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Determinant Factor Analysis of Financial Technology Adoption Among Halal Sector Microenterprises in Indonesia

Abrista Devi[1], Irman Firmansyah[2*], Arif Sapta Yuniarto[3], Baharom Abdul Hamid[4], M Kholil Nawawi[5]

[1,5]Ibn Khaldun University, Bogor, Indonesia,
[2]Faculty of Economics and Business, Siliwangi University, Tasikmalaya, Indonesia
[3]Ahmad Dahlan University, Yogyakarta, Indonesia
[4]INCEIF University, Kuala Lumpur, Malaysia

Abstract
This study offers an empirical analysis of the factors that influence the customer attitudes towards the adoption of Financial Technology services within the Micro, Small, and Medium Enterprises (MSMEs) sector. Using Survey method, a total of 240 respondents from MSMEs were included in the sample for this study. These respondents were selected from 16 different areas located in five typical provinces in Indonesia, namely Aceh, West Sumatera, Jakarta, West Java, and East Java. This research investigates the impact of several key factors on the consumer attitudes of MSMEs towards the adoption of FinTech. These factors include Perceived Ease of Use, Digital Literacy, Risk Perception, Infrastructure, Entrepreneurial Spirit, and Perceived Usefulness. This paper utilized the Structural Equation Modelling (SEM) technique to analyse various measurement, observations, and a hybrid model. The results of the study suggest that within the specific domain of halal sector MSMEs in Indonesia, there is no significant impact of parameters such as digital finance literacy, perceived risk, and perceived utility on the adoption of digital financial services. Nevertheless, it has been observed that the perceived ease of use, the presence of adequate infrastructure, and the presence of an entrepreneurial mindset have been found to have a positive and statistically significant influence on the adoption of financial technology services among MSMEs. This study also offers theoretical and practical implications for key stakeholders seeking to enhance the utilization of financial technology services among MSMEs in Indonesia.

Keywords: *Digital Finance Services; Financial Technology; Micro, Small, and Medium Enterprises.*

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***Corresponding author:**
irmanfirmansyah@unsil.ac.id

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1. Introduction

Today, the role of digital technology can be found in almost every part of the world, even the use of digital technologies such as smart phones give its users the opportunity to be able to access financial services faster and more efficiently, at an affordable cost, according to the needs of its users, and easy to use, especially for those belonging to the group of underserved people (Romanova & Kudinska, 2016; Stulz, 2019). Users of e-money or digital wallets, for example, will feel safer in transactions since they do not need to carry cash. Also, since there are electronic records that can be used as proof/receipts of payment, transactions will be more transparent (Vergara & Agudo, 2021). Therefore, digital-based financial transactions do not need extra expenditures such as waste papers or facility rent (Elsaid, 2021). Yet, it should be acknowledged that digital banking is prone to security threats such as cyber security, fraud, data privacy risk, big data analytics discrimination, and etc (Chava & Paradkar, 2018).

Additionally, Fintech has become the preferred option for many small and medium-sized firms (SMEs) across a wide range of industries, including halal food sector. Fintech has the potential to alter the way SMEs access, manage, and generate income. This is due to the emergence of fintech technologies that provide long-term prospects for the SMEs sector in addressing restrictions such as loan availability and financial inclusion. Fintech also offers cost-cutting and time-saving options for SMEs of food business sector, such as online payments and automated financial administration. By the acceleration of transaction processes and the reduction of administrative costs, fintech can make it possible for SMEs to focus more on the development of the firm and the enhancement of product quality. Moreover, Also, the commercial and financial activities of SMEs are simplified as a result of the services offered by Fintech, which make them more efficient. Fintech security and dependability ensure that data and financial transactions are safe and protected. As a result, in order to pique SMEs's attention, Fintech must be able to deliver extra features and helpful innovations for halal business sector, such as inventory management, accounting, and data analysis (Ernst & Young, 2021; World-Bank-Group, 2020).

As compared to other Asian nations, Indonesia has the highest proportion of small and medium-sized enterprises (SMEs), as demonstrated by the country's 97% SME share of employment, 60.3% PME contribution to GDP, and 15.7% SME share of exports in 2013 (APEC, 2013). In term of Halal market, Indonesia is a home to the world's biggest domestic halal economic market, which is driven by the world's largest Muslim population, which is projected to number 229.6 million in the year 2020. In 2020, this population's domestic expenditure on halal economy items and services was $184 billion, and it is anticipated that this spending would expand at a compound annual growth rate of 14.96%, bringing the total to $281.6 billion by 2025. Meanwhile, in term of Halal food sector, at $135 billion consumer spend in 2020, making it as a larger market segment compare to Muslim fashion, halal pharma and cosmetics, media, and halal tourism (Indonesia Halal Lifestyle Center et al., 2021). This characteristic solely makes Indonesia a promising market for fintech companies in delivering financial services to Halal SMEs sector.

Yet, many SMEs players still lack understanding of financial literacy, fintech applications, and halal product certification, which all present challenges in the actual use of fintech for SMEs (Rosa et al., 2022; Ali et al., 2020). SMEs face a number of digital literacy barriers, including a lack of awareness and barriers surrounding the impact of digital transformation on business growth and customer experience, lack of access to digital infrastructure, a shortage of understanding of digital technologies and lack of skills needed for digital adoption (Ollerenshaw et al., 2021; Puro et al., 2022). The obstacles could cause SMEs to lose an opportunity because of their inability to use digital media effectively (Islami et al., 2021). Digital literacy is the ability of users in understanding and using fintech applications, conducting financial transactions online, choosing types of fintech products and services, and managing the risks associated with the use of fintech (Bappebti, 2020; OJK, 2018; Ali et al., 2019).

SMEs have managerial competency and digital literacy difficulties. Financial constraints may prevent SMEs from investing in management training and development. It's a major concern where SME operational issues include fraud, poor working conditions, and a lack of social infrastructure. Increased competition, the ability to respond to quickly shifting market needs, technological advancements, and capacity restrictions are some additional concerns. Other problems, such as insufficient institutional capacity, weak management skills, and a lack of competent training, might also be contributors to SME's limited managerial capacities. The capacity of SMEs to expand and compete in the market may both be hindered by such constraints. Therefore, it is important to address these challenges through targeted policies that promote greater access to financial resources, training programmes for managers, and support for the development of social infrastructure. In addition, it is important to recognise the importance of addressing these challenges in a timely manner (Islam & Hossain, 2018; Maheshkar & Soni, 2021; Yoshino, 2016).

With FinTech, it is expected that we can address these above-mentioned issues. As a result, the focus of this article is on the extensive use of FinTech for halal MSMEs sector by investigating some important determinant factors of FinTech adoption for halal business sector in Indonesia. Confidently to say that this is the first attempt to conduct a comprehensive policy research in the area of finance digitalization to promote the halal business value chain in Indonesia. The degree to which halal MSMEs sector is driven to adopt FinTech may be gauged by the organization's digital literacy, perceived ease of use, perception of risk and security, technical infrastructure, entrepreneurial spirit, and perceived usefulness.

2. Literature Review

2.1. Technology Acceptance Model (TAM)

There is increasing interest in studying technology adoption at the Micro, Small, and Medium Enterprise (MSMEs) scale, with the Technology Acceptance Model being one of the most relevant frameworks for understanding this phenomenon. TAM, which was developed by Davis focuses on two key dimensions, namely Perceived Usefulness and Perceived Ease of Use, which have an impact on user intentions to adopt technology (Davis, 1989). In the context of MSMEs, TAM has been used as a tool to analyse why MSMEs adopt technology, especially financial technology (digital finance). Previous research such as that conducted by Xiang *et al* (2021) on MSMEs in China, and Firmansyah *et al* (2022) who reviewed literature review studies, have provided insight into the factors that influence FinTech adoption by MSMEs. These findings provide important information about the importance of perceptions of usability and ease of use in stimulating the intention of MSMEs to adopt innovative financial technology solutions. However, there is a need to further explore more specific contexts and consider additional factors that may influence the use of TAM in MSMEs.

Therefore, this study explores the use of TAM in MSMEs of halal sector in Indonesia with a focus on the use of digital financial services. Through this in-depth analysis, this research is expected able to provide richer and more relevant insights for the development of better technology adoption strategies for MSMEs in the halal sector in Indonesia.

2.2. Theory of Planned Behaviour

Theory of Planned Behaviour has become an influential framework in understanding the factors that influence individual decisions and actions, including in the context of Micro, Small and Medium Enterprises (MSMEs). TPB, which was developed by Ajzen (1991), emphasizes three main factors, namely Attitude, Subjective Norm, and Perceived Behavioural Control, which together form Intention and finally real behaviour. Within the MSME framework, SDGs have become a relevant instrument for understanding how MSMEs take certain steps, such as the adoption of new technologies. Previous studies, such as those conducted by (Asad and Aftab, 2021), have applied TPB

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to analyse the factors that influence MSMEs in adopting innovations, responding to market changes, or even in overcoming certain obstacles on a smaller scale. Although TPB has provided valuable insights, this research aims to bring a new dimension in the use of TPB in the halal sector MSMEs, with a focus on the motivations for using digital finance. By analysing more deeply and integrating broader contextual factors, this research hopes to make a more comprehensive contribution in understanding the decisions and actions of MSMEs in the halal sector in facing business competition.

2.3. The Level of Digital Literacy

It may be simpler for SMEs with greater levels of digital literacy to access and apply digital or Sharia-based financial technology to increase the efficiency and productivity of their businesses. Several studies have shown a favourable correlation between high levels of digital literacy and the use of financial technologies by SMEs. For instance, study carried out in Nigeria by (Nugraha et al., 2022) indicated that the degree of digital literacy had a favourable and substantial influence on the adoption of fintech. This was the case even if digital literacy was not the only factor. In a similar vein, research conducted in Pakistan by Setiawan et al. (2021) demonstrates that high levels of digital literacy have a beneficial effect on the use of fintech by SMEs. The hypothesis could be phrased as follows:

H1: The level of digital literacy has a positive impact on the use of Islamic fintech by Halal food SMEs

2.4. The Perceived Ease of Use

The ease of use of digital finance or financial technology is critical in determining their adoption. The perceived ease of use of digital or financial technology influences user behaviour, according to the Technological Acceptance Model (TAM). The more user-friendly digital or financial technologies are, the more likely people are to embrace and actively utilise them.

The more intuitive and easier it is for SMEs to utilise financial technology or fintech, the more likely they will include it into their commercial endeavours, particularly those governed by Shariah. Numerous studies have shown a favourable correlation between the user-friendliness of digital or fintech and the rate at which SMEs adopt such technologies. For instance, study carried out in China by Nugraha et al. (2022) discovered that the user-friendliness of fintech had a favourable and substantial influence on the uptake of fintech by SMEs. Similarly, Syah & Karen (2022) and Nangin et al. (2020) demonstrated that the convenience with which technology may be used has a beneficial influence on SMEs' adoption of fintech. The facility in the use of fintech is correlated positively with SMEs' adoption and use of such technology. One possible formulation of the hypothesis is as follows:

H2: The perceived ease of use has a positive impact on the use of Islamic fintech by Halal food SMEs

2.5. Risk and Security Perception

While deciding whether or not to employ digital or Islamic fintech, one's sense of risk and security might play a significant role. Some research suggests that SMEs are less inclined to employ fintech technology when they perceive a greater degree of uncertainty, risk or insecurity associated with doing so. Numerous studies have shown a negative correlation between SME's fintech adoption and their views of risk and security. Jangir et al. (2023) conducted a study and discovered that SME's views of risk and security had a substantial and negative effect on their intent to utilise fintech. Afif et al. (2021) and Ashraf 92021) investigated that Indonesia's SMEs reach similar conclusions, finding that security worries discourage their technology usage. SMEs' adoption of Islamic fintech is predicted to be hindered by concerns about safety and risk. One possible formulation of the hypothesis is as follows:

H3: The perception of risk and security has a negative impact on the use of Islamic fintech by Halal food SMEs

2.6. Technology Infrastructure

Adequate technology infrastructure is crucial in supporting the use of digital or fintech technologies in an organization or business. A strong technological infrastructure can provide easy, fast, and reliable access to digital technologies and ensure the security and stability of the technology systems in use. This will simplify the process of using fintech, improve business efficiency, and provide a better customer experience. SME's adoption of fintech is significantly influenced by a sufficient technical infrastructure. Nugraha et al. (2022) confirmed that SMEs with fast, dependable internet connectivity and suitable technical infrastructure are more likely to use fintech in their business operations. Related to this, it has been previously studied by Mhlane (2007) that infrastructure supports technology implementation.

Overall, the presence of an acceptable technological infrastructure substantially influences the degree to which an organisation, company, or individual can use fintech to support their financial transaction. Therefore, companies or organizations need to pay attention to investing in adequate technology infrastructure as one of the important factors in increasing the adoption of Islamic fintech and increasing business efficiency. The hypothesis could be phrased as follows:

H4: The technology infrastructure has a positive impact on the use of Islamic fintech by Halal food SMEs

2.7. Entrepreneurial Spirit

When it comes to implementing fintech by SMEs, the "soul" of entrepreneurs is seen as an essential component. This is due to the fact that the spirit of entrepreneurship may impact both the attitudes and views of technology and innovation held by entrepreneurs, as well as the incentive to embrace such practises within their own businesses. According to the Planned Behavior Theory (TPB), the intention to accept new technology is determined by attitude, subjective norm, and control of behaviour. Khan et al. (2020) discovered that entrepreneurial spirit has a beneficial impact on entrepreneur intention to use fintech technology by way of subjective norms, behavioural control, and attitudes. In addition, a different study that was conducted by the Karimi & Walter (2021) found that business owners who have a strong spirit of entrepreneurship tend to be more open to innovation and new technologies, including fintech, and are better able to optimise such technologies to support the expansion of their businesses.

It is possible to draw the following conclusion from the research findings: the entrepreneurial mindset plays a significant part in the implementation of fintech by SMEs. Those with a strong entrepreneurial spirit are often more receptive to innovation and new technology, and they are also better able to maximise the use of such technologies to assist the expansion of their businesses. The hypothesis may be phrased as follows:

H5: Entrepreneurial spirit has a positive impact on the use of Islamic fintech by Halal food SMEs

2.8. Managerial Skill

Management skills are an important factor influencing SMEs' use of fintech. An entrepreneur with good managerial skills will be able to understand and leverage fintech technologies optimally to improve their business performance. According to research conducted by Wee et al. (2022), leadership skills, such as the ability to influence, motivate, and provide vision, play an important role in SMEs' adoption of BI and analytics. So that managerial skills can assist entrepreneurs in managing and utilizing fintech effectively and efficiently. Similar research results were also found by Coffie et al. (2020) found that managerial ability influences the adoption of payment technology in SMEs.

This study is supported by the notion of managing skills, which claims that excellent management skills may increase the efficacy and efficiency of using firm resources, including fintech

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technology. According to the study and theoretical findings, SME's application of Islamic fintech is expected to be positively impacted by management skills. Then, the hypothesis is stating as follows: H6: Managerial skill has a positive impact on the use of Islamic fintech by Halal food SMEs

3. Methodology

To address the research question, Structural Equation Modelling (SEM) is employed in this work. In order to make the calculation and analysis of SEM more accessible, Joreskog & Sorbom (1984) developed the user-friendly and interactive LISREL programme (Feng, 2018). This research identifies five exogenous latent variables, namely, level of digital literacy, ease of use of digital technology, risk and security perception, technological infrastructure, and entrepreneurial spirit; and two endogenic latent variables (Perceived Usefulness and FinTech adoption). The SEM model used in this analysis is shown in Figure 1.

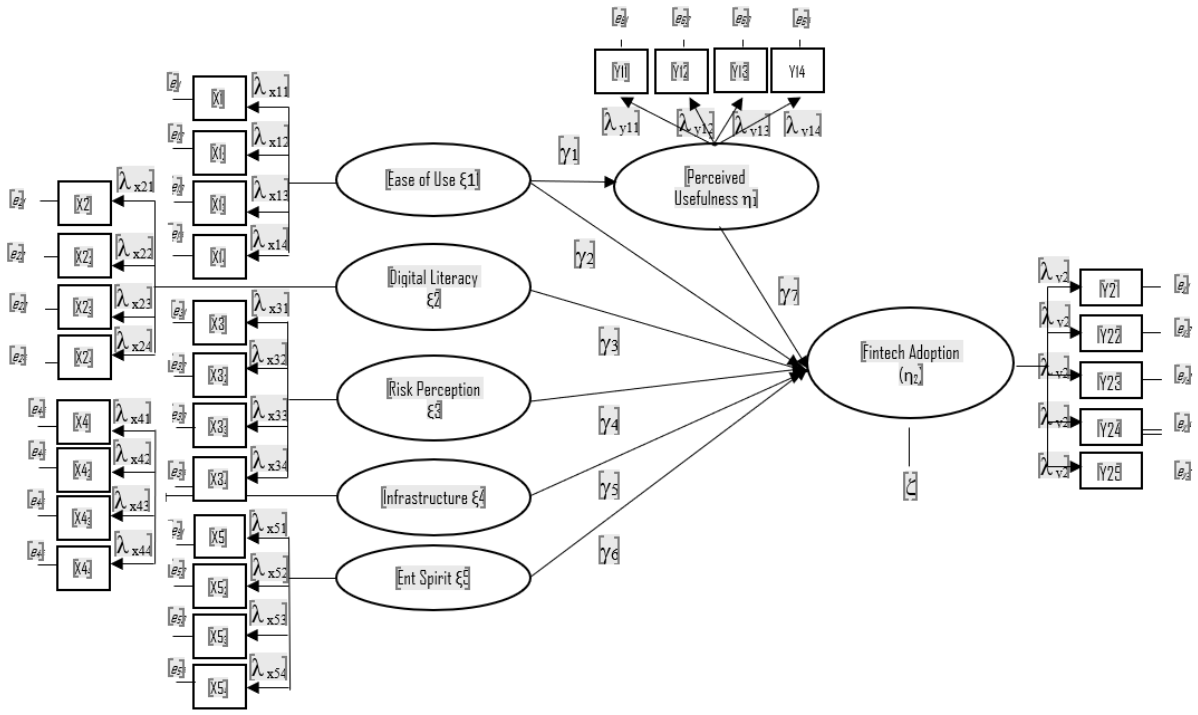

Figure 1. SEM Hybrid Model

Explanation:

ξ_1 = Perceived Ease of Use
ξ_2 = Digital Literacy
ξ_3 = Perceived Risk
ξ_4 = Infrastructure
ξ_5 = Entrepreneurial Spirit
η_1 = Perceived Usefulness
η_2 = FinTech Adoption
λ = Effect between endogenous and exogenous latent variables toward their indicators
γ = Direct Effect exogenous latent variables toward endogenous latent variables
ε = Direct Effect endogenous latent variables toward endogenous latent variables
e = Error of endogenous and exogenous indicators
δ = Error of exogenous indicators

ζ = Error of the equation

The model was constructed using findings from prior study investigations that are hypothesized to impact an individual's behaviour in the adoption of digital financial services in Indonesia. The subsequent content presents the operational definitions and measurement model indicators pertaining to each latent variable.

Table 1. Operational Variables and Measurements

No	Indicators	Statements	Sources
Digital Literacy: Digital financial literacy encompasses the aptitude to proficiently administer personal funds, exercise informed judgment in financial matters, and leverage digital tools and technologies to traverse the contemporary financial environment.			
DL1	Ability to download and install	Rate your ability to download and install a new mobile application!	(Prete, 2022; Siddik et al., 2023)
DL2	Ability to use	Rate your ability to use digital finance account!	
DL3	Risk Awareness	Rate your digital finance risk awareness!	
DL4	Benefit Awareness	Rate your digital finance benefit awareness!	
Perceived Ease of Use: The level of an individual's belief regarding the ease of using a specific technology.			
PEU1	Easy to learn	I find digital finance services easy to learn.	(Benlian & Hess, 2011; Jain & Raman, 2022; Kim et al., 2008)
PEU2	Easy to use	I find digital finance services easy to use.	
PEU3	Easy to navigate	I find digital finance services easy to navigate.	
PEU4	Easy to remember	I find digital finance services easy to remember.	
Risk Perception: A broad term that includes different types of risks such as financial risk, performance risk, and psychological risk, social risk and privacy risk affecting the adoption of DFS.			
PR1	Vulnerable to cyberattacks	Do you think digital finance services are vulnerable to cyberattacks?	(Featherman & Pavlou, 2003; Jain & Raman, 2022)
PR2	Lack of regulation	Do you think digital finance services are not regulated enough?	
PR3	Lack of transparency	Do you think digital finance services are not transparent enough?	
PR4	Lack of security	Do you think digital finance services are not secure enough?	
Infrastructure: The extent to which an individual perceives that the organizational and technical infrastructure is providing support for the use of the system.			

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No	Indicators	Statements	Sources
I1	Reliable and Affordable internet access	Is there reliable and affordable internet access in your area?	(Al-Gahtani et al., 2007; J. Wang, 2023)
I2	Reliable and Affordable devices	Do you use a smartphone or other digital finance device?	
I3	Available in-home language	Are there digital finance services that are available in your language?	
I4	Meet the needs of people	Are there digital finance services that are designed to meet the needs of people in your community?	
Entrepreneurial Spirit: Refers to the unique characteristics and attributes of entrepreneurs who aspire to seek and create new opportunities, take calculated risks, and alter the world through their entrepreneurial endeavours			
ES1	Search of new business opportunities	I am constantly in search of new business opportunities, whereas digital finance can be optimized	(Aisaiti et al., 2019; Muathe et al., 2020)
ES2	Risk takers	I am willing to take risks to pursue new business opportunities by optimizing digital finance	
ES3	Passionate	I am passionate about the potential of digital finance to improve people's lives	
ES4	Confident	I am confident in my ability to succeed in work and business especially by optimizing the use of digital finance	
Perceived Usefulness: The level of an individual's conviction regarding the potential improvement in job performance through the utilization of a specific technology.			
PU1	Save more money	I believe that digital finance services can help me save money	(Benlian & Hess, 2011; Jain & Raman, 2022; Kim et al., 2008)
PU2	Financial management improvement	Digital finance services may improve my financial management	
PU3	Easier to access financial product	Digital finance services make me easier to access financial products and services.	
PU4	Improve financial decisions	Digital finance services may improve my financial decisions	
Financial Technology Adoption: Customers' Behavioral Intention to adopt digital financial services			
DFS1	More frequently to use	I would frequently use digital finance services for financial transactions	(Cheng et al., 2006; Jain & Raman, 2022)
DFS2	Recommend to others	I would strongly recommend others to use DFS	
DFS3	Continuing to use	I anticipate continuing to use DFS to manage my financial transactions in the future	

No	Indicators	Statements	Sources
DFS4	Intend to use	I intend to use DFS for quick and easy access to my financial information	

The instrument questionnaire will be distributed to 240 samples (this is considered as the adequate number of minimum sampling for SEM) in 16 cities of 5 representative provinces in Indonesia (DKI Jakarta, East Java [*Surabaya, Sidoarjo, and Malang*], West Sumatera [*Kota Padang and Kota Pariaman*], West Java [T*asikmalaya, Bandung, Ciamis, Pangandaran, Banjar, Kuningan, Majalengka, Bogor, Bekasi, Depok*], and Aceh [*Banda Aceh and Aceh Besar*]) to learn about the public's perceptions of the determinant factors that influence their inclusion in digital finance. These provinces were chosen because they are among the top five provinces in terms of Islamic financial inclusion index in Indonesia. In the meanwhile, the areas were selected because of the significant concentration of MSMEs.

There are some list of the various steps that are involved in the SEM procedure. These steps are as follows: 1) model specification; 2) model identification; 3) Confirmatory Factor Analysis (CFA) for model measurement (involving, programming, estimation, test and modification, as well as re-specification if required); 4) Path Analysis for structural model (involving, programming, estimation, test and modification; as well as re-specification if necessary); and 5) interpretation and communication of the results (Joreskog and Sorbom, 1984; Tanjung and Devi, 2018).

4. Results And Discussion

4.1 An examination of the Demographic Characteristics of Respondents and their attitudes towards the use of Digital Financial Services

We have conducted a randomly survey of 240 halal sector MSMEs at 16 areas in 5 representative provinces with the highest financial inclusion index in Indonesia. To ensure the inclusion of eligible participants in this study, specifically those who operate businesses in the halal sector and fall within the category of Micro, Small, and Medium Enterprises (MSMEs), we initially inquire about the nature of their business activities, specifically if they engage in the sale of products or services that are deemed impermissible in Islam. Furthermore, we endeavored to inquire about the financial sources or funds that they obtained. However, we believe that including conventional capital as one of the criteria for screening in the halal sector is not an adequate decision. It is important to note that in Indonesia, there is currently a lack of regulatory requirements pertaining to the classification of MSMEs as halal or non-halal. In essence, it can be observed that the business sector aligns with Sharia principles, although the compatibility of the financing/credit sources obtained by MSMEs remain unclear.

The respondents who were interviewed were divided into two (2), namely respondents who fall into the category of users of Digital Financial Services, and the category of non-users of Digital Financial Services. We interviewed these two groups of MSME respondents in the halal sector to obtain their perceptions about the use of Digital Financial Services and their attitudes and desires to adopt Digital Financial Services specifically FinTech services in Indonesia.

The descriptive statistics of the respondents' demographic characteristics were analyzed and presented in table 3. Of the 240 respondents, 45.8% from West Java provinces, 25% from East Java, 12.1% from West Sumatera, 8.8% from Aceh and 8.3% from DKI Jakarta. The study involved a random selection of respondents from each province, with a total of five provinces being chosen to reflect the larger population of 33 provinces in Indonesia. The findings indicate that a significant proportion of MSMEs surveyed, specifically 81.7%, reported an annual sales income of less than or equal to IDR 2 billion. This statement elucidates that the majority of MSMEs in Indonesia are

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categorized as micro and ultra-micro enterprises. Based on data provided by the Ministry of Cooperatives and SMEs, it is observed that micro enterprises in Indonesia constitute 98.67% of the overall MSMEs in the country. In contrast, micro enterprises represent a mere 1.22% of the total, while medium-sized enterprises account for a minimal 0.1%[1]. The dominance of micro/ultra-micro enterprises with an annual sales income of less than IDR 2 billion is a natural occurrence in the context of data collecting.

Additional data regarding the demographics of the participants indicates that a majority of individuals who took part in this investigation were of the female gender. Given the prevailing circumstances in Indonesia, it is evident that women have emerged as the primary participants in MSMEs. According to the statistics provided by the Indonesian Central Bureau of Statistics (BPS) for the year 2021, it is apparent that women constitute 64.5% of the overall MSMEs in Indonesia. This translates to almost 37 million MSMEs, which possess a cumulative worth amounting to USD 135 billion[2]. This finding demonstrates the significant and critical contribution of women to the advancement of the MSME sector in Indonesia. In addition, approximately 73.8% of MSMEs fall within the age range of 30-50 years, indicating that a significant proportion of these enterprises are comprised of individuals in their productive years. It is noteworthy that a significant proportion of respondents from the MSMEs has educational backgrounds ranging from high school to college levels. This finding demonstrates that those who have obtained a university degree may not necessarily be actively seeking employment. Occasionally, individuals exhibit self-reliance and autonomy, which subsequently enables them to generate employment opportunities for others upon completion of their education. Presently, numerous educational establishments and institutes of higher learning have been prioritizing the provision of entrepreneurship training or mentorship, aiming to equip graduates not only for industry entry but also to enable them to generate employment opportunities within the community (Hakiem *et al*, 2023; Mok, 2012; Do Nguyen and Nguyen, 2023). Table 2 comprises the demography information of respondents in details.

Table 2. Demography Information of respondents

Demography	Category	Percentage
Province	Aceh	8.8%
	West Sumatera	12.1%
	DKI Jakarta	8.3%
	West Java	45.8%
	East Java	25%
Yearly Income	≤ Rp 2 Billion	81.7%
	Rp 15.1 Billion - Rp 50 Billion	14.2%
	Rp 2.1 Billion - Rp 15 Billion	4.2%
Gender	Male	37.1%
	Female	62.9%
Age	<30 Tahun	17.5%
	30-50 Tahun	73.8%
	>50 Tahun	8.8%
Residence	Rural	72.9%
	Urban	27.1%
Religion	Islam	99.2%

[1] https://dataindonesia.id/industri-perdagangan/detail/berapa-jumlah-umkm-di-indonesia
[2] BPS.go.id (UMKM, 2021)

Demography	Category	Percentage
	Non-Islam	2%
Education	Not having proper education	0
	Elementary school	9.2%
	Junior high school	12.5%
	Senior high school	35.8%
	Diploma	6.3%
	Graduate/Master/Doctoral	36.3%
Marital Status	Single	13.8%
	Married	80.4%
	Divorced	2.9%
	Widowed	2.9%

Of the 240 MSMEs participants that were surveyed, there are 46%, operate within the food and beverage sector. According to the BPS, it is projected that the quantity of MSMEs operating within the food industry will reach a total of 1.51 million business units by the year 2021[3]. This observation indicates that the food and beverage sector is prominently represented within the MSME business sector, with a notable prevalence in various locations. We also sought information regarding the ownership of the periodic financial reports of the MSMEs. It was revealed that majority of MSMEs (47.9%), possessed financial reports. This finding also substantiates the observed progress in the financial literacy skills of MSME participants. There has been a growing recognition of the importance of financial management, and in addition, the implementation of regular financial reporting can also facilitate the ability of MSMEs to access financial institutions (Ali et al., 2020). Finally, we inquired about the ownership of halal certification. While the food and beverage industry included the largest proportion of respondents, it is noteworthy that a significant portion (51.70%) indicated a lack of halal certification for their products. Furthermore, a notable percentage (15.40%) reported being amid pursuing halal certifications. There exist several factors contributing to the absence or delayed acquisition of halal certification among these MSMEs. These factors encompass the lack of necessity for halal certification in their product offerings, inadequate comprehension of the halal certification application process, financial constraints impeding the pursuit of certification, and a notable lack of awareness among certain respondents regarding the requirement for halal certification for their products.

Table 3. An overview of the business sector, financial reporting, and the ownership of Halal certification.

Business Sector		Periodic Financial Report	
Grocery store	15,80%	Yes	47,90%
Food and beverage	46,20%	No	51,70%
Fashion and cosmetic	11,20%	**Halal Certification Ownership**	
Drugs & Farmacy	0,80%	Yes	32,90%
Handicraft	5%		
Travel and tourism	0,80%	We have applied	
Transportation	0,40%	halal certification to	15,40%

[3] BPS.go.id (UMKM, 2021)

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Services	15,40%	legal body (on process)	
Others	4,40%	No	51,70%

Last but not least, we endeavored to conduct a survey to examine the behavior and activities of MSMEs in relation to the utilization of digital finance services. The MSME respondents were categorized into three distinct groups: (1) those who had never utilized Digital Financial Services (*prior to adoption*), (2) individuals who were new to using Digital Financial Services for less than one year (*initial adoption*) and (3) those who had already been utilizing Digital Financial Services for more than one year (*continuos use*). The data shown in Figure 2 indicates that a majority proportion of the individuals surveyed had not utilized Digital Financial Services for conducting their financial activities, with a majority comprising 44.20% of the respondents. When inquiring about the potential adoption of Digital Financial Services (DFS) in the future, the majority of respondents expressed their intention to utilize DFS as a means to enhance their access to financial services. It can be argued that a majority of the participants in the study had utilized DFS. Specifically, 35.40% of the respondents reported using these services for a duration of less than 1 year, while the remaining 20.40% indicated a usage period beyond 1 year.

According to the findings derived from our observations, it has been seen that certain MSMEs have adopted digital financial services in recent times. This adoption can be attributed to the provision of financial assistance by banks and microfinance institutions to these enterprises. In Aceh, a significant proportion of MSMEs we encountered were found to have established partnerships with Sharia-compliant financial institutions, including BSI (Bank Syariah Indonesia) and Bank Aceh. On addition to receiving financing, MSMEs are also instructed on the utilization of QR code services for payment transactions. The provision of e-banking service facilities is of utmost importance when bringing DFS to this halal sectors.

Moreover, within the cohort of participants who have utilized DFS, the majority have engaged with e-banking and digital payment platforms, while only a few have availed themselves of digital loan services, crowdfunding, and Digital Financial Innovation (DFI). For the subset of participants who have not utilized DFS, a significant proportion is expected to adopt e-banking and digital payment services in the coming times. Only a limited number of individuals also exhibit curiosity in using digital lending services, digital financial innovation, and crowdfunding. The respondents' lack of interest in utilizing FinTech-based digital financial services can be attributed to several factors. These include a limited comprehension of FinTech and crowdfunding services, unfavourable impressions of digital lending, and a reluctance to extend loans for business purposes. Figure 2 provides a comprehensive overview of the various categories of individuals who utilize digital financial services.

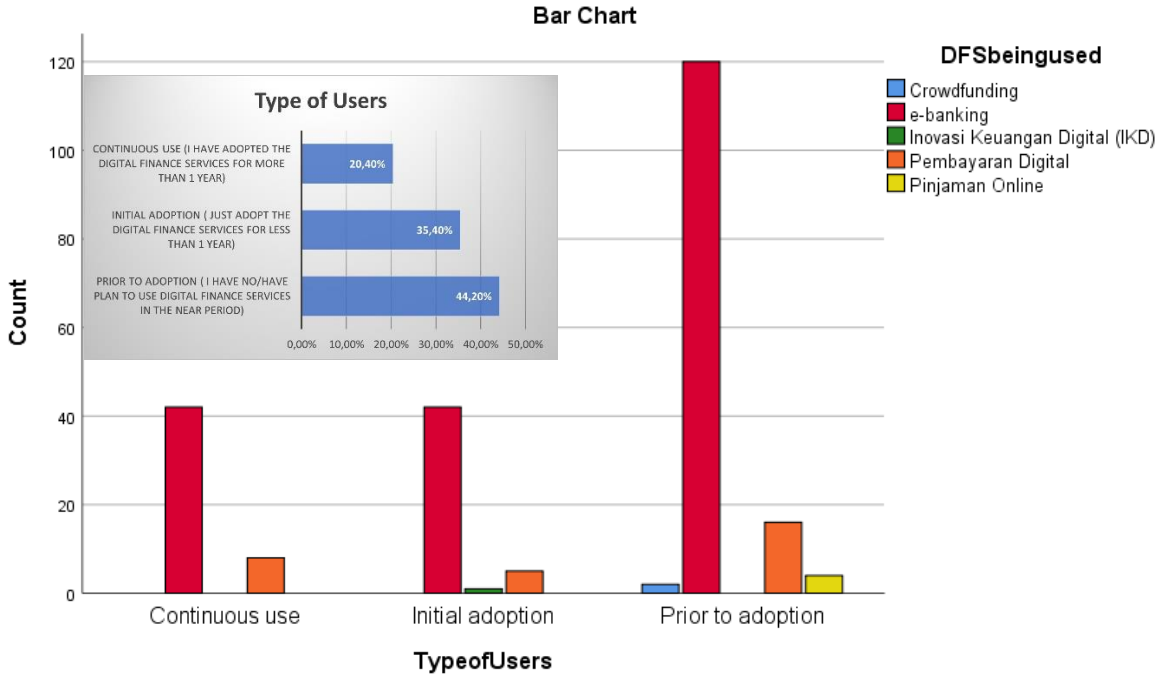

Figure 2. The Types of Users of Digital Finance Services

4.2 An Examination of the Determination of FinTech Adoption among Indonesia's Microenterprises

To begin with, it is necessary to assess the fit of individual parameters in the hypothesized model to determine the viability of their estimated values. Parameter estimates are expected to exhibit the correct sign and size, and to be consistent with the underlying theory. Any unexpected estimate indicates either the model is inapporpriate or the iput data are missing. The results indicated that the estimates were quite normal and acceptable.

To identify the determinants of FinTech Adoption of halal MSMEs, SEM model is calculated on two stages. The initial stage is the first CFA (Confirmatory Factor Analysis/1st CFA) which describes the relationship between indicators toward its latent variables. The second stage is the second CFA (2nd CFA) which describes the relationship between second layer indicators toward its latent variables. The SEM results in this section are the final process from a set of SEM procedures, 1) specification, 2) identification, 3) estimation, 4) testing and 5) final result. This section will broadly discuss the SEM model of Digital Financial Services Adoption of halal MSMEs and the result of 1st CFA. The number of observations of this model is 240 observations.

Table 4. Standardized Solution and T-Value of 1st CFA FinTech Adoption of Halal Microenterprises Model

No	Indicators	SLF (Standardized Loading Factor)	t-value	error	Description
Perceived Ease of Use					
Chi-Square = 4.58, df = 2, p-value = 0.10143, RMSEA = 0.073					
Composite Reliability (CR) = 0.95 Variance Extracted (VE) = 0.84					
PEU1	Easy to learn	0.93	19	0.13	Significant
PEU2	Easy to use	0.91	18.27	0.17	
PEU3	Easy to navigate	0.92	18.68	0.15	

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No	Indicators	SLF (Standardized Loading Factor)	t-value	error	Description
Perceived Ease of Use					
Chi-Square = 4.58, df = 2, p-value = 0.10143, RMSEA = 0.073					
Composite Reliability (CR) = 0.95 Variance Extracted (VE) = 0.84					
PEU4	Easy to remember	0.90	17.75	0.19	
Digital Literacy					
Chi-Square = 0.27, df = 1, p-value = 0.60239, RMSEA = 0.000					
Composite Reliability (CR) = 0.93 Variance Extracted (VE) = 0.76					
DL1	Ability to download and install	0.78	12.82	0.39	Significant
DL2	Ability to use	0.98	15.52	0.12	
DL3	Risk Awareness	0.87	16.49	0.25	
DL4	Benefit Awareness	0.89	17.25	0.21	
Perceived of Risk					
Chi-Square = 1.54, df = 1, p-value = 0.21534, RMSEA = 0.047					
Composite Reliability (CR) = 0.77 Variance Extracted (VE) = 0.50					
PR1	Vulnerable to cyberattacks	0.48	7.32	0.77	Significant
PR2	Lack of regulation	0.73	12.08	0.47	
PR3	Lack of transparency	0.58	16.09	0.14	
PR4	Lack of security	0.73	12.09	0.47	
Infrastructure					
Chi-Square = 1.04, df = 1, p-value = 0.30685, RMSEA = 0.014					
Composite Reliability (CR) = 0.90 Variance Extracted (VE) = 0.70					
I1	Reliable and Affordable internet Access	0.77	12.89	0.41	Significant
I2	Reliable and Affordable devices	0.80	14.38	0.37	
I3	Available in-home language	0.94	17.89	0.12	
I4	Meet the needs of people	0.82	15.07	0.32	
Entrepreneurial Spirit					
Chi-Square = 0.03, df = 1, p-value = 0.86182, RMSEA = 0.000					
Composite Reliability (CR) = 0.93 Variance Extracted (VE) = 0.77					
ES1	Search of new business opportunities	0.79	14.50	0.37	Significant
ES2	Risk takers	0.82	15.36	0.32	
ES3	Passionate	0.93	18.86	0.13	
ES4	Confident	0.96	19.30	0.10	
Perceived Usefulness					
Chi-Square = 2.85, df = 2, p-value = 0.24034, RMSEA = 0.042					
Composite Reliability (CR) = 0.90 Variance Extracted (VE) = 0.70					
PU1	Save more money	0.73	12.60	0.47	Significant
PU2	Financial management improvement	0.83	15.25	0.31	

No	Indicators	SLF (Standardized Loading Factor)	t-value	error	Description
Perceived Ease of Use					
Chi-Square = 4.58, df = 2, p-value = 0.10143, RMSEA = 0.073					
Composite Reliability (CR) = 0.95 Variance Extracted (VE) = 0.84					
PU3	Easier to access financial product	0.84	15.59	0.29	
PU4	Improve financial decisions	0.91	17.53	0.18	
FinTech Adoption					
Chi-Square = 0.00, df = 0, p-value = 1.00000, RMSEA = 0.000					
Composite Reliability (CR) = 0.95 Variance Extracted (VE) = 0.83					
DFS1	More frequently to use	0.92	18.05	0.15	Significant
DFS2	Recommend to others	0.83	15.51	0.31	
DFS3	Continuing to use	0.96	19.49	0.08	
DFS4	Intend to use	0.92	18.11	0.16	

By examining the data presented in Table 4, the Standardized Loading Factor (SLF) value and t-value for each indicator inside the latent variable can be observed. The measuring model for Perceived Ease of Use reveals that the element with the highest loading is "easy to learn" (loading factor = 0.93), followed by "easy to navigate" (loading factor = 0.92), "easy to use" (loading factor = 0.91), and "easy to remember" (loading factor = 0.90). In the context of the digital finance literacy measurement model, it is seen that the factor with the highest loading factor (0.98) is the ability to use. This is closely followed by benefit awareness (0.89), risk awareness (0.87), and the combined ability to download and install (0.78). When considering the Perceived Risk assessment model, it is observed that the factors with the highest loading are lack of regulation and lack of security, with a loading factor of 0.73. This is followed by lack of transparency, which has a loading factor of 0.58. The component with the lowest loading is vulnerability to cyberattacks, with a loading factor of 0.48. In terms of infrastructure, the element with the highest loading value is the availability of in-home language (0.94), followed by the provision of services that cater to individuals' needs (0.82).

Additionally, the reliability and affordability of devices (0.80) and internet connectivity (0.77) are also significant factors. Regarding the measurement model for assessing Entrepreneurial Spirit, it is seen that the element with the highest loading factor is "confident" (0.96). This is closely followed by "passionate" (0.93), "risk takers" (0.82), and lastly, "search of new business opportunities" (0.79). Based on the Perceived Usefulness assessment model, the item with the highest loading (0.91) is the enhancement of financial decision-making. This is closely followed by the facilitation of access to financial products (loading factor of 0.84), improvement in financial management (loading factor of 0.83), and ultimately, the promotion of saving behaviour (loading factor of 0.73). In relation to the measurement model for the adoption of Digital Financial Services, it is noteworthy that the element with the highest loading is the continued use, with a loading factor of 0.96. Subsequently, the factors of more frequent usage and intention to use exhibit a loading level of 0.92. Lastly, the factor of recommending the services to others demonstrates a loading factor of 0.83.

After considering the 1st CFA, the subsequent analysis focuses on the 2nd CFA to determine the adequacy or inadequacy of the suggested hybrid model's fit. The examination of the measurement model and hybrid model will be conducted in relation to this matter. The measurement model is considered to be a fit model if it is capable of accurately estimating the data covariance matrix. Table 5 depicts information on the Goodness of Fit (GoF) Test interpretation of Hybrid model. Given that

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out of the 13 categories proposed by the GoF, a total of 10 categories are considered to be a "*Good Fit"*, it can be concluded that the hybrid model can be accepted as the appropriate fit model.

Table 5. The Goodness of Fit Test (GoF) of FinTech Adoption of Halal Microenterprises Hybrid Model

Goodness of Fit	Cut off Value	Value	Description
Chi Square		768.82	Good Fit
df		319	Good Fit
Chi-square (χ2)/df	≤ 3 (2:1 (Tabachnik and Fidell, 2007) and 3:1 (Kline, 2005))	2.4	Good Fit
Probability (P-value)	≥0.05	0.00000	Poor Fit
RMR	Lower value of RMR (Tabachnik and Fidell, 2007), ≤ 0.05 or 0,08 (Hair 2007)	0.078	Good Fit
RMSEA	≤ 0.08	0.077	Good Fit
GFI	≥ 0.90	0.81	Marginal Fit
AGFI	≥ 0.90	0.76	Marginal Fit
CFI	≥ 0.90	0.98	Good Fit
NFI	≥ 0.90	0.96	Good Fit
NNFI	≥ 0.90	0.97	Good Fit
RFI	≥ 0.90	0.96	Good Fit
IFI	≥ 0.90	0.98	Good Fit

The subsequent phase involves the interpretation of the hybrid model, which consists of five (5) exogenous latent variables (Perceived Ease of Use [X1], Digital Literacy [X2], Perceived Risk [X3], Infrastructure [X4], and Entrepreneurial Spirit [X5]) and two endogenous latent variables (Perceived Usefulness [Y1] and Financial Technology Adoption [Y2]). Figure 3 and figure 4 illustrate the path diagram of the FinTech Adoption of Halal Microenterprises Hybrid Model (240 MSMEs respondents, including users and non-user's respondents). The second CFA hybrid model demonstrates that all the indicators of the measurement model have satisfied the criteria outlined in the structural equation modelling (SEM) framework. Specifically, the SLF indicator has achieved a value of ≥ 0.3, while the t-value has reached a minimum of ≥ 1.94 (Wijanto, 2008). Hence, a more in-depth interpretation of the data of the hypothesis can be conducted.

Table 6. Hypothesis Result of FinTech Adoption of Halal Microenterprises Hybrid Model

No	Hypothesis	SLF (Standardized Solution)	t-value	Description
H1	Perceived Ease of Use – Perceived Use	0.89	11.26	Positive, Significant
H2	Perceived Ease of Use - FinTech Adoption	0.56	4.29	Positive, Significant
H3	Digital Finance Literacy – FinTech Adoption	0.00	0.02	Positive, Insignificant
H4	Perceived Risk – FinTech Adoption	0.00	0.04	Positive, Insignificant

H5	Infrastructure – FinTech Adoption	0.26	4.04	Positive, Significant
H6	Entrepreneurial Spirit – FinTech Adoption	0.23	3.46	Positive, Significant
H7	Perceived Usefulness – FinTech Adoption	-0.10	-0.95	Negative, Insignificant
H8	Perceived Ease of Use – Perceived Usefulness – FinTech Adoption	0.47 (Total Effect) -0.09 (Indirect Effect)	6.03 -0.95	Positive, Significant Negative, insignificant

Among the eight hypotheses placed out in this study, it is evident that three hypotheses, namely Digital Finance Literacy, Perceived Risk, and Perceived Usefulness, demonstrate a lack of significant effect on an individual's behavior in utilizing FinTech within the halal MSME sector. In addition, the total effects from Perceived Ease of Use toward Digital Finance Services through Perceived Usefulness are positive and significant, meanwhile, it was found negative and insignificant of indirect effect. Nevertheless, it is worth noting that factors such as Perceived Ease of Use, Infrastructure, and Entrepreneurial Spirit exhibit a noteworthy and constructive impact on individuals' inclination to utilize Digital Financial Services inside the halal MSME sector. The subsequent discussion will provide a comprehensive analysis of these determining elements.

The notion of Perceived Ease of Use refers to an individual's subjective perception of the level of ease associated with utilizing a certain technology. In the present scenario, those who hold the belief that digital financial services possess attributes of simplicity in terms of learning, usability, navigation, and 6recall tend to engage in financial transactions via digital financial services. Therefore, it is vital for a technological system to possess clarity and user-friendliness, facilitating effortless task completion and promoting users' proficiency in technology utilization (McLean et al., 2020). Furthermore, it is imperative that the technological advancements in the field of finance facilitate the user's ability to do activities within specified timeframes, hence enhancing their overall efficiency and productivity (McLean et al., 2020; Q. Wang et al., 2022). Prior study has investigated the impact of perceived ease of use of technology in finance on individuals' attitudes toward adoption (Alalwan et al., 2016; McLean et al., 2020; Z. Wang & Huang, 2023). This finding is intriguing as it sheds light on the Technology Acceptance Model (TAM), a theoretical framework developed by Fred Davis in 1989. TAM incorporates two key factors, namely perceived ease of use and perceived usefulness. Interestingly, the study reveals that perceived usefulness does not exert a significant influence on the attitude of MSMEs operating in the halal sector when it comes to adopting digital financial services. In this case, our objective is to comprehend the factors influencing the adoption of digital services by company actors. These factors include environmental considerations, recommendations from social networks, and the necessity of using such services as a prerequisite for securing financial support from banking institutions. In essence, these commercial entities exhibit a limited comprehension of the potential benefits and advantages associated with the utilization of digital financial services. Hence, the findings of this research demonstrate that the observed effect lacks statistical significance.

The availability of adequate and supportive infrastructure plays an essential role in facilitating the adoption of digital financial services among microenterprises in Indonesia (Achmad, 2023; Ali KA & Subramanian, 2023). The utilization of digital financial services is contingent upon the accessibility of dependable and cost-effective equipment, internet connectivity, provision of languages spoken within households, and catering to the requirements of individuals within the community. It is important to acknowledge that a significant obstacle in achieving digital financial inclusion lies in the insufficient of digital infrastructure and services. This encompasses the absence

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of network connectivity for digital devices, as well as inadequate software and applications (Anakpo et al., 2023). Indonesia has emerged as a notable frontrunner in the realm of digital infrastructure and networks. According to data presented by the Association of Indonesian Internet Service Providers (APJII), Indonesia has achieved a commendable internet penetration rate of 77.36% in urban regions and 79.79% in rural areas as of 2023.

Upon examination of this fact, it may be inferred that the absence of digital infrastructure in rural regions of Indonesia does not pose a significant concern. Furthermore, the expansion of digital devices and network services to remote regions will contribute to a broader range of consumption options, enhanced agricultural output, and the empowerment of rural women in terms of decision-making within households and involvement in off-farm employment (Ma et al., 2023). In short, rural communities could leverage their mobile phones and internet connectivity to access financial services, including savings accounts, capital loans, and payment platforms, in order to enhance the viability and productivity of their enterprises and employment opportunities (Ali et al., 2020; Li et al., 2023). Hence, the widespread availability of smartphones, coupled with network accessibility, implies that an increasing number of financially excluded MSMEs could potentially gain access to digital financial services. Considering the circumstances, continuous efforts aimed at enhancing the efficacy, reliability, and security of Information and Technology infrastructure could significantly contribute to the advancement of digital financial inclusion among MSMEs in Indonesia.

5. Conclusion

The present study has yielded significant findings on the determinants of adoption of FinTech among the halal sector of MSMEs in Indonesia. The identified characteristics include perceived ease of use, infrastructure, and entrepreneurial spirit. In the context of the halal sector of MSMEs in Indonesia, it has been observed that factors such as digital finance literacy, perceived risk, and perceived usefulness do not exert any influence on the adoption of digital finance services.

This research contributes to the existing body of literature concerning the behavioral adoption of FinTech among microenterprises in five representative provinces in Indonesia. It achieves this by including the Theory of Planned Behavior and the Theory of Technology Acceptance Model into the study. This study represents a pioneering effort in utilizing structural equation modelling to examine the factors of Halal MSMEs' behavioral intention to use digital financial services for their routine financial transactions especially financial technology. It is acknowledged that plenty of research has been undertaken on the behavioral intention to utilize technology in finance study models. However, there remains a gap in the literature on research on digital financial services for MSMEs in the halal sector in Indonesia. This study addresses the need to understand the key determinants that impact customers' adoption of FinTech and enhances our comprehension of the adoption behavior of FinTech among microenterprises in Indonesia.

In order to enhance the behavioral inclination towards the adoption of FinTech in Indonesia, the study's findings propose the following practical implications. Based on the available evidence, it can be inferred that the level of digital financial literacy among MSMEs in the halal sector remains relatively low. Nevertheless, there is a notable inclination among these enterprises to acquire knowledge and understanding of digital financial services. Digital financial literacy encompasses understanding of diverse digital financial services, the underlying infrastructure, and the regulatory framework governing these implementations. Hence, it is imperative to facilitate the integration of MSMEs operating in the halal sector into cashless payment systems. In close proximity, the implementation of extensive outreach initiatives can be facilitated by the local government, financial professionals, and scholars through the implementation of programs aimed at digitalizing financial services for MSMEs. Indeed, the utilization of word-of-mouth (WOM) marketing has been extensively adopted by entrepreneurs. Consequently, those who have availed themselves of Digital Financial Services frequently extend invitations to their relatives or acquaintances to partake in the

same Digital Financial Services. Consequently, an increasing number of MSMEs operating in the halal sector are acquiring proficiency in digital finance. It is anticipated that this development would enhance the accessibility of digital financial services for microenterprises within the halal sector in Indonesia.

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