

Relationship Between Digital Banking and Financial Inclusion: Evidence from Tunisia

Ines Gharbi^{1*}, Aïda Kammoun²

¹Faculty of Economics and Management of Sfax, University of Sfax, Tunisia

²Department of Management, Higher Institute of Business Administration, University of Sfax, Tunisia

ABSTRACT

The concept of financial inclusion emerged in the period from the 1990s to 2000. It has been considered a policy priority by governments and international organizations to reduce poverty and establish inclusive growth. The Tunisian government and the Central Bank of Tunisia have taken some measures to promote financial inclusion through digitization, such as ATMs, mobile banking, internet banking and e-wallets. Within this framework, our study examined the relationship between the digitization of the Tunisian banking sector and financial inclusion and whether Fin-tech developments have contributed to an inclusive financial system. By developing a questionnaire survey of Tunisian bank employees, we found a significant positive relationship between digital technology and financial inclusion. Our research is original in that it examines the relationship between digital banking and financial inclusion using four indicators of inclusive development: access, use, quality, and efficiency of financial services. Similarly, and to our knowledge, this is the first study of its kind in the Tunisian context.

ARTICLE INFO

Article History:

Received : 31-01-2022

Revised : 26-05-2022

Accepted : 10-07-2022

Published : 31-10-2022

Keywords:

Digital Banking

Financial Inclusion

Bank Employees

Tunisia

JEL: M10, M21

*Corresponding Author E-mail:

gharbiines009@gmail.com



Copyright © 2022 Authors. This is an open access article distributed under the Creative Commons Attribution License (CC-BY-SA 4.0) which permits use, distribution and reproduction in any medium, provided the original work is properly cited & ShareAlike terms followed.

INTRODUCTION

Digital is a very innovative sector that evolves very quickly. Almost every three or four months there is something new (Gharbi et al., 2022). Thus, with the technological development of the

financial world, the exponential production of data and the changes in the behavior of bank customers, new players are appearing, such as digital finance start-ups and Fin-Tech, which are developing know-how on some of the historical

activities of banks and forcing them to accelerate their mutations by taking up the digital challenge. Thus, as mentioned by (Melubo, 2018): "Between the emergence of FinTechs and the new lifestyle of consumers, the traditional bank is faced with change and digital transformation to remain competitive". The Central Bank of Tunisia (BCT) has created a website "BCT FINTECH" to collaborate with the FinTechs and has launched FinTech initiatives such as "Regulatory SandBox" and "BCT-Lab" to change procedures in connection with technological advances. These measures are part of a joint strategy with the Ministry of Finance for the period 2018-2022. Digital banking has played a powerful role in the process of inclusive finance in countries. It expands opportunities for all, especially the poor and marginalized, to access and use different financial services and thus participates in financial activities. As argued by (Fanta and Makina, 2019): «The combination of IT and mobile telephony has emerged as a viable solution for greater financial inclusion because it minimizes the need for setting up physical branches by banks". In this paper, aware of the priority of financial inclusion in the international development agenda, the role of bank digitalization as a determinant of the degree of financial inclusion will be studied on this paper by analyzing the impact of bank digitalization on financial inclusion in the Tunisian context. Indeed, to have an inclusive growth in an economy, there should be digital financial systems that ensure the availability, accessibility, use, quality and efficiency of formal financial services to the entire population.

The reminder of the paper will be organized as follows. In the second section, we will present definitions of digital banking and financial inclusion. We also provide a literature review on the relationship between the digital transformation of the banking sector and financial inclusion. Section three will present our research model. The results of empirical investigation will be presented and discussed in the fourth section. Finally, we will conclude in section five.

LITTERATURE REVIEW

Defining digital banking

Digital banking is a cross between Fintech Company and Bank. Fintech defined by Nurfadilah and Samidi (2021) as a transformation of the financial system based on new technology. Whereas a digital bank, like a traditional bank, can be organized into five divisions: Retail Banking, Private and Commercial Banking, Analysis and IT, Financial Management and Operations, and Risk Management, the relative importance of these departments is not the same. Furthermore, the map of the relationships between the different divisions is different between digital and traditional banking, with Analysis and IT is the cornerstone of the digital bank. In general, the success and failure of a bank are measured by the technologies and analytical methods adopted rather than by its product range (Lipton et al, 2016). The use of technology to deliver financial goods in order to improve accessibility and affordability of services is known as digital banking (Melubo and Musau, 2020). The implementation of new financial instruments, services, or practices, the introduction of new money uses, the discovery of new funding channels, the implementation of new methods for processing daily operations, or the establishment of a new organization are all aspects of digital banking strategy (Kithinji, 2017).

Thus, bank digitization is defined as the realization of transactions digitally and access to bank account information electronically via personal computers. Well, banking digitization encompasses the set of technological initiatives used in the banking sector, and refers to the use of digital channels such as telephone, tablet and Internet for the provision of banking services and products.

Defining Financial Inclusion

According to (Ozili, 2020), «Financial inclusion is the ease of access to and availability of basic financial services for all members of the population». Referring to (Allen et al, 2016) and (Ozili, 2018), financial inclusion is the process

of ensuring that individuals' especially poor people have access to basic financial services in the formal financial sector. Likewise, (Chehade et al, 2017) present Financial inclusion as a status in which individuals, including low-income people, and enterprises, including the smallest, have access to and make use of a full range of quality formal financial services (payments, transfers, savings, credit, and insurance) offered in a responsible and sustainable manner by a variety of providers operating in an appropriate legal and regulatory environment. Also, (Sarma, 2015) presents financial inclusion as a procedure which warrants easier access, readiness and usage of financial services for all people of a country. This explanation strictly emphasizes on access to and usage of formal financial services for entire segments of society, which is one of the most vital factors in the economic growth of a nation. These definitions come together in the point that every member of the population must have access to/and usage of available formal financial services.

Thus, financial inclusion encompasses all the measures and means put in place to fight against banking and financial exclusion. It is composed of several financial products and services (microinsurance, various credit products, savings products and money transfer) and non-financial (training in business management, risk and governance, software to assist in decision-making and financial education and awareness) made available to every member of the population. As a conclusion, it appears that financial inclusion is a multi-dimensional concept. Banking penetration, availability of the banking services, usage of the banking system, affordability and timeliness of financial system are principal dimensions of financial inclusion.

Digital banking and financial inclusion: Literature review

The theoretical basis for the relationship between digital banking and financial inclusion is based on the premise that a large portion of the excluded population owns a cell phone, and that the provision of financial services via cell

phones and related devices can improve access to finance for the excluded population (The World Bank, 2016). This sub-section presents some research papers addressing the relationship between the digital transformation of the banking sector and financial inclusion. This was a challenge, as we encountered difficulties in finding quality articles that targeted our research problem, while technological developments such as the Internet and cell phones are promoting wider access to and use of financial services, very few studies have attempted to measure these relationships empirically. One of the reasons is that the wider adoption of these technologies is recent, while measuring causal relationships requires decades of time series data.

(Makau and Olando, 2021) evaluated the impacts of digital banking strategy on financial inclusion among commercial banks in Kenya in Kajiado district. A closed-ended questionnaire was administered and developed on a sample of 179 respondents for 323 bank branches and agents. This study shows that digital banking channels, digital financial infrastructure, and digital financial services, have a statistically positive and significant effect on financial inclusion, while digital service provision has a statistically insignificant effect on financial inclusion. Within the same context, (Melubo and Musau, 2020) sought to establish the effects of digital banking on the financial inclusion of Women entrepreneurs in Narok County, Kenya. Primary data was collected using a semi-structure questionnaire to be administered to Women business owners through face-to-face interviews. (Siddik et al, 2020) presented the effects of digital finance on financial inclusion, which is measured by outstanding loans from commercial banks (% of GDP; logarithm of outstanding loans) and digital finance is measured by three widely used proxy indicators: the number of ATMs per 100,000 adults (ATMs), the percentage of the population using the Internet (INT), and the value of mobile money transactions. (Fanta and Makina, 2019) examined the relationship between digital technology and financial inclusion. They measured financial

inclusion using two dimensions, namely accessibility and usage. Bank Acct is a dependent variable used to measure the accessibility of financial services using bank accounts per 1000 adults. EFT and Dep measure financial services usage and represent electronic funds transfers and deposits as a percentage of GDP. The authors report a significant positive relationship between digital technology and financial inclusion.

(Kumar et al, 2019) highlighted the impact of digital banking on financial inclusion in the Rupnagar district. The study is descriptive in nature and data is collected from primary (a self-assessment questionnaire) and secondary sources (collected from reports, newspapers, and books). The authors conclude that financial inclusion is positively influenced by digital banking and that digital banking channels have a positive association with promoting financial inclusion. In the same way, (Kithinji, 2017) studied the effects of the digital banking strategy on the financial inclusion of commercial banks in Kenya. The study was based on quantitative data from primary and secondary data sources. The

regression model established the relationship between numeric strategy and financial inclusion among commercial banks. There has been a significant positive development in financial inclusion, explained by the number of accounts, the value of deposits, the number of outlets and the customer base, over the 5 year period. The most important digital banking strategy according to this study is mobile banking, followed by ATM banking, agent banking and online banking, respectively.

(Naumenkova et al, 2018) examined the influence of the economy digitalization on the financial Inclusion in Ukraine. Their main objective is to assess the level of financial inclusion, to determine the influence of tariff and non-tariff barriers on access to different financial services for the Ukrainian population compared to other countries of the world and finally, to define the part of the adult population that is able to join the formal financial services system with the use of innovative financial service channels and systems. Table 1 below provides a summary of the articles reviewed.

Table 1. Summary of reviewed articles

Author(s)	FI dimensions	Sample	Methodology	Results
(Makau and Olando, 2021)	Access	179 respondents for 323 bank branches and agents	Multiple regression analysis	The digital banking strategy is having a positive impact on financial inclusion in commercial banks in Kajiado District, Kenya.
(Siddik et al., 2020)	Usage	189 countries	Two methods: Trend analysis and two case studies.	Digital finance has a positive impact on financial inclusion.
(Melubo and Musau, 2020)	Accessibility Usage	184 Women owned enterprise in Narok County, Kenya.	descriptive statistical methods	Digital banking has positively influenced the financial inclusion of Women businesses in Narok County.
(Fanta and Makina, 2019)	Accessibility Usage	168 countries	A multiple Imputation procedure using SPSS	Technology is fostering both access and usage of financial services.
(Kumar et al., 2019)	Usage	63 young people aged 20 to 30 from Rupnagar District, Punjab.	A self-assessment questionnaire	Digital banking channels have a positive combination with the promotion of financial inclusion.
(Naumenkova et al., 2018)	Access Usage	the general public in Ukraine	Methodological approaches proposed by the World Bank and the G20 Financial Inclusion Indicators	Financial services infrastructure in Ukraine is unbalanced, and the level of digital financial services is relatively low compared to European countries and middle-income countries.
(Kithinji, 2017)	Usage	42 commercial banks registered in Kenya as of December 31, 2016	A descriptive survey model.	Digital banks had a significant positive impact on the financial inclusion of commercial banks in Kenya

RESEARCH METHOD

According to a study of the Financial Inclusion Observatory in Tunisia, published on December 18, 2018, one-third of Tunisians have a bank account. Including the Post Office, MFIs, and insurance companies, 61% of Tunisians are clients of a formal financial institution. Our extensive Reading of the literature on previously studied dimensions of financial inclusion will highlight our contribution to this work as we will be adding another aspect of financial inclusion that has not, to our knowledge, been studied before. It is the efficiency: dimension cited by the Financial Inclusion Observatory in Tunisia. Financial inclusion will cover, so, all data relating to the access and use of formal financial services as well as those relating to their quality and its effect in improving the conditions of access to these services.

Data, Methodology and Hypotheses

Our goal is to estimate the degree of influence of digital banking on financial inclusion in the Tunisian context. In order to address this research issue, we conduct a quantitative approach consisting of the development and administration of a survey followed by an analysis and interpretation of the results. Our survey was carried out on the basis of a sample of 70 employees of different Tunisian banks. Primary data are collected from a questionnaire for employees working in the banking sector, (see Table 2 in the appendix), while data on the measurement of banking digitalization is collected from the IMF Financial Access Survey (FAS). These data will be analyzed using SPSS 20 software. We measure financial inclusion using three dimensions, namely access, quality and efficiency, all of which are dependent variables each measured by the regression factor score extracted from the PCA results. The regression models adopted in our study are as follows:

$Access = \alpha_0 + \alpha_1 Int + \alpha_2 phone + \alpha_3 digit_{trans} + \sum_{k=1}^n X_k^k + \epsilon_i$	[1]
$Quality = \alpha_0 + \alpha_1 Int + \alpha_2 phone + \alpha_3 digit_{trans} + \sum_{k=1}^n X_k^k + \epsilon_i$	[2]
$Efficiency = \alpha_0 + \alpha_1 Int + \alpha_2 phone + \alpha_3 digit_{trans} + \sum_{k=1}^n X_k^k + \epsilon_i$	[3]

In terms of explanatory variables, Int: is Internet users (% of population); phone: is cell phone subscriptions (per 100 inhabitants); digtrans is the number of mobile and Internet banking transactions (in the reference year) per 1,000 adults. And finally, X is a set of other control variables such as urban population (% of total); literacy rate (% of population 15 years and older) and total labor force, and epsilon is the error term.

The independent variables selected for our research are measures of banking digitalization. As determinants of bank digitization, and depending on the availability of data for Tunisia, we select only 3 independent variables: the number of mobile and internet banking transactions per 1000 adults; cell phone subscriptions per 100 inhabitants; and the percentage of internet users in the population.

RESULT AND DISCUSSION

Principal Component Analysis (PCA)

To perform a PCA, the following 3 conditions must first be met: First, we must be sure that the items are minimally correlated with each other. The correlation matrix should be observed. If several variables are correlated, the factorization is possible. If not, factorization makes no sense and is therefore not advisable. According to Table 3, we can observe that all the variables seem at least slightly correlated.

Second, the KMO index must be greater than 0.5, and the sign of the Bartlett test must tend to 0, which is verified from Table 4, Thus KMO index = 0.701 > 0.6 and Bartlett test = 0.000.

Table 4. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,701
Approx. Chi-Square		288,909
Bartlett's Test of Sphericity	Df	136
	Sig.	,000

Finally, observing the quality of representation of the variables, these must be greater than 0.4, which is verified through Table 5, and those that are less than 0.4 will be eliminated.

Table 3. Correlation matrix

	Access 1	Access 2	Access 3	Access 4	Usage 1	Usage 2	Usage 3	Usage 4	Usage 6	Quality 1	Quality 2	Quality 4	Efficiency 1	Efficiency 2	Efficiency 3	Efficiency 4	Efficiency 5
Access 1	1,000																
Access 2	,345	1,000															
Access 3	,025	,224	1,000														
Access 4	,155	,260	,344	1,000													
Usage 1	,219	,159	,158	,229	1,000												
Usage 2	,396	,306	-,051	,356	,288	1,000											
Usage 3	,130	,203	,444	,287	,222	,240	1,000										
Usage 4	-,001	,164	-,084	,105	,042	,195	,068	1,000									
Usage 5	,109	,155	-,015	,129	,070	,267	,325	,109	1,000								
Quality 1	,096	,190	,190	,306	,154	,114	,201	,296	,174	1,000							
Quality 2	,176	,256	,226	,196	,251	,265	,238	,136	,038	,414	1,000						
Quality 3	-,023	-,084	-,006	,053	-,045	,014	,042	,002	,056	,257	,385	1,000					
Efficiency 1	-,076	,187	-,144	,090	-,035	,011	,067	,226	,304	,162	,114	,268	1,000				
Efficiency 2	,248	,289	,227	,364	,328	,373	,271	,190	,311	,232	,387	,209	,235	1,000			
Efficiency 3	,243	,167	,073	,228	,412	,380	,322	,138	,291	,092	,161	,004	,083	,359	1,000		
Efficiency 4	,294	,252	-,091	,289	,221	,430	-,070	,187	,155	,293	,170	,113	,324	,290	,355	1,000	
Efficiency 5	,109	,406	,196	,351	,216	,240	,096	,337	-,014	,101	,039	-,131	,126	,240	,207	,330	1,000

Table 5. Representation quality

	Initial	Extraction
Access 1	1,000	,526
Access 2	1,000	,439
Access 3	1,000	,767
Access 4	1,000	,461
Usage 1	1,000	,415
Usage 2	1,000	,605
Usage 3	1,000	,722
Usage 4	1,000	,474
Usage 5	1,000	,734
Quality 1	1,000	,527
Quality 2	1,000	,686
Quality 3	1,000	,686
Efficiency 1	1,000	,658
Efficiency 2	1,000	,517
Efficiency 3	1,000	,548
Efficiency 4	1,000	,648
Efficiency 5	1,000	,721

Total variance explained

Looking at the "total variance explained" table 6, in the "total" column, which indicates the initial eigenvalues, only the eigenvalues greater than 1 (the Kaiser criterion) are retained (1.974; 1.221; 1.043). Therefore, only components 1, 2, and 3 are maintained. They concentrate more on variances than the initial variables. For this reason, the 1st, 2nd, and 3rd axes are those that give the maximum information. In other words, they represent about 70.631% of the total variance among all the initial items (17 items). The first one for a percentage of 28.712%, the second for 23.222%, and the third of 18.697%.

Rotated Component Matrix

The interpretation of the principal components is based on the search for the variables that are most strongly correlated with each component. Here, a correlation value greater than 0.5 is considered important.

Table 6. Total variance explained

Comp	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1,974	32,904	32,904	1,974	32,904	32,904	1,723	28,712	28,712
2	1,221	20,347	53,251	1,221	20,347	53,251	1,393	23,222	51,934
3	1,043	17,380	70,631	1,043	17,380	70,631	1,122	18,697	70,631
4	,743	12,376	83,008						
5	,539	8,980	91,987						
6	,481	8,013	100,000						

Table 7. Rotated component Matrix

	Component		
	1	2	3
Access 3			,929
Quality 1	,667		
Quality 2	,753		
Quality 3	,797		
Efficiency 3		,828	
Efficiency 4		,783	

The table 7 clearly shows that: The 1st component is strongly correlated with 3 variables.

The first component increases with the increase of quality 1; quality 2 and quality 3. This indicates that these 3 variables vary together, if one increase, the other two tend to do the same. Therefore, this component is considered a measure of the quality variable.

The second principal component increases with two variables: efficiency 3 and efficiency 4, which are highly correlated with this component. Therefore, we consider this component as a measure of the variable Efficiency.

The third principal component increases with only one variable, which is Access 3, so this component is a measure of the variable Access. It can be seen that this variable has a high loading of 0.929. This means that access to financial services is a strong predictor of financial inclusion.

Multiple linear regression

Table 8 shows the results of the regression models for the variable Access, Quality and Efficiency. All 3 models have adequate explanatory power, with R-squared values ranging from 0.555 to 0.710. The R-squared value peaks in model 2, indicating that about 71% of the variation in financial inclusion is due to the independent variables in the model.

Table 8. Regression analysis

	R2	Adjusted R2	F	Sig
Model 1: ACCESS	0.687	0.500	3.663	0.034
Model 2: QUALITY	0.710	0.536	4.078	0.025
Model 3: EFFICIENCY	0.555	0.288	2.080	0.146

In terms of hypothesis testing, the results of model 1 reveals that digital banking positively affects access to financial services In this case, digital banking promotes accessibility of banking services to members of the population. This variable is consistent with the results of (Melubo and Musau, 2020); (Siddik and Kabiraj, 2020); (Fanta and Makina, 2019); (Kumar et al, 2019). In Somme, having a simple cell phone can potentially open up access to various financial services. Having access to the Internet also expands the range of possibilities. These technologies could help overcome the barriers that prevent unbanked adults from accessing financial services. However, cell phones could eliminate the need to travel long distances to a financial institution.

Regarding model 2, the results show that digital banking has a promoting effect on financial inclusion by improving the quality of banking services for customers through secure transactions and safe, reliable, affordable products. Our result is consistent with the results of (Melubo and Musau, 2020) and (Kithinji, 2017).

Concerning model 3 on the impact of banking digitalization on the efficiency of financial services, it presents our contribution in this work. To our knowledge, this dimension has not been the subject of previous work, but it is cited by the observatory of financial inclusion in Tunisia. In fact, according to our results, digitalized banking services have a positive impact on the efficiency of banking services for customers and for the bank itself. As a result, banks that offer a wide range of internet banking services are more efficient than those that do not. In addition, digitalized banking services help banks improve their earning power and asset quality. Thus, it is no wonder that banks are increasingly turning to the Internet and related information technologies to improve business efficiency and service quality.

The most important driver of financial inclusion today is technology, the powerful effect of which is

its ability to deliver financial services to people wherever they are and whenever they need them. Thus, technology and the Internet are affecting financial access, quality and efficiency of financial services. Cell phone subscriptions have a positive relationship with inclusive development. Financial inclusion has emerged as a by-product of these technologies, now commonly referred to as FinTech (financial technology). Digital financial inclusion can improve the well-being of individuals and businesses that have a reliable digital platform to access funds in their bank accounts to conduct financial transactions (According to CGAP Annual Report, 2015).

Analysis of the impact of control variables on financial inclusion

In terms of the control variables, the results in Table 9 show that the coefficient on the labor force is negative and insignificant for all three models (Student's t-value is -1.083; -1.433; -.676 respectively) meaning that this variable has no effect on financial inclusion. Thus, being part of the labor force is not an indicator of financial inclusion.

Regarding the literacy rate, the empirical results show that this variable has a positive (.667; 1.038) and significant impact (student's t-value is 2.401; 2.888 with a p = .037 and .016) at the 5% significance level for the first two models, meaning that the literacy rate has a positive impact on financial inclusion in terms of access and quality of financial services. Our results are

similar to those found by (Uddin et al, 2017); (Chikalipah, 2017), (Chithra and Selvam, 2013) who found that literacy are significantly associated with financial inclusion. Thus, for uneducated people, accessing financial services is very difficult to achieve, as they do not know how to analyze the credit risk and benefits of a loan or savings project, nor do they provide the necessary documents and information to access the loan. In this context, illiteracy is the main obstacle to financial inclusion. For the last model, however, this variable is negative and not significant.

Also, statistical tests show that there is a positive and non-significant relationship between financial inclusion and urban population in all three models. This result is contrary to the result of the United Nations, (2018) which shows that the possession of all the opportunities to access different financial services thus improving financial inclusion. Thus, living in an urban area is the path to financial inclusion. According to the latest study of the observatory of financial inclusion in Tunisia, rural people are proportionally more likely to be customers of the Post Office, while urban people prefer banks.

CONCLUSION

In an increasingly digitalized world, digital banking has played an important role in the inclusive growth process of countries. This research explored the effects of bank digitalization on financial inclusion by developing a questionnaire survey for bank employees. We

Table 6. Total variance explained

Model	Variables	Coefficient	T-Student	Sig
Model 1: Access	Urban population	,021	,056	,957
	Literacy rate	,667	2,401	,037
	Labor force	-,012	-1,083	,304
Model 2: Quality	Urban population	,325	,665	,521
	Literacy rate	1,038	2,888	,016
	Labor force	-,021	-1,433	,183
Model 3: Efficiency	Urban population	,607	1,361	,203
	Literacy rate	-,425	-1,296	,224
	Labor force	-,009	-,676	,515

found that bank digitalization has positive effects on financial inclusion, it is perceived to improve access, quality and efficiency of financial services. However, it does not improve the use of financial services.

Based on our findings, policymakers should adopt such policies to promote digital finance, which in turn will promote financial inclusion, leading to inclusive growth in the country. Again, the rise of digitization and technologies related to artificial intelligence and Blockchain

has placed new challenges before the Central Bank. These include driving the digitalization of the banking system transformation in order to be even closer to customers and to manage operating costs as well as possible. In this context, it would be important to exploit all the opportunities offered by these technologies dedicated to finance (FinTech). As a key policy implication, encouraging digital banking applications would play an important role in addressing the challenges of impoverished growth, financial exclusion, inequality and poverty in Tunisia.

REFERENCES

- Allen, F. Demircuc-Kunt, A. Klapper, L. and Martinez Peria, M.S. (2016), "The Foundations of Financial Inclusion: Understanding Ownership and Use of Formal Accounts", *Journal of Financial Intermediation*, Vol 27, pp. 1-30.
- Chehade, N., Navarro, A., Barnieh, Y., and Attia, H. (2017), "Financial inclusion measurement in the Arab World ", The Consultative Group to Assist the Poor.
- Chikalipah, S. (2017), "What determines financial inclusion in Sub-Saharan Africa?", *African Journal Of Economic and Management Studies*, Vol.8 No.1, pp.8-18. <https://doi.org/10.1108/AJEMS-01-2016-0007>.
- Chithra, N., & Selvam, M. (2013). Determinants of financial inclusion: An empirical study on the inter-state variations in India. Available at SSRN 2296096.
- Fanta, A. B. and Makina, D. (2019), "The relationship between technology and financial inclusion: Cross-sectional evidence", In *Extending financial inclusion in Africa*, Academic Press, pp. 211-230.
- Gharbi, I., Daoud, Y., & Kammoun, A. (2022). The Digitalization in the COVID-19 Era: A Review, Synthesis, and Challenges–Mitigating the Impact of COVID-19 via Digitalization. *Handbook of Research on Interdisciplinary Perspectives on the Threats and Impacts of Pandemics*, pp. 284-304.
- GPII (2010).G20 Principles for Innovative Financial Inclusion—Executive Brief. Retrieved from <http://www.gpfi.org/publications/g20-principles-innovativefinancial-inclusion-executive-brief>.
- Kithinji, E. (2017), "Effects of digital banking strategy on financial inclusion among commercial banks in Kenya", (Doctoral dissertation, University of Nairobi).
- Kumar, N., Sharma, S., & Vyas, M. (2019). Impact of digital banking on financial inclusion: An investigation on youngsters in Rupnagar city, Punjab. *International Journal of Management, IT and Engineering*, Vol. 9, No. 5, pp. 365-374.
- Lipton, A., Shrier, D., Pentland, A. (2016), "Digital banking manifesto: the end of banks? ", Massachusetts Institute of Technology.
- Makau, J. M., & Olando, C. O. (2021).Digital Banking Strategy and Financial Inclusion among Commercial Banks in Kajiado County.A Case of Kenya Commercial Bank in Kajiado County, Kenya. *Asian Journal of Economics, Business and Accounting*, Vol. 21, No. 5, pp. 1-14. <https://doi.org/10.9734/ajeba/2021/v21i530376>.
- Melubo, K. D., & Musau, S. (2020). Digital Banking and Financial Inclusion of Women Enterprises in Narok County, Kenya. *International Journal of Current Aspects in Finance, Banking and Accounting*, Vol. 2, No. 1, pp. 28-41.

- Nurfadilah, D., & Samidi, S. (2021). How the covid-19 crisis is affecting customers' intention to use islamic fintech services: evidence from indonesia. *Journal of Islamic Monetary Economics and Finance*, Vol. 7, pp. 83-114. <https://doi.org/10.21098/jimf.v7i0.1318>.
- Ozili, P. K. (2018), "Impact of digital finance on financial inclusion and stability", *Borsa Istanbul Review*, Vol. 18, No. 4, pp. 329-340.
- Ozili, P. K. (2020), "Financial inclusion research around the world: A review", In *Forum for social economics*, Routledge, pp. 1-23.
- Sarma, M. (2015), "Measuring financial inclusion", *Economics Bulletin*, Vol. 35, No. 1, pp. 604– 611.
- Siddik, M. N. A., and Kabiraj, S. (2020), "Digital finance for financial inclusion and inclusive growth", George, B., & Paul, J (Ed.), *Digital transformation in business and society*, Springer International Publishing, New York, NY, pp. 155-168.
- Uddin, A., Chowdhury, M. A. F., & Islam, M. N. (2017). Determinants of financial inclusion in Bangladesh: Dynamic GMM & quantile regression approach. *The Journal of Developing Areas*. Vol. 15, No. 2, pp. 221-237.

APPENDIX

Table 2. The survey

Degree of agreement	1. Strongly disagree	2. Disagree	3. Somewhat agree	4. Agree	5. Strongly agree
Employee perception of the effect of bank digitalization on financial inclusion					
1. Digitization and accessibility					
2. Digitization and Use					
3. Digitalization and quality					
4. Digitization and efficiency					