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Article

Digital Wallets for Impactful Financial Inclusion: Innovative Strategies Based on Sharia Economics and Cybersecurity in Indonesia

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Abstract

The rapid advancement of digitalization has positioned digital wallets (e-wallets) as vital instruments in promoting financial inclusion in Indonesia. While offering convenience and efficiency, the adoption of digital wallets still faces significant challenges, particularly related to the digital literacy gap, cybersecurity threats such as phishing and OTP (One-Time Passcode) fraud, and the need to integrate Sharia economic principles in this Muslim-majority country. This article employs a qualitative approach through a literature study method to identify critical issues and formulate innovative, high-quality, engaging, and action-inspiring solutions in line with the theme Research to Impact. The findings show that digitalization serves as a catalyst in expanding access to financial services; however, barriers related to literacy and cybersecurity may erode public trust. The urgency to integrate Sharia principles becomes essential to boost adoption among the Muslim population, while multi-stakeholder collaboration is crucial in building an inclusive financial ecosystem. Based on analytical findings, this article proposes five key strategies: (1) Building public trust through massive and continuous digital security education, including the identification of fraud modes and the importance of safeguarding personal data. (2) Innovating Sharia-responsive and inclusive financial services, such as developing transparent Sharia digital wallet features and partnerships with Sharia financial institutions. (3) Improving digital infrastructure and adaptive regulatory support from the government and regulators to reach remote areas and vulnerable segments. (4) Empowering MSMEs through comprehensive training on digital integration, QRIS utilization, and Sharia-based financing. (5) Establishing “Community-Based Digital Financial Inclusion Centers” at the local level as hubs for education, technical support, and partnership facilitation. The implementation of these strategies is expected to address challenges, increase public trust, expand access, and ensure a secure, Sharia-compliant, and sustainable digital financial inclusion in Indonesia, delivering real impact for economic development.

Keywords: digital financial inclusion; digital wallets; cybersecurity; sharia economics; research to impact

1. Introduction

1.1. Background

The rapid development of digital technology has brought significant transformation across various sectors of life, including the financial sector. Digital wallets (e-wallets) have emerged as a disruptive innovation that offers ease, speed, and efficiency in financial transactions, replacing the function of conventional wallets that rely on physical cash and cards (Suyanto, 2023; Nursaputri & Safitri, 2024). In Indonesia, the adoption of digital wallets continues to grow, driven by the National Non-Cash Movement (Gerakan Nasional Non Tunai – GNNT) and the increasing demand for more practical payment methods, especially among communities that are becoming more familiar with smart devices. This digital potential plays a significant role in expanding the reach of financial

services, empowering the local economy, and facilitating access for previously marginalized groups, including Micro, Small, and Medium Enterprises (MSMEs) (Dwi Tirta Kencana, Universitas Teknokrat Indonesia; Elvita Rahmayanti Putri, BINUS).

However, the transition toward an inclusive digital financial ecosystem is not without challenges. Literature reveals disparities in digital access and literacy, especially in rural areas, as well as a strong preference for cash transactions among some segments of society (Maisaroh & Wahyuni, 2024). More critically, the increased use of digital services correlates with the rise in cybersecurity risks. Threats such as phishing and One-Time Passcode (OTP) scams have become alarming issues that may erode user trust if not balanced with adequate security literacy (Alif & Pratama, 2021; Pardosi et al., 2024). The integrity, confidentiality, and availability of data are key pillars that must be maintained in digital financial systems.

In the context of Indonesia, a Muslim-majority country, digital financial inclusion must also align with Sharia economic principles. The integration of Sharia values into digital financial services is crucial to ensure that technological adoption goes hand in hand with the religious beliefs of the society (Maisaroh & Wahyuni, 2024). Without sufficient understanding of Sharia financial literacy, the full potential of digital financial inclusion will not be realized. Therefore, critical and creative ideas are needed, not only to identify existing problems but also to offer innovative and sustainable solutions to promote digital financial inclusion that is secure, Sharia-compliant, and positively impactful for all segments of society. This article seeks to address that gap by analyzing current challenges and formulating recommendations that can inspire real action in realizing the vision of Research to Impact

1.2. Problem Formulation

Based on the background above, this study formulates the following research questions:

1. How can digital wallets effectively act as catalysts for increasing digital financial inclusion in Indonesia?
2. What are the main challenges related to cybersecurity and digital literacy that hinder the adoption of digital wallets, and what are the solutions?
3. Why is the integration of Sharia economic principles important in the development and utilization of digital financial services, particularly digital wallets, in Indonesia?
4. How can multi-stakeholder collaboration (government, financial institutions, society, and academia) be optimized to overcome the barriers to digital financial inclusion and information security?
5. What innovative and solution-oriented ideas can be implemented to enhance trust, accessibility, and literacy in Sharia-compliant digital financial inclusion in Indonesia?

1.3. Research Objectives

In line with the problem formulation above, this study aims to:

1. Analyze the role of digital wallets as catalysts for digital financial inclusion in Indonesia based on a literature review.
2. Identify and explore the main challenges related to cybersecurity and digital literacy that hinder the adoption of digital wallets, and propose concrete solutions.
3. Examine the urgency and implications of integrating Sharia economic principles into the development and utilization of digital financial services, particularly digital wallets, in Indonesia.
4. Formulate strategies for optimizing multi-stakeholder collaboration in addressing the challenges of digital financial inclusion and information security.
5. Develop innovative and solution-oriented ideas to improve trust, accessibility, and literacy in Sharia-compliant digital financial inclusion in Indonesia.

1.4. Research Benefits

This research is expected to offer the following benefits:

1.4.1. Theoretical Benefits

Theoretically, this article is expected to enrich academic discourse, particularly in the fields of digital economics and Sharia finance, by presenting a comprehensive analysis of digital financial inclusion based on a literature study. The synthesis of various concepts and prior research findings may serve as a foundation for further theoretical development concerning the drivers and barriers of fintech adoption, as well as models of Sharia financial inclusion relevant to the Indonesian context.

1.4.2. Practical Benefits

- For Government and Regulators: Providing evidence-based policy recommendations for formulating adaptive regulations, cybersecurity education programs, and more effective financial inclusion initiatives.
- For Financial Institutions and Fintech Companies: Offering insights for developing digital financial products and services that are more inclusive, secure, Sharia-compliant, and responsive to public needs.
- For the General Public and MSME Actors: Increasing awareness of the benefits and risks of digital wallet usage and offering practical guidelines for safe and wise adoption of digital financial services.
- For Future Researchers: Serving as a reference and analytical framework for future research in the areas of digital financial inclusion, cybersecurity, and Sharia economics.

2. Literature Review

2.1. Concepts of Digital Wallets and Conventional Wallets

A digital wallet, often referred to as an e-wallet, is a technological innovation that allows individuals to store, manage, and use electronic money through digital devices such as smartphones, tablets, or computers. The emergence of digital wallets replaces the function of conventional wallets in storing physical financial assets like cash, credit cards, and debit cards (Suyanto, 2023). Conventional wallets, on the other hand, can be understood as physical containers used to store physical financial assets, such as cash (paper and coin currency), debit cards, credit cards, and identification documents (Surtiyono et al., 2021 in Nursaputri & Safitri, 2024; Yani & Widjajanto, 2023 in Nursaputri & Safitri, 2024). In Indonesia, digital wallets have become a popular phenomenon, with the public adopting their use as a more practical and efficient alternative for daily financial transactions.

The functions of digital wallets encompass various transactions, including online and offline shopping payments, money transfers, bill payments, and mobile credit top-ups. Users can access and manage their funds through applications installed on their digital devices. Transaction processes are validated by entering necessary information, such as the amount of money, the recipient's or merchant's identity, and confirmation through security methods like passwords or fingerprints (Suyanto, 2023). Furthermore, additional features such as loyalty programs, special discounts, and integration with other applications (e.g., ride-hailing, food delivery, or e-commerce) make the use of digital wallets increasingly attractive and provide added benefits to users.

Essentially, digital wallets offer convenience, speed, and flexibility in financial transactions. Users do not need to carry physical cash or credit cards; they simply use their digital devices. Digital wallets also provide advantages in recording and monitoring transactions, which simplifies users' financial management (Suyanto, 2023). Moreover, the convenience offered by digital wallets makes them an alternative payment method that leverages the internet and is accessible to various segments of society (Reski, 2024). The transition towards currency digitalization, including e-wallets, is an

inevitable phenomenon aligned with advancements in technology and the digitalization of the financial sector (Wiranta et al., 2024). These digital payment instruments, including e-wallets and mobile banking, are highly practical cashless applications that support the National Cashless Movement (GNNT) initiated by Bank Indonesia and other related institutions to encourage society towards a cashless society (Nursaputri & Safitri, 2024; Zustika & Fageh, 2022).

2.2. Information Security Theory and Concepts in Digital Financial Transactions

Information system security refers to the protection of information systems from unauthorized access, use, disclosure, disruption, modification, inspection, recording, or destruction (Pardosi et al., 2024; Stallings, 2017). Its objective is to maintain the confidentiality, integrity, and availability of data and information systems, commonly known as the CIA triad (Pardosi et al., 2024). The implementation of information system security involves the use of physical and electronic security technologies, administrative procedures, and comprehensive management policies, including the use of firewalls, encryption, antivirus software, and practices such as user authentication and access management (Pardosi et al., 2024).

The importance of information security can be viewed from several key perspectives (Pardosi et al., 2024):

- **Protection of Personal Data:** Safeguarding individual privacy and preventing identity theft, as organizations increasingly collect personal data. This is also emphasized by global data protection regulations such as GDPR.
- **Business Integrity and Trust:** Effective information security builds customer trust, which is crucial for the sustainability of online businesses and e-commerce. Security breaches can damage reputation and customer loyalty.
- **Operational and Business Continuity:** Protecting operations from disruptions due to cyberattacks (e.g., ransomware) and ensuring service availability. Effective security strategies include disaster recovery plans.
- **Regulatory Compliance:** Ensuring businesses comply with laws that mandate the protection of customer data and sensitive information, avoiding substantial fines and sanctions.
- **Protection Against Cyber Threats:** Guarding against increasingly sophisticated malware, phishing, and ransomware attacks. The cost of implementing information security is often lower than the losses resulting from security breaches.
- **Protection of Intellectual Property:** Crucial for protecting intellectual property and confidential business information from leaks that could benefit competitors.

Furthermore, Pardosi et al. (2024) elaborate on the implementation and challenges of the three fundamental principles of information security:

2.2.1. Confidentiality

This principle protects information from unauthorized access or disclosure to unauthorized parties, ensuring that sensitive information can only be accessed by individuals or entities with permission. Its implementation includes:

- **Encryption:** Converting information into an unreadable format without a decryption key, both for data at rest and data in transit (Florackis et al., 2023 in Pardosi et al., 2024).
- **Access Control:** Restricting access to information only to authorized users, through user authentication, access rights management, and role-based access control.
- **Security Awareness Training:** Educating employees on the importance of maintaining information confidentiality.
- **Use of Virtual Private Networks (VPN):** Creating encrypted tunnels for secure data transmission over public networks.
- **Non-Disclosure Agreements (NDA):** Legal agreements that restrict the use and disclosure of information.

- Challenges include cyberattacks (phishing, malware, man-in-the-middle), insider threats, and data complexity.

2.2.2. Integrity

This principle protects information from unauthorized modification, whether intentional or unintentional, ensuring that data remains accurate and complete throughout its lifecycle (Wijoyo, Rosadi, et al., 2023 in Pardosi et al., 2024). Its implementation includes:

- Access Control: Ensuring that only authorized users can modify data.
- Use of Hash Functions: Generating unique data summaries to verify data integrity; changes to data will result in a different hash value.
- Digital Signatures: Using cryptography to verify the sender and ensure messages are not altered during transmission.
- Audit and Logging: Recording user and system activities in detail to detect, investigate, and prevent unauthorized changes.
- Patch Management and Updates: Ensuring systems and applications are always updated to protect against vulnerabilities.
- Challenges include cyberattacks (malware, ransomware), human error, and insider threats.

2.2.3. Availability

This principle ensures that information and related systems can be accessed and used by authorized parties whenever needed, guaranteeing continuous business operations without significant disruption. Its implementation includes:

- Redundancy and Failover: Duplicating critical systems and network components so that other systems can take over in case of failure.
- Data Backup: Regularly backing up data to secure, separate locations for recovery after data loss incidents (e.g., ransomware attacks).
- Disaster Recovery: Developing plans to restore information technology operations after a disaster or system failure.

In the context of E-Wallet usage, specific threats that are most vulnerable and often unrecognized by users pertain to the use of one-time passcodes or OTPs. Scammers frequently request these OTP codes to gain unauthorized access to victims' E-Wallet accounts due to the victims' lack of awareness regarding the function and risks of OTP codes, which should be kept confidential (Alif & Pratama, 2021). Additionally, Phishing Attacks pose a risk, where scammers impersonate trusted organizations to gather personal information and gain account access (Alif & Pratama, 2021). Various cybercrime cases related to phishing (such as online fraud, illegal access, data manipulation, and data/identity theft) have been reported (Alif & Pratama, 2021). Awareness of information protection for E-Wallet accounts is crucial to avoid theft, fraud, or misuse.

2.3. Concepts of Accessibility and Digital Financial Inclusion

Financial inclusion is an essential component of economic development, ensuring that all segments of society have access to safe, affordable, and timely financial services (Elvita Rahmayanti Putri, BINUS). Nevertheless, many people, especially in remote and low-income areas, still struggle to access traditional banking services. In this context, technology plays a crucial role in improving financial inclusion in Indonesia (Elvita Rahmayanti Putri, BINUS), acting as a bridge that facilitates access to services for previously marginalized communities (World Bank, 2020 in Elvita Rahmayanti Putri, BINUS).

The role of technology in enhancing financial inclusion in Indonesia encompasses several key aspects:

2.3.1. Digitalization and Reduced Operational Costs

Digitalization has brought significant changes to the financial sector by reducing costs associated with providing financial services. Through digital platforms, financial institutions can minimize operational expenses such as account management, transactions, and other banking services. This automated process enables financial service providers to offer products and services at more affordable costs, supporting broader financial access, especially for those who were previously financially constrained (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). Digital transformation significantly accelerates business processes in the financial sector, particularly in lowering operational costs previously associated with conventional services. This simplification of business processes is a crucial foundation for expanding financial access, making it more inclusive and affordable, and creating opportunities for underserved communities (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). Digital banking, for instance, allows individuals to open and manage bank accounts via smartphone applications without needing to visit a physical bank, easing access for those living in remote areas or with limited mobility (Elvita Rahmayanti Putri, BINUS).

2.3.2. Financial Access from Anywhere and Enhanced User Experience Efficiency

Digitalization has opened doors to financial services access from various locations. The ability to manage financial transactions, open accounts, or access other financial services online has broadened the reach of financial services to those previously difficult to reach, including communities in remote areas or with physical limitations (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). Services accessible anytime and anywhere provide convenience and comfort, saving time and giving individuals greater control over their finances, enhancing financial independence (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). Digital payment applications (e-wallets) have become important tools in expanding financial inclusion, especially for those without bank accounts, enabling quick and easy payment transactions, goods purchases, and money transfers using mobile phones (Elvita Rahmayanti Putri, BINUS).

2.3.3. Economic Empowerment and Equitable Access

Reducing the cost of financial services through digitalization can play a significant role in empowering local economies. With more affordable services, small and medium-sized enterprises (SMEs) can more easily access credit, insurance, and other financial instruments that might have previously been difficult to obtain. Financial inclusion is not merely about broadening access but also about providing a real impetus for economic growth (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). The importance of digitalization in the context of financial inclusion is about creating equitable access, ensuring that financial services can be accessed by everyone, without exception, thus building a strong foundation for inclusive and sustainable economic growth (Dwi Tirta Kencana, Universitas Teknokrat Indonesia).

2.3.4. Innovation and Risk Reduction

Digitalization has been a catalyst for innovation in financial services. From digital payments to peer-to-peer lending services, technology has enabled the development of financial products that are more adaptive and responsive to market needs, creating diverse options and expanding the scope of access (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). One of the main benefits is its ability to reduce risk, especially in terms of security and fraud. The use of advanced technology in protecting customer data and securing financial transactions has helped minimize risk, giving consumers confidence to use online financial services with the assurance that their information and funds are safe (Dwi Tirta Kencana, Universitas Teknokrat Indonesia). Digitalization also assists financial institutions in managing financial risks more effectively through the use of sophisticated algorithms and data analytics (Dwi Tirta Kencana, Universitas Teknokrat Indonesia).

2.3.5. Financial Technology (Fintech)

Fintech is a major innovation that expands financial access. Fintech platforms like peer-to-peer (P2P) lending allow individuals to borrow or lend without going through traditional financial institutions (Finextra, 2021 in Elvita Rahmayanti Putri, BINUS). Besides P2P lending, fintech also provides digital payments, microinsurance, and technology-based investments that were previously inaccessible (McKinsey & Company, 2020 in Elvita Rahmayanti Putri, BINUS). Fintech innovations also contribute to overcoming geographical challenges and socio-economic disparities (Adelaja et al., 2024 in Rachmawati et al., 2024).

2.3.6. Enhanced Financial Literacy through Technology and Education

With the increasing number of fintech applications and digital platforms, improving financial literacy has become easier. Technology provides access to various educational resources on personal finance management, investments, savings, and debt that can be accessed anytime and anywhere (Elvita Rahmayanti Putri, BINUS). Application-based or digital media education programs are increasingly being organized (Bank Indonesia, 2021 in Elvita Rahmayanti Putri, BINUS). Financial customer education is an important initiative to increase financial literacy, which promotes financial inclusion and economic stability, equipping individuals with an understanding of products, the ability to assess risks, and sound decision-making (Rachmawati et al., 2024; Chabaeffe & Qutieshat, 2024 in Rachmawati et al., 2024; Spivak et al., 2024 in Rachmawati et al., 2024). Higher financial literacy supports individual well-being and economic stability (Rachmawati et al., 2024).

2.3.7. Social Dynamics and Challenges of Digital Financial Inclusion

In the transition to a digital financial system, it is crucial to consider the social and cultural dynamics that influence technology adoption (Maisaroh & Wahyuni, 2024). Underserved communities, such as rural populations, women, and MSME actors, often face access barriers, either due to limited infrastructure or low financial literacy. On the other hand, the preference for cash as a transaction tool remains strong in some circles (Maisaroh & Wahyuni, 2024; "Digital Finance," 2024 in Maisaroh & Wahyuni, 2024). The shift from cash to digital also carries cybersecurity and data protection risks (Maisaroh & Wahyuni, 2024).

2.3.8. Role of Regulation and Government Initiatives

Public trust in digital payment systems must be built through strong regulation and continuous consumer education. Bank Indonesia, through its Indonesia Payment System Vision 2025, aims to create an inclusive, efficient, and secure digital ecosystem (Maisaroh & Wahyuni, 2024; Indonesia, 2019a in Maisaroh & Wahyuni, 2024). Government initiatives such as the Pradhan Mantri Jan Dhan Yojana (PMJDY) in India demonstrate the importance of the government's role in expanding financial access in rural areas (Az Zahra & Ajija, 2023 in Rachmawati et al., 2024; Rahman, 2024 in Rachmawati et al., 2024).

2.3.9. Role of Sharia Financial Literacy

In the context of Indonesia as a country with a large Muslim population, Sharia financial literacy is key to integrating digital financial inclusion with Sharia values (Maisaroh & Wahyuni, 2024). By understanding Sharia financial principles, Muslim communities can adopt financial technology with confidence that the services align with religious teachings. Education and socialization programs involving Sharia financial institutions, the government, and local communities are needed to enhance this literacy (Maisaroh & Wahyuni, 2024; Hidayah, 2021 in Maisaroh & Wahyuni, 2024). Financial digitalization has great potential to drive financial inclusion in Indonesia, but its success depends on the ability to overcome challenges of literacy, technology access, and public trust in the digital financial system. In the context of the Sharia economy, an inclusive approach that respects religious

values is an important element in supporting this transition (Maisaroh & Wahyuni, 2024; Lantip, 2023 in Maisaroh & Wahyuni, 2024).

The integration of mobile technology, blockchain, AI, and cloud computing plays a vital role in creating a more inclusive financial ecosystem (Rachmawati et al., 2024). Blockchain supports transparent and secure transactions, AI provides personalized financial advice and credit assessment based on alternative data, while cloud computing offers cost-effective and secure infrastructure for financial solutions (Adelaja et al., 2024 in Rachmawati et al., 2024; Eziamaka et al., 2024 in Rachmawati et al., 2024; Fernando & Disanayaka, 2024 in Rachmawati et al., 2024). Successful examples like mobile money services in Kenya demonstrate that mobile money can enhance financial inclusion with easily accessible services (Adelaja et al., 2024 in Rachmawati et al., 2024; Eziamaka et al., 2024 in Rachmawati et al., 2024; Nasir et al., 2023 in Rachmawati et al., 2024).

2.4. Advantages and Limitations of Digital Wallets Based on Previous Studies

Digital wallets offer various significant advantages that have driven their widespread adoption. These advantages include the ease, speed, and flexibility in conducting financial transactions. Users do not need to carry physical cash or credit cards; they simply use their digital devices (Suyanto, 2023). Additionally, digital wallets also provide benefits in transaction recording and monitoring, which simplifies personal financial management. The presence of additional features such as loyalty programs, special discounts, and integration with other services makes digital wallets increasingly attractive and beneficial (Suyanto, 2023).

Further research indicates that digital wallets offer practicality because users do not need to prepare cash when transacting (Reski, 2024; Nursaputri & Safitri, 2024). The various conveniences and advanced features offered, such as promotional vouchers, time efficiency, and flexibility, make digital wallets an appealing choice, especially for Generation Z, who are familiar with technology and a multi-tasking lifestyle (Reski, 2024). A study by Tania Andriana, cited by Reski (2024), found that 82% of students consider the use of digital wallets to make transactions faster and more efficient. The ability to pay tuition fees, shop, and transfer funds simply through a smartphone, as well as transaction recording features that help track expenses and plan budgets, further strengthen the appeal of digital wallets among students (Reski, 2024). Moreover, currency digitalization, such as digital wallets, generally offers efficiency in transactions and reduced operational costs (Schuh & Stavins, 2015 in Wiranta et al., 2024), and is systematic with a more accurate database (Widyayanti, 2020 in Nursaputri & Safitri, 2024). Other benefits include clear transaction evidence, practicality, and security (Yuke et al., 2022 in Nursaputri & Safitri, 2024; Islamiyah, 2020 in Nursaputri & Safitri, 2024).

Nevertheless, the use of digital wallets also faces several challenges. Suyanto (2023) identifies issues such as security, regulation, internet penetration, and financial inclusion as potential obstacles that need to be addressed. Reski (2024) adds that the effectiveness of digital wallet utilization among students is not yet fully understood, influenced by perceptions of utilization, security, convenience, and local social and cultural factors, especially in areas with inadequate digital transaction access. Furthermore, common obstacles experienced by cashless users include limited signal, additional operational costs, machine errors, human errors, and internet availability (Khayyirah et al., 2022 in Nursaputri & Safitri, 2024). Limited digital literacy and inadequate internet infrastructure in rural areas also constitute major barriers to the adoption of digital services (Sripathi et al., 2024 in Rachmawati et al., 2024; Rachmawati et al., 2024).

2.5. Advantages and Limitations of Conventional Wallets Based on Previous Studies

Conventional wallets, while not as sophisticated as digital wallets, still possess distinct advantages. One of their strengths is their reliability, as they do not depend on technology such as internet connectivity or electricity availability, and their ease of access for all segments of society without requiring specific digital literacy (Suyanto, 2023). Wiranta et al., (2024) reinforce this by stating that physical money holds the advantage of universal recognition as a medium of exchange, enabling people from various social strata to transact without needing additional technological

access. In the early stages of financial technology development, physical money served as the backbone of the domestic economy, and its use also represents a symbol of national sovereignty. For elderly people or those less familiar with technology, cash payment remains the primary choice (Sudarmaji, 2020 in Nursaputri & Safitri, 2024), and Indonesia even ranks among the top countries in Southeast Asia for cash usage (Febrianty, 2019 in Nursaputri & Safitri, 2024).

However, conventional wallets also have significant limitations. If a physical wallet is lost or stolen, all the cash within it will be very difficult to recover. Although credit or debit cards stored inside can be blocked, the process tends to be longer and more complicated compared to freezing a digital wallet account (Suyanto, 2023). Another limitation is the obligation to conduct transactions physically at a location and often being tied to operating hours, which is less practical for remote or online transactions.

Furthermore, the use of physical money faces several challenges, including high production and distribution costs due to the need for high-quality raw materials and logistical constraints in remote areas (Wiranta et al., 2024). The risk of counterfeiting money also poses a significant problem, threatening economic stability and public trust in currency (Nursaputri & Safitri, 2024; Khairi & Gunawan, 2019 in Nursaputri & Safitri, 2024). Additionally, common issues with cash include unfit-for-circulation conditions such as being worn out, torn, or missing pieces, which are still used for transactions (Nursaputri & Safitri, 2024). In the long run, a cash-based system is less efficient than digital payment systems (Wiranta et al., 2024). Traditional banking systems, which are part of the conventional era, are often considered slow and inflexible, with interbank fund transfer processes requiring long times and high administrative fees. Access to traditional banking services is also often limited in rural areas, hindering financial inclusion (Wiranta et al., 2024). These limitations create an urgent need for more efficient financial solutions, prompting the transition towards digital systems.

3. Research Methods

3.1. Type and Research Approach

This scientific article is structured using a qualitative approach with a literature study (library research) method. The qualitative approach was chosen to gain a deep understanding of various concepts, theories, and previous research findings relevant to the topic of digital financial inclusion, particularly from the perspective of Islamic economics in Indonesia. The literature study method allows researchers to collect, evaluate, synthesize, and interpret data from existing written sources, such as scientific journals, books, official reports, and credible news articles. This approach aligns with the Research to Impact theme as it focuses on the systematic analysis of existing knowledge to generate new ideas, understandings, and potentially innovative, high-quality, engaging, and action-inspiring solutions.

3.2. Data Collection Methods and Techniques

The data used in the preparation of this article consists entirely of secondary data derived from various literature sources. Primary data sources include: reputable scientific journals, official reports from financial institutions and industry associations (such as Bank Indonesia, Financial Services Authority/OJK, APJII), and conceptual books and articles discussing fundamental theories and concepts related to digital wallets, information security, financial inclusion, and Islamic economic principles. The data collection techniques applied are documentation and systematic literature search. The researcher identifies keywords relevant to the topic, then searches academic databases and credible news portals to find literature. A strict selection process based on relevance, credibility, and recency of sources is carried out to ensure the quality of the information to be analyzed.

3.3. Data Collection Procedures

Although this research is based on a literature study and does not involve primary field data collection, the "data collection" procedure in this context refers to the systematic stages of acquiring, managing, and preparing relevant literature for analysis. This procedure is essential to ensure a comprehensive and relevant literature coverage:

3.3.1. Keyword Identification and Database Search

The initial stage involves identifying specific keywords relevant to the research topic, such as "digital financial inclusion," "Islamic economics," "digital wallet," "electronic transaction security," "MSMEs," and "QRIS." These keywords are then used to search various scientific databases and academic search engines like Google Scholar, ScienceDirect, ProQuest, and official publication portals of institutions such as Bank Indonesia or OJK. The focus is on articles published within a relevant timeframe (e.g., the last 5-10 years) to ensure the timeliness of the information.

3.3.2. Literature Selection Based on Relevance and Credibility

After a large number of articles and reports are identified, an initial selection process is conducted based on titles, abstracts, and keywords to assess their relevance to the research objectives. Literature that passes the initial selection is then further evaluated based on the credibility of its sources (e.g., indexed journals, reports from government agencies or reputable institutions). Irrelevant, non-credible, or duplicate articles are discarded.

3.3.3. Full Reading and Information Extraction

The selected literature is read thoroughly. At this stage, the researcher extracts important information that supports the arguments and discussion. Extracted information includes key definitions, relevant theories, previous research findings, statistical data, identified challenges, proposed solutions, and new perspectives or ideas that can enrich the article.

3.3.4. Data Organization and Concept Mapping

The extracted information is then systematically organized. This process involves concept mapping, grouping findings based on predetermined themes or sub-chapters (e.g., digital wallet concepts, information security, accessibility and financial inclusion, advantages/limitations), and identifying relationships between concepts. The use of tools such as literature matrices or conceptual frameworks can assist in this stage.

3.3.5. Verification and Triangulation of Literature Information

In the final stage of literature "data collection," cross-verification and triangulation of information from various different sources are performed. The purpose of this stage is to ensure the consistency and validity of arguments or facts found in the literature. If inconsistencies arise, the researcher will seek additional sources for clarification or note the differing views in the discussion.

3.4. Analysis Techniques and Conclusion Drawing

3.4.1. Data Reduction

The first stage in thematic analysis is data reduction. At this stage, the information collected from various literature sources is simplified, selected, focused, abstracted, and transformed into core elements relevant to the research questions (Maisaroh & Wahyuni, 2024). The researcher will filter the data to identify main themes, key concepts, and patterns emerging from various sources, while discarding irrelevant or redundant information. This process helps in managing a large volume of literature information.

3.4.2. Data Presentation

Following data reduction, the next stage is data presentation. The reduced data is then presented in the form of descriptive narratives, conceptual summaries, or comparative tables (if relevant) to facilitate interpretation (Maisaroh & Wahyuni, 2024). This presentation is designed to show the relationships between concepts and themes emerging from the literature, and to visualize the findings clearly and systematically. This aids in constructing a logical and easily understandable discussion flow for the reader.

3.4.3. Conclusion Drawing

The final stage of literature analysis is conclusion drawing. At this stage, the relationships between themes and concepts found during the data reduction and presentation process are analyzed in depth to gain a complete understanding of the research topic. The conclusions drawn will be synthetic, integrating various perspectives from the literature, and comprehensively addressing the research problem. These conclusions will also link the results of the literature analysis to the Research to Impact theme, demonstrating how new understandings can inspire actions or solutions.

4. Results and Discussion

This section presents the results of the literature analysis and synthesis, along with an in-depth discussion of these findings. The primary focus is on identifying issues surrounding digital financial inclusion, especially in the context of Muslim communities and Islamic economics, and offering critical, creative, and solvable ideas based on the literature review. This analysis aims to provide a comprehensive understanding and inspire concrete actions in line with the Research to Impact theme.

4.1. Research Findings

4.1.1. The Role of Digitalization as a Catalyst for Financial Inclusion

The literature consistently indicates that digitalization plays a significant role in expanding the reach of financial services. This finding is supported by Dwi Tirta Kencana (Universitas Teknokrat Indonesia), who highlights how digitalization reduces operational costs, enabling service providers to offer more affordable products and accelerate business processes. This directly empowers local economies and opens access for previously underserved communities, including MSMEs, who can now more easily access credit or insurance. Furthermore, digital payment applications (e-wallets) and digital banking serve as bridges for those without bank accounts or living in remote areas (Elvita Rahmayanti Putri, BINUS).

4.1.2. Challenges of Accessibility and Digital Literacy in Society

Despite the significant potential offered by digitalization, literature findings also highlight significant challenges in accessibility and digital literacy. Maisaroh & Wahyuni (2024) state that communities in rural areas, women, and MSME actors still frequently face access barriers, both due to limited internet infrastructure and low digital literacy. Moreover, the preference for cash remains strong among some segments of society (Maisaroh & Wahyuni, 2024), indicating cultural resistance to the full adoption of digital systems. This finding is reinforced by Reski (2024), who mentions that the effectiveness of digital wallet utilization among students is still influenced by perceptions, security, and infrastructure availability.

4.1.3. Cybersecurity Threats as an Inhibitor of Trust

Information security is a crucial aspect but often inhibits user trust. Findings indicate that cyber threats such as unauthorized One-Time Passcode (OTP) requests and phishing attacks are real risks that can harm e-wallet users (Alif & Pratama, 2021). Users' lack of awareness about the importance

of maintaining the confidentiality of personal information and transaction data exacerbates this vulnerability. This underscores the importance of the confidentiality, integrity, and availability (CIA Triad) principles in digital financial systems (Pardosi et al., 2024), which, if not guaranteed, can erode public trust.

4.1.4. Urgency of Integrating Islamic Economic Principles into the Digital Ecosystem

Another important finding is the urgency to integrate Islamic economic principles into the development and adoption of digital financial services, especially in Indonesia, which has a Muslim majority. Maisaroh & Wahyuni (2024) emphasize that Islamic financial literacy is key for Muslim communities to adopt financial technology with confidence that the services align with religious teachings. Without understanding and assurance of Sharia compliance, some communities may be reluctant to fully transition to digital systems, even if inclusive.

4.1.5. Need for Multistakeholder Collaboration in Financial Inclusion Development

Based on the literature, collaboration between the government, financial institutions, and the community is key to realizing true financial inclusion. Dwi Tirta Kencana (Universitas Teknokrat Indonesia) concludes that only through this cooperation can an inclusive and sustainable digital financial ecosystem be created. This finding is reinforced by the role of strong regulation from Bank Indonesia (Maisaroh & Wahyuni, 2024) and government initiatives in various countries (Rachmawati et al., 2024), which demonstrate the importance of policy support for expanding financial access.

4.2. Discussion

This discussion analyzes the findings above, links them to the problems identified in the literature review, and formulates innovative and relevant solutions. This analysis is expected to provide problem-solving approaches that align with the research questions and objectives of the article.

4.2.1. Building Trust Through Massive Digital Security Education

The high risk of cyberattacks such as phishing and OTP fraud indicates a significant gap in digital security literacy among digital wallet users. To address this, massive, continuous, and easily accessible digital security education programs are needed for all segments of society, not just focusing on urban areas. These programs must include: (1) Introduction to the latest fraud schemes, (2) The importance of maintaining the confidentiality of personal data (especially OTP and PINs), (3) How to verify the authenticity of messages or links, and (4) Reporting steps if one becomes a victim of fraud. Education can be conducted through social media campaigns, community workshops, and partnerships with MSMEs to disseminate information at the grassroots level. This will enhance user trust and reduce their vulnerability to cybercrime, supporting the Research to Impact objective with concrete preventive actions.

4.2.2. Innovation in Digital Financial Services that are Responsive and Sharia-Inclusive

Given the preference for cash and the importance of Sharia principles in Indonesia, digital financial inclusion solutions cannot be one-size-fits-all. There is a need for innovation in digital financial services that are more responsive to local needs and values, especially Sharia. This can be realized through: (1) Developing Sharia-compliant digital wallet features that are transparent regarding contracts (akad), permissible transaction types (halal), and Sharia-compliant fund management. (2) Partnerships between fintechs and Islamic financial institutions to create products consistent with murabahah, mudharabah, or musyarakah principles, especially for MSME financing. (3) Developing technology that supports offline transactions or low-signal areas, to reach remote areas without stable internet access. (4) Providing multilingual and easily contactable customer

support to assist users who are less tech-savvy. These ideas foster inclusive economic growth that aligns with cultural values.

4.2.3. Improving Digital Infrastructure and Adaptive Regulatory Support

Gaps in digital infrastructure and technological literacy are major obstacles to inclusion. Therefore, accelerating the development of telecommunications infrastructure in rural and remote areas is necessary. Additionally, the government and regulators (Bank Indonesia, OJK) need to develop more adaptive and inclusive regulations that not only focus on security but also on ease of access for vulnerable segments of society. These regulations could include incentives for fintechs operating in low-access areas, simplifying registration processes for MSMEs, or broader and easier implementation of QRIS standardization. The government's role as a facilitator and regulator is crucial to ensure the digital ecosystem grows equitably and sustainably.

4.2.4. Empowering MSMEs Through Digital Integration and Sharia Finance Training

MSMEs are the backbone of the economy, but they are often marginalized from formal financial access. A solution that can be implemented is a comprehensive training program for MSMEs on digital integration and Sharia finance. This training should cover: (1) The benefits and methods of using QRIS and digital wallets for business transactions, (2) Basic understanding of Islamic finance and Sharia-compliant financing products accessible digitally, (3) Simple digital marketing strategies, and (4) Cybersecurity literacy for businesses. Training can be facilitated by educational institutions, business communities, or local governments, with materials tailored to the local context and delivered in easily understandable language. This directly inspires action to enhance MSME capabilities and financial inclusion.

4.2.5. Establishment of "Community Digital Financial Inclusion Centers"

To directly address literacy and access challenges, the establishment of "Community Digital Financial Inclusion Centers" at the village or sub-district level can be considered. These centers would function as: (1) Education and training hubs for digital wallets, cybersecurity, and Sharia financial products. (2) Technical assistance points for communities experiencing difficulties in using applications. (3) Information centers on the latest digital financial policies. (4) Facilitators for partnerships between local MSMEs and fintech providers and Sharia banks. These centers can be operated by trained volunteers, KKN (Community Service Program) students, or through collaboration with educational institutions and local governments. This is an innovative idea that can have a tangible impact at the community level.

5. Conclusions

5.1. Conclusions

This article has comprehensively examined the role of digital wallets in fostering digital financial inclusion in Indonesia, highlighting existing challenges and formulating various innovative solutions. Digitalization has proven to be a crucial catalyst, reducing operational costs and expanding access to financial services for MSMEs and the wider community. However, full adoption is still hampered by gaps in digital literacy and cybersecurity, with phishing and OTP fraud threats eroding trust. Furthermore, the urgency of integrating Islamic economic principles is crucial in Indonesia to ensure that the adoption of digital services aligns with the religious values of the community. The success of digital financial inclusion also heavily relies on multi-stakeholder collaboration among the government, financial institutions, and society.

Through in-depth analysis, we proposed five concrete and impactful solutions: (1) Massive and continuous digital security education to build trust and reduce user vulnerability. (2) Innovation in responsive and Sharia-inclusive digital financial services, including the development of Sharia-

compliant digital wallet features and partnerships with Islamic financial institutions. (3) Improvement of digital infrastructure and adaptive regulatory support from the government and regulators for equitable access. (4) Empowerment of MSMEs through digital integration and Sharia finance training to enhance their business capabilities. (5) Establishment of "Community Digital Financial Inclusion Centers" at the local level as platforms for education, technical assistance, and partnership facilitation. The implementation of these solutions is expected to realize a more inclusive, secure, and sustainable digital financial ecosystem, in line with the Research to Impact vision.

5.2. Recommendations

Based on the conclusions and ideas outlined, here are several actionable recommendations to foster more equitable and impactful digital financial inclusion:

5.2.1. For Government and Regulators

The government, through Bank Indonesia and the Financial Services Authority (OJK), is advised to accelerate the development of digital infrastructure in 3T (Frontier, Outermost, Underdeveloped) regions and to formulate regulations that not only focus on security but also encourage inclusive innovation adaptable to the needs of vulnerable community segments. Incentives for fintechs operating in low-access areas and simplification of registration processes for MSMEs can be policy priorities.

5.2.2. For Financial Institutions and Fintechs

Conventional and Islamic financial institutions, as well as fintech companies, are encouraged to innovate in developing digital wallet products that are more responsive to local needs and Sharia principles. This includes developing transparent features regarding contracts (akad), permissible transaction types (halal), and providing easily accessible and multilingual customer support to reach diverse users. Strategic partnerships with MSMEs and local communities are also important for information dissemination and service adoption.

5.2.3. For Educational Institutions and Communities

Educational institutions (including universities and schools) and community organizations are advised to actively engage in digital education and literacy programs, especially cybersecurity literacy and Islamic financial literacy. Thematic student community service programs (KKN) can be directed towards forming "Community Digital Financial Inclusion Centers" in villages, providing practical training and technical assistance for local communities and MSMEs.

5.2.4. For Future Researchers

This research focused on a literature study. For future researchers, it is recommended to conduct empirical research involving primary data collection, such as surveys or interviews, to validate the proposed solutions. Research can focus on the effectiveness of digital security education programs, the actual impact of Sharia-compliant digital wallets, or case studies on the implementation of "Community Digital Financial Inclusion Centers" in specific areas.

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