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The Influence of Digital Based Payment System Innovation on Financial Inclusion and Poverty Alleviation: An Overview of Social Programs in the Sumatra Region

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Abstract

This study aims to analyze digital-based payment system innovations towards financial inclusion and poverty alleviation in the context of social programs in the North Sumatra region. Innovations in digital payment systems have provided new opportunities for people who previously found it difficult to access formal financial services. Through the use of digital technology, social programs in the Sumatra region can expand the reach and effectiveness of poverty alleviation efforts. The research methods used are surveys and secondary data analysis. The survey was conducted to collect data from respondents involved in social programs in the Sumatra region. The data was then analyzed to identify the relationship between the use of digital-based payment systems, financial inclusion, and poverty alleviation. The results showed that digital-based payment system innovation has a positive influence on financial inclusion and poverty alleviation in the Sumatra region. The use of digital payment systems facilitates public access to financial services, such as payments, money transfers, and savings. This provides an opportunity for those who were previously marginalized to participate in economic activities and increase financial independence. This research also reveals several factors that influence the successful implementation of digital-based payment system innovations in social programs in the Sumatra region. These factors include adequate technological infrastructure, adequate financial literacy, supportive regulations, and cooperation between various related parties.

Keywords: *digital-based payments, financial inclusion, poverty alleviation.*

Introduction

This investigation involves a qualitative assessment of how digital finance affects the inclusivity of financial services and the stability of the financial system. It concentrates on digital financial mechanisms and conducts an in-depth exploration into their influence on both financial inclusion and the stability of the financial system. At the theoretical level, the discourse additionally addressed the advantages and drawbacks associated with digital finance, as well as its implications for both digital financial inclusion and financial inclusion. Presently, the significance of digital finance and its connection to lifting people out of poverty and fostering economic growth has garnered considerable interest from policymakers and scholars. This attention is primarily due to persistent challenges that, if resolved, could enhance the efficacy of digital finance for individuals, businesses, governments, and overall economies. Digital finance, in conjunction with financial inclusion, yields a multitude of advantages for various stakeholders within the financial

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service ecosystem. This symbiotic relationship offers a host of benefits, including but not limited to the expansion of financial access to previously underserved or impoverished individuals, the mitigation of financial intermediation expenses for both traditional banking institutions and innovative FinTech providers, as well as the potential for augmented government revenue through increased aggregate spending within economies.

Over the recent years, Indonesia has made notable strides in economic development, resulting in the alleviation of unemployment, poverty, and disparities within communities, particularly in rural regions. Nevertheless, the government remains committed to furthering development efforts in peripheral and outlying areas. This vision is articulated in the Government Nawacita, as presented by Sri Adiningsih. It encompasses objectives such as the advancement of various regions within Indonesia, with a special focus on peripheral areas, the enhancement of the overall quality of life for the populace, the elevation of productivity and global competitiveness, and the expeditious promotion of domestic economic growth. In this age characterized by technological advancements, active engagement and collaboration from a multitude of stakeholders, encompassing both local communities and governmental bodies, are imperative in leveraging the potential of the digital economy to combat poverty and reduce disparities in rural areas. Armida Alisjahbana added that human capital development is very important in helping Indonesia solve problems in line with the Sustainable Development Goals (SDGs) that have been formulated by the United Nations (UN). Some of the goals underlined by Armida include no poverty, zero hunger, good health and well-being, and quality of education (Acha, 2018).

The development of technological innovation occurs in almost all business fields, one of which is in the financial services sector. This is certainly inseparable from the increasing use of the internet continues to increase in the last two years. According to the findings obtained from the survey conducted by the Indonesian Internet Service Providers Association (APJII), the number of internet users in Indonesia during the 2022-2023 period amounted to 215.63 million individuals. This figure represents approximately 78.19% of the entire population of Indonesia, which stands at 275.77 million people. This percentage is 1.17% higher than in 2021-2022 which was 77.02% (based on https://apjii.or.id). Increasing internet penetration is increasingly becoming a necessity for the community, especially since the COVID-19 pandemic in 2020. Meanwhile, the number of internal users in the previous period was 210.03 million users. If we look at the penetration rate based on the category of provinces in Indonesia, Banten Province with the highest penetration rate of 89.10 percent followed by DKI Jakarta Province at 86.96 percent. The third place is occupied by West Java Province at 82.73 percent.

Despite their numerous advantages, digital finance and financial inclusion have yet to permeate a significant segment of the population (G20, 2013), highlighting a noteworthy discrepancy between the availability, accessibility, and utilization of financial services. One domain where these disparities are particularly pronounced and increasingly gaining prominence, especially within the purview of FinTech providers, pertains to digital financial inclusion, financial data inclusion, and the adoption of digital currency. It is worth noting that these relationships and the related issues concerning financial inclusion have garnered relatively limited attention in the existing literature. Moreover, during periods of economic prosperity, FinTech providers have the potential to stimulate economic growth by facilitating an upsurge in the volume of financial transactions within the financial system. However, the extent to which FinTech providers and their activities might either exacerbate or mitigate economic crises, such as those precipitated by the COVID-19 pandemic, remains a subject that warrants further exploration and remains uncertain.

Today, the financial services sector, known as FinTech (Financial Technology), has rapidly expanded. The evolving FinTech sector, which blends finance with technology, has become a burgeoning industry. It caters to a broad spectrum of individuals who

engage in online transactions, utilizing the seamless integration of mobile devices, computer systems (internet), or secure digital payment systems connected to cards (Arner, Barberis, & Buckley, 2015; Hinson, Lensink, & Mueller, 2019; Manyika, Lund, Singer, White, & Berry, 2016). The type of fintech that is widely used today is payment / payment. The product included in the payment can be a digital wallet or an electronic wallet. Digital wallet (e-wallet) is an online application used by users to make transactions. Over time, digital wallets have become a frequently used online payment because consumers find this method useful and provide a safe, fast and easy service (Uddin & Akhi, 2014). The prevalence of this application among users in Indonesia can be attributed to the extensive utilization of smartphones and internet access in the country. The high penetration of smartphones and the availability of internet connectivity have created a favorable environment for the adoption and use of this application, which, in turn, has led to a large user base. The spread of e-wallets is concentrated in Java Island and parts of Sumatra and Sulawesi provinces. Meanwhile, the number of e-wallet conversions on the islands of Kalimantan, Papua, and Nusa Tenggara is still very minimal when viewed from Google Trend analysis (Kusumawardhani & Purnaningrum, 2021).

Digital financial services offer a level of convenience and cost-effectiveness that surpasses traditional banking services. This accessibility allows individuals with lower incomes or living in poverty in developing nations to participate in the formal financial system, providing them the opportunity to save and borrow, ultimately reaping various financial advantages (Santika, Aliyani, & Mintarsih, 2022). This aspect holds significant importance for the public, as it not only enhances the safety of their funds but also presents a more convenient alternative to storing money at home, especially during travel (Durai & Stella, 2019). Nevertheless, the establishment and delivery of digital financial services necessitate the involvement of multiple stakeholders. These key players encompass banks and financial institutions, mobile network operators, financial technology providers, regulatory bodies, agents, chain retailers, and the end-users (Haider, 2018). Digital finance has the potential to eliminate transaction fees and offer cost-effective, convenient, and secure banking services to individuals in developing nations, particularly those with limited financial resources. The concept of financial inclusion, which entails ensuring that households and businesses have access to a comprehensive range of financial services, plays a crucial role in promoting progress. This approach can empower impoverished households to enhance their living standards and stimulate economic mobility. Digital financial services are recognized as significant solutions in the realm of financial matters, aiming to bolster monetary considerations (Agufa, 2016). The concept of financial inclusion serves to bridge the divide between traditional cash transactions and digital payments. When customers gain access to digital payment systems, they gain the capability to swiftly and cost-effectively transfer funds to friends, family, and engage in business collaborations (Radcliffe & Voorhies, 2012).

As per the United Nations Report, financial inclusion is an ongoing effort aimed at delivering affordable financial services to bring marginalized populations into the formal economy. Another way to define financial inclusion is by looking at it as the utilization of formal financial services by individuals who are economically disadvantaged (Beck, Demirgüç-Kunt, & Levine, 2007; Bruhn & Love, 2014). In practical terms, financial inclusion entails increasing the number of individuals, primarily from impoverished backgrounds, who gain access to formal financial services, chiefly through the use of formal bank accounts. This endeavor contributes significantly to poverty alleviation and stimulates economic growth. By extending financial inclusion, individuals who were previously excluded from the formal financial system now have the means to invest in education, save money, and establish businesses. These actions collectively foster poverty reduction and spur economic growth (Beck et al., 2007; Bruhn & Love, 2014). The ultimate goal of an inclusive financial system is to create a desirable environment where everyone, particularly those in poverty, can access and move funds, increase their working capital, and reduce financial risk.

In the 2019 SNLIK (National Survey of Financial Literacy and Inclusion), the financial literacy index was calculated based on strata in rural and urban areas. Each province had one city and one district chosen to represent urban and rural areas, except for DKI Jakarta province. The financial literacy index showed an increase from 2016 to 2019 in both rural and urban strata. However, in 2019, the rural financial literacy index was lower than the national average (38.03%). The data on financial literacy index by province reveals significant disparities. DKI Jakarta had the highest financial literacy index (59.16%), while East Nusa Tenggara had the lowest (27.82%). Thirteen provinces had a financial literacy index above the national average, including Aceh, Riau, South Sumatra, Riau Islands, DKI Jakarta, Central Java, D.I. Yogyakarta, East Java, Banten, Bali, East Kalimantan, North Sulawesi, and Central Sulawesi. On the other hand, 21 provinces had a financial literacy index below the national average. In 2022, the overall literacy rate, as per the SNLIK, was 49.68%, an increase from the 2019 literacy index of 38.03%. Notably, North Sumatra Province's literacy rate surpassed the national average, standing at 51.69%.

Financial inclusion is the state where everyone has access to financial services offered by formal institutions and possesses at least one formal account to conduct financial transactions at an affordable cost (Group, 2016; Klapper & Singer, 2014). These formal accounts encompass bank accounts, nonbank accounts, or mobile money accounts, facilitating various financial activities such as savings, borrowing, access to insurance products, payments, transfers, and receipt of remittances (Demirguc-Kunt, Klapper, Singer, & Ansar, 2018). Financial inclusion not only ensures accessibility to financial services but also promotes economic growth and cultivates a savings culture, particularly in rural regions, as noted by Dube et al. (2014). Financial market imperfections often obstruct financially disadvantaged individuals, who typically lack collateral and credit history, from accessing financial services (Aghion & Bolton, 1997). In 2022, the financial inclusion rate for Sumatra Province reached 95.58%, an improvement over 2019's 93.98% and 2016's 75.60%. In 2023, the key objectives of the Financial Services Authority (OJK) revolve around increasing financial literacy, with a focus on Micro, Small and Medium Enterprises (MSMEs), students, and individuals with disabilities.

Poor households have no other choice but to embrace a systematic approach that involves a self-saving strategy, achieved by cutting back on spending and making sacrifices like withdrawing their children from school or skipping healthcare. If poor households are reluctant to make significant savings, then they will be trapped in a cycle of poverty. Beyond poverty, there is a threshold where the dynamics of wealth distribution become complex and can lead to imperfections in markets, especially in financial markets, which are risky conditions that have the potential to exacerbate poverty in a sustainable manner (Barrett, Garg, & McBride, 2016). Additionally, as asserted by Stiglitz and Weiss (Stiglitz & Weiss, 1981), the enduring existence of poverty is attributed to issues of information asymmetry, where credit prices have the potential to influence transaction dynamics, thus preventing efficient market clearing. This outcome stems from adverse selection and incentive effects. In fact, the presence of adverse selection and moral hazard prompts the financial system to limit credit availability, whereas the process of poverty alleviation necessitates financial institutions to furnish financial services to impoverished individuals to enable their consumption and address other essential requirements (Toindepi, 2016).

Several recent studies have explored the link between access to financial services and the reduction of poverty among the most disadvantaged segments of society. For instance, research conducted by (Beuermann, McKelvey, & Vakis, 2012) demonstrated that in rural Peru, expanded mobile phone coverage has led to a decrease in extreme poverty and an increase in household consumption. In a separate study by Simplice Asongu (Simplice Asongu, 2015), a negative correlation was identified between mobile phone penetration and income inequality across a sample of 52 African countries. (Suri & Jack, 2016) using household panel data to show the long-term impact of mobile money on Kenyans'

economic livelihoods. They found that Kenya's use of mobile money systems increased per capita consumption levels, increased efficiency of consumption allocation over time and pulled about 2.0% of Kenyans out of extreme poverty (those living on less than $1.25 a day). However, very few studies have access to such panel data Suri and Jack (2016). In another study, (Aker, Boumnijel, McClelland, & Tierney, 2016) used data from a randomized experiment of a mobile money cash transfer program in Niger and found that providing social assistance via mobile phone led to significant time and cost savings for recipients, as well as better nutritional outcomes. Households that received mobile transfers experienced a 9% to 16% rise in food diversity, and children consumed an additional one-third of their daily diet. Furthermore, in a study conducted by (Munyegera & Matsumoto, 2016), it was observed that mobile money services have a beneficial effect on the overall well-being of rural households in Uganda, primarily by simplifying the process of sending and receiving remittances.

In a corresponding investigation, (Simplice A. Asongu & Le Roux, 2017) uncovered that the expansion of mobile, internet, and broadband access had a favorable impact on inclusive growth, as measured by an inequality-adjusted human development index. (Arvidsson, 2014) study delved into consumer attitudes regarding mobile payments and revealed that the adoption of new payment systems is associated with perceived security concerns. In Cambodia, (Seng, 2017) study ascertained that mobile phones exerted a positive influence on both formal and informal borrowing. A research conducted by (Lenka et al., 2017) provided compelling evidence of a constructive correlation between the growth of mobile and internet services and financial inclusion. Furthermore, (Wieser, Bruhn, Kinzinger, Ruckteschler, & Heitmann, 2019) examined the effects of introducing mobile money agents in rural areas of Northern Uganda and established that this expansion reduced the proportion of impoverished rural households experiencing food insecurity. Their findings underscored the potential of mobile money to enhance the livelihoods of the underprivileged, particularly in remote areas distant from traditional bank branches, though no discernible impact was observed on savings or poverty outcomes. Lastly, (Chinoda & Kwenda, 2019) investigation, encompassing a dataset from 49 countries spanning from 2004 to 2016, revealed a unidirectional causal relationship from financial inclusion to mobile phone usage. Meanwhile, utilizing panel datasets from 61 low- and middle-income nations, (Mushtaq & Bruneau, 2019) research demonstrated that increased mobile penetration can drive greater financial inclusion.

Financial inclusion plays a pivotal role in expanding access to financial services and alleviating poverty. In today's digital age, electronic money has emerged as a significant innovation within payment systems and can substantially contribute to enhancing financial inclusion. (Kelikume, 2021) study, utilizing the systematic generalized moment method, has shown that the growing utilization of the internet has a substantial positive impact on enhancing the effectiveness of poverty alleviation through financial inclusion. Furthermore, a research conducted by (Bayar, Gavriletea, & Păun, 2021), which examined linkages within a sample of 11 post-communist EU countries spanning from 1996 to 2017 using panel cointegration and causality analysis, identified both positive and negative relationships between Internet usage levels, financial institution usage, and financial market accessibility. By boosting Internet usage, it was evident that access to financial institutions could be expanded in Bulgaria, Croatia, the Czech Republic, Hungary, and Poland. Additionally, this increased Internet usage could enhance financial market access in Latvia and Slovenia.

The discourse presented in this study makes a valuable contribution to the ongoing dialogue led by the World Bank in advocating for financial inclusion as an efficacious means of mitigating poverty in underdeveloped and impoverished nations. The insights derived from this research have the potential to furnish national and global policymakers with a deeper comprehension of the intricacies surrounding the rapid evolution of digital financial services, their distribution among impoverished populations, and the associated

risks entailed in digital financial inclusion. Furthermore, for scholars and researchers, the deliberations in this study augment the growing body of literature on financial inclusion, striving to proffer solutions for achieving sustainable financial inclusion, particularly within economically disadvantaged regions. The concepts explored in this research underscore the need for more collaborative research endeavors aimed at unraveling the intricate relationship between digital finance, financial inclusion, and digital financial inclusion, along with the accompanying risks and alternative models and perspectives within this domain. Additionally, the discourse in this study contributes to the examination of the role of financial innovation in bolstering the stability of banking and financial systems. The insights gleaned from this research have the potential to enhance our comprehension of the operations of Fintech companies, while also assisting regulatory authorities in grasping the interconnections among Fintech, financial inclusion, and the stability of financial systems.

Research Method

Research Design

This study adopts a literature study methodology by collecting data and opinions of scientists in testing digital-based payment innovations, financial inclusion and poverty alleviation in the North Sumatra region. (Kothari, 2004) Note that the survey research design examines causal relationships between variables. The objectives to be achieved in a study become the basis for determining the research approach to be used.

Study Population and Sample Size

The study population consisted of people living in the Sumatra region at the time the study was conducted. This study used multistage sampling techniques in site selection and respondents. This technique requires gradual selection. The first phase of multistage sampling consists of random sampling of ten (10) local government areas from 23 local government areas in Sumatra. From the selected community, as many as 223 respondents who understand the concept of digital financial inclusion were selected purposively and then used for research. Purposive sampling is inclusive. In addition, preliminary studies were conducted to determine the respondents and where they were located in the selected area.

Data Analysis Techniques

The structured questionnaire served as the main instrument of data collection in this study. The questionnaire contains open-ended questions and a 5-point Likert scale rating. Care is taken in constructing the questionnaire and the researcher ensures that the questionnaire captures all relevant aspects of the research variables. It further contains questions about the dimensions of digital-based payment innovation, financial inclusion used in the study and consumption expenditure developed to answer the study's research questions on a five-point Likert scale and to test hypotheses. All questionnaire statement items are operationalized from the existing literature.

Questionnaire Design and Measurement

Researchers such as Wrennet al. (2002), explain that measuring and designing questionnaires is a significant process. Thus, researchers should exercise caution when creating, writing, and reviewing questionnaire items, content, and layout; and for the purpose of standardization trials should be carried out to ensure that the developed questionnaire will find exactly what it wants to measure, the format is appropriate and participants will easily understand the topic and questions (Wrennet al.,2002). Saunders et al. (2012) states that a well-designed questionnaire leads to improved response rates and the legitimacy and quality of the data collected. Since the examination uses an approved scale effectively, efforts in this area have concentrated on making significant changes

according to the settings and dialects in which the specialists work. Each factor is designed in the format of a Likert scale of estimates 1–5, where the scope of responses is 1 very) to 5 (strongly agree). Therefore, the assessment is as follows; Strongly Agree (SA) 5 points, Agree (A) 4 points, Doubt (U) 3 points, Strongly Disagree (SD) 2 points, and Disagree (D) 1 point. Scoring or rating scales are important because attached numbers make it easier for researchers to combine positive and negative opinions for statistical analysis.

Data Sources

The data utilized in this study primarily originated from primary sources, specifically through the administration of surveys. In this research, questionnaires were employed as the primary data collection tool, and copies of these questionnaires were utilized to gather information from respondents located in the Sumatra region.

Instrument Validity

Researchers use the validity of the content to test the validity of the research instrument ascertained through the review of experts (i.e. experts in their field including research supervisors and statisticians) to ensure that the questions compiled are sufficient to collect the intended responses. Second, the scale used in this study was adapted from existing measures applied and validated in previous studies.

Instrument Reliability

Reliability issues were also addressed in the study. First, retests were carried out on the research instrument which then used the Cronbach alpha coefficient to determine the internal reliability of the research instrument. This is done by applying internal consistency techniques to assess reliability. The collected pre-test data is fed into SPSS data analysis software version 25.0 to generate internal consistency data of instruments. Cronbach alphas greater than 0.7 are considered adequate and reliable for a given data collection instrument according to Gliem and Gliem (2003). It can be concluded that all research constructs are very reliable, given the results of pilot studies. The corrected item-total correlation ranged from 0.33 to 0.91, indicating that there were no redundant items and therefore no deleted items. Pilot studies help researchers to acknowledge and solve as many problems as possible before completing the final survey. No important issues have been recognized in this study.

Data analysis methods

Data obtained from field surveys are first presented with simple descriptive statistics such as tables, frequencies, graphs and percentages. Data was tested with a simple regression model using SPSS software version 25.0.

Results and Discussion

Normality Test

In determining the normality of data, one commonly examines the significance value. If the significance value (sig value) exceeds 0.05, the data can be characterized as normal. Conversely, if the significance value is less than 0.05, the data is considered abnormal.

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

	Unstandardized Residual	
Variable	Financial Inclusion	Poverty Alleviation

N		62	62
Normal Parameters[a,b]	Mean	.0000000	.0000000
	Std. Deviation	106.818.912	120.984.272
Most Extreme Differences	Absolute	.114	.094
	Positive	.114	.094
	Negative	-.105	-.084
Test Statistic		.114	.094
Asymp. Sig. (2-tailed)		.042[c,]	.200[c,d]

Source: Primary data processed (2022)

The table provided indicates that the significance value (sig value) is 0.042, which is greater than 0.05. This observation suggests that the variable representing Digital-Based Payment System Innovation (X) and its relationship with Financial Inclusion (Y1) is normally distributed. The variable of Digital-Based Payment System Innovation (X) on Poverty Alleviation (Y_2) is normally distributed, this is indicated by a GIS value of 0.200 > 0.05.

Homogeneity Test

In making decisions based on the homogeneity test, the primary criterion is still the significance value. If the significance value (sig value) is greater than 0.05, it indicates that the variables are homogeneous. Conversely, if the significance value is less than 0.05, it suggests that the variables are not equal or lack homogeneity.

Table 2. Homogeneity Test Results

		Levene Statistic	df1	df2	Itself.
Digital-Based Payment System Innovation for Financial Inclusion	Based on Mean	.298	4	56	.878
	Based on Median	.172	4	56	.952
	Based on Median and with adjusted df	.172	4	53.450	.952
	Based on trimmed mean	.323	4	56	.862
Digital-Based Payment System Innovation for Poverty Alleviation	Based on Mean	.265	3	56	.850
	Based on Median	.088	3	56	.966
	Based on Median and with adjusted df	.088	3	46.806	.966
	Based on trimmed mean	.255	3	56	.858

Source: Primary data processed (2022)

In Table 2, it is evident that the significance value (sig value) for the variable of Digital-Based Payment System Innovation concerning Financial Inclusion is 0.862, which is greater than 0.05. Therefore, it can be concluded that this variable exhibits homogeneity. Similarly, the variable of Digital-Based Payment System Innovation in relation to Poverty Alleviation is also homogeneous, as indicated by a significance value (GIS value) of 0.858, which is greater than 0.05.

Simple Linear Regression Test

A simple linear regression formula is:

$Y_1=a+bX$ $Y_2=a+bX$

Table 3. Simple Linear Regression Test Results

Coefficients[a]

Model		Financial Inclusion			Poverty Alleviation		
		Unstandardized Coefficients		Standardized Coefficients	Unstandardized Coefficients		Standardized Coefficients
		B	Std. Error	Beta	B	Std. Error	Beta
1	(Constant)	.604	1.967		1.242	2.228	
	Digital-Based Payment System Innovation	.790	.044	.917	.576	.050	.829

Source: Primary data processed (2022)

According to the calculations in the simple regression coefficient table, the constant coefficient is 0.604, and the coefficient for the independent variable (X) is 0.790. Therefore, the regression equation Y = 0.604 + 0.790X is derived. This equation indicates that the constant value, 0.604, signifies that when the Digital-Based Payment System Innovation has a value of 0, Financial Inclusion is at 0.604. Furthermore, the coefficient of 0.790 associated with the independent variable (Digital-Based Payment System Innovation) in the regression equation demonstrates a positive relationship. In other words, for every one-unit increase in the Digital-Based Payment System Innovation variable, there is a corresponding increase of 0.790 in the dependent variable Y (Financial Inclusion). Referring to the table, it is evident that 62 respondents generated a correlation value of 0.917.

The results from the calculations in Table 3, which represent the simple regression coefficients, reveal that the constant coefficient has a value of 1.242, while the coefficient for the independent variable (X) is 0.576. Consequently, the regression equation Y2 = 1.242 + 0.576X is formulated. This equation signifies that the constant value, 1.242, indicates that when the Digital-Based Payment System Innovation is at 0, the value of Poverty Alleviation (Y2) stands at 1.242. Furthermore, the coefficient of 0.576 associated with the independent variable (Digital-Based Payment System Innovation) in the regression equation demonstrates a positive relationship. In other words, for every one-unit increase in the Digital-Based Payment System Innovation variable, there is a corresponding increase of 0.576 in the dependent variable Y2 (Poverty Alleviation). Referring to the table, it is evident that a correlation value of 0.829 was generated by 62 respondents.

From the data above, it can be concluded that between the variable of Digital-Based Payment System Innovation (X) and the variable of Financial Inclusion (Y_1) has a very strong relationship because it has a correlation value of 0.917, and the variable of Digital-Based Payment System Innovation (X) with the variable of Poverty Alleviation (Y_2) has a very strong relationship because of the correlation value of 0.829.

Test t (Partial Test)

Table 4. T Test Results for Digital-Based Payment System Innovation (X) towards Financial Inclusion (Y_1)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.604	1.967		.307	.760
	Digital-Based Payment System Innovation	.790	.044	.917	17.838	.000

Source: Primary data processed (2022)

The determination of the t-value in the table for a 5% significance level, with degrees of freedom of 60 (where df = N–2 for N = 62), yields a t-table value of 2.000. Using SPSS, the t-statistic obtained is 17.838. Decision criterion: If the t-statistic surpasses the t-table value, the alternative hypothesis (Ha) is accepted, and the null hypothesis (H0) is rejected. In this instance, with a t-statistic of 17.838 exceeding the t-table value of 2.000 at a 5% significance level, Ha is accepted, and H0 is rejected. As per the hypothesis testing results, it can be inferred that "There exists an impact of Digital-Based Payment System Innovation on Financial Inclusion."

Table 5. T Test Results for Digital-Based Payment System Innovation (X) for Poverty Alleviation (Y_2)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.242	2.228		.557	.579
	Digital-Based Payment System Innovation	.576	.050	.829	11.479	.000

Source: Primary data processed (2022)

The determination of the t-value in the table for a 5% significance level, with degrees of freedom (df) equal to 60 (where df = N–2 for N = 62), results in a t-table value of 2,000. The t-statistic obtained using SPSS is 11.479. Decision criteria: If the t-statistic exceeds the t-table value, the alternative hypothesis (Ha) is accepted, and the null hypothesis (H0) is rejected. In this case, with a t-statistic of 11.479 surpassing the t-table value of 2,000 at a 5% significance level, Ha is accepted, and H0 is rejected. Based on the results of hypothesis testing, it can be concluded that "There is an impact of Digital-Based Payment System Innovation on Poverty Alleviation."

Test Coefficient of Determination (R^2)

The reaason behind using the coefficient of determination test (R^2) is as follows: when the value of the coefficient of determination is 0 ($R^2 = 0$), it implies that the variation of Y cannot be explained by X at all. Conversely, if $R^2 = 1$, it indicates that the entire variation of Y can be explained by X. In simpler terms, if $R^2 = 1$, all observation points precisely align with the regression line.

The results of the Coefficient of Determination test between digital-based payment system innovation (X) and financial inclusion (Y_1) are known to have a value of R^2 (Adjusted R Square) of 0.858 equivalent to 85.8%. This means that the influence of Digital-Based Payment System Innovation on Financial Inclusion is 85.8%. Meanwhile, the remaining 14.2% were influenced by other factors that were not studied.

The results of the coefficient of determination test between digital-based payment system innovation (X) and poverty alleviation (Y_2) are known to have an R^2 value (Adjusted R Square) of 0.687 equivalent to 68.7%. This means that the influence of Digital-Based Payment System Innovation on Poverty Alleviation is 68.7%. Meanwhile, the remaining 31.3 were influenced by other factors not studied.

Discussion

The Effect of Digital-Based Payment System Innovation on Financial Inclusion

The analysis findings demonstrate that advancements in digital payment systems play a vital role in promoting financial inclusion. Financial inclusion aims to provide fair and unbiased access to a range of financial services and products, such as bank accounts, loans, insurance, investments, and payment systems. Digital payment systems employ information and communication technology to enable electronic financial transactions, commonly through mobile apps, online banking, or digital payment platforms.

In 2022, the OJK survey revealed a financial inclusion index of 85.10%, marking an increase from 76.19% in the 2019 SNLIK period. This indicates a decreasing gap between literacy and inclusion rates, from 38.16% in 2019 to 35.42% in 2022. North Sumatra leads in financial inclusion with a composite index of 93.98%. The conventional financial inclusion rate in North Sumatra reached 90.84%, while Islamic financial inclusion reached 15.45%. Meanwhile, several other regions in North Sumatra also have relatively high levels of financial inclusion. Aceh has a composite financial inclusion index of 86.09%, with conventional and sharia financial inclusion rates reaching 86.09% and 18.04% respectively. However, there are also regions with lower levels of financial inclusion. For example, West Sumatra has a composite financial inclusion index of 66.75%, with conventional financial inclusion reaching 63.87% and Islamic financial inclusion of 22.25%. Jambi and Bangka Belitung also have relatively low levels of financial inclusion, with composite financial inclusion indices of 64.87% and 64.57% respectively. In general, this data illustrates that North Sumatra has a better level of financial inclusion compared to several other regions in Sumatra. However, there were significant differences in the level of financial inclusion between conventional and sharia regions across the provinces analyzed. Islamic Financial inclusion rates tend to be lower than conventional financial inclusion in these regions. This shows that there are challenges in expanding Islamic financial inclusion in North Sumatra. Financial understanding and practice have been going well and can still be improved.

The Government of the Republic of Indonesia has issued Minister of Finance Regulation Number 32/PMK.05/2014 which aims to implement an Electronic State Revenue System (SPNe) by utilizing information technology. The aim of this regulation is to transition manual transactions into electronic ones and promote the shift from cash to non-cash payment methods. This change is intended to boost financial inclusion. Through electronification of transactions, the government wants to open access for the public, including in remote areas, to be connected to financial services and financial institutions. With the electronic system, it is expected that the public can conduct financial transactions more easily and efficiently, and have the opportunity to recognize banking services formally.

In addition, electronification is also one of the strategies in expanding financial access. By providing electronic payment services, the government hopes to open opportunities for people who previously did not have access to the banking system to be able to take

advantage of financial services more broadly. This step is also expected to accelerate the process of financial inclusion, so that people who do not yet have formal access to banking can begin their introduction to the banking world.

The KAT (Remote Indigenous Communities) Empowerment Program is a comprehensive and continuous effort carried out by the central and local governments, since planning and evaluation, so that KAT residents are expected to be ready to accept social and environmental changes. This assistance program is intended for a certain group of people who are related by geographical, economic and/or socio-cultural unity and are poor, remote and/or socioeconomically vulnerable. The KAT Empowerment Program has been implemented by the Ministry of Social Affairs. The KAT empowerment program is under the responsibility of the Directorate of KAT Empowerment, Directorate General of Social Empowerment and Poverty Reduction.

Based on (TNP2K, 2018) the target beneficiaries of the 2016-2019 KAT empowerment program, provinces that receive KAT benefits in the Sumatra region include Jambi Province, the target beneficiaries each year are 65 families (KK), so that the total in four years is 260 families with a population of 1,771. South Sumatra Province also has the same target as Jambi, which is 65 families each year, so that the total number of target beneficiaries for four years is 260 families with a population of 1,868. Meanwhile, in the provinces of South Sulawesi, Gorontalo, Aceh, West Papua, and North Sumatra, the target beneficiaries set are also 85 households each year. Therefore, the total number of target beneficiaries in four years in these provinces is 340 households, with each province having a different population, namely South Sulawesi (2,166), Gorontalo (2,291), Aceh (2,629), West Papua (2,743), and North Sumatra (2,864). Thus, the KAT Empowerment Program in the 2016-2019 period has a total target of 1,590 beneficiaries with a total population of 14,071 (TNP2K, 2018).

Meanwhile, the Ministry of PUPR has also distributed social aid to 200 barbers who are members of the Garut Barber Brotherhood (PPRG) and 85 tailors who are members of the Pondok Gede Jatimakmur Tailor Association. This social assistance has also been distributed simultaneously to 34 provinces in Indonesia with details of 12,761 packages on the island of Sumatra, 13,926 packages on the island of Java, 1,175 packages on the island of Bali, 985 packages in West Nusa Tenggara, 992 packages in East Nusa Tenggara, 4,510 packages on the island of Kalimantan, 9,120 packages on the island of Sulawesi and 7,670 packages in the provinces of Maluku and Papua.

In 2022, Bank Indonesia will persist in advancing the digitalization of payment systems to hasten the integration of the digital economic and financial ecosystem and stimulate economic recovery. Aligned with the Indonesia Payment System Blueprint (BSPI) 2025, the key focus areas for 2022 include regulatory reform, the development of retail payment system infrastructure, and the standardization of payment systems. The adoption of the national QR standard, QRIS, is being expanded to accelerate payment system digitalization. As of December 2022, Bank Indonesia data indicates that QRIS usage is primarily concentrated in Java, with 20,590,488 users, followed by Sumatra with 4,755,340 users, Sulawesi-Maluku-Papua Island with 1,176,139 users, Kalimantan Island with 1,253,849 users, and Bali-Nusa Tenggara Island with 979,788 users. This shows that there is quite a lot of interest in using digital-based payment systems in Sumatra. The existence of transactions carried out in the district area shows a better level of financial inclusion, and evidence of public response to fintech to utilize technology-based banking facilities.

Digital finance has a multifaceted positive impact on financial inclusion. Firstly, it can enhance access to basic services for low-income and impoverished individuals in rural areas, promoting financial inclusion. Secondly, it can offer better access to financial services for rural and low-income customers who face difficulties accessing formal bank branches due to transportation issues and long waiting times, leading to cost savings for

banks and improved profitability while boosting financial inclusion. Thirdly, user-friendly digital finance platforms can facilitate various financial transactions, making it more convenient for people to handle tasks like utility payments and money transfers, which can, in turn, encourage others in rural and informal sectors to adopt digital financial services, ultimately expanding financial inclusion.

The Effect of Digital-Based Payment System Innovation on Poverty Alleviation

Digital-based payment system innovation has a significant influence on poverty alleviation through social programs in the Sumatra region. The use of digital payment systems facilitates access for social program beneficiaries to receive direct assistance without having to go to the bank physically. This increases accessibility and speeds up the payment process, reducing costs and administrative complexity. In addition, the use of digital payment systems also reduces leakage and misuse of social program funds as electronic transactions create a digital footprint that allows for better oversight and auditing. In terms of efficiency, digital payment systems reduce administrative costs associated with handling cash and manual processes. Better automation speeds up the payment process and reduces the need for manual labor, so social program funds can be more efficiently used. In addition, digital-based payment system innovation also promotes financial inclusion in Sumatra by providing access to digital financial services to communities previously underserved by the traditional banking system. With access to accounts, payments, and other financial services, economic opportunities can be developed and people's living standards improved. Overall, the use of digital-based payment systems in social programs in Sumatra has a positive impact on reducing poverty by increasing accessibility, reducing leakages, improving administrative efficiency, and promoting financial inclusion.

Poverty remains an enduring topic, persistently challenging both developing and developed nations. The emergence of distinct poverty pockets demands effective solutions, particularly in the face of the ongoing Covid-19 pandemic. The pandemic has amplified issues, evident in heightened unemployment rates, business closures, and the struggle to meet daily needs. Defined by the Minister of Social Affairs' regulation, the impoverished are those without a source of livelihood or lack the means to meet basic needs for themselves and their families. This criteria clarifies that not everyone experiencing financial difficulties falls under the category of poverty; it's about the inability to meet daily necessities. An intriguing current phenomenon is the reluctance of people to be labeled as impoverished until social aid is available, leading to misdirected assistance. This results in aid not reaching the actual impoverished and subsidies being given to those who aren't in need. Efforts are underway in Sumatra to address this issue, focusing on fulfilling minimum village service standards, poverty reduction, economic development, human resource empowerment, sustainable natural resource management, and rural economic growth to foster connections between rural and urban areas.

Based on Short-Term Programs 2018 – 2020 (PUPR, 2017) shows the number of infrastructure development financing needs based on development areas on the island of Sumatra in 2018 to 2020. This data is part of an effort to support national priorities in the development programming process.

In 2018, there were various sectors that required financing, such as infrastructure, connectivity, and maritime with a total of 112 projects and costs of 3,927,953 units. In addition, the sectors of energy security, food security, regional development, poverty reduction, business development and tourism, as well as housing and settlements also require financing. In 2019, there was an increase in the number of projects requiring financing, particularly in the regional development sector, with 364 projects and a total cost of 6,188,007 units. Additionally, the Infrastructure, Connectivity, and Maritime sector still required financing, albeit with a smaller number of projects compared to the previous year. In 2020, several sectors experienced a significant decrease in both the

number of projects and financing, such as energy security, which did not have any projects requiring financing that year. Nevertheless, the regional development sector remained the sector with the largest number of projects and significant costs.

Overall, the total financing needed for infrastructure development on the island of Sumatra during the period reached 11,700,108 units in 2018, increased to 15,281,036 units in 2019, and then decreased to 10,037,117 units in 2020. This shows commitment in supporting national priorities through financing infrastructure development on the island of Sumatra, focusing on sectors that are the main foothold for economic growth, improving community welfare, and poverty alleviation.

Digital transformation, as evidenced by research, has the potential to boost annual growth by nearly 2 percentage points and decrease poverty by about 1 percentage point (Calderon, Kambou, Korman, Kubota, & Canales, 2019). These positive impacts can be magnified when coupled with increased investments in human capital. However, it's crucial to recognize that the distribution of these effects is not uniform. While the adoption of new digital technologies can alleviate poverty in specific groups, it can also worsen existing inequalities and give rise to new disparities, both within and between countries, as well as between urban and rural populations, men and women, and the wealthy and the less privileged (Sutrisno, 2021). For instance, urban areas tend to have greater digital connectivity compared to rural areas, and even within urban settings, disparities often persist, with affluent central and inner-city neighborhoods having more access.

Data reported by the Central Statistics Agency (BPS) Bengkulu Province in September 2022 shows that Bengkulu Province has the second highest percentage of poor people on the island of Sumatra. The percentage of poor people in Bengkulu, which is 14.34 percent, also exceeds the percentage of poor people nationally in Indonesia which is 9.57 percent. In addition to Bengkulu Province, there are several other provinces on the island of Sumatra that also have significant poverty rates. Aceh has a percentage of poor people of 14.75 percent, North Sumatra of 8.33 percent, West Sumatra of 6.04 percent, South Sumatra of 11.95 percent, Lampung of 11.44 percent, Bangka Belitung of 4.61 percent, Jambi of 7.70 percent, Riau Islands of 6.03 percent, and Riau of 6.84 percent. This data indicates that the problem of poverty is still a serious challenge in Bengkulu Province and several other provinces on the island of Sumatra. High poverty rates reflect social inequality and unequal distribution of resources and opportunities in the region. The government and related parties need to make more intensive efforts to reduce the poverty rate on the island of Sumatra, especially in Bengkulu Province and other provinces that have a high percentage of poor people. This can involve economic empowerment programs, improved access to education and health services, and improved infrastructure and employment opportunities.

Economic transformation can be achieved by enhancing productivity, either through (i) structural changes, which involve shifting labor from less productive agricultural sectors to manufacturing and services, or (ii) by improving productivity within sectors due to changes in firms, either entering or exiting the market. This transformation can impact poverty reduction through three main channels: the structure of production (enabling the poor to become producers), the consumption of goods and services (empowering the poor as consumers), and the broader context of service delivery (Diwakar, Lemma, Shepherd, & te Velde, 2019). Within these channels, individuals can escape poverty through "growth from above," driven by increased formal investment, especially in labor-intensive manufacturing sectors like the garment industry, which often provide opportunities for poor individuals, including migrants and women. Conversely, "growth from below" directly lifts people out of extreme poverty, and it is linked to state support and private sector investment in small-scale agriculture and related sectors such as transportation, trade, information, and financial services (Shepherd & Diwakar, 2019). Poverty reduction through "growth from above" primarily occurs in industries where jobs are accessible to

the poor, often involving migrants and women. In contrast, poverty reduction through "growth from below" necessitates building the assets and human capital of the poor, supporting economic empowerment, particularly among women, and addressing or eliminating barriers to migration.

Conclusion

The innovation of digital-based payment systems plays a significant role in promoting financial inclusion, which is defined as the fair and equitable access to a range of financial products and services, including bank accounts, loans, insurance, investments, and payment systems. Digital-based payment systems leverage information and communication technology to enable electronic financial transactions, often through mobile apps, internet banking, or digital payment platforms. In 2022, the OJK survey highlights a remarkable increase in the financial inclusion index, reaching 85.10 percent, when compared to the previous assessment in 2019. North Sumatra stands out with the highest level of financial inclusion, boasting a composite index of 93.98%. Nevertheless, it's important to note that there are disparities in conventional and Islamic financial inclusion across various regions, with Islamic financial inclusion often lagging behind its conventional counterpart. Digital finance has a positive influence on financial inclusion. Digital financial services not only enhance access to basic services but also extend access to financial resources for rural customers. Furthermore, they offer a convenient platform for conducting basic financial transactions. The ease of use associated with digital finance may also encourage others to adopt digital financial services, thereby contributing to the broader adoption and expansion of financial inclusion efforts.

Digital-based payment system innovation has a profoundly positive influence on poverty alleviation in the Sumatra region. The adoption of digital payment systems greatly simplifies the process of disbursing social program benefits to recipients, eliminating the need for physical visits to banks. This heightened accessibility and expedited payment processing not only reduce costs but also streamline administrative procedures. Additionally, the use of digital payment systems minimizes the chances of fund leakage and misuse in social programs, as electronic transactions leave a digital trail that can be effectively monitored and audited. Furthermore, the efficiency of administrative tasks has improved significantly with the implementation of digital payment systems, leading to a reduction in expenses associated with cash handling and manual operations. The automation of processes accelerates the disbursement of social program funds while decreasing the reliance on manual labor, making the utilization of these funds more efficient. Moreover, digital-based payment system innovation contributes to advancing financial inclusion in Sumatra by extending access to digital financial services to communities that were previously underserved by the traditional banking system. With newfound access to accounts, payments, and other financial services, economic opportunities can be harnessed, ultimately enhancing people's living standards. In summary, the integration of digital-based payment systems into social programs in Sumatra yields a constructive impact on poverty reduction through improved accessibility, reduced fund mismanagement, increased administrative efficiency, and the promotion of financial inclusion.

In conclusion, digital-based payment system innovation has great potential in increasing financial inclusion and poverty alleviation in the Sumatra region. In order to optimize its benefits, comprehensive efforts need to be made, including investment in technology infrastructure, increasing financial literacy, and developing regulations that support the use of digital-based payment systems.

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