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The Effect Of Digital Technologies On Financial Inclusion: The Case Of The Emerging European Economies[1]

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Abstract

The study aims to empirically research the effect of digital technologies on financial inclusion. The paper examined emerging European countries and discussed the period from 2010-2019. A panel data analysis was performed. Six different panel data models were constructed. The number of bank branches per 100.000 people and the number of debit cards per 1.000 people are used in the models as indicators of financial inclusion. Fixed broadband subscriptions per 100 people, active mobile broadband subscriptions per 100 people, and the proportion of Internet users are used as indicators of digital technologies. The estimation of the models confirmed that digital technologies have a significant and negative effect on the number of bank branches per 100.000 people and a significant and positive effect on the number of bank cards per 1.000 people. According to results the utilize of digital technologies has a positive effect on financial inclusion, especially in the banking sector. This situation will allow countries to improve the degree of financial inclusion.

Keywords: *Financial Inclusion, Digital Technologies, Panel Data Analysis*

JEL Codes: G20, G21, G29

INTRODUCTION

Researchers, policymakers, and those working in the area debate the issue of financial inclusion. Mainly characterized by access to credit, the concept of financial inclusion refers, from a broad viewpoint to the facilities of formal financial services at purchasable prices for all (Siddik et al., 2015).

The deficiency of accessibility, affordable, and convenient financial services has always been a universal issue. According to forecasts, around 2.9 billion people worldwide cannot access traditional banking and financial services (Lapukeni, 2015). Financial inclusion is seen as a crucial element in improving the living standards of low-income people. According to Lapukeni (2015), enhanced access to financial services contributes to deprivation remission by lowering frailty, improving the efficiency of micro, small, and medium enterprises, and promoting the formalization of firms. Enhanced access to financial services has an affirmative effect on economic growth and financial stability, both at the micro and macro levels. Enhanced financial inclusion helps to cover the emptiness in financial infrastructure for underserved individuals, especially in countries where the distance and time costs of banking services are too high (Andrianaivo & Kpodar, 2011). To ensure that all sections of society can benefit from banking services, it is necessary to use technology to create channels to

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reach unbanked individuals and branch networks (Bhargava et al., 2014). Information and communication technologies (ICT), particularly the Internet, act a crucial role in the economy, particularly in improving financial services (Akpa & Asongu, 2023). With the use of the Internet in all aspects of life and easier access to the Internet, the potential for access to the required financial resources has emerged. The Internet serves as an active catalyst for technology and innovation. At this point, it is increasingly becoming the central axis of the digital economy, supporting social and economic growth (Adeoye & Alenoghena, 2019). In this context, Akpa and Asongu (2023) argue that improving the provision of Internet services can increase the qualification of financial services and decrease the gap between clients and financial organizations. Therefore, using the Internet and mobile services has the probable to ease access to financial services presented by financial institutions.

Technological innovation is important in overcoming barriers and providing access to low-cost financial services in developing countries. Mobile banking applications are an encouraging element of financial inclusion, and using mobile devices facilitates financial inclusion by facilitating financial transactions (Falaiye et al., 2024). According to Nnaomah et al. (2024), promoting mobile money and digital payment systems is an important step towards financial inclusion in area where traditional banking substructure is inadequate. These digital platforms enable access to financial services for people except from the financial system and demonstrate the power of technology. In this context, Rumondang et al. (2020) emphasize that spreading cell phones can develop access to and utilize of financial services in the banking sector. Furthermore, they showed that internet penetration could also be essential in supporting branchless banking in developing countries.

Particularly in developing countries, infrastructure problems in providing Internet and mobile services and the effect of Internet-based services on financial inclusion are among the issues studied. Therefore, this article examines the impact of Internet and mobile infrastructure services, i.e., the utilize of digital technologies, on financial inclusion in the context of emerging European economies. Accordingly, the study's introduction is followed by a literature review. Then, the aim, dataset, and methodology used to analyse the study are mentioned. The subsequent section presents the findings acquired from the analysis. This study is finished with the conclusion part.

LITERATURE REVIEW

The literature continues to discuss the feature influencing financial inclusion. In the studies reviewed, the nexus between financial inclusion and Internet and mobile services was addressed in terms of both digital and information technologies. In this context, an essential part of the studies on this topic is listed.

Andrianaivo and Kpodar (2011) found that in African countries, the spread of ICTs - especially the spread of cell phones - contributes significantly to financial inclusion and economic growth. Evans (2012) reached a

similar conclusion in the African context and concluded a positive nexus between Internet and mobile phone utilize and financial inclusion. In other words, the author concludes that increasing Internet and mobile phone use increases financial inclusion. Diniz et al. (2012) also concluded that successful experiments with financial inclusion in emerging markets can be attributed to the utilize of ICT-enabled branchless banking. According to Lapukeni (2015), the number of mobile phone connections in Africa is growing faster than financial inclusion. Within this context, the development of ICT can increase the grade of financial inclusion via mobile financial services. When investigating the influence of technological infrastructure on financial inclusion in Ghana, Agyekum et al. (2016) found that higher internet density positively affect the degree of financial inclusion of households. Nwafor (2018) also analysed the nexus between internet density and financial inclusion in Nigeria and found that Internet density impacts financial inclusion. Shen et al. (2018) found the mediating influence of financial knowledge and internet intensity on the utilize of digital products. Their study concludes a significant and affirmative correlation among the utilize of digital financial products and financial inclusion in China.

Lenka and Barik (2018) examined the impact of mobile phone and internet usage on financial inclusion in SAARC countries. They identified a positive nexus between the growth in the grade of financial inclusion and the increase in mobile phone and internet services. Another paper that found a affirmative correlation among the Internet and financial inclusion is that of Adeoye and Alenoghena (2019) for Nigeria. In this context, the study recommends investing in a more appropriate and modern telecommunications and Internet infrastructure to reduce costs and increase the availability of the Internet. Mushtaq and Bruneau (2019) found that mobile phone penetration in low- and middle-income countries can promote financial inclusion. In conclusion, they found an affirmative nexus between ICT and financial inclusion. They also concluded that ICTs can contribute to reducing poverty and income inequality by promoting financial inclusion.

Another study by Hussein (2020) found that mobile phone and Internet use is affirmatively associated with financial inclusion. The author deduced that Egypt has the inferior degree of financial inclusion between Arab and African countries. Chatterjee (2020) found an affirmative correlation between financial inclusion and ICT in 41 countries. The author also found in the study that ICT can be utilized as a tool to enhancement the level of financial inclusion. In the study completed by Siddik et al. (2020) in the Bangladesh sample, it was determined that improved access to and utilize of mobile banking services positively influences the level of financial inclusion. Shen et al. (2020) also found in their Chinese study that there is no primary link between financial inclusion and internet use but a mediating effect through financial education.

Bayar et al. (2021), who researched access to financial institutions and financial markets, found that the widespread use of cell phones and the Internet positively influences financial inclusion in the short and long periods. Considering Wellalage et al. (2021), ICTs raise the grade of financial inclusion of entrepreneurs in Africa. Pradhan et al. (2021) concluded in their empirical study in 20 Indian states that there is a short- and

long-term nexus between information and communication substructure, financial inclusion, and economic growth. They also emphasized that there is a strong connection between the promotion of ICT substructure and financial inclusion scheme. They also noted that economic growth and financial inclusion will contribute to more investment in ICT.

Financial services offered through mobile phones and the Internet have influenced how individuals and institutions conduct financial transactions. In this context, Fernandes et al. (2021) encountered that financial services offered via digital platforms affect financial inclusion. Ajouz and Abuamria (2021) studied the impact of mobile payments on women's financial inclusion in Palestine. In general, the paper found that increasing mobile payments raises financial inclusion. Also, they concluded that the increased utilize of mobile payments improves women's financial situation. Yue et al. (2022) also found that the increasing utilization of digital finance increases participation in the credit market and facilitates access. Kouladoum et al. (2022) researched the nexus between digital technologies and financial inclusion for 43 sub-Saharan African regions. They concluded that the increase in digital technologies raises the financial inclusion rate. Fauzia et al. (2022) examined whether ICT and financial inclusion can create synergies and improve environmental quality. In this context, it was emphasized that problems need to be addressed jointly. The presence of a long- and short-term nexus between ICT and financial inclusion was found by Tsimisaraka et al. (2023) in the context of 10 countries. In their study, Akpa and Asongu (2023) look at the quality of governance and find that policies that improve governance capabilities can help to combine internet substructure to improve internet usage and thus increase financial inclusion. This paper emphasizes that the low quality of the Internet in sub-Saharan Africa hampers and hinders the development of financial services. Alraja et al. (2023), who found that digital applications have an adverse effect on access to financial services, examined OECD countries in their study. In this context, it proposes that measures should be developed to strengthen consumer confidence in financial services. Daud and Ahmad (2023) found in their study using the dynamic panel method for 84 countries from 2011-2017 that financial inclusion and digital technologies affirmative impact economic growth. They also determined that countries' income levels act an essential role in the impact of digital technologies on financial inclusion. At the same time, Daud et al. (2024) found that digital technologies increase the level of financial inclusion and have a significant effect on eliminating gender disparities. Naveenan et al. (2024), who glanced at the issue of digital inclusion in relation to health outcomes, found as a result of their study that digital inclusion plays a regulatory act in the impact of financial inclusion on health results in developing countries. Widyastuti (2024) encountered that digital financial literacy and demographic aspects for example age, income, and occupation are effective for digital financial inclusion in Indonesia. Mumtaz (2024), who looked at financial inclusion in terms of participation in agriculture, found that in Pakistani households, participation in agriculture was higher among those who used cell phones and smartphones and that financial inclusion increased

agricultural participation. Zou et al. (2024), in their paper conducted in 30 regions in China, found that digital finance increases economic resilience and is also present at the spatial level.

Studies conducted in the literature in various countries conclude that mobile phones, the Internet, mobile services and practices, which are generally considered indicators of digital technologies, are associated with and positively influence financial inclusion. It was also noted that the concept of digital finance, which in the literature guides to the consideration of digital applications in the financial sector, has been studied in relation to various economic variables.

This study concentrates on the impact of digital technologies on financial inclusion about Internet and mobile phone services. Its unique aspect is its focus on emerging European countries. The study developed more than one model and examined the impact of digital technologies on financial inclusion. However, it is diverse from the studies in the literature in terms of the years and variables examined.

AIM, DATA SET, METHOD

This paper investigates the effect of digital technologies on financial inclusion in emerging European countries from 2010 to 2019 using panel data analysis. According to the World Bank, all adults in the absence of a bank account live in developing countries. In this case, financial inclusion is seen as a critical factor in reducing poverty and increasing welfare. Therefore, considering the studies in the literature, emerging economies other than high-income countries in Europe were considered. In addition, since data from 12 different countries and 10 years were utilized in the study, panel data analysis was preferred. It was decided to use this method because panel data analysis allows the analysis of data from more than one country and more than one year. This way, findings for all observations regarding the relevant country groups and years can be analyzed, and comments can be made for all countries and years.

The method of estimating panel data models consisting of cross-sectional and time-dimensional data is called panel data analysis (Yerdelen-Tatoğlu, 2021, p.4). Models estimated with panel data are also called panel data regression models, and two basic approaches are used in estimating these models: fixed effects and random effects (Çınar, 2021, p.15). The fixed effects model has different values for each cross-sectional unit. Therefore, the fixed coefficient can be a fixed variable (Yerdelen-Tatoğlu, 2021, p.80). There may be cases where the units in the sample are randomly chosen, and differences between units can also be random. This is called "random differences" (Yerdelen-Tatoğlu, 2021, p.103). In this context, panel data analysis was utilized in the study because more than one country (unit) and more than one time (year) effect can be considered together, and the appropriate estimation approach was decided as a consequence of the tests.

The symbols of the variables and the data source of the data series used are in view in Table 1.

Table 1. Details of Variables

Symbol	Identifications	Sources	References
bank	Number of commercial bank branches per 100.000 adults	FAS / IMF	Tsimisaraka et al. (2023), Li et al.(2022), Kouladoum et al. (2022).
card	Number of debit cards per 1.000 adults	FAS / IMF	Honahan (2006), Espinosa-Vega et al.(2020)
fixed	Fixed broadband subscriptions per 100 people	ITU	Naveenan et al.(2024), Mushtaq & Bruneau (2019), Kouladoum et al. (2022).
Internet	The rate of people utilizing the Internet (%)	ITU	Naveenan et al. (2024), Mushtaq & Bruneau (2019), Lenka & Barik (2018), Kouladoum et al. (2022).
mobile	Active mobile broadband subscriptions per 100 people	ITU	Naveenan et al.(2024), Mushtaq & Bruneau (2019), Lenka & Barik (2018), Kouladoum et al. (2022).
population	Population growth (% annual)	WDI / WB	Evans (2012), Daud & Ahmad(2023), Daud et al. (2024)

**FAS: Financial Access Survey, IMF: International Monetary Fund, ITU: International Telecommunication Union, WB: World Bank, WDI: World Development Indicators*

When analysing Table 1, it becomes clear that the variables in the paper come from different data sources. The study uses the number of commercial bank branches per 100.000 adults –*bank*- and bank cards per 1.000 adults -*card*- to represent financial inclusion. The data reaches from the International Monetary Fund's Financial Access Survey.

In the paper, digital technologies were measured by indicators for information and communication technologies. Data on fixed broadband subscriptions per 100 people -*fixed*-, the rate of people utilizing the Internet -*Internet*-, and active mobile broadband subscriptions per 100 people -*mobile*- were used to represent digital technologies. The data reaches from from the International Telecommunication Union. Data on population growth -*population*- were gathered from the World Bank's World Development Indicators database. These are utilized in the study and were chosen founded on studies from the literature (Akpa & Asongu, 2023; Alraja et al., 2023; Al-Smadi, 2022; Bayar et al., 2021; Chatterjee, 2020; Li et al., 2022). The data for these variables are annual and cover 2010-2019. The emerging European countries that form the study sample are North Macedonia, Russia, Albania, Bosnia and Herzegovina, Montenegro, Bulgaria, Poland, Romania, Turkey, Hungary, Moldova and Serbia.

In this study, six different panel data models are constructed to search the effect of digital technologies on financial inclusion in a detailed empirical context. These models are as follows:

$$bank_{it} = \alpha_{it} + \beta_1 fixed_{it} + \beta_2 population_{it} + u_{it} \quad (1)$$
$$bank_{it} = \alpha_{it} + \beta_1 internet_{it} + \beta_2 population_{it} + u_{it} \quad (2)$$
$$bank_{it} = \alpha_{it} + \beta_1 mobile_{it} + \beta_2 population_{it} + u_{it} \quad (3)$$
$$card_{it} = \alpha_{it} + \beta_1 fixed_{it} + \beta_2 population_{it} + u_{it} \quad (4)$$
$$card_{it} = \alpha_{it} + \beta_1 internet_{it} + \beta_2 population_{it} + u_{it} \quad (5)$$

$$card_{it} = \alpha_{it} + \beta_1 mobile_{it} + \beta_2 population_{it} + u_{it} \quad (6)$$

The panel data models constructed in the study are numbered as (1), (2), (3), (4), (5) and (6). As seen in the models, *banks and card*s are considered dependent variables for representing financial inclusion, and digital technologies, *fixed internet, and mobile* are considered independent variables. The *population* is used as a control variable in all models. i denotes countries, and t denotes years in the models. α is the constant term, β_1 and β_2 are the coefficients, and u is the error term.

During the analysis process, the data series of the variables utilized in the study were analyzed utilizing descriptive statistics. The statistics belonging to the variables were examined, and the appropriate model form was decided. After determining the form of the models, the estimation process was started. The Hausman test was performed to determine the appropriate estimator approach in estimating the models. After determining the appropriate estimator, unit and time effects test, multiple linearity, heteroskedasticity, autocorrelation, and inter-unit correlation assumptions were tested within the content of panel data analysis.

FINDINGS

The variables' data are analyzed in detail before the paper proceeds with estimating the models. Table 2 displays the descriptive statistics.

Table 2: Descriptive Statistics

Variable	bank	card	fixed	internet	mobile	population
Observations	120	119	120	119	119	120
Mean	32.158	921.086	17.09	61.943	53.160	-0.201
Standard deviation	12.788	467.183	5.951	12.638	30.712	0.707
Minimum	14.199	295.519	3.579	32.3	2.926	-1.805
Maximum	91.896	2631.426	32.935	89.972	185.779	1.701

Table 2 shows the mean value, the standard deviation, the number of observations, and the minimum and maximum values of the data series of the variables. Analyzing the number of observations, it is visible that the number of observations for the card, the Internet, and the mobile phone is 119, with one year missing. In this context, the study data is available as an unbalanced panel data set due to missing data.

When analyzing Table 2, the difference in the scale between the minimum and maximum issues of the data series for the card variable is striking. In this context, the *card* is analyzed in logarithmic form. In the following sections of the study, the card is symbolized as *lncard.*

After the data series of the variables were examined in detail, the estimation process of the models began. Table 3 offers the results obtained from the estimation of the models and the test results regarding the models' assumptions.

Table 3: Results

Model/Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable: bank			Dependent Variable: lncard		
fixed	-0.58*			0.031*		
	(0.26)			*(0.00)*		
internet		-0.19*			0.011*	
		(0.06)			*(0.00)*	
mobile			-0.07*			0.004
			(0.03)			*(0.00)*
population	7.40*	6.13*	8.26*	-0.21*	-0.12*	-0.25*
	(2.38)	*(1.99)*	*(2.64)*	*(0.06)*	*(0.02)*	*(0.07)*
Fixed Term	43.71*	45.49*	37.80*	6.13	5.96	6.45
	(4.35)	*(3.90)*	*(1.63)*	*(0.00)*	*(0.06)*	*(0.05)*
R^2	0.37	0.37	0.34	0.71	0.85	0.65
F test	9.20	21.57	9.27	21.87	189.17	17.37
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
LR test	196.29	180.84	190.43	250.21	338.82	244.56
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
Hausman Test	8.46	6.68	10.94	18.58	9.34	15.09
	[0.01]	[0.03]	[0.00]	[0.00]	[0.00]	[0.00]
Modified Wald	3731.03	1075.76	40332.5	3083.09	286.37	1448
test	[0.00]	[0.00]	4	[0.00]	[0.000]	[0.00]
			[0.00]			
Durbin -Watson	0.93	0.97	0.94	0.43	0.79	0.46
LBI	1.50	1.56	1.50	0.97	1.25	0.88
Pesaran	-0.92	-1.08	-1.945	-1.48	-1.13	0.37
	[0.35]	[0.27]	[0.051]	[0.14]	[0.25]	[0.71]
Friedman	5.33	6.95	4.15	5.68	7.90	7,511
	[0.91]	[0.80]	[0.96]	[0.89]	[0.72]	[0.75]
Mean VIF	1 .03	1.01	1.00	1.03	1.01	1.00

***Note 1** :*, significant at 1% level*
***Note 2:** Values in parentheses show standard errors.*
***Note 3**: Square brackets explain probability values.*

The results of 6 different models and the issue of the acceptance tests are shown in Table 3. Accordingly, the models' mean-variance increment factor (VIF) was analyzed to investigate whether there is a multicollinearity issue between the independent variables in the models. According to the mean VIF values of the models in Table 3, there is no multicollinearity problem in the models. The presence of heteroscedasticity in the models was tested utilizing the modified Wald test. Consequence of this test expressed the presence of heteroscedasticity in all models. The Durbin-Watson and LBI tests were performed to check for autocorrelation. An autocorrelation was found in the test results. A further assumption is that the correlation between the units was tested using Pesaran and Friedman tests. The results of the Pesaran and Friedman tests for all models show no problem with the correlation between the units in the models. As a result, auto correlation and heteroscedasticity were found in all models.

Likelihood ratio (LR) tests were utilized to test for unit and time effects in the models. The test result is that only one unit effect (country) is found in all models. The Hausman test was used to determine the estimator for

the models. Consequence of the Hausman test, the estimator for fixed effects is consistent. Therefore, the estimator of Arellano, Froot, and Rogers, which is robust to autocorrelation and heteroscedasticity, is used with a fixed effects approach.

The independent variables, *fixed, Internet,* and *mobile*, have a statistically significant and negative impact on the *bank* at the 1% level according to the estimation consequences of the models (1), (2), and (3). A rise in the fixed by 1 unit decreases the bank by 0.58 units. An increase in the Internet and mobile leads to a decrease in the bank. In this direction, it can be said that there is a negative effect between the bank, which is the dependent variable in the models, and the independent variables *fixed, Internet,* and *mobile*. In addition, the population considered a control variable in the corresponding models has a statistically significant and positive effect on the bank at the 1% level. When analyzing the F-test results of the models, it is found that all models are significant at the 1% level. The R^2 value, which expresses the explanatory nature of the models, was calculated at 37% for models (1), (2) and 34% (3).

According to the estimation results of models (4), (5), and (6), *fixed, Internet*, and *mobile*, which are included as independent variables in the models, have a statistically significant and positive effect on *lncard* at the 1% level. Thus, an increase in *fixed, Internet*, and *mobile* increases *lnkart*, albeit to a small extent. In this direction, it can be said that there is a positive effect among the dependent variable –*lncard*- and the independent variables -*fixed, Internet, and mobile*-. The effect of population, considered a control variable, on the *lncard* variable is also statistically significant at the 1% level in the models. When analyzing the F-test results of models (4), (5), and (6), it is found that all models are significant at the 1% level. The R^2 values are calculated as 71% (in model 4), 85% (in model 5), and 65% (in model 6).

CONCLUSION

Physical distance, cost, and time pressure are the main obstacles to accessing financial products and services. With the concretion of digital technologies into the financial world, the banking sector's product range has diversified, offering customers faster access and lower costs. The fact that financial institutions offer products and services via the Internet, mobile infrastructures, and digital technologies can facilitate access to and utilization of financial services. From this perspective, the contribution of the use of the Internet and mobile technologies - in other words, digital technologies - to financial inclusion is the subject of this paper.

This paper aims to empirically research the effect of digital technologies on financial inclusion. This study analyzes the European emerging markets, including Turkey. The study covers 12 European countries and analyzed the term from 2010 to 2019. A panel data analysis is utilized in the study. In addition, six different panel data models are constructed in this study. The number of bank branches per 100.000 adults and debit cards per 1.000 adults are utilized as dependent variables in the models. These variables are often used in the

literature as indicators of financial inclusion. Digital technologies are measured by information and communication technologies. Data on fixed broadband connections per 100 people, active mobile broadband connections per 100 people and the rate of people who utilize the Internet are included in the models as independent variables. The population growth rate is used as a control variable.

In the study, models are estimated utilizing panel data analysis. As a consequence of the decision tests for the estimators, it is first established that the fixed effects approach is consistent. In this context, tests were performed on the assumptions of heteroscedasticity, autocorrelation, and correlation between units using the fixed effects approach. Consequence of the tests, problems with heteroscedasticity and autocorrelation were found in all models. Therefore, the estimator of Arellano, Froot, and Rogers, which is robust to heteroscedasticity and autocorrelation, is utilized to estimate the model.

One of the outcome of the models is that the number of bank branches per 100,000 adults decreases when the number of fixed broadband connections per 100 adults, active mobile broadband subscriptions per 100 people and the proportion of internet users increase. This shows that using mobile and Internet services reduces the need for physical access to banks. The intensive use of mobile and Internet services by private individuals has also enabled banks to offer their customers solutions via online or mobile applications instead of physical branches.

Further evidence for the estimation of the models is that the number of debit cards per 1.000 people increases with the number of fixed broadband subscriptions per 100 people, the number of active mobile broadband subscriptions per 100 people, and the proportion of Internet users. This result shows that the number of people with bank accounts and the number of bank accounts has increased with the use of mobile and internet services. Digital services for instance mobile phones and the Internet can increase the number of debit cards, as they can open accounts quickly and easily via the bank's mobile and online applications without time and location restrictions. This is also supported by the fact that the provision of bank cards is fast and inexpensive, thanks to online and mobile applications.

In this context, the study recommends improving digitalization policy by attaching importance to information and communication infrastructure in European countries that are in the position of emerging economies. At this point, raising awareness of digital technologies and promoting their use is essential. This way, digital products and services can be diversified and available to individuals. At this point, training programs on digital financial services should also be developed. Increasing the degree of financial inclusion, it is also important to develop strategies to enhance individuals' financial literacy and ability to use digital products. To this end, including financial and digital literacy programs in education curricula is important. Policymakers should play a supportive and encouraging role in projects that include digital innovations to improve the level of financial

inclusion.

In summary, this study issues empirical evidence that the utilize of digital technologies supports the goal of financial inclusion, i.e. providing individuals and institutions with fast and affordable access to the products and services of the financial system without time and location restrictions. The paper's results support the study's findings by Kouladoum et al. (2022) and Daud and Ahmad (2023).

The findings obtained from the study's empirical analysis reveal the study's theoretical contributions while also presenting practical contributions in drawing attention to the importance of digital applications such as the Internet and mobile technologies in accessing the financial system. Accordingly, investments should be encouraged to strengthen the infrastructure of digital technologies and increase awareness on the subject.

Future studies can examine the effect of digital technologies on financial inclusion in different countries or groups of countries, or empirical studies can be conducted with different indicative of financial inclusion.

In addition, the study's model can be reconsidered using different variables related to digital literacy, computer use, mobile banking, and e-commerce applications.

The study's results depend on the sample group, the period, and the indicators considered, which shows its limitations. The results may vary depending on the different samples, time periods, or variables.

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