

The Role of Financial Literacy in Reducing Credit Risk Due to Digital Financial Inclusion A Study on Generation Z

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Abstract. *This study aims to analyze the influence of digital financial inclusion and financial literacy on credit risk and examine the role of financial literacy in moderating the relationship between digital financial inclusion and credit risk in Generation Z. The study used an explanatory quantitative approach with primary data collected through a Likert-scale questionnaire. The sample consisted of 212 Generation Z respondents aged 18–25 years selected through purposive sampling. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4. Significance testing was conducted through bootstrapping 10,000 subsamples at a 5 percent significance level. The evaluation results showed that the measurement model met the reliability and validity criteria, while the structural model explained 49.9 percent of the variation in the credit risk construct ($R^2 = 0.499$). In this study, the credit risk construct was reverse-coded so that a higher score indicates a lower actual credit risk. Digital financial inclusion has a positive and significant effect on the reverse credit risk score ($\beta = 0.397$; $p < 0.001$), which substantively indicates a negative relationship with actual credit risk. Financial literacy also has a positive and significant effect on the reverse score ($\beta = 0.470$; $p < 0.001$), thus negatively related to actual credit risk. The interaction effect of financial literacy and digital financial inclusion is negative and significant ($\beta = -0.304$; $p < 0.001$). The conditional effect of digital financial inclusion on the reverse score decreases from 0.701 at low literacy levels to 0.397 at the average level and 0.093 at high levels; the effect at high levels is not significant ($p = 0.070$). Thus, financial literacy is shown to moderate the relationship by weakening the positive effect of digital financial inclusion on the reverse credit risk score. This finding confirms that the direction of the results should be interpreted consistently with the coding of the credit risk construct.*

Keywords: Credit Risk; Digital Financial Inclusion; Financial Literacy; Generation Z; PLS-SEM.

1. Introduction

The post-pandemic era has given rise to a new way of life. The Covid-19 pandemic, which first entered Indonesia in 2020, caused turmoil, particularly in the economic sector, and changed lifestyles. These changes in human lifestyles at that time impacted the efficiency of individual interactions, one of which was the use of digital technology, which continues to be developed because it is believed to provide efficiency in life. Digital technology has contributed significantly to changes in the global banking industry. This transformation has provided a new perspective on access to banking or financial services and the way banks serve customers; this transformation is known as Digital Financial Inclusion (DFI).

Digital Financial Inclusion (DFI) is defined as the ease with which every individual can access financial information or services that aim to provide equality of access to economic activities.(Hua et al., 2023). Easy access to services and products is essential for all levels of society, aiming to improve the economy in the region. Indonesia's financial inclusion index in 2024 was 75.02%, meaning that out of 100 people aged 15-79, 75 were financially inclusive.(OJK, 2024). The national target of increasing financial inclusion in Indonesia is 90%, but there is a gap in the survey results, which remains a hope and goal for Indonesia.

Financial inclusion is realized through good financial literacy. Access to financial knowledge will encourage people to access all nearby economic services. Financial inclusion index survey results show that residents in urban areas have a higher financial inclusion index. Access to economic or financial services in rural areas is not as good as in urban areas. Financial services, especially digital ones, currently do not require people or customers to come to the office to receive services. Instead, financial institutions, especially banks, are currently focused on providing digital financial services as well and effectively as possible. According to a press release from the Financial Services Authority (OJK), the total achievement of financial access in 2024 currently reaches 9,509,528 accesses to service products.(Bulan et al., 2024). Access to banking finance is currently transforming towards digitalization, banking services can now be easily accessed through online banking platforms, applications via mobile phones, this can facilitate and simplify financial decision-making.(Martínez de Ibarreta et al., 2025).

Financial inclusion provides easier service for customers. Digital transformation also drives cost reductions, market competitiveness, and convenience for individual banking institutions. Access to formal financial services is also easier and faster. Individuals and communities now no longer need to "visit" banks, but can access them through mobile phones, significantly strengthening economic stability and financial access.(Fernandez, nd)Germany is ensuring equitable distribution of financial services and reducing dependency through digital transformation. Several other countries emphasizing digital banking transformation, particularly in rural areas, still face limitations or challenges with infrastructure, digital literacy, and trust in the use of digital services.(Arellano & Ramón, 2017).

2. Research Methods

This research will employ a quantitative explanatory approach, utilizing secondary data. This study aims to explain the causal relationship between digital financial inclusion, financial behavior, financial literacy, and credit risk in Generation Z. This approach is used to explain the causal relationship between research variables and test the influence of moderating variables (Sekaran & Bougie, 2016).

3. Results and Discussion

3.1. Respondent Characteristics

Respondent characteristics reflect the sample profile used in the study. The research criteria focused on Generation Z who have used digital financial services and made digital credit transactions in the form of paylater or online loans. Based on a recapitulation of the initial data collection, 22-year-olds constituted the largest group at 24 percent, followed by 21-year-olds at 18 percent and 24-year-olds at 14 percent. The overall percentage of other age groups was 44 percent.

Summary of Respondent Characteristics

Characteristics	Category	Frequency	Percentage (%)
Gender	Man	98	46.23
Gender	Woman	114	53.77

Status	Student	107	50.47
Status	Work	96	45.28
Status	Businessman	9	4.25
Income/pocket money	< Rp. 1,000,000	16	7.55
Income/pocket money	Rp1,000,000–Rp3,000,000	6	2.83
Income/pocket money	Rp3,000,000–Rp5,000,000	123	58.02
Income/pocket money	> Rp. 5,000,000	67	31.60
Use of digital credit	Have you ever used paylater/online loans?	209	98.58
Use of digital credit	Never used paylater/online loans	3	1.42

Source: Research data recapitulation, 2026.

The composition of respondents showed a slight preponderance of women compared to men. Based on status, the majority of respondents were students and employed individuals. The largest group was those with an income or pocket money of Rp3,000,000 to Rp5,000,000. Almost all responses also came from individuals who had used PayLater or online loans, thus aligning the sample with the research focus on credit risk among users of digital financial services.

a. Research Data Description

Data description was performed using the average score for each construct. Construct scores were obtained from the average of each respondent's indicators. A summary of descriptive statistics is presented in Table.

Descriptive Statistics of Research Constructs

Construct	Average	Standard deviation	Minimum	Maximum
Digital Financial Inclusion	3,449	0.654	2,000	4,667
Financial Literacy	3,468	0.629	2,167	4,833
Credit Risk	4,768	0.347	3,800	5,000

Source: Processed research data, 2026.

The average digital financial inclusion score was 3.449, and the average financial literacy score was 3.468. Credit risk had an average of 4.768 with a standard deviation of 0.347. These values indicate that responses to the credit risk indicator were concentrated at high scores and exhibited relatively lower variation compared to the other two constructs. This condition requires careful interpretation because the study results primarily represent respondents who have been exposed to digital credit and exhibit a high level of credit risk.

b. Evaluation of Measurement Model

The measurement model evaluation was conducted to ensure that the indicators used were capable of measuring the constructs reliably and validly. All primary constructs were treated as reflective constructs. The interaction construct of financial literacy and digital financial inclusion was formed by SmartPLS through a two-stage approach and was not evaluated as a separate reflective construct.

c. Indicator Reliability and Outer Loading

Indicator reliability is evaluated using the outer loading value. An indicator is considered reliable if it has an outer loading of at least 0.70. The test results are presented in Table 4.3.

Outer Loading Test Results

Construct	Indicator	Outer loading	Criteria	Conclusion

Digital Financial Inclusion	X1	0.779	> 0.70	Fulfil
Digital Financial Inclusion	X2	0.769	> 0.70	Fulfil
Digital Financial Inclusion	X3	0.839	> 0.70	Fulfil
Digital Financial Inclusion	X4	0.741	> 0.70	Fulfil
Digital Financial Inclusion	X5	0.769	> 0.70	Fulfil
Digital Financial Inclusion	X6	0.740	> 0.70	Fulfil
Financial Literacy	Z1	0.754	> 0.70	Fulfil
Financial Literacy	Z2	0.791	> 0.70	Fulfil
Financial Literacy	Z3	0.782	> 0.70	Fulfil
Financial Literacy	Z4	0.752	> 0.70	Fulfil
Financial Literacy	Z5	0.819	> 0.70	Fulfil
Financial Literacy	Z6	0.759	> 0.70	Fulfil
Credit Risk	Y1	0.832	> 0.70	Fulfil
Credit Risk	Y2	0.816	> 0.70	Fulfil

Credit Risk	Y3	0.765	> 0.70	Fulfil
Credit Risk	Y4	0.771	> 0.70	Fulfil
Credit Risk	Y5	0.826	> 0.70	Fulfil

Source: SmartPLS 4 data processing results, 2026.

All indicators had outer loadings above 0.70. The lowest value was 0.740 for indicator X6, while the highest was 0.839 for indicator X3. Thus, all indicators met the indicator reliability criteria, and no indicators needed to be eliminated based on the outer loading criteria.

3.2. Construct Reliability and Convergent Validity

Internal consistency reliability was evaluated using Cronbach's alpha, composite reliability rho_A, and composite reliability rho_C. A construct is considered reliable if the value of all three measures is greater than 0.70. Convergent validity was evaluated using Average Variance Extracted (AVE) with a minimum limit of 0.50.

Construct Reliability and Convergent Validity

Construct	Cronbach's alpha	rho_A	rho_C	AVE	Conclusion
Digital Financial Inclusion	0.865	0.867	0.899	0.598	Fulfil
Financial Literacy	0.869	0.875	0.901	0.603	Fulfil
Credit Risk	0.862	0.865	0.900	0.644	Fulfil

Source: SmartPLS 4 data processing results, 2026.

Cronbach's alpha values ranged from 0.862 to 0.869, rho_A values ranged from 0.865 to 0.875, and rho_C values ranged from 0.899 to 0.901. All values exceeded 0.70 and did not indicate high reliability. AVE values ranged from 0.598 to 0.644 and all exceeded 0.50. Thus, all three constructs met internal consistency reliability and convergent validity.

a. Discriminant Validity

Discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT). An HTMT value below 0.90 indicates that each construct has adequate empirical differentiation.

HTMT Test Results

Construct Pair	HTMT	Criteria	Conclusion
Digital Financial Inclusion – Credit Risk	0.487	< 0.90	Fulfil
Financial Literacy – Credit Risk	0.573	< 0.90	Fulfil
Financial Literacy – Digital Financial Inclusion	0.126	< 0.90	Fulfil

Source: SmartPLS 4 data processing results, 2026.

The highest HTMT value was 0.573 for the financial literacy and credit risk pair, while the lowest was 0.126 for the financial literacy and digital financial inclusion pair. All values were below 0.90. Therefore, discriminant validity was declared met.

Based on the outer loading, internal consistency reliability, AVE, and HTMT tests, the measurement model was declared to meet the reliability and validity requirements. The analysis then continued with the evaluation of the structural model.

b. Structural Model Evaluation

Collinearity Testing

Collinearity in the structural model is evaluated using the inner Variance Inflation Factor (VIF). A VIF value below 3.00 indicates no substantive collinearity issues among the credit risk predictors.

Inner VIF Test Results

Structural Relationships	Inner VIF	Criteria	Conclusion

Digital Financial Inclusion → Credit Risk	1,004	< 3.00	No problem
Financial Literacy → Credit Risk	1,005	< 3.00	No problem
Financial Literacy Interaction × Digital Financial Inclusion → Credit Risk	1,001	< 3.00	No problem

Source: SmartPLS 4 data processing results, 2026.

The inner VIF values ranged between 1.001 and 1.005. All values were well below 3.00, so the path coefficients could be interpreted without any indication of collinearity between predictors.

Coefficient of Determination

The coefficient of determination is used to assess the proportion of credit risk variation that can be jointly explained by digital financial inclusion, financial literacy, and the interaction between the two.

R² and Adjusted R² Test Results

Endogenous Construct	R ²	Adjusted R ²
Credit Risk	0.499	0.492

Source: SmartPLS 4 data processing results, 2026.

The R² value for credit risk was 0.499, and the adjusted R² was 0.492. This means that digital financial inclusion, financial literacy, and their interaction together explained 49.9 percent of the variation in credit risk. The remaining 50.1 percent of the variation was attributed to factors not included in the research model.

c. Effect Size f²

The f² effect size indicates the change in the model's explanatory power when a predictor is removed. Values of 0.02, 0.15, and 0.35 are used as benchmarks for small, medium, and large effects, respectively.

Effect Size f^2 Test Results

Structural Relationships	f^2	Effect Category
Digital Financial Inclusion → Credit Risk	0.313	Currently
Financial Literacy → Credit Risk	0.439	Big
Financial Literacy Interaction × Digital Financial Inclusion → Credit Risk	0.177	Currently

Source: SmartPLS 4 data processing results, 2026.

Digital financial inclusion has a moderate effect on credit risk with an f^2 of 0.313. Financial literacy has a large effect with an f^2 of 0.439. The interaction construct has an f^2 of 0.177, making it a moderate effect. Thus, the moderating effect is not only statistically significant but also makes a substantial contribution to the model's explanatory power.

3.3. Hypothesis Testing

Hypothesis testing was conducted using bootstrapping on 10,000 subsamples. A relationship is considered significant at the 5 percent level if the p-value is less than 0.05 and the 95 percent confidence interval does not include zero. SmartPLS-displayed p-values close to zero are reported as $p < 0.001$.

Bootstrapping Results and Hypothesis Testing

Hypothesis	Connection	β	t-statistic	p-value	95% CI	Direction	Decision
H1	Digital Financial Inclusion → Credit Risk	0.397	9,038	< 0.001	0.309 to 0.482	Positive	Accepted
H2	Financial Literacy → Credit Risk	0.470	11,086	< 0.001	0.389 to 0.554	Positive	Accepted

H3	Financial Literacy × Digital Financial Inclusion → Credit Risk	-0.304	6,163	< 0.001	-0.400 to -0.208	Negative	Accepted
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Source: SmartPLS 4 data processing results, 2026.

a. The Impact of Digital Financial Inclusion on Credit Risk

The path coefficient of digital financial inclusion on credit risk is 0.397 with a t-statistic of 9.038 and $p < 0.001$. The 95 percent confidence interval is between 0.309 and 0.482 and does not include zero. Thus, digital financial inclusion has a positive and significant effect on credit risk. H1 is accepted. The positive direction indicates that increased access to and use of digital financial services in the study sample is associated with increased credit risk.

b. The Influence of Financial Literacy on Credit Risk

The path coefficient of financial literacy on credit risk is 0.470 with a t-statistic of 11.086 and $p < 0.001$. The 95 percent confidence interval is between 0.389 and 0.554 and does not include zero. Thus, financial literacy has a positive and significant effect on credit risk, thus statistically accepting H2. However, the positive direction does not support the hypothesis that financial literacy always directly reduces credit risk. In the moderation model, this coefficient represents the effect of financial literacy on credit risk when digital financial inclusion is at its average value.

c. The Moderating Role of Financial Literacy

The interaction coefficient between financial literacy and digital financial inclusion on credit risk is -0.304 with a t-statistic of 6.163 and $p < 0.001$. The 95 percent confidence interval is between -0.400 and -0.208 and does not include zero. These results indicate that financial literacy moderates the relationship between digital financial inclusion and credit risk in a negative direction. Thus, H3 is accepted. The negative direction means that the higher the financial literacy, the weaker the positive effect of digital financial inclusion on credit risk.

Conditional Direct Effects on Financial Literacy Level

Financial Literacy Level	Coefficient X → Y	t-statistic	p-value	95% CI	Conclusion
Low (-1 SD)	0.701	9,000	< 0.001	0.544 to 0.852	Significant

Average	0.397	9,038	< 0.001	0.309 to 0.482	Significant
Height (+1 SD)	0.093	1,809	0.070	-0.007 to 0.193	Not significant

Source: SmartPLS 4 data processing results, 2026.

4. Conclusion

The main problem of this research is how the role of financial literacy in the relationship between digital financial inclusion and credit risk in Generation Z. The results of the model evaluation indicate that all constructs meet the requirements of reliability and validity. The structural model produces an R^2 value of 0.499 and an adjusted R^2 of 0.492. Thus, digital financial inclusion, financial literacy, and their interaction are able to explain 49.9 percent of the variation in the credit risk construct, while the remaining 50.1 percent is related to other factors not included in the research model. Interpretation of the results requires considering that credit risk indicators are reverse-coded. Higher construct scores indicate lower actual credit risk. Therefore, the positive coefficients of digital financial inclusion and financial literacy on the credit risk construct indicate an inverse relationship with actual credit risk. In the study sample, increased digital financial inclusion and increased financial literacy are associated with a decrease in actual credit risk. Because the study used a cross-sectional design, these relationships should be understood as statistical associations among the respondents studied and not as absolute proof of cause and effect. Financial literacy was also shown to moderate the relationship between digital financial inclusion and credit risk, with a negative interaction coefficient. In reverse-coded credit risk scores, the effect of digital financial inclusion decreased from 0.701 at low financial literacy levels to 0.397 at average financial literacy levels and 0.093 at high financial literacy levels. The effect at high literacy levels was no longer significant at the 5 percent level. This pattern indicates that the higher the financial literacy, the smaller the marginal effect of digital financial inclusion on changes in credit risk. Substantively, these findings indicate a pattern of substitution or diminishing marginal benefits. Financial literacy has a direct protective relationship with credit risk. When financial literacy is high, changes in credit risk become less dependent on the level of digital financial inclusion, resulting in a smaller incremental contribution from digital financial inclusion. Thus, the role of financial literacy in reducing credit risk is primarily seen through its direct relationship with credit risk, while its moderating role is demonstrated by the weakening marginal effect of digital financial inclusion. Financial literacy not only enhances the influence of digital financial inclusion but also serves as a source of financial management skills that can stand alone in reducing credit risk for Generation Z.

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