payments to Digital Payments

The shift from traditional to digital payments reflects a profound transformation in the way society manages and engages with money. In the era of industrial revolution 4.0, developments in digital technology such as the Internet of Things (IoT), artificial intelligence (AI), and mobile computing have penetrated the payments sector, leading society into the era of digital payments (Tarantang et al., 2019). Traditional payments, which involve the use of cash, checks, or credit cards, have limitations in terms of speed, security, and efficiency. In contrast, digital payments provide solutions that are more sophisticated and responsive to the needs of modern consumers. Mobile banking, for example, allows individuals to conduct financial transactions anytime and anywhere via their mobile devices. Quick Response Code Indonesia Standard (QRIS) is a symbol of the shift to digital payments by simplifying the transaction process through QR codes that can be accessed by various payment applications. The advantage of digital payments lies not only in ease of access, but also in providing more diverse payment options. Digital applications such as OVO, GO-PAY, and DANA offer non-cash payment solutions for various purposes, from online transportation, and purchasing goods and services online, to paying bills. This innovation creates a more efficient transaction experience and eliminates the need for cash. While traditional payments still have their place, the adoption of digital payments continues to grow as technology penetration increases and consumer behavior changes. Digital banking, e-wallets and QRIS payment systems are increasingly changing the global payments landscape. The government and regulators also play a role in supporting this transition by launching a less cash society program to encourage people to switch to digital payments, minimize security-related risks and provide encouragement for technology-based economic growth (Abdiansyah, 2021).

Digital payments and cash are two financial transaction systems that each have advantages and disadvantages, giving rise to complex considerations in the context of security, efficiency and accessibility (Kameswaran & Hulikal, 2019). In terms of security, digital payments are often considered safer than cash. Encryption systems and high-security technologies protect user data in digital transactions, minimizing the risk of money loss or theft. Additionally, digital payments enable real-time tracking of transactions, making it easier to identify and address potential suspicious activity. However, digital payment security is also in the spotlight, especially regarding the risk of personal data leaks and cyber-attacks. Despite ongoing efforts to improve security, these risks remain relevant and may raise concerns for the privacy and integrity of user information. In terms of efficiency, digital payments stand out with fast and easy transaction processes. Transferring money between accounts, paying bills, or purchasing goods and services can be done quickly via an app or mobile device. This increases time efficiency and reduces the physical need for transactions. Cash still has advantages in

accessibility in some situations. Cash transactions do not require an internet connection or special equipment, allowing transactions in remote places or areas with limited internet access. In terms of efficiency, the use of cash can pose challenges such as the risk of loss or theft, as well as limitations in tracking transactions. Therefore, although digital payments offer high efficiency, cash is still relevant, especially in situations where accessibility is a priority. Digital payment applications such as Mobile Banking, QRIS, OVO, GO-PAY, and DANA have become the backbone of the modern financial ecosystem, changing the way people transact and shop.

Mobile Banking, as one of the leading innovations, allows users to access their bank accounts, transfer funds and track financial activities through their mobile devices. Ease of access and comprehensive functionality make Mobile Banking a popular choice, providing users with the convenience to manage their finances efficiently. QRIS is a step forward in creating uniform payment standards. By using QR codes, QRIS simplifies the payment process across various applications, allowing users to use one code to make transactions with various digital payment service providers. It promotes interconnection between platforms, increasing efficiency and convenience in transactions (Sihaloho et al., 2020).

OVO, GO-PAY, and DANA are real representations of the digital payment transformation in Indonesia. OVO, with support from the Lippo Group, provides various services ranging from bill payments to transactions with various business partners. GO-PAY, which originates from the Gojek ecosystem, has become the main choice for payment for online transportation services, food delivery and various other services. Meanwhile DANA, with various attractive features and promotions, has succeeded in attracting users' attention by expanding its use in various sectors. The success of this digital payment application is not only driven by ease of use, but also through the various incentives and promotions offered to users. Cashback, discounts, and loyalty programs are significant attractions to drive adoption. Additionally, integration with various services such as transportation, online shopping, and bill payments provides users with holistic ecosystem benefits. Despite this, challenges remain, including concerns about the security of user data, intense competition among service providers, and expanding penetration into the wider public. By continuing to innovate and understand user needs, digital payment applications continue to contribute to changes in transaction patterns and payment culture in Indonesia, shaping the direction towards a more cashless society (Shintiya, 2023).

Digital payment applications such as Mobile Banking, QRIS, OVO, GO-PAY, and DANA have detailed their success through providing convenience and innovation in various daily transactions. Mobile Banking, as the dominant platform, provides direct access to traditional banking services via mobile devices, allowing users to make money transfers, pay bills, and even invest with ease. This advantage brings banking services to users' fingertips, optimizing time efficiency and providing greater control over personal finances (Pangastuti & Nonni, 2023). QRIS represents ease of payment in various scenarios. Users only need to point their device's camera at the QR code to initiate payment, eliminating the physical need for a credit card or cash. This innovation paves the way for efficient and secure contactless transactions, reducing waiting times and minimizing physical risks associated with cash. OVO, GO-PAY, and DANA emerged as innovators in providing convenience for daily transactions. For example, GO-PAY not only facilitates payments for transportation and food delivery services, but also expands to a variety of businesses, from retail to healthcare. DANA presents a multi-purpose solution with bill payment features, e-money balance top-up, and even transactions at offline merchants. Meanwhile OVO, with its extensive partnerships, gives users access to non-cash transactions in various sectors, from daily shopping to payments at entertainment venues. The convenience offered is not only limited to transactions, but also to additional features such as cashback, discounts and loyalty programs. These

innovations aim to increase user appeal, drive adoption, and create a more enjoyable shopping experience. By providing easy access, extensive integration, and various incentives, digital payment applications have succeeded in shaping the way society interacts with money and embracing more modern and efficient transaction patterns in everyday life (Aulia, 2020).

The government is taking an important role in encouraging community empowerment through digital payment systems, by launching the less cash society program. This program aims to create a more advanced and efficient payment culture by reducing dependence on cash (Shintya & Nasution, 2023). These efforts include a series of policies, educational campaigns and incentives to stimulate the adoption of digital payments across all levels of society. One of the main aspects of the less cash society program is improving digital payment infrastructure. The government is investing resources to expand internet access networks, creating an environment that supports seamless digital transactions. People from various levels can more easily access and use digital payment services. In addition, educational campaigns are a key instrument in changing people's behavior towards payments. The government is trying to increase digital literacy, provide information about the benefits and ways to use digital payments, and help address security and privacy concerns. This campaign aims to provide the public with a better understanding of how to use digital payment applications and their benefits in everyday life. The government also encourages the adoption of digital payments through incentives, such as cashback programs, special discounts or reward programs. These measures are designed to provide positive incentives for people to switch to digital payments. By providing added value to users, the government hopes to stimulate interest and habits in digital payments. In addition, financial regulations and policies are also updated to support the growth of digital payments. The government is working to create a conducive business environment and liberalize regulations related to digital finance to increase legal certainty and support innovation. Through the less cash society program, the government not only accelerates the transformation towards a digital economy, but also provides greater opportunities for people to access financial services, reduces inequality in access to the financial system, and increases financial inclusivity.

Equitable use of electronic money at all levels of society is a challenge that involves various aspects, while also bringing great opportunities in creating financial inclusivity. One of the main challenges is unequal access to technology in society. Some groups, especially in remote areas or with low levels of accessibility, may experience difficulties in utilizing electronic money due to limited technological infrastructure and internet connectivity (Pramono et al., 2022). Therefore, equal distribution of technological accessibility needs to be improved so that all people can feel the benefits of electronic money. Financial literacy is also an obstacle to realizing equitable use of electronic money. Some people may not fully understand how to use digital payment applications, carry out non-cash transactions, or manage electronic balances. Appropriate and comprehensive educational campaigns are needed to increase public understanding of the benefits and ways of using electronic money. Another challenge is concerns regarding security and privacy. Some people may be reluctant to switch to electronic money because of distrust in the security of digital transactions (Aisy & Syamlan, 2022). Serious efforts are needed on the part of service providers and the government to build public trust by improving security systems, involving strict data protection policies, and providing guarantees regarding user privacy. Although these challenges exist, equitable use of electronic money also brings a number of great opportunities. The growth of smartphone penetration in various levels of society and advances in fintech technology provide opportunities to increase financial inclusivity. Service providers can design solutions that are more user-friendly, easy to understand, and accessible to all groups. In addition, the government can take advantage of incentive policies and educational programs to encourage the adoption of electronic money among wider levels of society (Pardede, 2019).

Challenges in Implementing Digital Payments

Security and privacy play a central role in the context of digital transactions, emerging as crucial issues that influence user adoption and trust in digital payment systems. In an era where technology is increasingly sophisticated, the use of electronic money, mobile banking and digital payment applications is increasingly widespread. With the increasing volume of online transactions, there is also an increase in potential security and privacy risks (Diller & Tashijan, 2002). The success of a digital payment system relies heavily on its ability to protect sensitive user data and ensure that every transaction is carried out securely. Security is a major issue because digital payment systems are vulnerable to cyber attacks, phishing and identity theft. Encryption technology and advanced security measures has become imperative to protect users' personal and financial information from ever-evolving threats. In digital transactions, users entrust service providers with invaluable information, and their vulnerability to security breaches can undermine public trust in the system. Meanwhile, privacy aspects are also the main focus in digital payment security discussions. Users are increasingly concerned about how personal data is collected, stored and used by service providers. Incidents of flagrant privacy violations have increased public awareness of the importance of protecting personal data. Therefore, digital payment systems must prioritize privacy protection by implementing clear and transparent policies regarding the collection and use of customer data (Simbolon et al., 2021).

Efforts to overcome these security and privacy challenges are not only the responsibility of service providers, but also require close collaboration between government, industry and consumers (Zhang, 2017). Strong regulation and strict monitoring are needed to ensure high-security standards in the digital payments sector. Meanwhile, consumer education is also needed so that they can take more proactive protective measures and understand the risks and responsibilities involved in using digital payment systems. By keeping security and privacy a top priority, digital payment systems can build user trust, stimulate the growth of digital economic sectors, and create a safe and reliable transaction environment. Maintaining user security and privacy in digital payment systems is a primary focus of service providers and regulators, who are working together to implement measures to mitigate risks and increase user trust. Service providers proactively implement advanced encryption technology in their platforms to protect user data during transactions. Multiple authentication systems and biometric recognition are also increasingly commonly used as additional security measures, ensuring that only authorized account holders can access and carry out transactions. The importance of transparency in data collection and use has encouraged service providers to develop privacy policies that are clear and easy to understand (Mullingan, 2014).

Users are now more often given detailed information about how personal data will be used and guaranteed that the information will not be misused. In addition, service providers often provide users with further controls in managing their privacy preferences, allowing them to control the extent to which their personal information is shared and processed. From a regulatory perspective, regulators play a role in shaping the security and privacy standards implemented by service providers. They issue guidelines and rules that ensure that every entity in the digital payments sector adheres to certain standards to protect users. Monitoring and auditing compliance is an integral part of the role of regulators, who strive to ensure that any security breaches or privacy breaches are promptly identified and acted upon. Collaboration between service providers and regulators involves exchanging information regarding the latest security risks, cyber attack trends and best practices in managing user privacy. Industry forums and committees were established to facilitate dialogue and collaboration between various stakeholders. Often, regulators also encourage the involvement of third parties to conduct independent security audits of service providers as a form of strengthening security and privacy (Junaedi et al., 2023).

CONCLUSION

The results of research on various aspects of digital economic development, especially in the context of the digital payment system in Indonesia, illustrate a positive trend that has been accelerated by the COVID-19 pandemic. E-commerce and the use of digital wallets have experienced a significant increase in response to social policies and changes in consumption patterns during the pandemic. This digital transformation, especially in the Micro, Small and Medium Enterprises (MSME) sector, has had a positive impact in speeding up business processes and increasing market access for small and medium businesses. Despite current positive developments, there are still challenges that need to be overcome to achieve equitable use of electronic money across all levels of society. It is important to ensure that the benefits of the digital economy can be felt equally by all groups, including those in rural areas or community groups who still have limited access to technology. Governments and regulators have an important role in creating an environment that supports the growth of the digital economy while maintaining user security and privacy. Joint steps by service providers to increase the security of digital transactions and build public trust are a top priority. It is hoped that this collaborative effort can create a strong foundation for sustainable growth in Indonesia's digital economy. With good cooperation between all relevant parties, including the government, regulators and industry players, it is hoped that Indonesia can continue to optimize its digital economic potential. Maintaining user security and comfort in digital transactions is the key to success, so that people increasingly trust and are encouraged to adopt digital payments as an integral part of everyday life.

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