Journal of Indonesian Economy and Business
Volume 40, Number 3, 2025, 363 – 381

DIGITALIZATION AND ACCESS TO HOUSEHOLD CREDIT IN INDONESIA: PRE- AND POST-COVID-19 PANDEMIC (2019 AND 2021)

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ABSTRACT

Introduction/Main Objective: This study examines the effect of digitalization on access to household credit during the National Economic Recovery (PEN) program in Indonesia. **Background Problems:** Financial inclusion plays an important role in improving welfare and quality of life, accelerating economic growth, and alleviating poverty. Digitalization can affect financial inclusion through the transmission of mobile financial services, such as internet banking. **Novelty**: This study contributes to the literature on financial inclusion from the perspective of household credit. **Research Method:** This study uses the binomial logit model and data from the national socio-economic survey (SUSENAS) and statistics on village potential (PODES) from 2019 (before the pandemic) and 2021 (one year after the pandemic). **Findings/Results:** The results show that the average marginal effect of a household's internet use was 1 percent higher than non-use before COVID-19. Meanwhile, after COVID-19, the marginal effect was 1.6 percent greater for households accessing credit through internet use than for those not using the internet. Furthermore, the probability of credit access is 4.6 percent higher for cell phone users than for non-users pre-COVID-19; meanwhile, post-COVID-19, the probability was 4.1 percent smaller than pre-COVID-19.The majority of households with access to credit are headed by males living in rural areas; they are married and working; they graduated from junior high school or above; and they are 30-59 years old. **Conclusion:** This study, by comparing 2019 to 2021, concludes that, as a result of the COVID-19 pandemic, digitalization accelerated access to household credit.

ARTICLE INFO

Article information:

Received July 4, 2023. Received in revised version March 29, 2024.Received in revised version July 24, 2024. Received in revised version December 18, 2024. Accepted 3 February 202.

Keywords:

Digitalization, credit access, financial inclusion, logic model, COVID-19 Pandemic

JEL Code:

G5, G2, O1, E5, O3

ISSN:

ISSN 2085-8272 (print)
ISSN 2338-5847 (online)

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https://doi.org/10.22146/jieb.v40i3.8766 https://journal.ugm.ac.id/v3/jieb

INTRODUCTION

Digitalization in Indonesia grew rapidly during the COVID-19 pandemic. Most people can access the internet easily. The COVID-19 pandemic accelerated the transformation towards digital (digitization) in all fields. Apart from that, it was also the impact of government policies that implemented physical restrictions such as working, studying, and worshiping from home. In the banking sector, digitalization makes it easier for people to carry out financial transactions more easily, quickly, and efficiently. In fact, internet use for financial transactions in 2025 is still low. The low rate of usage can be caused by various factors. Some people choose to come directly to the bank to make transactions because they think it is easier. Apart from that, many people are reluctant to use digital financial services because they are worried about their security. Distrust of formal financial institutions is one of the obstacles for individuals in using financial services. In order to realize an inclusive financial system, the government is committed to improving digital financial services. This has motivated the authors to conduct further research on the impact of digitalization on financial inclusion at the household level in Indonesia, especially during the COVID-19 pandemic.

Dluhopolskyi et al. (2023) find that the COVID-19 pandemic augmented the adoption of digitalization in all business processes. The term digitalization is defined as the process of moving to a digital business (Gartner, 2021) and the integration of digital technology into everyday life (Ochs and Riemann, 2018). Digitalization is driven by internet use, behavior change, societal expectations, and the availability of capital (Schreckling and Steiger, 2017). One industry that is actively discussing digitalization strategies is the banking industry (Graupner et al., 2015). Budiarani et al. (2021) find that the use of digitalization for transactions could reduce the incidence of infection during the pandemic, and even improve the quality of services of the companies offering digital wallets. In addition, the COVID-19 pandemic has accelerated the development of the digital infrastructure that supports the fintech companies (Dluhopolskyi et al., 2023).

In the banking industry, digitalization is a necessity (Schmidt, 2017). Digitalization of banking is defined as a shift from the concept of traditional banks to future banks, which is done by encouraging them to adjust their business strategies, change governance, reorganize distribution networks, and promote banking transactions through digital means (OJK, 2021, Rumondang et al., 2019). With digitalization, people can access financial services without having to come to financial institutions in person (Demirguc-Kunt et al., 2018; Ozili, 2018; Fanta & Makina, 2019; Rumondang et al., 2019).

The widespread use of cell phones connected to the internet has encouraged wider access to mobile banking, internet banking, mobile payments, electronic credit information systems, and technology-based individual identification systems (Soetiono and Setiawan, 2018; Patwardhan, 2018; Akyuwen and Waskito, 2018). Cell phones are considered the instrument with the most potential for reaching populations that are not served by conventional financial services (Sapovadia, 2018). Cell phones make it easier for people to access accounts digitally (Demirguc-Kunt et al., 2018). Digital financial services can be accessed remotely for cashless payments (Beirne and Fernandez, 2021).

In general, digitalization is widely regarded as a highly significant factor in enhancing financial inclusion (Ozili, 2018; Koh and Ha, 2018; Patwardhan, 2018). According to Zhang et al. (2023), digitalization also enhances the effectiveness of financial initiatives. Financial inclusion has emerged as a key policy priority

around the world (Sarma and Pais, 2010; World Bank, 2014; Allen et al., 2015; Ozili, 2018). Financial inclusion plays an important role in improving welfare (Sarma, 2008) and quality of life (Beirne and Fernandez, 2021). In the National Economic Recovery (PEN) program, financial inclusion also plays an important role in accelerating economic growth and poverty alleviation (World Bank, 2014). Financial inclusion is also possible for reducing inequality. As Sulistyaningrum and Tjahjadi (2022) state, the inequality may create a non-optimal distribution of resources, economic instability, and may even lead to an economic crisis.

Digitalization also can affect financial inclusion through the transmission of mobile financial services, in this case internet banking (Akyuwen and Jaka, 2018; Durai and Stella, 2019). Fundamentally, account ownership is the first step towards financial inclusion, but it does not automatically imply optimal use of services (Sarma, 2008; World Bank, 2014; Demirguc-Kunt et al., 2018). In order to experience the full benefits of having an account, one must use the account for financial transactions, whether to save, make payments, or access credit.

Access to credit is an indicator that can be used to better measure financial inclusion (World Bank, 2014). Access to household credit is defined as credit received by households through formal financial institutions regulated by the government (Demirguc-Kunt et al., 2018). Access to credit from banks makes it easier for households to facilitate consumption overtime (World Bank, 2014). On the other hand, credit expansion can also cause a financial crisis if not managed properly.

Referring to previous studies, digitalization is considered to play an important role in accelerating financial inclusion, especially access to credit (Sarma and Pais, 2010; Ozili, 2018; Evans, 2018; Bui, 2021). According to research by Sarma and Pais (2010) conducted in 49 countries, the use of the internet and cell phones has a significant effect on financial inclusion. Scholars say that financial inclusion consists of three aspects, namely accessibility (account ownership), availability (banking infrastructure), and use (credit access). This is in line with the findings of Sarma and Pais (2010) and Ozili (2018),who have conducted research that analyzes cross-border banking data from the World Bank. They show that increased availability of cell phones and a good internet connection have a positive impact on access and use of financial services, in this case, access to credit. In addition, based on research in 44 African countries between 2000 and 2016, Evans (2018) demonstrates that digitalization has a positive and significant impact on access to credit. He also states that access to credit is important in promoting financial inclusion on a sustainable basis. However, it is argued that regulations regarding poor credit access are a major stumbling block for financial inclusion. A recent study by Bui et al. (2021) in Vietnam explains that digitalization facilitates credit applications and increases credit approval rates. However, the adoption of digital technology does not necessarily increase financial transparency but encourages banking innovation. Technological innovation can reduce access barriers that lead to increased financial inclusion.

Currently, the literature discussing the connection between digitalization and access to credit remains contradictory. Some studies show cell phones and the internet do not affect credit access (Makina 2019). A study by Midika (2016) argues that internet use does not have any correlation with the use of financial services. This is backed by Shen et al. (2019), who argue that internet use only has a direct effect on financial inclusion and not on financial literacy (Shen et al., 2019). In Indonesia, research on

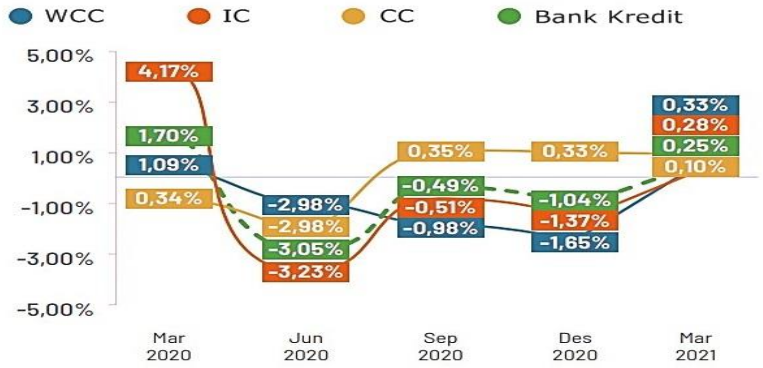
financial inclusion has been conducted by Nugroho and Purwanti (2018) using the Indonesian population from the 2014 Global Findex. The results show that financial inclusion in Indonesia is still low based on such indicators as account ownership, savings, and access to bank credit. The study demonstrates that financial inclusion is only influenced by income level, education level, and age.

This study aims to analyze the effect of digitalization on access to credit pre- and post-COVID-19 from the perspective of households, using data from the Indonesian national socio-economic survey (SUSENAS) and statistics on village potential (PODES) from 2019 and 2021. In Indonesia, household consumption makes the largest contribution to national income, accounting for 57.66 percent (BPS-Statistics Indonesia, 2021). During the COVID-19 pandemic, the economy slowed down. Figure 2 shows the contraction of consumption credit (CC) in early 2020, followed by the contraction of working capital credit (WCC) and investment credit (IC) in the following quarter. These conditions had an impact in terms of the weakening of household consumption and the contraction of banking credit (BPS-Statistics Indonesia, 2021; OJK, 2021).

In line with its PENprogram, the government is committed to encouraging increased financial inclusion (OJK, 2020). The government issued Presidential Decree No. 114 of 2020 to support the National Strategy for Financial Inclusion (SNLKI). Efforts to increase financial inclusion are carried out by two main strategies, namely improvement of digital-based financial services and the acceleration of bank credit.

This study uses the binomial logit model to analyze the effect of digitalization on credit access. The main findings are that, according to data from before and after the COVID-19 pandemic, digitalization has been demonstrated to have had a significant impact on access to household credit. The average marginal effect of a household's internet use was 1 percent higher than non-use pre-COVID-19. Meanwhile, post-COVID-19, the marginal effect was 1.6 percent greater for households accessing credit through internet use than for those not using the internet. Furthermore, the probability of credit access was 4.6 percent higher for cell phone users than for non-users pre-COVID-19; meanwhile, post-COVID-19, the probability by 4.1 percent smaller than pre-COVID-19. The majority of households accessing formal credit in Indonesia are headed by males living in rural areas; they are married and working; they graduated from junior high school or above; and they are 30-59 years old.

Figure 1. Bank Credit Contraction during the COVID-19 Pandemic



Source: OJK, 2021

This study contributes to the literature on financial inclusion from the perspective of access to household credit. A previous study by Sarma and Pais (2010) conducted across-country research in 49 countries; Ozili (2018) used cross-border banking data from the World Bank; and Evans (2018) used data 44 African countries between 2000 and 2016. We examine the effect of digitalization on access to household credit within the framework of the PENprogram. This study uses data from the national socio-economic surveys (SUSENAS) in 2019 and 2021 and statistics on village potential (PODES) released by BPS-Statistics Indonesia. Based on the availability of data, this study focuses on the level of customers in banks and cooperatives as providers of formal financial services. A previous study by Nugroho and Purwanti (2018) uses estimates of data on the Indonesian population from the 2014 Global Findex.

The remainder of this paper is structured as follows. Section II presents the data and methodology, while Section III presents the result and discussion. Section IV explains the conclusions and makes some recommendations for future research.

DATA AND METHODOLOGY

1. Data

This study uses quantitative data. All data are presented in the form of numbers, including data that were initially qualitative in nature but were then re-analyzed and coded into quantitative data. Our study uses datasets from the 2019 and 2021 national socio-economic surveys (SUSENAS) and statistics on village potential (PODES) to analyze the effect of digitalization on access to household credit. The SUSENAS data are used as the main data, supported by the PODES data to complete the control variables (in this case, signal strength).

The SUSENAS is a survey carried out by BPS-Statistics Indonesia to obtain information on household socio-economic characteristics related to the achievement of welfare. Meanwhile, the PODES data collection is carried out to provide basic regional data related to villages (*kelurahan*). The SUSENAS samples were randomly distributed across 34 provinces and 514 districts or municipalities with a total of 320,000 households in 2019 and 345,000 households in 2021. This study uses data from 2019 and 2021 to highlight conditions before and after the 2020 COVID-19 pandemic.

The outcome variable of this research is credit access. Credit access is defined as the status of formal credit receipts by households from banks and/or cooperatives in the past year (Statistics of Indonesia, 2021). Credit access is considered a relevant indicator for measuring financial inclusion. This is in line with research conducted by Sarma & Pais (2010), Fungacova & Weill (2015), Nugroho & Purwanti (2018), Evans (2018), Xu (2020), and Bui et al. (2021).

Meanwhile, the variable of interest in this research is digitalization. This variable was measured using indicators such as the usage of the internet, cell phones, and e-banking. The use of internet services, including the use of social media, is part of digitalization (Gabrielsson et al., 2019). The use of cell phones is considered important in the sense that they are the main medium used by the public to access digital financial services (Evans, 2018; Demirguc-Kunt et al., 2018). In line with the research framework, the use of the internet and cell phones are considered to be a representation of digitalization in general, while the use of e-banking is considered to be a representation of digitalization. In this context, the head of the household is considered to be a representation of the household in question.

Table 1. Data Description

Variable	Definition	Source of Data
	Outcome Variable	
Credit Access	Dummy variable for household formal credit access; 0 if formal credit access; 1 if otherwise	SUSENAS 2019 & 2021
	Interest Variable: **Digitalization**	
Internet Usage	Dummy variable for internet usage of the head of household; 0 if not using; 1 if using	SUSENAS 2019 & 2021
Cell phone Usage	Dummy variable for cell phone usage of the head of household; 0 if not using; 1 if using	SUSENAS 2019 & 2021
E-banking Usage	Dummy variable for e-banking usage of head of the household; 0 if not using; 1 if using	SUSENAS 2019 & 2021
	Control Variables: **household characteristics**	
Age	Ratio variable for the age of the head of household at the time of enumeration	SUSENAS 2019 & 2021
Gender	Dummy variable for the gender of the head of household; 0 for female; 1 for male	SUSENAS 2019 & 2021
Marital Status	Dummy variable for the marital status of the head of household; 0 if unmarried; 1 if married or previously married	SUSENAS 2019 & 2021
Graduated Elementary School	Dummy variable for the education level of the head of household; 1 if graduated from elementary school (SD); 0 if otherwise	SUSENAS 2019 & 2021
Graduated Junior High School	Dummy variable for the education level of the head of household; 1 if graduated from junior high school (SMP); 0 if otherwise	SUSENAS 2019 & 2021
Graduated Senior High School	Dummy variable for the education level of the head of household; 1 if graduated from senior high school (SMA); 0 if otherwise	SUSENAS 2019 & 2021
Graduated college	Dummy variable for the education level of the head of household; 1 if graduated from college; 0 if otherwise	SUSENAS 2019 & 2021
Employment Status	Dummy variable for the employment status of the head of household; 1 if working; 0 if otherwise	SUSENAS 2019 & 2021
Income Level	Ratio variable for ln average expenditure per capita per month	SUSENAS 2019 & 2021
Household Size	Ratio variable for the number of household members in the household, in units of people	SUSENAS 2019 & 2021
Residential Area Strata	Dummy variable for the classification of the household location; 0 if located in a rural area, 1 if located in an urban area	SUSENAS 2019 & 2021
Signal Strength	Ratio variable for cell phone signal strength in the household area, proxied by the number of BTS towers	PODES 2019 & 2021
	Regional Control	
District/City Code	The use of district/city codes to consider the differences in characteristics between districts/cities	SUSENAS 2019 & 2021

This research has optimally controlled the variables of household characteristics that cause bias in the dependent variable and used the district/city code as regional control. Other control variables used included age, gender, marital status, education level, employment status, income level, household size, residential area strata, and signal strength. In previous studies, digitalization variables have had the potential to be endogenous, acting as omitted variables between digitalization and credit access. This study enhances the control variable as signal strength, proxied by the number of base transceiver station (BTS) towers to address the endogeneity problem (Falentina et al., 2020; Bui et al., 2021).

We use regional control as a dummy because there are different characteristics between districts and municipalities residents regarding financial inclusion. According to Sarma and Pais (2010), financial inclusion in cities is higher than in rural areas. Therefore, dummy 1 is for households living in cities.

2. Methodology

To analyze the effect of digitalization on credit access, this study uses the binomial logit model. This method is used because the outcome variable (credit access) is discrete and binary (Woldridge, 2016). Sulistyaningrum (2016) mentions that the choice of model—whether it is logit or probit—is not critical when the dependent variable is binary. Hence, the logit model is adopted. Therefore, the researchers can identify the probability of households accessing bank credit. The use of the logit model is in line with the research conducted by Sarma and Pais (2010) and Nugroho and Purwanti (2018). The estimated probability of credit access is formulated into the following model:

$$\hat{P}(1) = \Lambda(\beta_{0i} + \beta_1 internet_i + \beta_2 cell\_phone_i + \beta_7\, graduated\_sd + \beta_8\, graduated\_smp + \beta_9 graduated\_pt_i + \beta_{11} work_i + \beta_{12} ln\_percapita_i + \beta_{13} household\_size + \beta_{14} urban_i + \beta_{15} bts_i + \theta_i + e \quad \text{..... (1)}$$

In this model, Λ(z) is a logit function; credit access is a binary outcome variable; $\widehat{P}$ (*credit access=1*) is the probability of households accessing bank credit; *x* is the variable of interest or control variable; $\beta_0,\ldots,\beta_{15}$ is the regression coefficient; *i* is the reference for the research period (2019 and 2021); internet is the variable that indicates internet usage (whether or not the household head uses internet); cell_phone is the variable that indicates cell phone usage (whether or not the household head uses a cell phone); e-banking is the variable that indicates e-banking usage (whether or not the household head uses e-banking); age is the variable that indicates the age of the household head (in years); male is the variable that indicates gender (whether or not the household head is male); married is the variable that indicates marital status (whether or not the household head is married/has previously been married); graduated SD is the variable that indicates education level (whether or not the household head graduated from elementary school/equivalent); graduates is the variable that indicates education level (whether or not the household head graduated from junior high school/equivalent); graduated_SMA is the variable that indicates education level (whether or not the household head graduated from senior high school/equivalent); graduated_PT is the variable that indicates education level (whether or not the household head graduated from college); ln_percapita is the variable that indicates income level (in-proxy with ln average expenditure per capita per month); household_size is the variable

that indicates household size (in person); urban is the variable that indicates the residential area strata (whether or not the household is located in an urban area); bts is the variable that indicates signal strength (in- proxy with the number of base transceiver station/BTS towers per district/city); θ is the district/city code as the regional control; e is the error term, which is assumed to be normally distributed.

RESULT AND DISCUSSION

We begin our discussion by examining the descriptive statistics and cross-tabulation results. The descriptive statistics can be observed in Table 2. They show that almost half of households in Indonesia have a savings account. Before the COVID-19 pandemic, only 42.2 percent of the population had an account. This figure then rose to 48.9 percent post-pandemic. However, relatively few people have access to formal credit (16.9 percent). This is due to bank policies that tightened the requirements for applying for credit during the pandemic to minimize the potential for bad loans.

At the start of the pandemic, digitalization increased massively. The public was advised to stay at home to reduce the spread of COVID-19. People inevitably carried out transactions via e-banking because of limited operational hours and restrictions on visitors to financial institutions. This led to a spike in the use of e-banking at the start of the pandemic. Society was starting to adapt to the new normal conditions. Many of them chose to come directly to financial institutions to make transactions despite strict health protocols. This meant that there was no significant difference between users and non-users of e-banking in terms of the probability of inclusion in 2021. Additionally, the probability of account ownership has always been shown to be higher in households that use digital technology compared to non-users.

Table 2. Descriptive Statistics (percentage)

Variable	Pre-COVID-19	Post-COVID-19
(1)	(2)	(3)
Have a savings account	42.2	48.9
Have access to formal credit	17.0	16.9
Use the internet	31.5	45.3
Own a cell phone	77.1	79.9
Use e-banking	3.2	5.1
Gender (male)	84.4	85.1
Graduated from elementary school	28.1	28.9
Graduated from junior high school	15.5	15.8
Graduated from senior high school	23.9	26.2
Graduated from college	8.8	9.7
Married/previously married	96.8	97.0
Working	88.3	89.1
Living in an urban area	41.4	42.1

Source: SUSENAS(2021).

In terms of the use of digital technology, there had been an increase in the use of cell phones, the internet, and e-banking after the pandemic compared to before the pandemic. Most household heads (79.9 percent) used cell phones in 2021, an increase of more than 2 percent compared to before the pandemic. The number of household heads who used the internet was also quite high (45.3 percent) in 2021, which was up almost 14 percent compared to before the pandemic. This increase was due to government policies regarding work from home (WFH) and study from home (SFH), which increased digitalization in households.

However, the surge in internet usage did not necessarily mean an increase in the number of e-banking users. The COVID-19 pandemic was unable to significantly boost e-banking. The number of house hold heads who used e-banking only increased by 1.90 percent during the pandemic. Of the total internet users, it is recorded that only about 11 percent used it for the purposes of personal e-banking . This shows that while many people use the internet, only a small number use it for online financial transacttions. The Indonesian Financial Services Authority (OJK) in 2021 stated that digitalization in banking was still prone to data leakage and account abuse. Demirguc-Kunt et al. (2018) have argued that e-banking must be supported by a strong regulatory framework and consumer protection to ensure that people feel safe and comfortable while carrying out financial transactions.

As for household characteristics, the majority (90 percent) of households in Indonesia are headed by men. They have graduated from elementary and high school. They are married, working, and live in rural areas. The trend of the values of the coefficients of the variables, in other words, the influence of the household characteristics, also increased when the time before the COVID-19 pandemic is compared to the time after it.

According to Table 3, the SUSENAS records that the heads of households surveyed were between 10 and 97 years old. This figure varies greatly, with the average age of the head of a household being around 48 years. Among the 340,000 households that responded, one household was found to be headed by a 10-year-old. This household consisted of 1 person, a female, who was unmarried and was yet to graduate from elementary school. This household head did not work and received income in the form of a pension fund or transfer. This household spent around IDR 802,000 on monthly needs. The head of this household had also been using a cell phone and the internet for the previous three months.

This phenomenon of a minor being the head of household is not unheard of in Indonesia. The 2021 SUSENAS recorded that around 0.1 percent of households were headed by young people who were 10-17 years old. Most of them had graduated from elementary or junior high school and were already working. At a fairly young age, they were already responsible for the household needs of one to eleven people.

Moving on to the income level variable, expenditures for food and non-food items varied widely. Expenditure per capita ranged from IDR 100,000 to IDR 95 million per month, with an average expenditure per capita of IDR 1.3 million per month. This is in line with research by Adiat and Tjachja (2020), which finds that income inequality in several regions of Indonesia is very high with a tendency to increase every year.

Table 3. Descriptive Household Statistics (Post-Pandemic)

Variable	Min	Max
(1)	(2)	(3)
Age (years)	16	97
Expenditure per capita per month (in thousands of rupiah)	0.1	94.7
Number of household members (person)	1	29
Number of BTS towers in the district/city where they live	1	1177

Source: SUSENAS (2021

In terms of household size, the largest number of household members recorded was 29 people. This usually occurs in a household consisting of several heads of households. Meanwhile, the number of household members determines the amount of needs that must be met every month. Harahap (2021) states that families with many household members need far more resources than families with fewer household members.

The signal strength variable, which was proxied by the number of BTS towers in the district or municipality where the respondents resided, shows a fairly high level of inequality. There were households living in locations that only had 1 BTS tower. On the other hand, there were other districts and cities that had up to 1,177 BTS towers. This situation causes the reception of internet and cell phone signals in different locations to vary widely. This is one of the reasons why the writers used the regional control to accommodate regional differences in further analysis.

3.1. Credit Access based on Household Characteristics

Account ownership is an early indicator of financial inclusion (World Bank, 2014). By having an account, one can easily carry out financial transactions (Demirguc-Kunt et al., 2018). In 2021, Statistics Indonesia noted that account ownership had increased by around 6.72 percent during the COVID-19 pandemic. In 2019, 42.19 percent of households were recorded as being account holders, and this soared to 48.91 percent post-pandemic (BSP-Statistics Indonesia, 2021). Restrictions on mobility, such as the Large Scale Social Restrictions (*Pembatasan Sosial Berskala Besar*/PSBB) and the Restrictions on Social Activities (*Pemberlakuan Pembatasan Kegiatan Masyarakat*/ PPKM) during the COVID-19 pandemic prompted rapid changes in people's behavior patterns (Permana et al., 2021). People began to shift from shopping offline to doing it online. In order to shop comfortably and safely via e-commerce, people were encouraged to create a savings account as a means of payment. There were also an increasing number of sellers that, significantly, offered cashless payment facilities, and some of them even did not accept cash payments. This is what caused account ownership to increase during the COVID-19 pandemic.

Unfortunately, the increase in the level of account ownership was not accompanied by growth in access to credit. Statistics Indonesia (2021) noted that credit access growth slowed down at the start of the pandemic. Access to household credit decreased from 17.04 percent in 2019 to 16.60 percent in 2020. The OJK (2021) stated that there was a weakening in household consumption due to the pandemic, which caused credit contraction. Along with the implementation of the government's PEN program, access to credit increased again in 2021 to 17.04 percent.

Figure 3. Credit Access based on Household Characteristics (in percent) 2021

(Statistics Indonesia, 2021)

Description:

Level of Education
Code 0 No formal Education
Code 1 Graduated elementary school
Code 2 Graduated junior high school
Code 3 Graduated senior high school
Code 4 Graduated college

Marital Status
Code 0 Not Married
Code 1 Married/Previously Married

Job Status
Code 0 Not Working
Code 1 Working

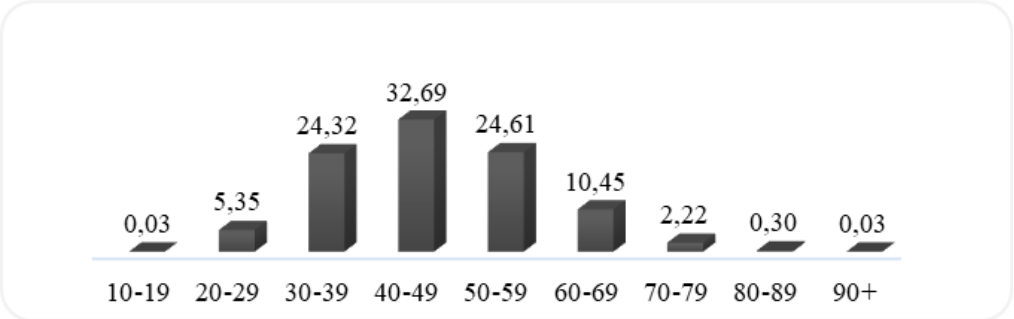
Regional Strata
Code 0 Rural
Code 1 Urban

Gender
Code 0 Female
Code 1 Male

According to Figure 3, access to bank credit was dominated by people who were married (99.14 percent), male (91.66 percent), working (94.26 percent), who had graduated from junior high school and above (60.32 percent), and lived in rural areas (55.24 percent). It is interesting to note that more people living in rural areas had access to credit than those who lived in urban areas. It is suspected that, during the pandemic, it was more difficult for people to access credit from banks because of the many conditions that had to be met and banks were increasingly selective in disbursing funds (OJK, 2021). In rural areas, residents benefitted from the number of cooperatives, such as the *Koperasi Unit Desa* (village unit cooperatives), which lent money to their members based on the principle of kinship.

The majority of households that had access to bank credit were headed by individuals aged 30-59 years (Figure 4). This is in line with a study by Elrangga (2016), which states that customers who are in the productive age category receive more bank credit. The age of 30 and over is not generally the time when people start working; it is an age when many of them are already established. They usually already have valuable assets that can be used as collateral for credit from the bank.

Figure 4. Access to Credit based on the Age of the Household Head



(Statistics Indonesia, 2021, in percent)

It is interesting to note that around 0.03 percent of households headed by individuals under the age of 19 had received formal credit. It is not uncommon for young married couples to apply for credit from cooperatives. This is because government and private banks usually have a minimum age requirement when applying for credit, which is 21 years. This is different from credit from cooperatives, for which applications have no age requirement, and they are open to anyone who is registered as a member of the cooperative. This is in line with Law No. 25 of 1992, which states that cooperatives are people's economic movements based on the principle of kinship to improve the welfare of their members.

3.1 The Effect of Digitalization on Credit Access

The binomial logit model is adopted to analyze the effect of digitalization on the access to credit. The results of this research prove that digitalization had a significant effect on credit access, both before and after the COVID-19 pandemic (see Table 4). There is a significant difference between households that used the internet, cell phones, and e-banking compared to non-users in terms of credit access. This is in line with research by Evans (2018), which shows that digitalization has a significant effect on access to credit.

By considering all digitalization variables, the results show that there are significant differences between households that use the internet, cell phones, and e-banking, and those that do not in terms of financial inclusion. This is in line with research by Ozili (2018), which demonstrates that the use of the internet, cell phones, and e-banking are interrelated in influencing financial inclusion. These three digitalization variables might be correlated to each other (prone to strong collinearity). So, instead of putting all these variables in a single measurement, the analysis in this study continues with different measurements of digitalization. The researchers estimate the effects of internet usage, cell phone usage, and e-banking on credit access separately. Besides that, this analysis also reports the result when there are no control variables (see Table A1).

It has been demonstrated that, when estimated, each digitalization variable shows a significant influence on financial inclusion. However, in terms of financial inclusion, there was a lower probability for e-banking users compared to those who did not use e-banking. This happened because the level of e-banking usage in Indonesia before the COVID-19 pandemic was so low that it did not have a significant effect on financial inclusion. Most Indonesians feel safer and more comfortable making financial transactions directly at the bank rather than using e-banking. However, during the COVID-19 pandemic, e-banking usage became important and had a significant effect on the level of financial inclusion. Nevertheless, there was a reduction in activities using e-banking for financial transactions because people reduced their consumption of goods and services.

Table 5 shows the calculations of the average marginal effect (AME), which is an advanced estimate to find out how much the outcome variable shifts because of a change in one independent variable when the other independent variables are constant at a specific value (Long and Freese, 2006). The results show that,pre-COVID-19, accessing credit through internet usage was 1 percent higher than where there was no internet usage. Meanwhile, post-COVID-19,the effect was 1.6 percent higher than it was pre-COVID-19 and this was a statistically significant positive effect at the 1 percent level. The findings of this study differ

from previous research by Fanta and Makina (2019),which shows that the effect of internet use on access to credit was 5.39 percent higher, using cross-country analysis from 2012 to 2017. Meanwhile, Falentina et al. (2021) show that the effect of internet use increased access to credit by 4.47 percent in small and medium enterprises (SMEs) in Yogyakarta.

Table 4. The Effect of Digitalization on the Probability of Credit Access Pre-and Post-Pandemic

Variable	Credit Access (=1, otherwise 0)	
	Pre-COVID-19	**Post-COVID-19**
Internet Usage	0.078***	0.120***
	(0.014)	(0.013)
Cell phone Usage	0.361***	0.317***
	(0.016)	(0.017)
E-banking Usage	-0.114***	-0.057**
	(0.027)	(0.022)
Age	-0.007***	-0.008***
	(0.000)	(0.000)
Gender (Male)	0.207***	0.253***
	(0.018)	(0.018)
Marital Status (Married)	1.482***	1.309***
	(0.051)	(0.049)
Level of Education		
Graduated Elementary School	0.148***	0.111***
	(0.051)	(0.016)
Graduated Junior High School	0.296***	0.210***
	(0.019)	(0.019)
Graduated Senior High School	0.390***	0.243***
	(0.018)	(0.018)
Graduated College	0.430***	0.196***
	(0.023)	(0.022)
Employment Status (working)	0.348***	0.425***
	(0.021)	(0.021)
Income Level	0.655***	0.564***
	(0.010)	(0.010)
Household Size	0.220***	0.224***
	(0.003)	(0.003)
Residential Area Strata (Urban)	0.036**	0.000
	(0.012)	(0.012)
Signal Strength	0.004	0.000
	(0.014)	(0.031)
N	315 672	334 229

This table reports results from the binomial logit model.
*Standard errors are in parentheses * p < 0.10. ** p < 0.05. *** p < 0.01.*
Source: The 2019 and 2021 SUSENAS and PODES (processed)

Table 5. The Effect of Digitalization on Credit Access (AME Calculation)

Variable	Credit Access	
	Pre-COVID-19	**Post-COVID-19**
Internet Usage	0,010***	0,016***
	(0,002)	(0,002)
Cell phone Usage	0,046***	0,041***
	(0,002)	(0,002)
E-banking Usage	-0,001***	-0,007***
	(0,004)	(0,003)
Age	-0,001***	-0,001***
	(0.000)	(0.000)
Gender (Male)	0,027***	0,033***
	(0,002)	(0,002)
Marital Status (Married)	0,190***	0,169***
	(0,007)	(0,006)
Level of Education		
Graduated Elementary School	0,019***	0,014***
	(0,002)	(0,002)
Graduated Junior High School	0,038***	0,027***
	(0,002)	(0,002)
Graduated Senior High School	0,050***	0,031***
	(0,002)	(0,002)
Graduated College	0,055***	0,025***
	(0,003)	(0,003)
Employment Status (working)	0,044***	0,055***
	(0,003)	(0,001)
Income Level	0,084***	0,073***
	(0,001)	(0,002)
Household Size	0,028***	0,029***
	(0.000)	(0.000)
Residential Area Strata (Urban)	0,005**	0.000
	(0,002)	(0,002)
Signal Strength	0.000	0.000
	(0,002)	(0,004)
District/city	-	-
N	315 672	334 229

This table reports the marginal effect results.
*Standard errors are in parentheses * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.*
Source: The 2019 and 2021 Susenas and Podes (processed)

Furthermore, the probability of credit access was 4.6 percent higher for cell phone users than for non-users pre-COVID-19; meanwhile, post-COVID-19, the probability was 4.1 percent smaller than pre-COVID-19. These findings differ from a study by Fanta and Makina (2019) which states that, in 2019, the relationship between phone network usage and access to credit was negative with a coefficient of 3.29 percent, while, when the measure was the use of

the internet, the relationship was positive. On the other hand, they state that credit access had a positive effect on electronic fund transfer, and this was statistically significant at 1 percent level with a coefficient of 2.3 percent, which is a smaller coefficient compared to the result of this study. Interestingly, during the pandemic, the probability of credit access was 0.7 percent lower for e-banking users. This is related to banks being increasingly selective in disbursing bank credit to the public during the pandemic, including in terms of applying for credit via e-banking email (OJK, 2021).

The male population is shown to be 3 percent higher in terms of access to credit than the female population. This is because the bargaining position of women tends to be weaker than that of men in making financial decisions. This is in line with the research conducted by Allen et al. (2015), which states that men, as heads of households, have greater power in terms of making household decisions, including decisions about applying for credit. Marital status has also been demonstrated to have the most significant effect on the probability of credit access. Prior to the pandemic, the probability of credit access was 19 percent higher for those who were married or had been married. Meanwhile, during the pandemic, the probability was 17 percent higher. This shows that married residents always have a higher chance of being approved for formal credit than unmarried residents, both before and during the pandemic (OJK, 2021).

As for the heterogeneity analysis, Table 6 shows the effect of digitalization on the probability of credit access in urban areas only. The findings show that those households that use digitalization technology (both internet and cell phones) have a lower probability of accessing the credit both pre- and post-pandemic. This finding suggested that urban people can more easily access credit directly by going to the bank; therefore, most of them did not utilize digitalization technology. The use of e-banking post-pandemic had a higher probability of accessing credit than households with no e-banking in urban areas.

CONCLUSIONS AND SUGGESTIONS

This study, by comparing 2019 to 2021, concludes that, as a result of the COVID-19 pandemic, digitalization accelerated access to household credit. In general, digitalization has always been demonstrated to have a significant impact on financial inclusion, with the exception

Table 6. Probability of Credit Access in Urban Areas Pre- and Post-COVID-19 Pandemic

Variable	Credit Access (=1, otherwise 0)	
	Pre-COVID-19	**Post-COVID-19**
Internet Usage	-0.102**	-0.083**
	(0.019)	(0.019)
Cell phone Usage	-0.260**	-0.234**
	(0.026)	(0.027)
E-banking Usage	0.036	0.003**
	(0.031)	(0.025)
Control variable	Yes	Yes
Observations	130 688	140 710

Note: This table reports the binomial logit model.
*Standard errors are in parentheses * p < 0.10. ** p < 0.05. *** p < 0.01.*

Since Table 6 only estimates the impact of digitalization on the probability of credit access in urban areas, it is not necessary to control for cities.

of the use of e-banking. Based on financial inclusion indicators, digitalization has also been demonstrated to have a significant impact on household account ownership and access to credit, both before and during the COVID-19 pandemic. The SUSENAS and PODES data show that many households accessing formal credit in Indonesia are headed by males living in rural areas, who are married, working, and graduated from junior high school or above. Furthermore, the probability of credit access is higher for cell phone users than for non-users pre-COVID-19, and post-COVID-19 the probability was smaller than pre-COVID-19. Interestingly, during the pandemic, the probability of having access to credit is lower for e-banking users. In line with the National Economic Recovery (PEN) program, financial inclusion can be increased by accelerating credit distribution to all levels of society. This research on financial inclusion has limitations because of the limitations of the data, which have the potential to cause bias. For future research, the analysis of financial inclusion could be focused on those internet users who already use e-banking. It would be interesting to further investigate the reasons why the use of e-banking is still very low amid a surge in internet usage.

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Appendix

Table A1. The Effect of Internet Usage on Credit Access

No	variables	credit access = 1, otherwise = 0			
		Pre-COVID-19		**Post-COVID-19**	
		with control	no control	with control	no control
1	internet usage	0.078***	-0.344***	0.120***	-0.358***
		(0.014)	(0.011)	(0.013)	(0.010)
2	cell phone usage	0.361***	-0.708***	0.317***	-0.586***
		(0.016)	(0.015)	(0.017)	(0.015)
3	e-banking usage	-0.114***	-0.115***	-0.057**	-0.083***
		(0.027)	(0.025)	(0.022)	(0.019)

This table reports the binomial logit model.
*Standard errors are in parentheses * $p < 0.10$. ** $p < 0.05$. *** $p < 0.01$.*
Source: The 2019 and 2021 Susenas and Podes (processed)