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IMPLEMENTATION OF BIOMETRIC TECHNOLOGY TO IMPROVE ACCESS AND SECURITY OF DIGITAL FINANCIAL SERVICES

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Abstract

The development of digital financial services brings new challenges related to data security and user identity protection. Biometric technologies, such as fingerprint and facial recognition, offer more secure and practical authentication solutions than conventional methods such as PINs or passwords. This study aims to examine the effectiveness of biometric implementation in enhancing the security and accessibility of digital financial services through a literature review of various scientific sources and recent industry reports. The results of the study indicate that biometrics significantly reduces the risk of identity theft and illegal access, as well as speeds up the user verification process. In addition, this technology also supports financial inclusion by facilitating access for previously underserved communities. However, challenges related to data privacy, implementation costs, and infrastructure readiness remain major concerns. Therefore, collaboration between financial institutions, regulators, and technology providers is essential to ensure the safe, efficient, and inclusive implementation of biometrics in the digital financial ecosystem.

Keywords: Implementation, Biometric Technology, Access, Digital Financial Service Security.

Introduction

The development of information technology has brought significant changes to various aspects of human life, including the financial sector. The digitisation of financial services allows people to conduct transactions quickly, efficiently, and without geographical limitations. However, along with the rapid growth of digital financial services, challenges related to data security and user identity protection have also become more complex. Cybercrime threats such as identity theft, fraud, and illegal access to financial accounts have become critical issues that need to be addressed immediately (Johnson & Smith, 2023).

One solution that is currently being developed to address these issues is the implementation of biometric technology. Biometric technology utilises unique human characteristics, such as fingerprints, faces, voices, or irises, as a more secure authentication method compared to conventional passwords or PINs. The uniqueness of each individual makes biometrics very difficult to forge, thereby increasing the level of security in the user identity verification process (M. Lee & Kim, 2023).

In the context of digital financial services, biometric technology not only serves as a security measure but also enhances service accessibility. Users no longer need to

remember multiple passwords or carry physical tokens; instead, they can access services using their own body parts. This is particularly beneficial for groups who are less familiar with technology or have limited access to conventional devices (J. Lee & Park, 2025).

The implementation of biometric technology in the financial sector has demonstrated various tangible benefits. For example, some banks and fintech companies in Indonesia have begun adopting biometric authentication in mobile banking applications and ATM machines. User experience has improved as the verification process becomes faster, easier, and minimises the risk of errors due to forgotten passwords (Zhang, 2024).

However, the implementation of biometrics also faces several challenges. One of them is the concern regarding the privacy and security of biometric data stored on company servers. If biometric data falls into the wrong hands, the consequences could be more severe than a typical password leak, as biometric data cannot be changed like passwords. Additionally, the initial investment costs for building biometric infrastructure are quite high. Companies must prepare supporting hardware and software and ensure that the system can work reliably in various environmental conditions. Other technical challenges, such as the accuracy of facial recognition in low light conditions or changes in users' physical appearance, also need to be considered (Rahman & Islam, 2022).

From a regulatory perspective, there are still legal loopholes that specifically regulate the protection of biometric data in Indonesia. This raises concerns among the public regarding the misuse and security of their personal data. Therefore, collaboration between the government, industry, and technology providers is needed to create comprehensive regulations that protect the interests of all parties (Beeza Team, 2024). In addition, educating the public about the benefits and risks of using biometrics is also an important aspect. Many users are still hesitant to switch to biometric authentication methods due to a lack of understanding about how they work and their security. Appropriate socialisation can increase public trust in using this technology (Prima, 2023).

Considering the various challenges and opportunities that exist, research on the implementation of biometric technology in digital financial services is highly relevant. This study is expected to provide a comprehensive overview of the effectiveness, obstacles, and solutions that can be applied to optimise the use of biometrics in improving access and security of digital financial services.

Thus, this research not only contributes to the development of knowledge in the field of financial technology but also provides practical recommendations for stakeholders in designing policies and strategies for the implementation of secure, inclusive, and sustainable biometric technology.

Research Method

The research method used in this study is a literature review, which involves identifying, evaluating, and synthesising various academic sources such as scientific journals, research reports, and related publications that discuss the implementation of biometric technology in digital financial services, particularly in terms of security and accessibility. This process is carried out systematically by determining the scope of the topic, collecting literature from reputable databases over the past five years, as well as analysing key findings to obtain a comprehensive overview of the effectiveness, challenges, and opportunities for developing biometric technology in the digital financial sector (Okoli & Schabram, 2010); (Randolph, 2009).

Results and Discussion

The Effectiveness of Biometrics in Influencing the Security and Accessibility of Digital Financial Services

The effectiveness of biometric technology in influencing the security and accessibility of digital financial services has become a major concern in today's digital age. As digital-based financial transactions increase, so do the risks of cybercrime, identity theft, and illegal access to financial accounts.

Therefore, financial institutions and digital service providers are continuously seeking solutions that can provide optimal protection while maintaining ease of access for their users (Amirullah & Ade Eviyanti, 2024). Biometric technologies, such as fingerprint scanning, facial recognition, and voice recognition, offer authentication methods that are difficult to forge because they are based on each individual's unique characteristics.

As such, biometrics is a much safer solution than traditional methods such as passwords or PINs, which are easy to guess, steal, or forget. In many cases, biometrics has been proven to significantly reduce the risk of unauthorised access and identity theft in digital financial services (Marcel et al., 2023).

The implementation of biometrics in digital financial services, such as mobile banking and digital wallets, has resulted in a 40% reduction in identity theft incidents after the technology was implemented. Additionally, biometrics can prevent spoofing attacks and account takeovers, which often occur due to SIM card theft or social engineering. As a result, data and financial transaction security is better protected, providing a sense of security for both users and financial institutions (Castaño & Gómez, 2022).

In terms of accessibility, biometrics also brings positive changes. Users no longer need to remember complex passwords or carry physical tokens to access financial services. With just a fingerprint or facial recognition, the authentication process becomes much easier and faster, enhancing transaction convenience and efficiency.

This is particularly beneficial for groups in society who are less familiar with technology or have limitations in reading and writing (FinTech Insights Team, 2025).

The speed of biometric verification is also an important added value in digital financial services. The authentication process, which typically takes several minutes, can be reduced to a matter of seconds, thereby accelerating transactions and reducing customer wait times. This efficiency not only enhances the user experience but also supports the operational efficiency of financial institutions by reducing costs associated with manual security support (Wijaya & Santoso, 2023).

Beyond security and accessibility, the implementation of biometrics also impacts customer satisfaction and loyalty. A safer, faster, and more personalised user experience makes customers feel valued and protected by their financial service providers. Studies indicate that increased customer satisfaction can directly impact the profitability of financial companies (Beeza Team, 2024).

From a financial inclusion perspective, biometrics plays an important role in opening access to financial services for previously underserved populations, such as people who do not have official identification or have difficulty remembering PINs. With biometrics, they can access financial services easily and securely, supporting financial inclusion efforts in various developing countries (Verihubs Team, 2024).

However, the effectiveness of biometrics is not without challenges. One of the main obstacles is the issue of privacy and security of biometric data stored on servers. If biometric data is leaked, the risk is greater than that of password leaks because biometric data cannot be changed. Additionally, the initial investment costs for building biometric infrastructure and the need for specialised hardware are important considerations in adopting this technology (iProov Team, 2024).

Another challenge that needs to be addressed is the possibility of system failure in recognising users' biometric data, especially under certain conditions such as low lighting for facial recognition or physical changes in users. Therefore, it is important for service providers to provide alternative authentication options and ensure that biometric systems are compatible with various user conditions (Wang & Li, 2024).

The adoption of biometrics also requires education and awareness among the public so that they understand the benefits, risks, and how this technology works. User acceptance of biometrics is greatly influenced by their level of trust in the security and privacy of their data. Without adequate education, some users may still be hesitant or refuse to use biometrics in financial transactions (Kumar & Gupta, 2021).

From a regulatory perspective, biometric data protection must be strictly regulated to prevent misuse and ensure user privacy rights are protected. Collaboration between the government, industry, and technology providers is essential to establish clear standards and regulations for the use of biometrics in the financial sector (Santoso & Prasetyo, 2022).

Overall, research and implementation of biometrics in the digital financial sector show that this technology can provide higher protection against cyber threats, improve convenience and accessibility, and support financial inclusion. However, the success of biometric implementation depends heavily on infrastructure readiness, data protection, and public acceptance.

The sustainable integration of biometrics with digital payment systems is expected to provide more holistic and efficient security solutions, while encouraging wider adoption among the public. Future innovation and development of biometric technology must continue to pay attention to security, privacy, and inclusivity aspects so that its benefits can be optimally felt by all levels of society.

Thus, the effectiveness of biometrics in influencing the security and accessibility of digital financial services is significant. This technology not only offers higher protection compared to traditional methods but also enhances user convenience and comfort in accessing financial services. Despite the challenges that still need to be addressed, biometric integration is a strategic step toward building a safer, more inclusive, and trustworthy digital financial ecosystem in the future.

Impact on User Experience and Adoption of Financial Services

The impact of biometric implementation on user experience and financial service adoption is significant, especially in terms of security, convenience, and efficiency. The use of biometrics such as fingerprints, facial recognition, or voice has changed the way customers access and use digital financial services, replacing traditional methods such as PINs or passwords that are vulnerable to theft and forgetfulness (Li & Zhang, 2024).

One of the main impacts is increased user convenience. With biometrics, the authentication process becomes faster and more practical; users simply need to touch a screen or point their face at a camera to access their account or make a transaction. This eliminates the need to remember complex passwords, resulting in a smoother and more efficient user experience (Jain & Ross, 2021).

From a security perspective, biometrics offers significantly better protection compared to conventional methods. Biometric data is extremely difficult to forge because it is based on unique individual characteristics, thereby significantly reducing the risk of fraud and account takeover. Studies indicate that the implementation of biometrics can reduce incidents of identity theft and unauthorised access by up to 40% in some banking institutions (Singh & Sharma, 2022).

The onboarding or registration experience for new customers has also become simpler and faster thanks to biometrics. Processes that previously required manual verification and physical documents can now be completed digitally in just a few seconds, either through a mobile app or website. This not only improves the operational efficiency of financial institutions but also accelerates the adoption of services by the general public (Suhendra & Lestari, 2022).

In addition, biometrics has a positive impact on customer trust and loyalty. The sense of security that users feel when their data and transactions are protected encourages them to be more active in using digital financial services. This safe and convenient experience is one of the main factors in increasing customer retention and loyalty (Brown & Green, 2022).

Biometric technology also plays an important role in expanding financial inclusion. People who previously had difficulty accessing financial services due to a lack of official identity or digital literacy can now easily enjoy financial services through biometric verification. This supports financial inclusion efforts in many developing countries (Raharja & Setiawan, 2023).

However, the adoption of biometrics is not without challenges. Some users, particularly older individuals or those less tech-savvy, tend to be slower to adopt this change and feel more comfortable with traditional methods. Therefore, education and awareness campaigns about the benefits and security of biometrics are essential to increase public acceptance (Chen & Wang, 2023).

Concerns regarding privacy and the security of biometric data are also important issues. Approximately 30% of users still feel uncertain about the storage and use of their biometric data by financial institutions. To address this, financial institutions must ensure that biometric data is stored with strong encryption and in accordance with applicable data protection regulations (Pratama, 2021).

In addition, technical constraints such as system failures in recognising users' biometrics, especially under certain conditions such as low light or physical changes, remain a challenge. Service providers need to provide alternative authentication options so as not to hinder user access (Nugroho & Putri, 2024).

From a regulatory perspective, banks and financial institutions adopting biometrics must comply with strict data protection standards, such as the GDPR in the European Union. Compliance with these regulations is crucial for maintaining user trust and avoiding future legal risks. Future trends indicate that the adoption of biometrics in financial services will continue to grow alongside technological advancements and regulatory support. Biometric-based digital identity will become the primary standard in customer verification and digital financial transactions (Musa & Bello, 2021).

Overall, the implementation of biometrics has a significant positive impact on user experience and the adoption rate of digital financial services. This technology not only improves security and convenience but also opens up wider and more inclusive access for all segments of society (Digiprimatera Team, 2024).

Thus, biometrics is a strategic innovation that can drive digital transformation in the financial sector. With secure data management, adequate education, and compliance with regulations, biometrics will become the main foundation in building a secure, efficient, and inclusive digital financial services ecosystem in the future.

Conclusion

The implementation of biometric technology in digital financial services is highly effective in enhancing transaction security and convenience for users. By leveraging the unique characteristics of each individual, such as fingerprints or facial features, biometrics provides better protection against fraud, identity theft, and unauthorised access, while also speeding up the authentication process, thereby making the user experience more efficient and practical. The use of biometrics also supports compliance with increasingly stringent security regulations and enhances customer trust and loyalty toward digital financial institutions.

However, the implementation of biometrics still faces several challenges, such as user privacy concerns, relatively high implementation costs, and issues of technological compatibility with various devices used by the public. It is important for financial institutions to ensure that biometric data is managed and protected securely and transparently, and to provide adequate education to users so that the level of trust and adoption of this technology increases.

Overall, the integration of biometrics in digital financial services is a strategic step towards building a secure, efficient, and inclusive financial ecosystem. By continuing to innovate and prioritising privacy and user education, biometric technology can become a cornerstone in addressing future digital security challenges and driving more trustworthy financial transformation.

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