DIGITAL TRANSFORMATION AND RISK MANAGEMENT IN ISLAMIC BANKS: AN ISLAMIC INFORMATION TECHNOLOGY-BASED APPROACH AMIDST THE CHALLENGES OF THE INDUSTRY 4.0 ERA

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Abstract

Digital transformation in the era of Industry 4.0 has brought major changes to the Islamic financial system, especially in how Islamic banks utilize technologies such as process automation, big data, artificial intelligence (AI), fintech, and blockchain. This transformation is not only about digital banking, but also includes overhauling core information systems, implementing data analytics, modernizing organizational structures, and integrating maqasid al-syariah values into technology design. Although it offers great opportunities in terms of increased efficiency, financial inclusion, and service responsiveness, digitization also poses operational risks, cybersecurity risks, low digital literacy, and the risk of sharia non-compliance. The research in this file uses a qualitative approach based on literature studies to describe how Islamic banks can manage digital risks through technology strengthening, digital transformation strategies, and the implementation of IT-based sharia governance. The results of the study show that the appropriate use of technology can accelerate service innovation, improve operational efficiency, and strengthen the risk management system of Islamic banks while maintaining Sharia compliance.

Keywords: Digital transformation, Islamic Bank risk management, Industry 4.0

INTRODUCTION

The fourth industrial revolution or Industry 4.0 era has brought changes in various aspects of life, including the Islamic financial system. The Industry 4.0 era is characterized by the use of digital technology as a tool needed by every business actor, including the financial industry, to develop their business. With digital technology, it is possible for industries to collaborate with various business actors to achieve common goals and objectives. Technological developments such as automated processes, in-depth data analysis, and unlimited connectivity have reshaped the overall business and economic landscape. Sharia finance, as part of the overall global economic system, is undergoing a significant transformation, seeking ways to take advantage of the positive potential offered by Industry 4.0(Wahyuni Sappali et al., 2023).

Digital transformation in Islamic banking means more than just introducing mobile applications or digital banking. It involves overhauling core information systems, strengthening data analytics, adopting fintech, and considering the values of maqasid al-shariah in technology design. A study on Islamic banks in Indonesia found that the transformation of banking information systems has a positive impact on customer transaction decisions(Christina Ika Ningrum & Faizin, 2023) . Through information technology, Islamic banks can provide more responsive, personalized, and data-driven services, but at the same time, they must be prepared to face major challenges related to technical and regulatory risk management.

Sharia financial management, with its principles rooted in Islamic values, is inseparable from a company. Digital transformation related to sharia financial management involves the application of technology to improve transparency, accountability, and efficiency, while ensuring compliance with sharia principles. Risk management is an important aspect in the digital transformation process of Islamic banks, indicating that the integration of digital finance in the Islamic financial market poses several major risks such as limited digital infrastructure, low literacy rates, and inadequate Sharia supervision(Bagas, 2024).

Digital or financial technology is becoming increasingly diverse in society. Electronic money (e-payment) and insurance technology (insuretech) are now emerging in society. In fact, this includes service improvements made by the conventional and Islamic financial sectors. However, Islamic banking essentially conducts transactions based on Islamic principles. Therefore, interest or usury, contracts, billing, and dispute resolution methods are different. Changes in services in the financial services industry are no longer just a trend, but have become a necessity to meet the demands of an increasingly dynamic and complex market amid a growing global financial ecosystem. Along with advances in information and communication technology (ICT), the Islamic finance sector in Indonesia has shown significant growth, marked by an increase in various Islamic financial institutions such as Islamic banks, Islamic insurance, and Islamic mutual funds(Wahyuni Sappali et al., 2023).

This study aims to examine how technology can be integrated into Islamic banking to improve efficiency, transparency, and financial inclusion. Amidst rapid technological developments, Islamic banking needs to adapt in order to remain relevant and competitive in meeting the needs of the community. The research focuses on analyzing the impact and potential application of technology in the concept of Sharia 4.0, formulating strategies for the use of technology for Islamic financial institutions, and evaluating improvements in operational efficiency and service access. The research results are expected to assist Islamic banking in optimizing services, strengthening transparency, and providing strategic guidance to face the digital era in an innovative manner, while adhering to Islamic principles and supporting inclusive and sustainable economic growth.

METHODOLOGY

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The research method used is a qualitative method with an approach using a literature review or bibliography. Qualitative research is a research method used to study natural objects, where the researcher is the key instrument, data collection techniques are carried out triangulation (combination), data analysis is inductive, and the research results emphasize meaning rather than generalization(Naamy, 2022). Research using this approach is a type of research that collects information and notes, reports, books, and scientific sources related to the problem. Literature research includes collecting information and data from books, scientific literature references, and other scientific reference materials such as proceedings and reports from official institutions or organizations. This literature search uses a systematic literature review approach. A systematic literature review is a series of methods for searching, evaluating, and interpreting all available research literature to provide answers to predetermined research questions. DISCUSSION

RESULT AND DISCUSSION

1. Digital Transformation in Islamic Banks

Digital transformation is a process of change that utilizes digital technology as its main foundation. In the context of banking, this transformation is evident in efforts to bring services closer to customers through facilities such as mobile banking applications to facilitate transactions, branchless banking, automatic account opening machines such as Tyme Digital, and various other supporting digital applications(Christina Ika Ningrum & Faizin, 2023). The Islamic financial system can utilize fintech technology to provide financial services to the micro sector and provide more accessible financial products. In addition, digital transformation enables Islamic financial providers to develop digital financial transactions that follow Islamic principles. Financial institutions can meet customer expectations and growing customers by understanding the opportunities to improve products and services through digital transformation. Islamic financial institutions can also create significant added value. Furthermore, in the digital economy, these innovations can open up new opportunities for growth in the Islamic finance sector(Qothrunnada et al., 2023).

Technological developments in the modern era have had a major impact on various sectors, including Islamic banking, which is now required to adopt technology as part of its operations. The use of technology has become an important strategy for Islamic banks to be able to adapt to the changing times. This digital transformation has also accelerated the emergence of more innovative and efficient Islamic financial products and services. Through the use of technology, Islamic financial institutions can offer services that are more [personalized and tailored to customer needs, while ensuring that all processes remain based on Islamic principles(Bagas, 2024).

Sharia fintech presents various opportunities, such as the development of digital financing products and blockchain-based services, although it still requires strengthening of regulatory aspects and digital literacy to be in line with sharia principles. Sharia supervision is also a key factor in digital transformation, where sharia supervisors (DPS) have an important role in ensuring that digital innovations such as the "beyond BSI" platform comply with sharia provisions. Meanwhile, strengthening the digitalization strategy through investment in mobile applications, Sharia fintech integration, and backend system updates is considered important to maintain the competitiveness of Sharia banks in facing the era of industry 4.0(Tiara Adelia Putri et al., 2025).

Digital technology is now expanding the scope of interaction between banks and their customers, employees, and suppliers. Various channels such as online services, digital payment systems, mobile application features, and strengthening the bank's image through social media are part of the banking digital strategy. The use of big data and advanced analytics plays an important role in improving the quality of decision-making, whether in sales, product development, pricing, risk assurance, or in creating a more optimal customer experience. Process automation directly helps speed up and simplify low-value routine tasks, while reducing the risk of errors. In addition, digital applications drive productivity improvements and ensure regulatory compliance, while data visualization and automated processing systems support the implementation of paperless workflows. Overall, digitization is a strategic means of accelerating product innovation and new business models, including social media-based marketing and digital business concepts that utilize crowdsourcing(Ardianto et al., 2024).

2. The Application of Industry 4.0 Technology in Sharia Systems With

With the implementation of advanced technologies such as artificial intelligence, the Internet of Things, blockchain, and big data, the Industry 4.0 revolution has transformed the global economy. In the context of the Sharia economy, the impact is significant because it changes how Sharia financial institutions operate and interact with the public. The digitization of Islamic financial services is one of the main impacts, which gives customers easier and more effective access through mobile banking applications and online platforms(Muhammad Irfan Syah et al., 2024).

The application of Industry 4.0 technology in the Islamic system has accelerated the transformation of Islamic financial and social services through several main channels: the application of Islamic fintech (e-banking, e-wallets, cashless payments) which expands inclusion and market access; the use of blockchain and tokenization for smart sukuk which increases transparency, liquidity, and retail investor participation; blockchain-based platforms for zakat collection and distribution that promise accountability and donation tracking; as well as the adoption of artificial intelligence (AI) and robo-advisors to strengthen fiqh (sharia-compliance), audit automation, and product recommendations in accordance with maqāṣid al-syariah(Jalal & Rosyadi, 2025).

The application of efficiency in Islamic finance can be achieved through process automation, the application of technology in services, and increasing employee productivity. The goal is to reduce operational costs, speed up processing time, and improve customer service. Risk management is a systematic method for identifying, measuring, and managing potential hazards that a company may face. Meanwhile, risk encompasses uncertainties that may affect the achievement of Islamic financial institutions' objectives. In this case, it can include credit, market, operational, and sharia compliance risks(Qothrunnada et al., 2023).

3. The Impact of Digital Transformation on Risk Management

In today's era of digitalization and technology, many digital-based banking services, including mobile banking services, offer many benefits for customer convenience. However, there are certainly risks involved in using them. Although mobile banking services offer advantages to customers who use them, there are several drawbacks, such as human error, fraud, cybercrime, and other mistakes that occur when using mobile banking services. Operational risk refers to operational activities that do not go according to plan and can cause losses, such as system errors, human error, control, and inadequate procedures. Strategic and operational risks have a significant impact on companies, even though they are less likely to occur than operational risks(Oktaviani & Basyariah, 2022).

Digital transformation brings significant changes in risk management, particularly through the use of technologies such as big data analytics, artificial intelligence (AI), and cloud computing, which improve the ability to identify, measure, and mitigate risks in real time. The application of intelligent analytics enables financial institutions to predict potential system failures, customer behavior, and operational risk patterns more accurately than traditional methods. In addition, the integration of digital technology accelerates the automation of internal controls, thereby reducing human error and improving risk management efficiency. However, digitization also creates new risks such as cyber attacks, data leaks, and high dependence on technological infrastructure, requiring institutions to strengthen cyber risk management through layered data security policies and AI-based monitoring systems(Fadhil et al., 2025).

In the Islamic finance sector, digital transformation expands service accessibility but requires adjustments to technology-based Sharia compliance frameworks to ensure compliance risks remain manageable. The implementation of digital platforms also demands increased digital literacy among employees so that risk handling processes run effectively and are in line with modern governance standards. Overall, digital transformation strengthens risk management resilience, but requires organizations to develop adaptive and comprehensive mitigation strategies in an era of rapidly changing technology.

4. Challenges and Strategies for Sharia Banks in Facing the Industry 4.0 Era Islamic

Islamic banks face significant challenges in adopting digital technology in the Industry 4.0 era because they must balance digital innovation with sharia principles. Islamic banks find themselves in a dilemma between introducing blockchain, AI, and mobile banking-based services while maintaining sharia compliance in every product. This digitalization requires the Sharia Supervisory Board (DPS) to actively evaluate and issue fatwas related to new technologies, so that sharia compliance risks remain minimal(Fadhil et al., 2025). In addition, cybersecurity is a crucial challenge. Sharia banks must improve their defenses against cyber risks such as customer data leaks and cyber attacks as the use of digital services increases significantly. Limited human resources with IT security competencies also exacerbate this risk, making investment in training and security infrastructure very important.

Strategies adopted by Islamic banks to address these challenges include strengthening digital banking services to enhance Islamic financial inclusion. For example, digital services such as mobile banking and internet banking are very helpful in expanding access to customers who were previously difficult to reach by conventional banking(Nasir Tajul Aripin et al., 2022). In this way, Islamic banks not only increase their customer volume but also strengthen the basis of Islamic financial inclusion. From an internal strategy perspective, Islamic banks need to undergo a comprehensive digital transformation, including IT infrastructure development and competitiveness enhancement. Digitalization strategies such as adopting cloud-based banking systems, API integration, and legacy system modernization are crucial for Islamic banks to compete with fintech and other digital banks. Investment in human resources and organizational transformation policies are also part of this strategy.

CONCLUSION

Digital transformation in Islamic banking is a strategic necessity in order to remain relevant and competitive in the era of Industry 4.0. Digital technologies such as AI, big data, fintech, and blockchain have opened up opportunities for Islamic banks to improve efficiency, expand financial inclusion, and provide faster services that are tailored to customer needs. However, this process also presents various challenges, such as cybersecurity risks, potential technical errors, low digital literacy, and the risk of sharia non-compliance if technological innovations are not monitored and are not in line with Islamic principles.

Islamic banks must have a comprehensive strategy to overcome these challenges. Strengthening digital risk management, improving the quality of human resources, modernizing IT infrastructure, and collaborating with Islamic fintech are important steps. In addition, the Sharia Supervisory Board (DPS) needs to play a more active role in ensuring that every digital technology and product remains in accordance with sharia contracts and principles. Overall, a well-planned digital transformation that adheres to Islamic principles can strengthen the competitiveness of Islamic banks, improve service quality, and support the sustainability of the Islamic finance sector in Indonesia in the digital era.

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