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The Role of Digital Transformation in Developing Microfinance

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Abstract: This study aims to answer a major question on the importance of digitalization of microfinance services.

Due to the novelty of introducing digitalization to financial services in general and to microfinance services in particular, there has been limited formal research on the role of digital transformation in developing microfinance in Egypt. The article aims at determining the influence of digitalization usage on the development of microfinance institutions' performance in Egypt.

In this research; both of primary and secondary data were used to gather information. Primary data collected through a questionnaire that was distributed to a hundred and twenty managers working in microfinance institutions in Egypt. The questionnaire was answered by 102 respondents. Secondary data were collected from a variety of sources from the literature review like journals, researches, dissertations, articles, reports and worldwide web. The research was applied to microfinance institutions in Egypt. SPSS version 25 and SMART-PLS version 3.3 were used as statistical tools for data analysis approach.

The research supports that digitalization of financial services will lead to better performance of microfinance institutions (MFIs) in Egypt. The research also presents a model that microfinance institutions should adopt when first applying digitalization. Government should formulate policies which focus on improving digital infrastructure. The researchers found that although the obstacles that microfinance institutions face, adoption of digitalization is still a must.

Keywords : *Global Food Security Index (GFSI), Government Reinvention, Food Security, Food Availability, Local Production.*

الملخص: لا توجد العديد من الدراسات الخاصة بدراسة تأثير الرقمنة على التمويل متناهي الصغرفي مصر حتى الآن وذلك بسبب حداثة دخول الخدمات المالية ولا سيما خدمات التمويل متناهي الصغر عالم الاقتصاد الرقمي في مصر. يهدف هذا البحث إلى الوصول إلى أثر تطبيق الرقمنة على تطوير مؤسسات التمويل متناهي الصغر.

تهدف هذه الدراسة إلى دراسة دور الرقمنة في تطوير خدمات التمويل متناهي الصغر في مصر. وقد تم تجميع بيانات أولية وثانوية لإجراء هذا البحث. وقد تم جمع البيانات الاولية من خلال الإستبيان واللذي تم توزيعه على مائة وعشرين مدير من مديري مؤسسات التمويل متناهي الصغر، وقد قام مائة واثنان منهم بملأ الاستبيان. أما بالنسبة للبيانات الثانوية فقد تم تجميعها من مصادرمختلفة مثل الدوريات العلمية والأبحاث السابقة ورسائل الدكتوراه وكذلك المقالات العلمية والتقارير والمواقع الالكترونية. تم تطبيق الدراسة على مؤسسات التمويل متناهي الصغر بمصر وتم استخدام SPSS version 25 and SMART-PLS version 3.3 كأدوات لتحليل البيانات احصائياً.

وقد توصلت الدراسة إلى أن تطبيق الرقمنة يؤدي الى تحسين أداء مؤسسات التمويل متناهي الصغر. كما تعرض الدراسة للنموذج التي يجب أن تقوم مؤسسات التمويل متناهي الصغر بتبنيه عند البدء في تطبيق التكنولوجيا. كما أنها توصلت أنه يجب على صانعي القرار بالحكومة إصدار السياسات والتي من شأنها تحسين البنية التحتية التكنولوجية. ورغم الصعوبات التي تواجهها تلك المؤسسات إلا أن تطبيق الرقمنة لهو شيء ضروري لا يمكن الاستغناء عنه.

الكلمات الدالة: التمويل متناهي الصغر - الرقمنة - التكنولوجيا المالية - التحول الرقمي

1. Introduction:

1.1 Background

The current circumstances that the world passes accelerated the need for digital transformation. It has become an urgency to enable the economy to face the downfalls that occurred especially after Covid-19 Pandemic. Using technology to develop microfinance can be one of the tools for supporting economy specially in developing countries. There are limited research on the role that digital transformation plays in developing microfinance in Egypt and whether it would offer support to microfinance institutions to achieve a better performance.

There have been several proven advantages of digital transformation to microfinance in many countries. It can speed up the flow of information, automate transactions, control, and analyze data. It can also reduce costs and increase efficiency and customer outreach, thus achieving further financial inclusion.(Agrawal & Sen, 2017)

Digital technology can help microenterprises cut costs by improving their internal processes, improving their products through faster communication with their customers, and better promoting and distributing their products through online presence. Also using technology has become a necessity with the pandemic's rapid spread into the world. (Vandeputte, De Toffol, & Peirce, 2017)

In emerging economies, the proportion of adults engaged in digital payments increased from 35% in 2014 to 57% in 2021. Conversely, in high-income economies, digital payment participation among adults is nearly ubiquitous, with 95% participation. Also in some developing economies, the share of adults making a digital payment is low, there is considerable potential for expansion in utilizing payment cards, mobile phones, or the internet for making direct payments from an account. In Egypt, for example, about 70 percent of account owners have not used payment cards nor a mobile phone or the internet to make a digital payment. According to the Global Findex database of 2021 developed by the World bank, the overall account ownership in developing economies grew by 30 percentage points, from 42 percent in 2011 to 71 percent in 2021. (Asli & et al., 2021). Account ownership in Egypt developed from 10 percent in 2011 to 27 percent in 2021 (Nasr, Helmy, & Ghiyazuddin, 2018)

The Egyptian government is supporting the development of digitalizing microfinance. Several laws have been issued to support microfinance, formal sector and digital transformation,

as well, a number of initiatives have been taken to support that approach. However, there are several difficulties to be overcome as a result of the novelty of the introduction of digitalization to financial products in Egypt, particularly microfinance. The traditional microfinance model has been developed over many years worldwide and it has become a necessity to join the financial digital sector. For this reason, it has been incorporated in many initiatives for development and poverty reduction.

Medium, Small and Micro Enterprises' Development Agency -MSMEDA is the agency in Egypt in charge of the development of Medium, Small, and Micro enterprises as well as entrepreneurship. It is contributing to reviving handicrafts and heritage to preserve Egyptian identity and offers many non-financial services for small and micro enterprises. It was established by decree of Prime Minister No. 947 of 2017 and amended by Decree No. 2370 of 2018, to be under the authority of the Prime Minister. The Agency replaced the Social Fund for Development that was established in 1991. Thus, having a total experience of more than 30 years in supporting MSMEs, providing job opportunities and spreading the culture of entrepreneurship(www.msmeda.org.eg, 2021).

The Microfinance services in Egypt are provided by three main stakeholders. NGOs and MFIs that are established by the Egyptian Ministry of Social Solidarity according to the Non-Profit Organization Law No. 84 of 2008 directed to MFIs and licensed by Financial Regulatory Authority (FRA) to work in microfinance field, banks that are registered with the Central Bank of Egypt in accordance with the Banks Law No. 88 of 2003 and microfinance companies that obtained a license from Financial Regulatory Authority (FRA) in accordance with Law No. 10 of 2009 regulating non-banking financial markets and law 141 for the year 2014 regulating microfinance. Under the regulatory framework, MFIs are required to obtain a license from FRA to operate in Egypt. The licensing process involves a review of the MFI's business plan, financial statements, management structure, as well as risk management and the ability to comply with regulatory requirements. (https://fra.gov.eg/, 2023).

1.2 Problem Statement

There are few researchers that have focused on the role of digitalization in developing microfinance. Moreover, there are limited researches on the role that digital transformation plays in developing microfinance in Egypt and whether it would offer support to microfinance institutions to achieve a better performance in terms of efficiency,

customer experience improvement and cost reduction. In this vein, the research problem can be addressed in this statement *"How the digital transformation has a role in the development of microfinance in Egypt."*

1.3 Research Objective:

The research is guided by the following objective:

- Determining if digital transformation helps in developing microfinance institutions' performance.

1.4 Research Hypotheses:

The Main Hypothesis is: There is a positive relationship between digital transformation and developing microfinance. The following sub-hypotheses emerged from it:

1-There is a significant relationship between digital technology and loan process support.

2-There is a significant relationship between Digital Technology and Operational Efficiency.

3-There is a significant relationship between digital technology and Profit versus Cost.

4-There is a significant relationship between Digital Technology and Technology Advantages for Clients.

5-There is a significant relationship between Mobile technology and Loan Process Support.

6-There is a significant relationship of Mobile technology and Operational Efficiency

7-There is a significant relationship of Mobile technology and Profit versus Cost

8-There is a significant relationship between Mobile Technology and Technology Advantages for Clients.

9-There is significant relationship between Technology Cost & Mobile Network Problems and Loan Process Support

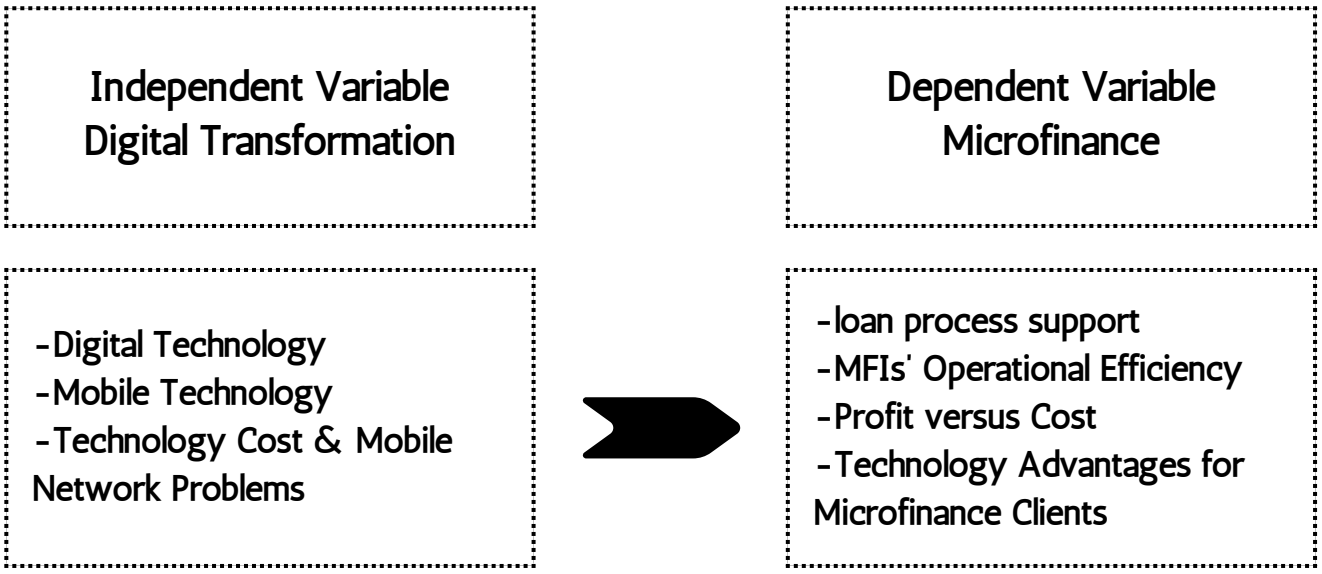
10-There is a significant relationship between Technology Cost & Mobile Network Problems and Operational Efficiency

11-There is a significant relationship between Technology Cost & Mobile Network Problems and Profit versus Cost

12-There is a significant relationship between Technology Cost & Mobile Network Problems and Technology Advantages for Clients

1.5 Research Model:

Figure 1.1: Research Model



Prepared by Researchers

2. Literature Review

This article focuses on the relationship between the two variables: Digital Transformation and Microfinance, the following literature referred to researches that referred to such variables.

In their paper, Ahmed and Isa aimed at studying the performance of microfinance institutions in OIC countries. The study is composed of panels, based on the type of microfinance institutions classification whether it is Islamic or conventional microfinance institution. They used data of 146 microfinance institutions of OIC countries for the period of 2008-2018. It concluded that, digitalization has significant impact on the performance of microfinance institutions (MFIs) whether they be Islamic or conventional ones. (Ahmed & ISA, 2023)

In their paper Dorfleitner, Forcella, and Nguyen; they aimed at identifying the factors that are associated with applying digital transformation to microfinance institutions (MFIs). They used an online survey and distributed it to 105 MFIs. They concluded that the adoption of digital tools is consistent with the social performance of MFIs. Furthermore,

the profitability of the institutions and their home country development are associated with a larger application of digital support solutions. They also concluded that the digitization process can help to avoid a trade-off between the social and financial performance of the MFIs. /'Although the findings regarding the profitability of MFIs support the argument that performing digital solutions is a costly process that poses a need for financial sustainability, it does not appear to foster an increase in the lending rate in order to finance the digital transformation process (Dorfleitner, Forcella, & Nguyen, 2022).

In their research, Ashta and Milana aimed at showing the importance and challenges of digital payment. As it is common in developing countries to have a cash-based economy. This includes high risks of fraud or theft. They concluded that as a solution, various digital payment services have been invented such as mobile money. In many developing countries, mobile phone penetration is higher than bank account penetration. Consequently, mobile banking platforms have achieved a strong market position in many developing countries. (Milana & Ashta, 2020).

In his thesis, Mitoko aimed at studying if a more risk-tolerant paradigm using technology for the microcredit industry would lead to more sustained positive impacts for microcredit. He concluded that a more risk-tolerant paradigm using digital credit like mobile phone-based loans for the microcredit industry is likely to lead to more sustained positive impacts. He recommends that using technology is crucial to reduce corruption and deliver better and more efficient products. He also recommended using a machine learning algorithm to evaluate micro-enterprises' performance. He utilized an integrated, dynamic, micro-macro, agent-based simulation as an assessment tool modelling the case of Kenya (Mitoko, 2019).

In her master research, Maina examined perceived information technology integration and performance of microfinance institutions in Kenya. The study used primary data which was collected via a questionnaire. The findings showed that IT integration enhances the performance of microfinance institutions. Microfinance institutions have integrated IT in finance management, marketing management, and human resources departments, which contributes to increased profits, increased operational efficiency, and increased market share in the microfinance institutions. The study recommends that microfinance institutions should increase the level of IT integration in all their departments to improve customer, internal processes needs, therefore, enhancing the overall performance of the MFI. In her master, Maina has used the Technology Acceptance Model (TAM),

developed by Davis in 1989 to illustrate the level of microfinance institutions acceptance for technology integration and its use in enhancing performance in microfinance sector as illustrated in the following figure (2.1):

Figure 2.1: Description of the Technology Acceptance Model

(Davis, 1989)

It is one of the most extensively used models to describe how technology can be integrated. There are three pillars in TAM; perceived ease of use (PEOU), perceived usefulness (PU), and Technology Acceptance (TA) as illustrated in figure (2-2). Many scholars have applied this model to diverse disciplines. (Maina, 2019)

Schachter examined the relationship between mobile phone technology and faster economic growth in Kenya. She analyzed the level of development by examining social, political, and economic issues during 2007-2008, drawing on prior research. She then focused on the explosive growth of M-Pesa mobile payment system and the emergence of decentralized banking system to investigate the impact of technology on these development elements in Kenya. The success of M-Pesa, according to this thesis, was a result of the public's lack of confidence in traditional institutions, cooperation between the public, private, and nonprofit sectors, an initial lack of regulation to support innovation, and extensive consumer testing to produce the best product-market fit. In the end, technology cannot eliminate all causes of cyclical poverty, but it can lead to novel solutions to previously ignored development challenges (Schachter, 2019).

According to Mushtaq and Bruneau, technology penetration can promote financial inclusion for microfinance customers. As there is a positive relationship between technology and financial inclusion and a negative one between technology diffusion and poverty. It can help reduce poverty and income inequality by fostering financial inclusion. They recommended that policy makers should make digital banking a priority to improve the financial capability among the population and to increase awareness about digital banking.

They should as well design a regulatory framework and develop consumer protection mechanism (Mushtaq & Bruneau, 2019).

In his dissertation, Konate aims at analyzing contributions of mobile payment in developing countries. He is particularly interested in the properties of this device in terms of financial inclusion and regulation of the informal sector. He also examined the contribution of mobile money to mitigating the shortcomings of traditional microfinance. He has built a model that analyzes different options for controlling the size of the informal sector. He explored the issue of international interoperability of mobile payment devices in a region. The thesis concluded that the informal sector regulation should be more creative and should offer some incentives. It also concluded that mobile money mitigates some of the shortcomings of traditional microfinance; and that mobile payment associated with new forms of microcredit increases both the size of the formal sector and welfare; the mobile payment market in the region can be fully interconnected. The thesis uses various methods: descriptive, theoretical, and statistical (Konate, 2018).

In their research, Agrawal & Sen aimed at studying technology integration in financial services. They concluded that it improves operational efficiency, reduce costs, and provide regular alerts to clients without any additional cost. Channels such as mobile devices help better in tracking transactions on real-time basis, with the mobile users' base increasing rapidly in INDIA. They studied four microfinance institutions in India using an exploratory, qualitative, and descriptive study (Agrawal & Sen, 2017).

In his thesis, Mwela examined reasons of low ICT usage in microfinance institutions. He also studied the challenges of performing its duties when using ICT. He concluded that MFIs face many challenges in performing its duties regarding ICT usage such as lack of adequate facilities, bad perceptions of stakeholders, and high operating costs. The study recommended that ICT usage is now being considered as one of the most important and effective mechanisms for poverty alleviation. He used quantitative approach for the research topic. He collected primary data from libraries and used a questionnaire. The study took place in Peri Urban areas in Ilala Municipality in Dar Es Salaam City in Tanzania (Mwela, 2014).

3.Analysis & Methodology of the Research

The research collected Primary data from a sample of respondents through using a questionnaire. Secondary data was collected through researches, dissertations, articles and material from different websites. SPSS version 25 and SMART-PLS version 3.3 software were used to analyze data. The researchers used as well descriptive statistics in order to determine to what extent there is an effect on the main and sub-hypotheses of the research to find out if there is a statistical effect of the digital transformation on micro finance institutions, performance in Egypt at a significance level of (α 0.05).

The questionnaire is applied to a random sample of microfinance institutions (MFIs) from all governorates of Egypt. It was answered by (102) employees from different MFIs' managers, team leaders and heads of digital transformation departments inside MFIs. The researchers used a quantitative approach for the research topic to acquire deeper empirical data and more actionable results for MFIs. The questionnaire consists of three sections as the following:

First: Demographic & Functional Data for Managers of Microfinance Institutions (MFIs): this part includes multiple items to measure the demographic status of respondents including (Gender, Age, Educational level, Years of Experience) as well as functional status including (Number of organization branches, as well as organization category).

Second: This part includes several elements to evaluate the independent variable which is (digital transformation) and its dimensions.

Third: This part includes several elements to evaluate the dependent variable (microfinance), and its dimensions.

3.1 Demographic & Functional Data

Frequency and percentages are computed for the sample's characteristics. Table (3.1) provides a summary of responses that were collected for the research with regard to gender, age, level of education, and years of experience. It shows that (67.6%) of the research sample members are males and the female percentage is (32.4%). It also indicates that 45.1% of respondents are between the age 35 and 44 and 34.3% of respondents are at the age of 45 or above. Only 20.6% of respondents are between 21-34 years old. It shows that the majority of respondents (72.5%) have a bachelor's degree and 21.6% of respondents are postgraduates. It also shows that 42 % of respondents have 15 Years of experience and more; this represents the highest category of respondents, followed by respondents who have experience

between 5-9 years who represent (31%) of respondents. The following table (3.1) describes the demographic data of the sample.

Table 3.1: Frequency and Percentage of Respondents' Characteristics

Gender	Frequency	%
Male	69	67.6
Female	33	32.4
Age		
21-34	21	20.6
35-44	46	45.1
45 and above	35	34.3
Education Level		
Medium level	6	5.9
Bachelor	74	72.5
Postgraduate	22	21.6
Years of Experience		
5-9 years	32	31
10-14 years	27	31
15 years and above	43	42
Total	102	100

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The following table (3.2) shows respondents' years of experience. Most of them has more than 15 years of experience, whereas around 31.4 % has between 5 – 9 years of experience. It also shows that most of respondents (82.4%) are working in microfinance institutions (MFIs) whose branches' number ranges between 1 and 4 branches, and only 10% of the MFIs have more than 10 branches. It also shows that 61% of MFIs belong to category C (Their portfolio is less than 10 million EGP), 23% of MFIs are classified as category A (Their portfolio exceeds 50 million EGP)

and only 16% are classified as category B (Their portfolio exceeds 10 million EGP and less than 50 million EGP).

Table 3.2: Frequency & Percentage of Respondents' Functional Characteristics

Number of branches	Frequency	%
1-4	84	82.4%
5-10	8	7.8%
More than 10	10	9.8%
MFI Category		
Category A	16	23%
Category B	23	16%
Category C		61%
Total	102	100 %

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3.2 Descriptive Analysis:

The researchers used descriptive statistics to identify the tendency of the respondents' opinions around the statements used to measure the independent variable which is "digital transformation" and the dependent variable which is "microfinance".

Digital Transformation

The following table (3.3) presents the weighted mean for the nine statements used to measure the independent variable. Item no. 7, which is "Internet Connectivity is a challenge in your organization" has the highest mean which is 4.25 which reflects a higher importance from the respondents' point of view. It is followed by item no 1 which states "Your organization is fully digitalized" which is 4.2. This is followed by item no. 2 which states "Loan officers have the skill to use technology effectively" as its weighted mean is 4.14. The least weighted mean was for item no. 9 which is "Your organization developed mobile application to grant microfinance loans" as its weighted mean is 3.04%, this is followed by item no. 5 which is "Your MFI offers services through mobile technology" as its weighted mean is 3.31%.

It also shows the percentage of responses for the statements of the independent variable which is "Digital transformation". As shown in the following table (3.3), it could be noticed that most of the respondents agreed to item no. 7 which is "Internet Connectivity is a challenge in your organization" with the percentage of 88.3%. Respondents also widely agreed to item no.1 which is "Your organization is fully digitalized" with the percentage of 84.3%. Followed by item no. 2 which states "Loan officers have the skill to use technology effectively." with an approval percentage of 82%. The least agreed upon item is no. 9 which states that "Your organization developed mobile application to grant microfinance loans" with the percentage of 37.3%. Followed by item no. 5 which states that "Your MFI offers services through Mobile Technology" with the percentage of 32.4%. As for the statement that has the most neutral answers with the percentage of 33.3% is item no. 9 which states that "Your organization developed mobile application to grant microfinance loans".

Table 3.3: Percentages of Responses and Weighted Mean for the Independent Variable "Digital Transformation"

No.		2%	3%	4%	5%	Weighted Mean
1	Your organization is fully digitalized.	5.9%	9.8%	43.1%	41.2%	4.20
2	Loan Officers have the skill to use technology effectively.	3.9%	13.7%	47.1%	35.3%	4.14
3	The MFI technological infrastructure is well established.	6.9%	17.6%	42.2%	33.3%	4.02
4	The cost of technology integration is high.	6.9%	22.5%	43.1%	27.5%	3.91
5	Your MFI offers services through Mobile Technology	32.4%	19.6%	32.4%	15.7%	3.31
6	Mobile network problems are a challenge in your organization	11.8%	15.7%	48.0%	24.5%	3.85
7	Internet Connectivity is a challenge in your organization	3.9%	7.8%	47.1%	41.2%	4.25
8	Mobile Technology helped to reduce cost for organization	11.8%	24.5%	39.2%	24.5%	3.76
9	Your organization developed mobile application to grant microfinance loans	37.3%	33.3%	17.6%	11.8%	3.04

Prepared by Researchers based on statistical analysis

Microfinance:

The following table (3.4) presents the weighted mean for the nineteen statements used to measure the independent variable. Item no 19 which is "Having financial services through technology is important after the pandemic." has the highest weighted mean which is 4.37 which reflects a higher importance from the respondents' point of view. Followed by item no. 15 which states that "Technology helps to give clients quick services" with a weighted mean 4.29. The table shows that most of the respondents agreed to item no. 4 which is "Technology is used in the process of Loan Repayment." with the percentage of 92.2%. In addition to that, respondents widely agreed to statement no.15 which is "Technology helps to give clients quick services." with the percentage of 92.1%. The least agreed upon statement is no. 17 that states that "Technology has reduced cost of loan disbursed." with the percentage of 35.3%. Followed by item no. 18 which states that "It is better using technology than having human interaction" with the percentage of 35.4%. Statement no. 8 has the most neutral answers with the percentage of 33.3%, it states that "Technology has increased profits in the organization". That is followed by item no. 18 which states "it is better using technology than having human interaction".

Table 3.4: Percentages of Responses and Weighted Mean for the Dependent Variable "Microfinance"

		2	3	4	5	Weighted Mean
		%	%	%	%	
1	Number of clients increased after using technology.	8.8%	19.6%	48.0%	23.5%	3.86
2	Technology is used in the process of Loan Application.	18.6%	20.6%	39.2%	21.6%	3.64
3	Technology is used in the process of Loan Disbursement.	14.7%	11.8%	46.1%	27.5%	3.86
4	Technology is used in the process of Loan Repayment.	5.9%	2.0%	52.0%	40.2%	4.26
5	Technology is used in sending notifications and reminders to clients.	14.7%	12.7%	40.2%	32.4%	3.90
6	Technology prevents segments of the population from accessing financial services.	20.6%	16.7%	40.2%	22.5%	3.65

7	Women are struggling more to use technology in getting services.	27.5%	14.7%	40.2%	17.6%	3.48
8	Technology has increased profits in the organization	9.8%	33.3%	38.2%	18.6%	3.66
9	Technology has reduced cost of operation in the organization	16.7%	22.5%	41.2%	19.6%	3.64
10	Technology has increased market share of the organization	9.8%	19.6%	48.0%	22.5%	3.83
11	Technology has facilitated development of new financial products	6.9%	22.5%	49.0%	21.6%	3.85
12	Technology has increased organization's efficiency	2.0%	6.9%	53.9%	37.3%	4.26
13	After adopting technology, high cost is one of the challenges your organization face.	2.0%	18.6%	44.1%	35.3%	4.13
17	Technology has increased profits in the organization	35.3%	20.6%	25.5%	18.6%	3.27
18	It is better using technology than having human interaction	29.4%	29.4%	25.5%	15.7%	3.27
19	Having financial services through technology is important after the pandemic.	0.0%	8.8%	45.1%	46.1%	4.37

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3.3 Exploratory Factor Analysis:

The researchers used descriptive statistics to identify the tendency of the respondents' opinions around the statements used to measure the independent variable which is "digital transformation" and the dependent variable which is "microfinance".

Digital Transformation

Exploratory factor analysis was conducted to examine the underlying structure of the observed variables for digital transformation. The first step to identify EFA is to investigate the Kaiser-Meyer-Olkin (KMO) Measure and Bartlett's test for Sphericity.

KMO measure is a statistical measure of sampling adequacy used to assess whether the data are suitable for factor analysis. KMO values range from 0 to 1, with higher values indicating that the data are more suitable for factor analysis. A KMO value of 0.5 or lower indicates that the observed variables are not suitable for factor analysis, while a value above 0.5 suggests that the data may be suitable. A KMO value of 0.7 or higher is generally considered to be good, indicating that the observed variables share enough variance to justify conducting factor analysis of Sampling Adequacy.

Bartlett's test for Sphericity is a statistical test used in exploratory factor analysis (EFA) to assess whether the observed variables in a data set are significantly correlated with each other, indicating that they may share common underlying factors.

Table (3.5) shows that Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.669, indicating that the data were suitable for factor analysis. Bartlett's test of sphericity was statistically significant, ($\chi 2(36) = 211.073$, $p < .001$), indicating that the correlation matrix was not an identity matrix and that factor analysis is appropriate.

Table 3.5: KMO and Bartlett's Test for Digital Transformation

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.669
Bartlett's Test of Sphericity	Approx. Chi-Square	211.073
	Df	36
	Sig.	0.000

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Rotated Component Matrixa for Digital Transformation

The following table (3.6) presents factor loading for the independent variable.

It includes approximations of the correlations between individual variables and the estimated components. Based on the result of EFA, there were three items that loaded onto Factor 1 that measures "Digital Technology". The factor loading for first item "Loan Officers have the skill to use technology effectively" is 0.869, as for the second item "The MFI technological infrastructure is well established" is 0.849. As for the third item "Your organization is fully digitalized", its factor loading is 0.839.

There were three items in Factor 2 labeled "Technology cost & Mobile network problems". The factor loading for first item "Internet connectivity is a challenge in your MFI" is 0.810 The factor loading for second item "Mobile network problems is a challenge in your MFI" is 0.765. The factor loading for Third item "The cost of technology integration is high" is 0.685. From table (3.6), there were three items in third factor, which are labeled "Mobile Technology". The factor loading for the item "Mobile Technology helped to reduce cost for the MFI" is 0.746, as for the second item "Your MFI developed mobile application to grant microfinance loans", its factor loading is 623. The factor loading for the third item "Your MFI offers services through Mobile Technology" is 0.499.

Table 3.6: Rotated Component Matrix for Digital Transformation

Items	Rotated Component Matrixa		
	Digital echnology	Technology cost & Mobile network problems	Mobile Technology
Loan Officers have the skill to use technology effectively.	0.869		
The MFI technological infrastructure is well established.	0.849		
Your organization is fully digitalized.	0.839		
Internet Connectivity is a challenge in your organization		0.810	
Mobile network problems are a challenge in your organization		0.765	
The cost of technology integration is high.		0.685	
Mobile Technology helped to reduce cost for organization			0.746
Your MFI developed mobile application to grant microfinance loans			0.623
Your MFI offers services through Mobile Technology			0.499

Prepared by Researchers based on statistical analysis

Microfinance:

The following table (3.7) shows the KMO and Barlette's Test applied to the dependent variable "microfinance". It shows The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is .0.748, indicating that the data were suitable for factor analysis. Bartlett's test of sphericity was statistically significant, ($\chi 2(171) = 787.999$, $p < .001$), indicating that the correlation matrix is not an identity matrix and that factor analysis is appropriate.

Table 3.7: KMO and Bartlett's Test for Microfinance

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.748
Bartlett's Test of Sphericity	Approx. Chi-Square	787.999
	Df	171
	Sig.	0.000

Prepared by Researchers based on statistical analysis

Rotated Component Matrixa for Microfinance

The following table (3.8) presents rotated component matrix for the dependent variable, which is microfinance, sometimes referred to as the factor loading. It contains estimates of the correlations between each of the variables and the estimated components. Based on the result of EFA, there were seven items that loaded onto Factor 1 that measures "Technology advantages for clients & MFIs". The factors loadings were as follows: 0.675, 0.674, 0.660, 0.654, 0.648, 0.570 and 0.540.

There were two items that loaded onto Factor 2 that measures "Profit versus Cost".

The factor loading for the first item "Technology has reduced cost of operation in the organization" is 0.872 and the factor loading for the second item "Technology has increased profits in the organization" is 0.717. Five items were loaded onto factor 3 that measures "Loan Process Support". The factor loading for the item "Technology is used in sending notifications and reminders to clients is 0.816, the factor loading for the item "Digital Financial Education is advocated through your organization" is 0.666, the factor loading for the item "Technology is used in the process of Loan Application" is 0.513,

the factor loading for the item "It is better using technology than having human interaction" is 0.428. There were three items that loaded onto Factor 4 that measures "Operational Efficiency". The factor loading for the first item "Technology is used in the process of Loan Repayment" is 0.840. The factor loading for the second item "Technology is used in the process of Loan Disbursement." is 0.822. The factor loading for the third item "Having financial services through technology is important after the pandemic" is 0.478.

Table 3.8: Rotated Component Matrix for Microfinance

Items	Component				
	Technology advantages for clients &MFIs	Profit versus Cost	Loan Process Support	Operational Efficiency	Financial Inclusion
Technology has reduced cost of loan disbursed.	0.675				
Technology helps to give clients quick services.	0.674				
Technology has increased employees' job satisfaction	0.660				
Technology has increased organization's efficiency	0.654				
Technology has facilitated development of new financial products	0.648				
After adopting technology, high cost is one of the challenges your organization face.	0.570				
Technology has increased market share of the organization	0.540	0.519			
Technology has reduced cost of operation in the organization		0.872			
Technology has increased profits in the organization		0.717			
Technology is used in sending notifications and reminders to clients.			0.816		

Digital Financial Education is advocated through your organization.			0.666		
Technology is used in the process of Loan Application.			0.513		
Number of clients increased after using technology.			0.469		
It is better using technology than having human interaction			0.428		
Technology is used in the process of Loan Repayment.					
Technology is used in the process of Loan Repayment.				0.840	
Technology is used in the process of Loan Disbursement.				0.822	
Having financial services through technology is important after the pandemic.					
Women are struggling more to use technology in getting services.					0.815
Technology prevents segments of the population from accessing financial services.					0.782

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3.4 Partial Least Squares Structural Equation Modelling (PLS-SEM)

In this section, the researchers discuss the results of using the PLS-SEM to draw a conclusion from the sample data that have been collected. The main objective of a PLS-SEM is to assess the complex causal relationship of observable variable to latent variables, and one latent variable to another latent variable. A PLS-SEM is composed of two parts; the structural model and the measurement model. The measurement model presents the relationship between the latent variables and the observable variable, while the structural model presents the relationship between the latent variables. (Hair, Hult, Ringle , & Sarstedt, 2014).

Measurement Model will be evaluated through Convergent Validity and Discriminant Validity. As for the Structural Model, it will be evaluated by R2., f2 Effect Size and Goodness of fit and Path Coefficient to test hypotheses.

Measurement model

Measurement model is an element of a path model that contains the indicators and their relationships with the constructs and is also called the outer model in Smart PLS. The assessment of measurement models includes evaluating convergent validity through evaluating factor loadings, composite reliability to evaluate internal consistency, and average variance extracted (AVE). In addition, to assess discriminant validity, the Fornell-Larcker criterion and cross loadings are usually used (Hair, Hult, Ringle , & Sarstedt, 2014).

Convergent Validity

This is explained in table (3.9) by factor loadings, Cronbach's Alpha, composite reliability (CR), and average variance extracted (AVE). Composite reliability ranges between 0.799 and 0.899 which is considered acceptable. This means that the internal consistency reliability has been achieved.

The extracted average variance represents the overall variance in the indicators accounted for the latent variables, ranges between 0.544 and 0.811 which means it surpassed the recommended value of 0.5 which means that the constructs explain more than half of the variance of its indicators. thereby providing evidence of convergent validity.

Table 3.9: Factor Loading, Cross Loading, Cronbach's Alpha and Composite Reliability for Measurements Model

Constructs	Questions	Loading Factors	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Digital Technology	q3.1	0.862	0.831	0.899	0.748
	q3.2	0.883			
	q3.3	0.848			

Financial Inclusion	q4.6	0.753	0.603	0.826	0.748
	q4.7	0.918			
Loan Process Support	q4.1	0.817	0.724	0.824	0.544
	q4.16	0.590			
	q4.2	0.826			
	q4.5	0.691			
Mobile Technology	q3.5	0.769	0.505	0.799	0.667
	q3.8	0.861			
Operational Efficiency	q4.19	0.711	0.675	0.822	0.608
	q4.3	0.851			
	q4.4	0.771			
Profit versus Cost	q4.8	0.897	0.767	0.896	0.811
	q4.9	0.904			
Technology Advantages for Clients	q4.10	0.801	0.848	0.886	0.568
	q4.11	0.755			
	q4.12	0.795			
	q4.13	0.844			
	q4.15	0.641			
	q4.17	0.663			
Technology Cost & Mobile Network Problems	q3.4	0.743	0.636	0.799	0.571
	q3.6	0.787			
	q3.7	0.735			

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Discriminant Validity

Discriminant validity denotes how distinct a particular construct is from other constructs. It compares different constructs and their indicators to make sure they are distinct and unique. The Fornell-Larcker criterion as well as cross loadings provide evidence for the constructs' discriminant validity (Hair, Hult, Ringle , & Sarstedt, 2014).

Fornell-Larcker Criterion:

The Fornell-Larcker criterion is a more conservative approach to assess discriminant validity. It juxtaposes the square root of the Average Variance Extracted (AVE) values against the correlations between latent variables. Essentially, each construct's square root of AVE should exceed its highest correlation with any other construct. This approach hinges on the premise that a construct manifests more variance with its respective indicators than with any other construct(Hair, Hult, Ringle , & Sarstedt, 2014). The following table (3.10) measures the discriminant validity through using Fornell-Larcker criterion.

Table (3.10): Fornell-Larcker Criterion for Measurement Model

	Digital Technology	Financial Inclusion	Loan Process Support	Mobile Technology	Operational Efficiency	Profit versus Cost	Technology Advantages for Clients	Technology Cost & Mobile Network Problems
Digital Technology	0.86							
Financial Inclusion	-0.03	0.84						
Loan Process Support	0.49	-0.15	0.74					
Mobile Technology	0.32	-0.02	0.48	0.82				
Operational Efficiency	0.44	0.00	0.49	0.35	0.78			
Profit versus Cost	0.19	-0.10	0.40	0.50	0.18	0.90		
Technology Advantages for Clients	0.46	-0.17	0.60	0.48	0.37	0.54	0.75	
Technology Cost and Mobile Network Problems	0.05	0.25	0.03	0.18	0.06	-0.13	0.02	

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Table (3.10) shows that the square root of the AVE of the construct "Digital Technology" is higher than its highest correlation with any other construct as it is 0.86. The same with the construct "Financial Inclusion" as it is 0.84 which is higher than any other highest correlation. The same with the construct "Loan Process Support" as it is 0.74 which is higher than any other highest correlation. As for the "Mobile Technology" construct, it is 0.82 which is higher than any other highest correlation. The same with "Operational Efficiency" as it is 0.78 which is higher than any other highest correlation. The same with all other constructs as each construct shares more variance with its associated indicators than with any other construct. Thus, discriminant validity is established.

Cross Loading:

It is an indicator of the correlation with other constructs in the model. Actually, it is another method for assessing discriminant validity. An indicator's outer loading on the associated construct should be greater than all its loadings on other constructs. (Hair, Hult, Ringle , & Sarstedt, 2014). This is explained through table (3.13).

Table (3.11): Fornell-Larcker Criterion for Measurement Model

	Digital Technology	Financial Inclusion	Loan Process Support	Mobile Technology	Operational Efficiency	Profit versus Cost	Technology Advantages for Clients	Technology Cost & Mobile Network Problems
q3.1	0.862							
q3.2	0.883							
q3.3	0.848							
q3.4								0.743
q3.5				0.769				
q3.6								0.787
q3.7								0.735
q3.8				0.861				
q4.1			0.817					
q4.2			0.826					
q4.3					0.851			
q4.4					0.771			
q4.5			0.691					
q4.6	0.753							
q4.7	0.918							
q4.8						0.897		
q4.9						0.904		
q4.10							0.801	

q4.11							0.755	
q4.12							0.795	
q4.13							0.844	
q4.15							0.641	
q4.16			0.590					
q4.17							0.663	
0.711					0.711			

Prepared by Researchers based on statistical analysis

The outer loadings on all constructs are higher than all its cross loadings with other constructs. Thus, discriminant validity is established. The cross loading of the dimension "Digital Technology" is appropriate as it ranges between 0.862 and 0.883. The cross loading for the first statement which is "Your organization is fully digitalized is 0.862. The cross loading for the second statement which is "Loan officers have the skill to use technology effectively" is 0.883 and the cross loading for the third statement which is" The MFI technological infrastructure is well established" is 0.848.

The cross loading of the dimension "Loan Process Support" is appropriate as it ranges between 0.59 and 0.826. The cross loading for the first statement which is "Number of clients increased after using technology" is 0.817. The cross loading for the second statement which is "Technology is used in the process of Loan Application." is 0. 0.826. The cross loading for the third statement which is Technology is used in sending notifications and reminders to clients" is 0.691. The cross loading for the fourth statement which is "Digital Financial Education is advocated through your organization" is 0.590

The cross loading of the dimension which is "Mobile Technology" is appropriate as it ranges between 0.769 and 0.861. The cross loading for the first statement which is "Your MFI offers services through mobile technology" is 0.769. The cross loading for the second statement which is "Mobile Technology helped to reduce cost for organization" is 0.861.

The cross loading of the dimension named "Operational Efficiency" is appropriate as it ranges between 0.711 and 0.851. The cross loading for the first statement which is "Technology is used in the process of Loan Disbursement" is 0.851. The cross loading for the second statement which is "Technology is used in the process of Loan Repayment" is 0.771 The cross loading for the third statement which is "Having financial services through technology is important after the pandemic." is 0.711

The cross loading of the dimension which is "Profit Versus Cost" is appropriate as it ranges between 0.897 and 0.904. The cross loading for the first statement which is "Technology has increased profits in the MFI" is 0.897. The cross loading for the second statement which is "Technology has reduced cost of operation in the organization" is 0.904.

The cross loading of the dimension "Technology Advantages for Clients" is appropriate as it ranges between 0.641 and 0.844. The cross loading for the first statement which is "Technology has increased market share of the organization is 0.801. The cross loading for the second statement which is "Technology has facilitated development of new financial products." is 0.755. The cross loading for the third statement which is "Technology has increased organization's efficiency" is 0.795. The cross loading for the fourth statement which is "Technology has increased employees' job satisfaction" is 0.844. The cross loading for the fifth statement which is "Technology helps to give clients quick services" is 0.641.

The cross loading for the sixth statement which is "Technology has reduced cost of loan disbursed." is 0.663.

The cross loading of the dimension which is "Technology Cost and Mobile Network Problems" is appropriate as it ranges between 0.735 and 0.787. The cross loading for the first statement which is "The cost of technology integration is high" is 0.743. The cross loading for the second statement which is "Mobile network problems are a challenge in your organization" is 0.787. The cross loading for the third statement which is "Internet Connectivity is a challenge in your organization" is 0.735.

Structural Model

The essential criterion for assessing it is the coefficient of determination (R2) of the endogenous latent variables. R-squared (R^2) serves as a statistical metric for assessing the adequacy of fit in a regression model. In the context of Smart PLS (Partial Least Squares) modeling, R^2 is used to measure the amount of variance in the endogenous latent variables that can be explained by the exogenous latent variables in the model (Hair, Hult, Ringle, & Sarstedt, 2014). One can describe R2 values of 0.67, 0.33, and 0.19 in PLS path models as substantial, moderate, and weak, respectively as illustrated in table 3.13.

If certain inner path model structures explain endogenous latent variables by only a few (e.g. one or two) exogenous latent variables, "moderate". In this research, the major criteria for evaluating the structural model is through the significance of the path coefficients, coefficient determination (R^2) and effect size f2. After the evaluation of the Measurement Model, structural model can be evaluated to determine how well empirical data support the concept and therefore, to decide if the concept has been empirically confirmed.

Table 3.12 reveals that the R2 for "Loan Process Support" is 0.36 which implies that the research model with the research variables and their measurement items with their interrelationships can explain the change in "Loan Process Support" by 36%. According to Hair et al. (2014) the research model has moderate predictive accuracy for Loan Process Support. Moreover, the R2 for Technology Advantages for Clients is 0.319. Thus, the research model with the research variables and their measurement items with their interrelationships can explain the change in effectiveness by 31.9%. According to this percentage the research model has moderate predictive accuracy for "Technology Advantages for Clients" item. In general, the R2 for the structural model mostly ranges between substantial and moderate, thus R2 Coefficient of Determination is acceptable.

TABLE 3.12: R2 COEFFICIENT OF DETERMINATION FOR STRUCTURAL MODEL

Dependent variable	R Square	R Square Adjusted
Financial Inclusion	0.070	0.041
Loan Process Support	0.360	0.347
Operational Efficiency	0.242	0.219
Profit versus Cost	0.294	0.273
Technology Advantages for Clients	0.339	0.319

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Table 3.13: Criteria for R2 Coefficient of Determination for Structural Model

Criterion	Description
< 019	Weak
> 019 – 0.33	Moderate
>0.33 – 0.67	Substantial

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Effect Size – f2

In Smart PLS analysis, the effect size can be measured using the f^2. This indicator measures the effect size of a single exogenous variable (i.e., predictor variable) on a single endogenous variable (i.e., outcome variable) in a PLS path model. The f^2 indicator is a modification of the R^2 index, In Smart PLS analysis, the effect size can be measured using the f^2. This indicator measures the effect size of a single exogenous variable (i.e., predictor variable) on a single endogenous variable (i.e., outcome variable) in a PLS path model. The f^2 indicator is a modification of the R^2 index, which measures the proportion of variance in the endogenous variable that is explained by the exogenous variable(s) in the model. In general, a larger value of f^2 indicates a strong effect of the independent variable on the dependent variable. Cohen (1988) suggested that f^2 values of 0.02, 0.15, and 0.35 can be interpreted as small, medium, and large effect sizes, respectively, as illustrated in table (3.15), (Hair, Hult, Ringle , & Sarstedt, 2014).

It can be seen from table (3.14) that the largest effect size of independent variable is for Mobile Technology on Profit versus Cost, then the Digital Technology on Loan Process Support. On the other hand, all other effect sizes of independent variables are small.

Table 3.14: Effect Size f2 for Structural Model

Construct	Financial Inclusion	Loan Process Support	Operational Efficiency	Profit versus Cost	Technology Advantages for Clients
Digital Technology	0.000	0.202	0.162	0.001	0.155
Mobile Technology	0.003	0.180	0.059	0.340	0.195
Technology Cost and Mobile Network Problems	0.074		0.000	0.067	0.006

Prepared by Researchers based on statistical analysis

Table 3.15: Criterion of Effect Size f2 for Structural Model

Criterion f2	Description
< 0.02	Weak
> .02 – 0.15	Moderate
> 0.15 – 0.35	Substantial

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Goodness of Fit

The quality of the model is evaluated using a set of statistical criteria or indicators known as Goodness-of-Fit criteria or indicators; these statistical criteria or indicators are mainly used to express the overall quality of agreement of the model and to ensure that the model represents the research problem.

In this regard, it should be noted that there are many indicators to measure the quality of compatibility, but one of the most important and commonly used indicators by researchers is the indicators shown in the following table No. (3.16).

Table 3.16: Indicators for Goodness of Fit

Indicator	Description
NFI	It is the abbreviation of the Normed Fit Index and it is calculated by means of chi-square, and its value ranges from (zero), that is, non-compatibility, to (one), which is complete compatibility. The higher its value and the closer it is to (1), the more compatible.
SMSEA	It is an acronym for the Standardized Root Mean Square Residual, which represents the extent to which the model agrees with the variance matrix. The model has good agreement if its value is less than or equal to (0.08), and values from (0.08-0.10) indicate average agreement and the values Greater than (0.10) indicates poor agreement

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It is clear from Table (3.17) that the model has a high level of quality of agreement. As all indicators are within acceptable limits that the model is fit.

Table 3.17: Normed Fit Index (NFI)

	Saturated Model	Estimated Model
SRMR	0.097	0.115
d_ULS	3.037	4.286
d_G	1.112	1.227
Chi-Square	611.410	649.599
NFI	0.504	0.473

Prepared by Researchers based on statistical analysis

Path Coefficients

In this section, the researchers examine the strength of the hypothesized relationships among the constructs with values between -1 and +1, which means the closer the absolute value of estimated path coefficients is to 1, the stronger the relationship, and the more likely the association will be statistically significant (i.e., different from zero in the population). However, when the path coefficients are close to zero, the relationship would be weak and non-significant (i.e., not significantly different from zero).

In this research, a proposed model analysis of the structural model was carried out to explore a detailed picture of the results and to test the Hypotheses reached after conducting the analysis. The model focused on the analysis of the direct relationship between the independent variables (digital technology, Mobile Technology, and Technology Cost and Mobile Network Problems) and the dependent variables (Loan Process Support, Operational Efficiency, Profit versus Cost, and Technology Advantages for Clients). During the hypothesis testing phase, the validity of the proposed path is confirmed by assessing the statistical significance of each structural parameter value. Table (3.18) shows the 12 hypotheses reached after the statistical analysis.

According to $H1$, the result suggested that there is a significant relationship between digital technology and Loan Process Support (**β** = 0.34; t = 4.36; p <.001) hence, $H1$ is supported. Also, H2 is supported as the result showed that that there is a significant relationship between digital technology and Operational Efficiency (**β** = 0.38; t = 4.45; p <.001). For $H3$, the result suggested that there is a no significant relationship between digital technology and Profit versus Cost (**β** = 0.04; t = 0.45; p = .66) hence, $H3$ is not supported. H4 is supported as the result showed that that there is a significant relationship between digital technology and Technology Advantages for Clients (**β** = 0.35; t = 4.26 p <.001).

For $H5$, the result suggested that there is no significant relationship between Mobile technology and Loan Process Support (β = 0.43; t = 4.67; p <.001) hence, $H5$ is supported.H6 is supported as the result showed that that there is a significant relationship of Mobile technology and Operational Efficiency (β = 0.22; t = 2.21; p <.001). For $H7$, the result suggested that there is a significant relationship between Mobile technology and Profit versus Cost (β = 0.54; t = 6.34; p <.001) hence, $H7$ is supported. H8 is supported as the result showed that that there is a significant relationship between Mobile technology and Technology Advantages for Clients (β = 0.38; t = 4.38 p <.001).

For $H9$, the result suggested that there is no significant relationship between Technology Cost & Mobile Network Problems and Loan Process Support (β = -0.05; t = 0.40; p =0.87) hence, $H9$ is not supported. Also, the result for H10 showed that that there is no significant relationship between Technology Cost & Mobile Network Problems and Operational Efficiency (β = 0.00; t = 0.00; p =1.00) hence, $H9$ is not supported. For $H10$, the result suggested that there is a significant relationship of Technology Cost & Mobile Network Problems and Profit versus Cost (β = -0.22; t = 2.15; p = .03) hence, $H10$ is supported. For $H11$, the result suggested that there is a significant relationship of Technology Cost & Mobile Network Problems and Profit versus Cost (β = -0.22; t = 2.15; p = .03) hence, H 11 is supported. Lastly, for H12, it is not supported as the result showed that that there is not significant relationship between Technology Cost & Mobile Network Problems and Technology Advantages for Clients (β = -0.06; t = 0.53; p =.60).

Table 3.18: Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
Digital Technology -> Loan Process Support	0.34	0.35	0.08	4.36	0.00
Digital Technology -> Operational Efficiency	0.38	0.39	0.09	4.45	0.00
Digital Technology -> Profit versus Cost	0.04	0.05	0.10	0.45	0.66
Digital Technology -> Technology Advantages for Clients	0.35	0.35	0.08	4.26	0.00
Mobile Technology -> Loan Process Support	0.43	0.42	0.09	4.67	0.00
Mobile Technology -> Operational Efficiency	0.22	0.22	0.10	2.21	0.03
Mobile Technology -> Profit versus Cost	0.54	0.53	0.09	6.34	0.00
Mobile Technology -> Technology Advantages for Clients	0.38	0.39	0.09	4.38	0.00
Technology Cost and Mobile Network Problems -> Loan Process Support	-0.02	-0.02	0.15	0.16	0.87
Technology Cost and Mobile Network Problems -> Operational Efficiency	0.00	0.00	0.12	0.00	1.00
Technology Cost and Mobile Network Problems -> Profit versus Cost	-0.22	-0.21	0.10	2.15	0.03
Technology Cost and Mobile Network Problems -> Technology Advantages for Clients	-0.06	-0.06	0.10	0.53	0.60

Prepared by Researchers based on statistical analysis

Finally, the result suggested that the main hypothesis of the research which is "there is a positive relationship between using digital transformation and developing microfinance" is partially supported.

4- Result

The following are the research result based on the main objective mentioned earlier:

Determining if Digital Transformation Helps in Developing Microfinance Institutions' Performance.

Almost 60% of respondents believe that technology has reduced cost of operation inside the MFI. Around 70% of the respondents believe that technology has increased MFI's market share. Slightly more than 91% of the respondents believe that it has increased the organization's efficiency.

More than 60% of the respondents use technology in the process of loan application, around 73.5% use it in the process of loan disbursement, around 92% use it in the process of loan repayment, around 73% use it in sending notifications and reminders to clients.

One may reach the conclusion that application of digitalization has a positive impact in terms of reducing cost of operation, increasing market share, increasing organization's efficiency, increasing employee's job satisfaction as well as loan application, loan disbursement and loan repayment. This eventually increases productivity and overall performance of MFIs specifically in the era of the pandemic outbreak. This means that emphasizing the usage of digitalization in MFIs will have a great influence on overall performance of MFIs and will tackle challenges associated with efficiency and loan tracking.

The least agreed upon items were the statement that "Your organization developed a mobile application to grant microfinance loans" with the percentage of 37.3%. Followed by item no. 5 which states that "Your MFI offers services through mobile technology" with the percentage of 32.4%. This reflects that there are still many MFIs working on developing or using mobile applications which will help them present better services.

5-Recommendations

Based on respondents' point of view, the research came up with recommendations for four types of stakeholders, namely the academicians, microfinance institutions, policy makers and donors.

5.1 Recommendation for Academicians

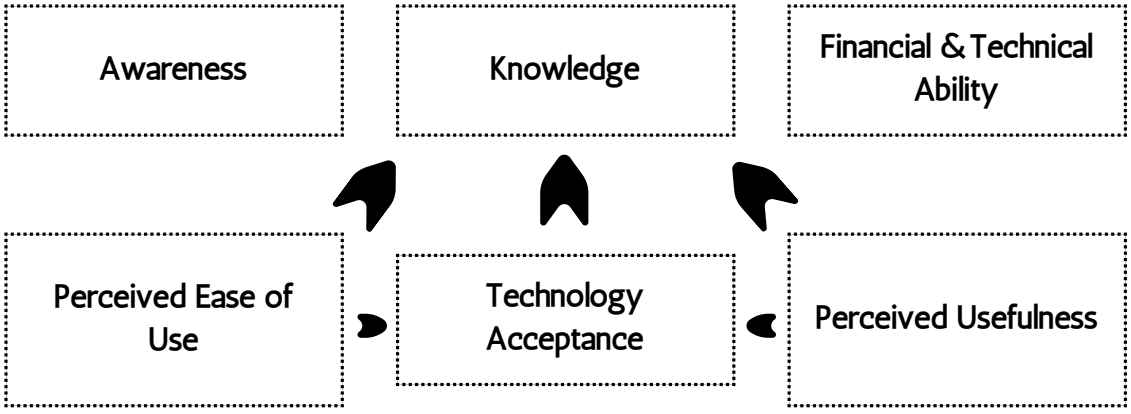
Further research should be conducted after a number of years to confirm or refute some of the findings in the research.

5.2 Recommendation for Microfinance Institutions (MFIs)

Microfinance institutions officials should apply a "Technology Adoption Model" specifically designed for Microfinance Institutions in order to help them adopt digitalization. The following figure (5.1) presents for Technology Adoption Model for Microfinance Institutions. It is adopted from the TAM Model's three pillars mentioned earlier in literature review section which are perceived ease of use (PEOU), perceived usefulness (PU) and Technology Acceptance (TA).

The researchers believe that it is not enough only to offer a useful and easy pattern of technology to accept and adopt technology as it could be still a struggle for the MFIs to apply. So, the researcher suggests adopting the following model to be used by MFIs when they are introduced to innovative technological systems.

Figure 5.1: Technology Adoption Model for Microfinance Institutions



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Awareness should first be spread to make users identify the need and necessity of digitizing the process. This will decrease the rejection that might occur if the reasons and rationale behind adopting new ways is not explained.

Knowledge: should be spread through training programs and workshops as officers working in MFIs should be trained on how to use it. In addition, microfinance borrowers should be taught how to use the methods that MFIs would apply. This could happen by offering workshops and training programs, Microfinance institutions should as well train technical staff and other employees on risks involved in using technology and fin-tech solutions and develop risk management mechanisms.

Financial and Technical Ability: Financial resources to upgrade MFI's technical ability and the digital infrastructure should be ensured. This includes investing in new hardware and software and ensuring that the institution has sufficient bandwidth and connectivity to support digital transactions. Microfinance institutions should hire competent staff with skills and competency to manage technology upgrades. Also, digital infrastructure should be enhanced for mobile fintech systems to run efficiently.

6-Conclusion

The research shows that there are some main challenges faced when using technology. They include mobile network, internet connectivity, digital literacy, lack of awareness, the cost of technology integration and data protection risk. Microfinance institutions can leverage technology to speed up the flow of information and the process of disbursing and collecting loans, automate transactions, control, and analyze data. It will also improve customer experience; reduce eventually loans' cost; and increase efficiency and customer outreach. Eventually digitization of Microfinance shall be the most convenient and affordable way.

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