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Sharia Fintech Transformation to Encourage the Inclusivity Growth of Small and Medium Enterprises in Indonesia

Fira Aulia^{1*}, Muhammad Syukron², Fathul Arifin³, Aris Syafi'i⁴, Hendri Hermawan Adinugraha⁵

^{1,2,3,4,5} Faculty of Islamic Economics and Business, UIN K.H. Abdurrahman Wahid Pekalongan, Indonesia

*Corresponding author(s). E-mail(s): firaaulia@mhs.uingusdur.ac.id Contributing authors: firaaulia@mhs.uingusdur.ac.id, muhammadsyukron@mhs.uingusdur.ac.id, fathularifin@mhs.uingusdur.ac.id, muhammadarissafii@uingusdur.ac.id, hendri.hermawan@uingusdur.ac.id

Abstract

Fintech is a business field that provides financial and banking services through the use of technology. The presence of fintech aims to make it easier for people to access financial products and services, including conducting financial transactions. This study aims to understand how fintech innovation can make a significant contribution to financial access and MSME growth. This research is a descriptive qualitative research. This research is a type of library research conducted through the study of various literature relevant to the research. The results showed that the transformation of Islamic fintech not only provides financial solutions in accordance with Sharia principles, but also plays an important role in increasing the inclusiveness of micro, small and medium enterprises. Policy implications and further development directions are discussed to support the implementation of Islamic fintech as a driver of inclusive growth in Indonesia's MSME sector.

Keywords: Islamic Financial Technology, MSMEs, Inclusive Finance

Introduction

Today's global economy has undergone significant changes, especially with the rapid adoption of information and communication technology. Digital transformation has affected various sectors, including the financial sector. The phenomenon of Financial Technology (Fintech) is one of the tangible manifestations of this change, which not only brings innovation in the provision of financial services, but also has the potential to increase financial inclusivity.

Financial inclusivity is one of the important indicators in a country's economic development. This is because financial inclusion can encourage economic growth, reduce poverty, and improve people's welfare. Based on Bank Indonesia data, financial inclusion in Indonesia in 2023 will reach 83.99%. This figure shows a significant increase compared to 2022 which was 81.13%. The increase in financial inclusion is driven by various factors, one of which is the growth of the fintech industry (Bank Indonesia, 2022).

Fintech is a financial industry that utilizes digital technology. The fintech industry is growing rapidly in Indonesia in recent years. This is supported by factors such as increasing internet penetration, digital economic growth, and conducive regulation. Fintech has the potential to drive the growth of financial inclusion, especially in the Micro, Small and

Medium Enterprises (MSMEs) segment. MSMEs are the backbone of the Indonesian economy which absorbs 97% of the workforce. However, MSMEs still face various challenges, one of which is access to financing (Saripudin, 2023). Other challenges as revealed (Ardiansyah & Sawitri, 2019) is the challenge of product pricing. Moreover (Sutarmin & Susanto, 2017) also stated that ineffective transactions are a problem faced by Micro, Small and Medium Enterprises (MSMEs).

Sharia fintech is emerging as an attractive solution, combining the principles of Islamic finance with technological innovation. Sharia Fintech transformation has the potential to provide inclusive and sustainable solutions for MSMEs in Indonesia. Through the utilization of blockchain technology, artificial intelligence, and other digital platforms, Sharia Fintech can increase MSME access to financing, payments, and other financial services. According to research (Milian et al., 2019) and (Rizvi et al., 2018) The fintech industry offers several advantages that result in factors such as flexibility, security, efficiency, and lower costs when compared to traditional banking services. Thanks to the ease of business operations, Micro, Small and Medium Enterprises (MSMEs), also known as "new" engines of economic growth, can now focus more on starting their operations, which will ultimately increase their market share at the national and even international levels.

However, efforts to transform sharia fintech are inseparable from a number of challenges, including regulatory policies, Islamic financial literacy, and technology integration in MSME business models. Therefore, further investigation is needed to understand the potential, constraints, and impact of sharia fintech transformation on the growth of MSME inclusivity in Indonesia. This study aims to explore the impact of Sharia Fintech transformation on the growth of MSME inclusivity in Indonesia. By analyzing the opportunities and challenges faced by MSMEs in adopting Sharia Fintech, this research is expected to provide a more comprehensive view of the potential contribution of Sharia Fintech in supporting inclusive MSME development.

Literature Review Sharia Fintech

Fiancial technology is a renewable form of technology products in an effort to digitize the financial system. Financial technology refers to a software system or application that combines finance with technology to run automatically (Imani et al., 2023). Fintech offers convenience in financial transaction issues including capital in entrepreneurship. By utilizing existing technological developments can provide transaction efficiency so that they can carry out other activities with more time. The development of the financial system has changed all financial service companies, both banking and non-banking sectors. The financial sector is a cursive aspect in society that needs digital renewal actions to improve fast service with security and protection of customers wisely (Amrullah & Hasan, 2021). Forms of fintech products include peer to peer lending, payment, and also crowfunding by bringing together both parties in conducting transactions such as lending, payments, and also other types of funding (Rohman, 2023).

According to (Bank Indonesia) Financial Technology is acculturation between financial services combined with technological developments to gain efficiency in making payments. according to (Hsueh, 2017) Financial technology is a form of service in the

financial sector with a new model combined through the development of information technology. Pribadiono in (Ansori, 2019) It also defines that fintech is a combination of financial features or the financial sector with modern technology. According to According to Harefa and Kennedy in (Kristianti & Tulenan, 2021) Fintech is the maximum use of technology in improving financial services. Fintech is also expected to increase access to using technology-based financial services in the wider community (Marginingsih, 2021).

The legal basis for the use of fintech is in (Peraturan Bank Indonesia Nomor 19/12/PBI/2017 tentang Penyelenggaraan Teknologi Finansial Indonesia) Article 1 paragraph (1) which explains that fintech is the use of technology in the financial system that produces new products, services, technology, and/or business models and can have an impact on monetary stability, financial system stability, and/or payment system efficiency, smoothness, security and reliability. then the Financial Services Authority (OJK) in (POJK Nomor 13/POJK.02/2018) on Digital Financial Innovation in the Financial Services Sector Article 1 paragraph (1) uses the term Digital Financial Innovation (IKD) to refer to fintech with the definition of updating business processes, business models, and financial instruments that provide new added value in the financial services sector by involving the digital ecosystem.

The development of sharia fintech is in line with the basis of the majority of Indonesian people who are Muslims which provide opportunities in the use of technology to increase economic value in Indonesia (Hiyanti et al., 2020). Fintech plays a role in realizing equity in the economic sector through the development of startups or MSMEs and even becoming one of the government's flagship programs in an effort to create financial inclusion that is beyond reach, useful, and improve the quality of financial services (Virdi, 2022). Sharia fintech began to be in demand by business actors, especially sharia-based ones because in the course of transactions there was no practice of usury, obscurity, gambling, fraud, and avoiding things that were haram or prohibited by Islam (Winarsih, 2022).

Inclusive

The World Bank defines inclusivity as a state in which individuals and businesses have access to useful and affordable financial products and services that can meet their needs, such as financial transactions, loans, mortgages, and insurance that are provided ethically and in a timely manner. Effective access also includes services that are pleasant and unpretentious, at prices that are reasonable for the general public and sustainable for service providers. Financial inclusion is defined as a means to reduce poverty and improve people's welfare.

In Indonesia, based on Presidential Regulation No. 82 of 2016 concerning the National Financial Inclusion Strategy, financial inclusion is defined as a condition where every member of the public has access to a variety of quality, timely, transparent, and affordable foreign exchange services, at varying costs according to individual needs and abilities.

The goal of financial inclusion (also known as inclusive banking) is divided into the following objectives (Muzdalifa et al., 2018):

- 1. Declare an inclusive financial strategy as one of the main strategies in economic development, poverty reduction, income equality, and financial system stability.
- 2. Offer financial products and services that suit the needs of the community.
- 3. Increase public awareness of financial services.
- 4. Expanding public access to financial services.
- 5. Strengthening cooperation between banks, microfinance institutions, and non-bank

- financial institutions.
- 6. Optimizing the use of information and communication technology (ICT) to increase the capacity of financial services.

MSMEs

MSMEs stand for Micro, Small and Medium Enterprises. According to (UU RI No 9 Tahun 1995) Article 1 explains that small business is a small-scale people's economic activity that meets the criteria of net worth or annual sales results and ownership as stipulated in the law, while medium and large enterprises are an economic activity that has net worth criteria or annual sales results greater than net worth and annual sales results of small businesses. According to longenecker in (Suryadi et al., 2018) explained that small and medium enterprises are businesses that have a workforce of less than 100 workers with annual income between 100-500 million. Susana suprapti in (Wenda et al., 2023) defines micro and medium enterprises as business entities with a net worth of 200 million with average annual sales of 1 billion either in the form of individuals or legal entities.

MSMEs play a role in improving community welfare and also as one of the factors that can help in national development. According to todaro and smith in (Aliyah, 2022) that the welfare of the community in the future can be realized through increasing equality of basic needs and also increasing economic scale through the readiness of social preferences of individuals or groups. Ariani suresmiathi in (Aliyah, 2022) stated that MSMEs play a role in reducing unemployment, creating jobs, reducing poverty and improving state welfare. MSMEs are dominated by businesses that still rely on natural resources which do not use too much capital, a workforce that is not encouraged at the education level, and does not require large infrastructure so that this condition makes the role of MSMEs very large in the form of increasing opportunities for job absorption and increasing GDP figures in Indonesia (Sarfiah et al., 2019).

Research Methods

This research uses descriptive analysis combined with a qualitative approach. Descriptive research is used to describe fintech, inclusiveness, and Micro, Small and Medium Enterprises (MSMEs) in Indonesia, while a qualitative approach is used to analyze the role of sharia fintech in increasing the inclusivity of Micro, Small and Medium Enterprises (MSMEs) in Indonesia, as well as problems faced by Micro, Small and Medium Enterprises (MSMEs) in Indonesia that can be minimized through the presence of fintech. This research is a type of library research conducted through a review of various literature relevant to the research. The data in this study were obtained from secondary sources. Data from secondary sources were collected through a review of various literature relevant to the study. The literature in question is in the form of books, scientific journals, mass media news, and the internet that are considered credible and standardized both nationally and internationally. Credible data is then analyzed to identify specific triggers so as to achieve a comprehensive understanding.

Results and Discussion

The Role of Sharia Fintech in Increasing Financial Inclusion in MSMEs in Indonesia

Fintech has a role that cannot be underestimated in various aspects of life. In the economic sector, one type of fintech application in everyday life is the existence of Islamic

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banks that strengthen the Islamic banking system. As one of the leading fintech companies in the economy, Islamic banks need to have various aspects related to meeting the needs of business actors and the economy. These needs are met not only by providing capital loans and money, but also by offering assistance in the form of payment for every good or service transacted. In addition, in today's digital era, Islamic bank operations need to be modernized. The operations of any Islamic bank must use a more modern banking system based on fintech principles. The reason is, fintech offers convenience in various financial transactions. This includes currency exchanges, money market transactions, and other transactions that require the use of banks as intermediaries. With a fintech system, economic actors can carry out various economic activities using only the devices they have.

The development of Fintech in Indonesia is currently experiencing rapid growth. Financial technology or fintech is predicted by the Financial Services Authority (OJK) of the Republic of Indonesia to grow significantly in Indonesia. Financial Services (OJK) as of December 2023, there are 3,183 digital financial services operating in Indonesia. This number has increased rapidly compared to 2022 which only reached 2,500 services. OJK predicts that the number of digital financial services in Indonesia will continue to increase in 2024. This growth is estimated at 20%. As for sharia fibtech, according to data from the Financial Services Authority (OJK) as of December 2023, there are 199 fintech startups registered as sharia fintech in Indonesia. This number has increased rapidly compared to 2022 which only reached 17 startups.

Every policy of Islamic banks is obliged to innovate in line with the rapid advancement of technology. Because of its ability to be accessed anywhere and anytime, Islamic banking must be able to keep up with the demands of the rapidly growing fintech development. If the financial system in Islamic Banking is able to utilize fintech in various economic activities, it is unlikely that the sharia-based banking system will increase in popularity because it is able to meet all the needs of the general public related to modern life and a banking system that is in accordance with religious law. The utilization of fintech in Islamic banking can be achieved by implementing various fintech innovations in various Islamic banking transactions. The use of fintech like this needs to require collaboration with various fintech-based business people who have undergone significant evolution in modern financial management.

Regarding MSMEs, sharia fintech policies cannot be ignored by various banks that use the fintech system in their credit operations. Various fintech-based banks offer incentives such as capital lock-in and money transfers to MSME participants through easily accessible payment systems. This is not far from the efforts of MSMEs in shaping the national economy, so various banks strive to develop the Indonesian economy by supporting MSME business actors in their modern financial businesses. In addition, the government also does not hesitate to support and develop MSMEs through partnerships built by the government as MSME media partners in finding modalities. Based on data from related survey respondents, the growth of MSMEs is very important because in the end it will be able to keep pace with the level of public welfare.

One way to improve MSMEs is through the optimization of sharia-based fintech. This optimization can be done through Islamic Banking, which can provide the necessary support for MSME participants to strengthen their use. According to (Muzdalifa et al., 2018) MSMEs

have access to a number of sharia fintech services, including the following.

1. Capital Loan

A number of sharia-based fintech banks have made various innovations that facilitate the process of applying for capital for MSME participants. MSME actors only need to collect various evidence to complete the capital process, not start guarantee procedures. This online service is reliable and the process is not too complicated.

2. Digital Payment Services

Some sharia fintech companies also provide a more modern and secure digital payment system for MSME players A simple, secure, and compliant payment process will make it easier for customers to complete transactions. Not only that, this will also attract more customers thus benefiting business owners.

3. Financial Regulation Services

Fintech-based sharia companies also provide financial regulation services. This service helps MSME employees in managing their money when carrying out business economic activities. Offers include financial advice without having to pay fees, investment performance management, and loan counseling. This service assists economic actors in exchange rate adjustments.

The role of fintech can help in overcoming problems in MSME management. Fintech can provide convenience in adjusting management patterns according to the needs of problems that occur. Fintech can help MSME management both in the funding system, financial statements between expenses and income and also organizing employees to create maximum productivity.

Every fintech program offered by the bank aims to increase MSMEs and people's purchasing power. If this program can be implemented in Islamic banks, it will be easier for business owners to prepare a sharia-compliant payment system. Therefore, the development of sharia-based fintech needs careful consideration, especially by business actors and government officials, because it can increase the number of people who adhere to sharia and religious teachings. Therefore, sharia fintech users can be said to have a positive impact on MSMEs because modern currency exchange rates do not fluctuate too much.

Micro, Small and Medium Enterprises (MSMEs) also have great potential when combined with the use of renewable technology that will make people compete for entrepreneurship so that they can help improve the level of welfare in meeting the needs of life, both physical and spiritual, and also socio-economic in a region and even a country.

Constraints on Sharia Fintech Implementation in Improving Financial Inclusion in MSMEs in Indonesia

In its implementation, there are several problems related to the development of sharia fintech in MSMEs. Based on the data collected by researchers, there are several factors that inhibit the growth of fintech, including the following.

1. Infrastructure

Fintech-related infrastructure currently only exists in big cities that have many modern money-based banks. But in underdeveloped areas, the use of the internet is still not as

widespread as in big cities, so fintech development cannot be done on a large scale.

2. Human resources (HR)

Currently, the number of human resources who have expertise in the field of sharia fintech operations is still relatively small. This is due to the lack of extensive knowledge about fintech in underdeveloped areas, making fintech innovation difficult.

3. Legislation

In its current operations, banks that rely on fintech are subject to data privacy laws. This is due to the absence of specific regulations related to financial technology, which hampers the ability of business owners to launch various fintech projects. This is the government's full support in developing a financial technology system that can be used by every bank.

4. Lack of Financial Literacy

Regarding the problem of lack of financial literacy, some people in small-scale areas do not fully understand fintech, both its definition, how to use it, its benefits, and its potential impact when conducting fintech-based financial transactions. In this regard, the government and fintech entrepreneurs are making significant efforts to inform and communicate with local communities about fintech.

In addition to the above factors, financial technology has greatly facilitated people in conducting financial transactions. Especially if the fintech in question is integrated with the Islamic economic system. Of course, this will have a positive impact on the growth of MSMEs and ultimately the nation's economy. However, this ease of use carries a number of risks, the most significant of which is the potential for cybercrime. The sensational world of computers makes it easier for hackers to conduct financial transactions, but security in smaller areas still does not achieve truly pure security. Therefore, cooperation from various MSMEs, fintech, and government actors is needed to solve this problem and ensure that the above obstacles do not recur.

Steps that can be taken in increasing fintech knowledge of MSME players are by providing knowledge and training on the use of digital media to business actors. The use of digital media must be done as well as possible, because the convenience offered by digital media also provides vulnerability to crime. MSME business actors need to be given guidance in branding and marketing products made to reach a wider market and also given knowledge of various forms of crime that must be watched out for so that unwanted things do not happen.

The Government's infrastructure to support the digital economy is still quite good. However, regulations from the Government have not been able to keep up with the rapid growth of digital startups and have not been adequately coordinated with various intergovernmental bodies. Another aspect of regulation that needs attention is related to consumer protection in the digital sector, which is still relatively new and has problems with cybercrime and cyberattacks that have not been fully resolved.

Conclusion

The results show that sharia fintech transformation not only provides financial solutions that are in accordance with sharia principles, but also plays an important role in increasing the inclusivity of micro, small and medium enterprises. Policy implications and

further development directions were discussed to support the implementation of sharia fintech as a driver of inclusive growth in the Indonesian MSME sector. Sharia fintech has an important role in increasing financial inclusion in MSMEs in Indonesia. Sharia fintech can provide easy access to funding, digital payment services, and financial arrangements for MSME players. OJK data shows that the development of sharia fintech in Indonesia is very rapid with an increase in the number of sharia fintech startups from 17 in 2022 to 199 in 2023. However, the implementation of sharia fintech for MSMEs still faces a number of obstacles such as limited infrastructure, limited human resources, inadequate regulations, and low public financial literacy. Efforts that can be made include providing digital and financial literacy training to MSMEs, improving infrastructure in disadvantaged areas, compiling comprehensive fintech regulations, and socializing the benefits and procedures for using fintech to the community. Government support in developing the sharia fintech ecosystem is also urgently needed in terms of regulation, coordination between institutions, and consumer protection so that the implementation of sharia fintech can be maximized in increasing MSME financial inclusion in Indonesia.

References

- Aliyah, A. H. (2022). Peran usaha Mikro Kecil dan Menengah (UMKM) Untuk meningkatkan Kesejahteraan Masyarakat. *Jurnal Ilmu Ekonomi*, 3(1).
- Amrullah, A., & Hasan, A. (2021). Fintech Keuangan Syariah dalam Perspektif Konsep Syariah. *Jurnal Ekonomi Dan Perbankan Syariah*, 08(02).
- Ansori, M. (2019). Perkembangan Dan Dampak Financial Technology (Fintech) Terhadap Industri Keuangan Syariah Di Jawa Tengah. *Jurnal Studi Keislaman, V ol. 5 No*(1), 32–45.
- Ardiansyah, & Sawitri. (2019). Analysis of Factors that Influence The Use of Social Media by Small and Medium Enterprises. *IEEE_SEM*, 7(11), 32–41.
- Bank Indonesia. (2018). Mengenal Financial Teknologi. Edukasi Bank Indonesia.
- Bank Indonesia. (2022). Sinergi Dan Inovasi Kebijakan Untuk Menjaga Stabilitas Sistem Keuangan Dan Mendukung Pertumbuhan Ekonomi Nasional.
- BPHN. (1995). Undang-Undang Republik Indonesia Nomor 1 Tahun 1995 Tentang Usaha Kecil. *Undang-Undang RI*, 1–29.
- Fajri, M. Z. N., bin Lahuri, S., & Umam, K. (2023). Mapping Islamic Fintech Research: A Bibliometric Analysis.
- Hiyanti, H., Nugroho, L., Sukmadilaga, C., & Fitrijanti, T. (2020). Peluang dan Tantangan Fintech (Financial Technology) Syariah di Indonesia. *Jurnal Ilmiah Ekonomi Islam*, *5*(3), 326–333. https://doi.org/10.29040/jiei.v5i3.578
- Imani, S., Hasanah, M., Atikah, I., Kartawinata, B. R., Jarullah, Riyadi, M. H., Qomaruddin, M., Hafidzh, M., Mahriani, E., Febriyani, D., Nugroho, L., Sari, N., Yetti, F., & Febrianty, M. L. (2023). *Fintech Syariah*. Widina Bhakti Persada Bandung.
- Indonesia, B. (2017). Peraturan Bank Indonesia Nomor 19/12/PBI/2017 tentang Penyelenggaraan Teknologi Finansial. *Bank Indonesia*, 1.
- Kristianti, I., & Tulenan, M. V. (2021). Dampak financial technology terhadap kinerja keuangan perbankan. *Kinerja*, *18*(1), 57–65.

- Marginingsih, R. (2021). Financial Technology (Fintech) Dalam Inklusi Keuangan Nasional di Masa Pandemi Covid-19. *Moneter Jurnal Akuntansi Dan Keuangan, 8*(1), 56–64. https://doi.org/10.31294/moneter.v8i1.9903
- Milian, Spinola, & de Carvalho, M. M. (2019). Fintechs: A Literature Review and Research Agenda. In *Electronic Commerce Research and Applications* (p. 34). https://doi.org/doi:10.1016/j.elerap.2019.100833.
- Muzdalifa, Irma, Rahma, Auliaa, I., Novalia, & Gita, B. (2018). Peran Fintech dalam Meningkatkan Keuangan Inklusif pada UMKM di Indonesia (Pendekatan Keuangan Syariah). *Jurnal Masharif Al_Syariah: Jurnal Ekonomi Dan Perbankan Syariah*, 3(1). https://doi.org/https://doi.org/10.30651/jms.v3i1.16 18.
- Otoritas Jasa Keuangan. (2018). Peraturan OJK No. 13/POJK.02/2018 Tentang Inovasi Digital di Sektor Jasa Keuangan. *Otoritas Jasa Keuangan*, 1–29.
- Rizvi, Naqvi, & Tanveer. (2018). Is Pakistan Ready to Embrace Fintech Innovation? *The Lahore Journal of Economics*, 23(2), 152–182.
- Rohman, A. N. (2023). Urgensi Pengaturan Fintech Lending Syariah Di Indonesia: Analisis Perlindungan Hukum Bagi Pengguna Layanan. *Jurnal Legislasi Indonesia*, 20(1), 16. https://doi.org/10.54629/jli.v20i1.991
- Sarfiah, S. N., Atmaja, H. E., & Verawati, D. M. (2019). UMKM Sebagai Pillar Membangun Ekonomi Bangsa. *Jurnal REP (Riset Ekonomi Pembangunan)*, 4(2), 137–146.
- Saripudin. (2023). Upaya Fintech Syariah Mendorong Akselerasi Pertumbuhan UMKM di Indonesia. *Jurnal Ilmiah Ekonomi Islam*, *5*(3), 326–333.
- Suryadi, Syahdanur, & Suryani, S. (2018). Analisis Pengembangan Usaha Mikro Kecil dan Menengah (UMKM) di Kabupaten Bengkalis Riau. *Jurnal Ekonomi KIAT*, 29(1), 1–10.
- Sutarmin, & Susanto. (2017). Potensi Pengembangan Transaksi Non Tunai di Indonesia. Sustainable Competitive Advantage (SCA) FEB UNSOED, 7(1), 292–302.
- Virdi, I. (2022). Kajian Hukum Terhadap Pengembangan Fintech Syariah Di Indonesia. *Jurnal Hukum & Pembangunan*, 52(1), 3–31.
- Wenda, P., Tatimu, V., & Sambul, S. A. P. (2023). Pengaruh Pertumbuhan Usaha Mikro Kecil Terhadap Pertumbuhan Ekonomi Di Desa Wenam Kecamatan Pirime Kabupaten Lani Jaya Papua. *Productivity*, 4(4), 1–23.
- Winarsih, T. (2022). Memaknai Perkembangan Fintech Syariah melalui Sistem Akad Syariah. *POPULER: Jurnal Penelitian Mahasiswa*, 1(3), 130–142.
- Yang, Y.-L., Hsueh, H.-W., Huang, M.-H., Cho, T.-Y., & Kishi, Y. (2017). Effect of Fintech on the Productivity in the Taiwan Banking Industry. *International Journal of E-Education, e-Business, e-Management and e-Learning, 7*(4), 255–263. https://doi.org/10.17706/ijeeee.2017.7.4.255-263