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THE IMPLEMENTATION OF FINTECH IMPLEMENTATION ON FINANCIAL INCLUSION IN EAST KALIMANTAN, INDONESIA

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Article Info	ABSTRACT
	The objective of this study is to identify, analyze, and explain the types of fintech technology, financial education and literacy, ease of access and use, fintech education programs, and access to financial services that have both direct and indirect effects on financial inclusion in Indonesia. This research employs a quantitative approach using the Partial Least Squares (PLS-SEM) model. The sampling technique used is purposive sampling based on specific predetermined criteria. The total number of respondents in this study is 697. The findings indicate that four variables fintech technology, financial education and literacy, ease of access and use, and fintech education programs have a positive and significant direct effect on access to financial services. Furthermore, five variables fintech technology, financial education and literacy, ease of access and use, fintech education programs, and access to financial services have a positive and significant direct effect on financial inclusion in Indonesia. Additionally, four variables fintech technology, financial education and literacy, ease of access and use, and fintech education programs have a positive and significant indirect effect on financial inclusion in Indonesia *This is an open access article under the CC BY-SA license.* CC BY SA

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1. INTRODUCTION

In recent years, the development of fintech technology has experienced a significant surge across the world, including Indonesia [1-2]. Fintech encompasses various financial services that utilize technology to improve efficiency, accessibility, and user experience [1-2]. In countries with large and diverse populations such as Indonesia, fintech offers innovative solutions to address the financial inclusion challenges faced by many people [3].

The implementation of fintech in Indonesia has become a main driver in increasing financial inclusion [4], Furthermore [4], [5] explain that broader access to financial services is one of the positive impacts of fintech development. With the presence of digital wallet applications and investment platforms, people who were previously not reached by formal financial institutions now have the opportunity to access financial services [2]. This is very important in Indonesia, because there are still many individuals and small businesses that have difficulty obtaining modern banking services [5].

Financial inclusion in Indonesia, as explained in [6] has increased along with the adoption of fintech technology. Their study shows that more and more people are using the financial services offered by fintech, thereby reducing the gap between those who are served and those who are underserved by the financial system [7]. This helps promote economic growth and improve the quality of life of the community. Various types of fintech technology, including digital payments, peer-to-peer lending, and crowdfunding, play an important role in enhancing financial inclusion [8], [9]. Furthermore, each type of fintech offers different solutions to meet the needs of society.

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For example, digital payment services facilitate daily transactions, while peer-to-peer lending provides alternative financing for small businesses that have difficulty obtaining credit from banks [10]. Financial education and literacy are highly needed [11] which emphasize that a good understanding of fintech products and risks can help the public make wiser financial decisions. Effective fintech education programs can cover various aspects, such as how to use applications, transaction security, and personal financial management [12].

The ease of access and use of fintech services is also an important factor in increasing financial inclusion. Then [13] shows that a user-friendly interface and a simple registration process can attract more users, especially among people who are less experienced with technology. Thus, fintech can become a bridge to connect the public with financial services that were previously difficult to reach [11].

Fintech education programs that are designed strategically can become an effective tool to improve financial literacy[10]. Furthermore [9] states that collaboration between fintech providers, the government, and educational institutions is very important to create comprehensive programs. With this appropriate approach, programs that help the public understand and utilize fintech services better can be created, thereby encouraging broader financial inclusion growth in Indonesia [12].

Based on the above background, the problem formulations that arise in this study are as follows: 1) Does the Type of Fintech Technology have a direct effect on Access to Financial Services, 2) Does the Type of Fintech Technology have a direct effect on Financial Inclusion in Indonesia, 3) Does the Type of Fintech Technology have an indirect effect, 4) Do Financial Education and Literacy have a direct effect on Access to Financial Services, 5) Do Financial Education and Literacy have a direct effect on Financial Inclusion in Indonesia, 6) Do Financial Education and Literacy have an indirect effect on Financial Inclusion in Indonesia through Access to Financial Services, 7) Do Ease of Access and Use have a direct effect on Access to Financial Services, 8) Do Ease of Access and Use have a direct effect on Financial Inclusion in Indonesia, 9) Do Ease of Access and Use have an indirect effect on Financial Inclusion in Indonesia through Access to Financial Services, 10) Do Fintech Education Programs have a direct effect on Access to Financial Services, 11) Do Fintech Education Programs have a direct effect on Financial Inclusion in Indonesia, 12) Do Fintech Education Programs have an indirect effect on Financial Inclusion in Indonesia through Access to Financial Services, 13) Does Access to Financial Services have a direct effect on Financial Inclusion in Indonesia.

Literature Review and Hypothesis Development

The literature review is an important part of research because it functions as a theoretical foundation, within a scientific context, and as a guide for the direction of the study. The following are the reasons why the literature review is very important: the literature review shows that the researcher has understood the latest developments, theories, concepts, and findings related to the topic being studied.

Financial Inclusion in Indonesia

Financial inclusion is the ability of an individual to obtain access to various financial products and services that are affordable and suitable to their needs. Financial inclusion is able to bring about changes in the mindset of economic actors in viewing money and profit. Then [2] explains that financial inclusion in Indonesia still faces various challenges, although access to financial services has increased. They note that many individuals, especially from low-income communities and micro, small, and medium enterprises (MSMEs), still find it difficult to obtain access to formal financial products [14], [15]. This is caused by factors such as a lack of understanding of financial products and distrust of financial institutions [16], [17]. Based on the above explanation, the hypothesis proposed in this study is as follows.

H1: The type of fintech technology has a direct, positive, and significant effect on Access to Financial Services

H2: The type of fintech technology has a direct, positive, and significant effect on Financial Inclusion in Indonesia

H3: The type of fintech technology has an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services.

Access to Financial Services

Access to Financial Services as defined by [16] is the ability of individuals and small businesses to obtain the financial services they need, such as savings, loans, insurance, and payment instruments. They emphasize that this access is not only about the availability of products, but also about the ability and understanding of the community in utilizing these services [14], [15]. This is very crucial for improving financial inclusion and reducing economic inequality.

Furthermore, the World Bank in the Global Financial Inclusion Database report notes that access to financial services has a positive impact on economic growth and poverty alleviation [17]. Furthermore, they find that individuals who have access to bank accounts tend to have better opportunities to invest and develop businesses. This report highlights that access to Financial Services can help communities manage risk and plan for the future, thereby increasing overall societal welfare [16]. Based on the above explanation, the hypotheses proposed in this study are as follows.

H4: Financial literacy education has a direct, positive, and significant effect on Access to Financial Services?

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H5: Financial literacy education has a direct, positive, and significant effect on Financial Inclusion in Indonesia?

H6: Financial literacy education has an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services.

Financial Literacy Education

Financial literacy education [4] is a learning process that prepares individuals to face social life, with an emphasis on experience. Furthermore [18] explains that financial literacy is an individual's ability to understand and use various financial information. This ability also includes money management, investment, and retirement planning. Then [19] emphasizes that financial literacy is very important in making good financial decisions. Financial literacy education refers to the ability of individuals to understand and use various financial concepts and information in daily life [13]. In accordance with the explanation described above, the hypotheses proposed in this study are as follows.

H7: Ease of access and use has a direct, positive, and significant effect on Access to Financial Services?

H8: Ease of access and use has a direct, positive, and significant effect on Financial Inclusion in Indonesia?

H9: Ease of access and use has an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services?

Ease of Access and Use

Ease of access in the use of technology [20] is the ease of access for individuals to easily reach and use information technology resources. This information further emphasizes that ease of access does not only depend on infrastructure, but also on user skills [21]. Meanwhile, it is stated that ease of access includes the ability of individuals to use technology and information in an effective way. This may involve factors such as infrastructure, skills, and social support. Meanwhile [22] states that the use of access refers to the extent to which individuals utilize technology to achieve certain goals [23]. Then [24] emphasizes that factors such as ease of use and user motivation greatly influence the level of technology use. Based on the explanation above, the hypotheses proposed in this study are as follows.

H10: Fintech education programs have a direct, positive, and significant effect on Access to Financial Services?

H11: Fintech education programs have a direct, positive, and significant effect on Financial Inclusion in Indonesia?

H12: Fintech education programs have an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services?

Fintech Education Program

Fintech education programs aim to increase public understanding of financial technology and how to utilize it effectively. Then [25] explains that a good education program must include basic knowledge about financial products. This includes risk management and technology use policies, which explain that education programs aim to improve human welfare [26]. Meanwhile, it is emphasized that a deep understanding of these aspects can help individuals make smarter financial decisions in utilizing fintech services optimally. Then [27] states that fintech education must also prioritize the aspect of digital literacy. Based on this explanation, the hypothesis proposed in this study is as follows.

H13: Access to Financial Services has a direct effect on Financial Inclusion in Indonesia?
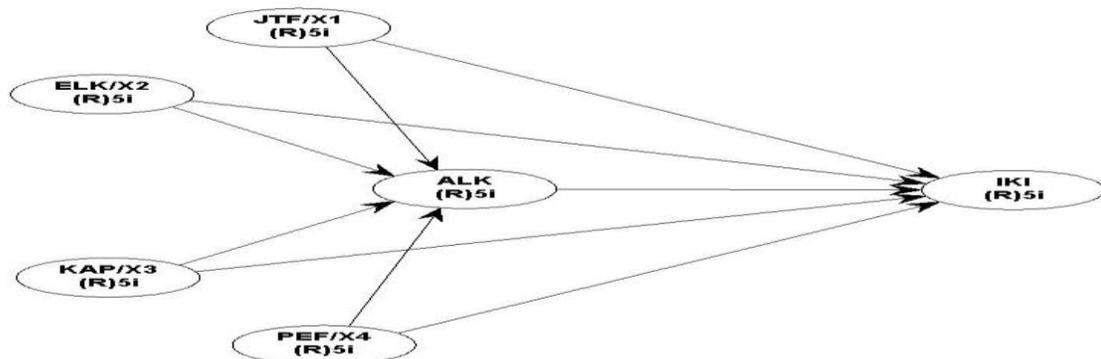

Figure 1. Initial conceptual model of the study

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2. RESEARCH METHOD

This study uses a quantitative approach with the Partial Least Squares (PLS) model. Then [28], [29] explain that a population is a collection of units whose characteristics are studied, and when the population is too large, the researcher must take a sample (part of the population) to be studied. The population in this study is all Indonesian people who use fintech services [30], [31].

The following are the advantages and disadvantages of Partial Least Squares–Structural Equation Modeling (PLS-SEM) briefly:1) The advantages of PLS-SEM: 1) Suitable for small samples, it can be used even though the number of respondents is not large (more flexible than CB-SEM). 2) Does not require normally distributed data. 3) Able to handle complex models, can estimate many indicators and latent variables at the same time. 4) Focuses on prediction. 5) Very good for research that aims to predict relationships between variables. 6) Can be used for various types of data, including ordinal data, Likert scales, or non-ideal distributions. 2. The disadvantages are: 1) Less suitable for testing established theories, CB-SEM is more appropriate if the main objective is confirmatory theory testing. 2) Does not provide a comprehensive overall model fit measure, and is different from CB-SEM which has fit indices such as CFI, RMSEA, and others. 3) Estimates can be biased for large sample sizes, and in very large samples, PLS results can be less accurate than CB-SEM. 4) Vulnerable to model misspecification errors, because its focus is predictive, theoretical interpretation must be carried out carefully.

A sample is the elements of the population that have been selected and chosen that can reflect all the characteristics of the existing population [32], [33]. The sample selection used in this study uses the Lemeshow formula. Furthermore [34] states that sample calculation using the Lemeshow formula approach can be used to calculate the number of samples when the total population cannot be known with certainty.

3. RESULTS AND ANALYSIS

The results of this study were obtained from the distribution of questionnaires. The questionnaires were distributed using Google Forms to respondents as many as those who filled them in and came from the direct return of the questionnaires. The study distributed questionnaires to people domiciled in the city of Samarinda who became the sample in the research.

Outer Model Test

The output results The output results of data processing produce reflective data that can be seen in Table 3.1 below.

Table 1. Outer Model Test

Variable	Indicator	Loading Factor	Cronbach Alpha	Composite Reability	AVE
Type of Fintech Technology (JTF/X1)	JTF/X1		0.887	0.918	0.691
	JTF/X11	0.839			
	JTF/X12	0.886			
	JTF/X13	0.850			
	JTF/X14	0.860			
	JTF/X15	0.713			
Financial Literacy Education (ELK/X2)	ELK/X2		0.908	0.933	0.735
	ELK/X21	0.727			
	ELK/X22	0.867			
	ELK/X23	0.909			
	ELK/X24	0.886			
	ELK/X25	0.887			
Ease of Access and Use (KAP/X3)	KAP/X3		0.894	0.922	0.702
	KAP/X31	0.838			
		0.833			

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Variable	Indicator	Loading Factor	Cronbach Alpha	Composite Reability	AVE
	KAP/X3 2	0.857			
	KAP/X3 3	0.850			
	KAP/X3 4	0.810			
	KAP/X3 5				
	PEF/X4				0.730
	PEF/X41		0.907	0.931	
Fintech Education Program (PEF/X4)	PEF/X42	0.792			
	PEF/X43	0.852			
	PEF/X44	0.888			
	PEF/X45	0.904			
		0.832			
	AKK/Y1				0.718
	AKK/Y1 1		0.901	0.927	
	AKK/Y1 2	0.832			
Access to Financial Services (AKK/Y1)	AKK/Y1 2	0.845			
	AKK/Y1 3	0.876			
	AKK/Y1 4	0.874			
		0.807			
	IKI/Y2				0.765
	AKI/Y21		0.923	0.942	
	AKI/Y22	0.840			
Financial Inclusion in Indonesia (IKI/Y2)	AKI/Y23	0.889			
	AKI/Y24	0.908			
	AKI/Y25	0.881			
		0.855			

Source: Output of the Wrap-PLS application

Based on these results, the composite reliability values of each variable are, Type of Fintech Technology = 0.918, Financial Education and Literacy = 0.933, Ease of Access and Use = 0.922, Fintech Education Program = 0.931, Access to Financial Services = 0.927, Financial Inclusion in Indonesia = 0.942. Thus, these values already meet the requirements because > 0.6 [29]. Furthermore, at the level of convergent validity based on the Average Variance Extracted (AVE) value where > 0.5 [30]. The AVE values for each variable are Type of Fintech Technology = 0.691, Financial Education and Literacy = 0.735, Ease of Access and Use = 0.702, Fintech Education Program = 0.730, Access to Financial Services = 0.718, Financial Inclusion in Indonesia = 0.765. Based on the results and criteria that have been determined, the results already meet the requirements and can be accepted. In the testing of validity and reliability, it refers to the loading factor value with the calculation results being > 0.5. The rule of thumb used is that if the loading factor value is greater than or equal to 0.6 it is considered sufficient as the criterion for fulfilling the criteria [29]. Reliability testing of all items or questions in this research will use the Cronbach Alpha coefficient formula

The Cronbach Alpha value in this research will use the value 0.6 with the assumption that the questionnaire instrument is declared reliable if the Cronbach Alpha value ≥ 0.6. The composite reliability value ≥ 0.6 and the AVE value > 0.5 [31]. The table above shows that all variable indicators have met the criteria and can be said to be valid and reliable.

Inner Model

Evaluation of the inner model includes the model fit test, path coefficient, and R. The model fit test is used to measure the suitability of a model with the research data. The following are the results of the model fit test and the measurement criteria shown in Table 3.2.

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Table 2. Inner Model Test

Description	Result	P-values	Criteria	Status
APC	0.195	<0.001	P < 0,05	Fit
ARS	0.447	<0.001	P < 0,05	Fit
AARS	0.444	<0.001	P < 0,05	Fit
AVIF	1.413	-	*Acceptable if <= 5, Ideally <= 3.3*	Fit
AFVIF	1.635	-	*Acceptable if <= 5, Ideally <= 3.3*	Fit
GoF	0.569	-	*Small >= 0.1, Medium >= 0.25, Large >= 0.36*	Fit
SPR	1.000	-	*Acceptable if >= 0.7, Ideally = 1*	Fit
RSCR	1.000	-	*Acceptable if >= 0.9, Ideally = 1*	Fit
SSR	1.000	-	*Acceptable if >= 0.7*	Fit
NLBCDR	1.000	-	*Acceptable if >= 0.7*	Fit

Source: Output of the Wrap-PLS application on model fit and quality indices.

Based on the table, APC, ARS and AARS are 0.195, 0.447 and 0.444. The values of these three indices are shown with fit results, because the requirement for acceptance of the three indices is more >= 0.05 of the (p-values). Furthermore, AVIF and AFVIF obtain fit results of 1.413 and 1.635 because their values are <= 5. GoF in the model has a value of 0.569 so that it is included in the large category, meaning that the explanatory ability of the research model is very likely to be accepted. Then the SPR value is 1.000 and is accepted because it is >= 0.7, RSCR of 1.000 is stated ideally. Furthermore, the SSR value of 1.000 is declared fit because it is >= 0.7, this indicates that 100% of the paths in the model are free from statistical weighting. The NLBCDR value is 1.000, meaning fit because it is >= 0.7. From all the model fit test results, it shows that this research model is accepted by ten indices.

Modeling Analysis and Hypothesis Testing

The results of this examination reveal the direction of the relationship between the independent variables and the dependent variables using path analysis. The research results can be rejected or accepted based on the significance value. The significance value in this research is 5%. Hypothesis testing in this study can be seen in Figure 2.
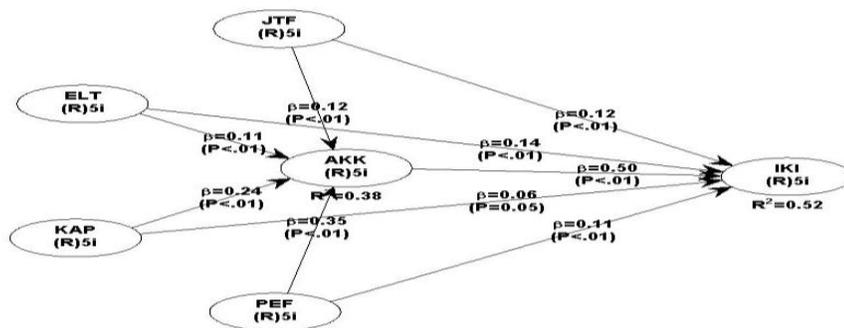

Figure 2. Final conceptual model of the study

Table 3. Hypothesis Test

Hypothesis	Path Coeff.	p-value	Description
H1.JTF has a direct effect →AKK.	0.112	<0.001	Accepted
H2. JTF has a direct effect →IKI.	0.123	<0.001	Accepted
H3. JTF has an indirect effect →IKI→AKK.	0.059	0.013	Accepted
H4. ELK has a direct effect → AKK.	0.109	0.002	Accepted
H5. ELK has a direct effect →IKI	0.138	<0.001	Accepted
H6. ELK has an indirect effect →IKI→AKK.	0.059	0.021	Accepted
H7. KAP has a direct effect →AKK	0.245	<0.001	Accepted
H8. KAP has a direct effect →IKI.	0.063	0.047	Accepted
H9. KAP has an indirect effect →IKI→AKK.	0.122	<0.001	Accepted
H10. PEF has a direct effect →ALK	0.354	<0.001	Accepted
H11. PEF has a direct effect →IKI.	0.106	0.002	Accepted
H12. PEF has an indirect effect →IKI→AKK.	0.176	<0.001	Accepted
H13. AKK has a direct effect →IKI	0.498	<0.001	Accepted

Source: Output of the Wrap-PLS application

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Based on Table 3.3, the results of the path test from WarpPLS are obtained. The test results are in the form of path coefficients and significance values; if the path coefficient is positive, then the effect is positive and significant, and if the path coefficient is negative, then the effect is negative. The p-value is used to measure how significant the effect of the independent variable on the dependent variable.

Hypothesis 1 (H1) (β = 0.119, p-value = <0.001) states that the Type of Fintech Technology has a direct, positive, and significant effect on Access to Financial Services. Hypothesis 2 (H2) (β = 0.123, p-value = <0.001). Fintech has a positive and significant effect on Access to Financial Services [4] Hypothesis 3 (H3) (β = 0.059, p-value = 0.013) states that the Type of Fintech Technology has an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services. This statement is in accordance with the results of research conducted by [4], [5] which state that the Type of Fintech Technology and financial inclusion in Indonesia have a direct, positive, and significant effect on Access to Financial Services.

Hypothesis 4 (H4) (β = 0.109, p-value = 0.002). Hypothesis 5 (H5) (β = 0.138, p-value = <0.001) states that financial literacy education has a positive and significant effect on access to services and financial inclusion in Indonesia, and the research results are in accordance with the results of studies [5], [7] which state that financial literacy education has a positive and significant effect on access to services and financial inclusion in Indonesia. Hypothesis 6 (H6) (β = 0.059, p-value = 0.021) means that Financial Literacy Education does not have a direct, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services. The results of this study are supported by the results of research [8], [9] which state that Financial Literacy Education does not have a direct, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services.

Hypothesis 7 (H7) (β = 0.245, p-value = <0.001), and Hypothesis 8 (H8) (β = 0.063, p-value = 0.047) state that Ease of Access and Use has a direct, positive, and significant effect on Financial Inclusion in Indonesia. The results of this study are consistent with the results of studies [10], [11] which state that Ease of Access and Use has a direct, positive, and significant effect on Financial Inclusion in Indonesia. Hypothesis 9 (H9) (β = 0.122, p-value = <0.001) states that Ease of Access and Use has an indirect effect on Financial Inclusion in Indonesia through Access to Financial Services [12].

Hypothesis 10 (H10) (β = 0.354, p-value = <0.001) and Hypothesis 11 (H11) (β = 0.106, p-value = <0.002) state that the Fintech Education Program has a direct, positive, and significant effect on Access to Financial Services and financial inclusion in Indonesia [16], [17]. Hypothesis 12 (H12) (β = 0.176, p-value = <0.002) shows that the Fintech Education Program has an indirect, positive, and significant effect on Financial Inclusion in Indonesia through Access to Financial Services [14], [15].

Hypothesis 13 (H13) (β = 0.498, p-value = <0.001) states that Access to Financial Services has a direct effect on Financial Inclusion in Indonesia, which means that Access to Financial Services has a direct effect on Financial Inclusion in Indonesia. The results of this study are in accordance with the results of research [16], [18] which state that Access to Financial Services has a direct effect on Financial Inclusion in Indonesia.

4. CONCLUSION

The level of the economy affects financial inclusion in Indonesia because good economic conditions encourage an increase in income and purchasing power of the community, which in turn expands their access to financial services. When the economy grows, more individuals and small businesses can open bank accounts, access credit, or participate in other financial products. Conversely, in difficult economic situations, people with low or irregular income tend to be marginalized from the formal financial system due to limited access and lack of understanding of financial products. Therefore, stable and evenly distributed economic growth is very important to strengthen financial inclusion in Indonesia.

The type of Wintech technology has a direct, positive, and significant effect on financial inclusion in Indonesia because of the limitations in access and understanding of the community toward the technology. Although fintech can offer easier and faster solutions, many individuals, especially in remote areas, still face obstacles in accessing the internet or digital devices.

The type of Wintech technology has an indirect, positive, and significant effect on financial inclusion in Indonesia because of the limitations in access and understanding of the community toward the technology. Although fintech can offer easier and faster solutions, many individuals, especially in remote areas, still face obstacles in accessing the internet or digital devices.

Financial education and literacy have a direct effect on Access to Financial Services because a good understanding of financial products and services enables individuals to make appropriate decisions. Communities that are educated about the benefits and risks of financial services, such as savings, loans, or investments, are more likely to use these services.

Financial education and literacy have an indirect, positive, and significant effect on financial inclusion in Indonesia through Access to Financial Services because other factors such as infrastructure, accessibility, and economic conditions are

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more dominant. Although understanding of finance is important, without adequate access support, such as the presence of nearby financial institutions, stable internet networks, or sufficient digital devices, individuals may still find it difficult to access financial services.

Ease of access and use has a direct, positive, and significant effect on Access to Financial Services, including financial inclusion in Indonesia, because the easier financial services are to access, the greater the possibility that the community will use them. Easy access, whether through nearby physical branches, mobile applications, or other digital platforms, enables individuals to access financial products without difficulty. In addition, ease of use, such as a simple interface and fast processes, encourages more people to utilize these services.

Ease of access and use has an indirect, positive effect on financial inclusion in Indonesia through Access to Financial Services because even though financial services are easy to access and use, other factors such as

Fintech education programs have a direct, positive, and significant effect on Access to Financial Services and financial inclusion in Indonesia, because these programs help increase public understanding of how to use financial technology safely and effectively. With proper education, individuals become more aware of the various fintech services available, such as digital payments, online loans, and investments. In addition, fintech education programs can reduce fear or confusion related to the use of financial technology, opening greater access for those who were previously hesitant to engage.

Fintech education programs have an indirect, positive, and significant effect on financial inclusion in Indonesia through Access to Financial Services because although education increases public understanding and awareness of fintech, other factors such as infrastructure, internet access, and economic conditions remain major obstacles. Communities that have received education may understand how to use digital financial services, but without adequate access to technology (such as digital devices or a stable internet network), they still find it difficult to access these services.

Access to Financial Services has a direct, positive, and significant effect on Access to Financial Services and financial inclusion in Indonesia, because without adequate access and proper financial access, communities cannot utilize the available financial products and services. When individuals or businesses have easy access to Financial Services such as bank accounts, loans, insurance, or investments, they can better manage their finances, reduce risks, and improve their economic well-being.

Access to Financial Services has an indirect, positive, and significant effect on financial inclusion in Indonesia through the type of financial fintech, because without the type of financial fintech, communities cannot utilize the available financial products and services.

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