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RESEARCH PAPER

Enhancing Financial Literacy through Fintech: A Study on Aceh's Millennials with Gender and Education as Moderators

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Abstract

Financial technology (fintech) has emerged as a transformative tool for promoting financial inclusion and enhancing financial literacy, particularly among the millennial generation. This study investigates the impact of fintech—specifically its dimensions of knowledge, usage, and accessibility—on the financial literacy of millennials in Aceh, Indonesia. Furthermore, the study examines whether gender and education level moderate these relationships. A quantitative approach was employed, utilizing both Structural Equation Modeling (SEM) and Moderated Multiple Regression (MMR) to ensure robust analysis. The sample consisted of 328 millennial respondents, selected through purposive sampling. The findings reveal that fintech knowledge, usage, and accessibility each have a significant and positive effect on financial literacy. Additionally, both gender and education were found to moderate these relationships; however, the moderation did not differ significantly between male and female groups or across educational levels. This indicates that while gender and education enhance the strength of the relationship between fintech and financial literacy, their moderating effects are consistent across groups. These results suggest the need for inclusive financial education strategies that cater to all demographic segments. Financial institutions and policymakers should focus on increasing access to fintech tools and strengthening financial literacy programs without bias toward gender or educational background. Future studies are encouraged to replicate this research in other regions and to explore additional moderating variables that may influence fintech adoption and financial capability among youth.

Keywords: Financial Technology, Financial Literacy, Millennials, Structural Equation Model (SEM), Moderated Multiple Regression.
JEL Classification: G1, G4, M2.

1. Introduction

The emergence of financial technology (fintech) has significantly transformed the landscape of financial services by offering digital alternatives to traditional banking (Broby, 2021). These innovations—ranging from mobile payments to

digital lending and investment platforms—have made financial services more accessible, efficient, and user-friendly. Among the primary adopters of fintech are Millennials, a generation characterized by high levels of digital literacy, familiarity with online platforms, and a strong preference for convenience and flexibility in financial transactions (Daqar et al., 2020). As digitalization accelerates, the ability to make informed financial decisions becomes increasingly essential for ensuring personal financial well-being (Lusardi and Mitchell, 2014).

Indonesia is one of the largest fintech markets in Southeast Asia, with rapid growth fueled by internet penetration, a young population, and increasing investor interest. According to the e-Conomy SEA 2022 report, the country's digital economy—including its fintech sector—is projected to reach a Gross Merchandise Value (GMV) of USD 307 billion by 2025. The number of fintech companies in Indonesia grew from 340 in 2019 to over 580 in 2021 and is expected to surpass 1,000 by 2025. Popular services include e-wallets such as GoPay, OVO, and DANA, as well as investment platforms like Bibit and Stockbit, which have become increasingly favored by retail investors. Meanwhile, digital lending continues to expand, with 102 fintech lending firms licensed by the Financial Services Authority (OJK) as of March 2023, collectively disbursing over IDR 65.4 trillion (USD 4.5 billion) in loans in the second quarter of 2021 alone.

While the fintech sector continues to flourish, financial literacy remains a persistent challenge—particularly among Millennials, who are simultaneously the most digitally active yet often underprepared to manage personal finances. Financial literacy refers to the ability to understand and effectively use various financial skills, including budgeting, saving, investing, and debt management. A lack of financial literacy can result in excessive debt, poor financial planning, and vulnerability to financial fraud. In Indonesia, surveys by the OJK indicate that only about 20% of Millennials demonstrate basic financial knowledge, with low levels of understanding in core areas such as interest rates, inflation, and credit scores. These gaps not only hinder financial inclusion but also limit the long-term economic empowerment of younger generations.

Financial literacy comprises four key dimensions: financial knowledge, attitudes, behavior, and the capacity to apply knowledge in decision-making. Education—both formal and informal—plays a central role in shaping these dimensions. Prior studies (e.g., Palameta, 2016; Darmawan and Pratiwi, 2020) consistently show that higher education levels are associated with better financial understanding and behavior. Informal learning, such as family financial discussions, also influences financial attitudes and practices. Additionally, gender

has emerged as a relevant factor in financial literacy, with studies indicating that men often report higher confidence in financial decision-making, while women may face additional barriers due to traditional roles and societal expectations (Ansong and Gyensare, 2012). Nevertheless, these general patterns can vary widely depending on context, emphasizing the need for intersectional and region-specific analysis.

Fintech holds significant potential to improve financial literacy by providing interactive and accessible tools for financial learning (Panos and Wilson, 2020). Mobile apps, gamified financial education, digital budgeting tools, and robo-advisors help users engage with financial content in real time and at their own pace. These technologies not only offer knowledge but also facilitate practical application, such as tracking spending, setting savings goals, and understanding investments. Social media platforms and online communities further support knowledge sharing and peer learning, especially among digitally native users like Millennials. Thus, fintech is increasingly positioned not just as a provider of financial services but also as a catalyst for financial capability and empowerment.

While national-level data highlight the promise of fintech, the impacts are unlikely to be uniform across Indonesia's diverse regions. Variations in digital infrastructure, education levels, and socio-cultural norms can influence how fintech is adopted and utilized. In this regard, Aceh presents a compelling case. Over the past few years, the region has experienced notable growth in digital connectivity, smartphone usage, and fintech initiatives introduced by local governments and financial institutions. Programs promoting mobile banking, QR-code payments, and online financial education are beginning to gain traction. However, the pace and pattern of adoption remain uneven, particularly among different gender groups and educational backgrounds. These disparities raise important questions about how digital financial tools are understood, accessed, and leveraged by local communities—especially by Acehnese Millennials, who are expected to become key actors in the region's socio-economic transformation.

Although fintech is widely believed to enhance financial literacy, empirical research focusing on specific local contexts—such as Aceh—remains limited. Existing studies tend to emphasize national trends or urban centers, overlooking peripheral regions where digital transitions may follow unique trajectories. This study seeks to fill that gap by examining the relationship between fintech usage and financial literacy among Millennials in Aceh, while also investigating how gender and education moderate this relationship. This research contributes both conceptually and empirically. Conceptually, it integrates technology adoption and

financial literacy within a localized socio-cultural framework. Empirically, it provides new evidence from a region that is underrepresented in the fintech literature, offering insights that can inform targeted interventions for enhancing financial inclusion and capability. By uncovering the ways fintech can support or fail to support financial literacy in Aceh, this study aims to generate practical recommendations for policymakers, educators, and fintech providers. Ultimately, the findings are expected to contribute to broader efforts in narrowing regional disparities in financial knowledge, promoting digital financial inclusion, and empowering young individuals to take greater control over their financial futures.

2. Literature Review

2.1 Financial Literacy

According to the Organization for Economic Co-operation and Development (OECD, 2016), financial literacy refers to an understanding and knowledge of financial concepts and risks, along with the skills, motivation, and beliefs necessary to apply that knowledge in making effective financial decisions. These abilities are essential for fostering positive financial behavior and improving the financial well-being of both individuals and communities, while also contributing to broader economic participation. In a similar vein, the National Strategy for Indonesian Financial Literacy defines financial literacy as a life skill that enables individuals to make informed decisions, manage their finances more effectively, and ultimately achieve personal and communal prosperity. Based on this framework, the Indonesian Financial Services Authority (OJK) categorizes financial literacy levels into four groups. The first is well-literate, referring to individuals or communities with strong knowledge and confidence in financial institutions and products, a thorough understanding of their features, benefits, and risks, and the ability to use them effectively while being aware of associated rights and obligations. The second category is sufficiently literate, which describes individuals who have a reasonable understanding and confidence in financial services and demonstrate basic comprehension of the characteristics and risks involved. Third, less literate individuals possess only limited knowledge and understanding of financial products and services; while they may be familiar with some basic concepts, they lack a comprehensive grasp of financial mechanisms. Lastly, those classified as not literate show minimal or no understanding of financial institutions or products, have low confidence in financial matters, and cannot manage or use financial tools appropriately.

Furthermore, an individual's level of financial literacy can vary significantly and is influenced by a range of demographic and socio-economic factors. Amaliyah and Witiastuti (2015) emphasized that gender and education level are among the key determinants of financial literacy. Supporting this view, the 2017 National Survey on Financial Literacy and Inclusion (SNLKI) conducted by OJK identified education, income level, and type of occupation as essential demographic variables for assessing a person's financial literacy level. These findings suggest that financial literacy is not merely an outcome of individual initiative but is also shaped by structural and contextual factors that warrant attention in both research and policy efforts.

2.2 Financial Technology

Financial technology, or fintech, encompasses a wide range of financial services—including payments, fundraising, lending, and asset management—that are enhanced through the use of technology to increase speed and efficiency. According to Chrismastianto (2017), fintech is essentially a combination of financial services and modern technology, or more broadly, it represents innovation in the financial sector driven by technological advancements. Similarly, the National Digital Research Center (NDRC, 2022) defines fintech as an innovative application of technology within the financial services industry. The term itself, derived from the fusion of "financial" and "technology," refers specifically to the use of modern technological tools in banking and finance. In today's digital era, fintech has become an increasingly dominant means of delivering financial services, transforming the way individuals interact with financial systems.

Fintech's influence on financial literacy can be observed through three interrelated dimensions: fintech knowledge, fintech usage, and fintech accessibility (Li et al., 2020). First, fintech knowledge involves an individual's understanding and awareness of financial technology and its various applications. A solid grasp of how fintech products and services function—and how they can be used to support personal financial management and decision-making—is a vital element of financial literacy. As individuals become more knowledgeable about fintech through educational content, training initiatives, or information from fintech providers, they are more likely to explore and adopt these technologies, thereby enhancing their financial competencies. Second, fintech use refers to the actual engagement with fintech platforms and services. Through regular interaction with fintech applications, individuals gain firsthand experience in managing digital

financial transactions. This exposure helps users become familiar with various fintech tools and their functionalities—such as budgeting, tracking expenses, making online payments, or monitoring investments—which, in turn, contributes to the development of financial skills and overall literacy. Lastly, fintech accessibility relates to the ease and availability of accessing fintech services. Broad accessibility ensures that individuals, regardless of geographic location, socioeconomic background, or physical limitations, can engage with fintech tools. This aspect is closely linked to financial inclusion, as accessible fintech platforms enable underserved or previously excluded populations to participate in the digital economy. The more accessible fintech becomes, the more opportunities individuals have to interact with it and leverage its benefits for improving their financial literacy and well-being.

2.3 Gender and Education

According to the nurture theory, the differences between men and women are primarily the result of socio-cultural constructions that assign distinct tasks and roles to each gender. This theory suggests that women are often marginalized or overlooked in their contributions to society, family, and the nation. In contrast, nature theory argues that gender differences are innate, universal, and unchangeable. Research by Chen and Volpe (2002) found that gender influences the level of financial literacy among students, with male students generally exhibiting higher financial literacy than female students. This is attributed to men's logical thinking, decisiveness, independence, and self-confidence, which lead them to consider fewer emotional variables when making financial decisions. However, Margaretha and Pambudhi (2015) present a differing perspective, indicating that female students actually have higher financial literacy levels than male students. Apart from gender, academic ability is also identified as a significant factor influencing financial literacy and financial management behavior. Students with greater knowledge tend to apply this knowledge positively in managing their personal finances, resulting in wiser financial decisions. Thus, higher academic ability correlates with better financial literacy and more prudent financial management.

3. Research Methodology

This study employs an associative quantitative research design aimed at examining the role of financial technology in influencing financial literacy among millennials, with gender and education as moderating variables. The decision to focus on

millennials in Aceh Province was motivated by the increasing prevalence of digital finance and the need to understand how fintech affects financial literacy within this demographic.

Primary data was collected through a structured questionnaire distributed across all districts and cities in Aceh Province. The selection of this research area and population is justified by the Financial Services Authority (OJK) data from 2019, which shows that fintech lending loans in Aceh reached IDR 113.26 billion—equivalent to 0.3% of the national total of IDR 41.03 trillion. Furthermore, Aceh accounted for 105,885 borrower accounts nationally, with 37,796 borrower accounts specifically in Aceh, representing 0.435% of the 8.75 million national borrower accounts. The number of lender accounts in Aceh was recorded at 2,894, or 0.6% of the national total of 480,262 accounts. The majority of lenders belong to the millennial generation, with the remainder being individuals over 35 years old (Walfazri, 2019).

The target population for this research consists of millennials in Aceh, defined by the Central Statistics Agency and supported by William H. Frey's analysis of the 2020 Population Census as individuals born between 1981 and 1996 (Frey, 2018), currently aged 25 to 39 years. The sampling method applied was purposive random sampling, where participants were intentionally selected based on specific criteria relevant to the study's objectives (Sugiyono, 2014). The sample size was determined using the Slovin formula, with a total millennial population of 18,346 and a margin of error set at 10%. The inclusion criteria for respondents were: 1) millennials aged 25 to 39 years; 2) a monthly income starting at IDR 2,500,000; 3) a minimum education level of senior high school.

Data analysis was conducted using Structural Equation Modeling (SEM), which is well-suited for examining complex relationships involving multiple variables simultaneously. SEM allows for the evaluation of both measurement models—ensuring the reliability and validity of observed variables—and structural models that analyze relationships between latent constructs. This approach provides a comprehensive understanding of the interplay among financial technology components, financial literacy, and the moderating effects of gender and education.

This study also employed Moderated Multiple Regression (MMR) to analyze the moderating effects of gender and education on the relationship between financial technology and financial literacy. MMR is a multivariate technique that includes several independent variables, a dependent variable, and moderating variables. It helps determine whether moderation occurs by examining interaction

effects between independent and moderating variables (Jaccard and Turrisi, 2003; Aguinis, 2004). The moderating variables in this study are dichotomous, representing gender and education, and the moderation can either strengthen or weaken the influence of financial technology on financial literacy. This moderation analysis is based on the multiple regression framework with interaction terms to capture the moderating effects.

As illustrated in Figure 1, the dependent variable is Financial Literacy (Y), the independent variables are Knowledge Satisfaction (X1), Use (X2), and Accessibility (X3), and the moderating variables are Gender (M1) and Education (M2).

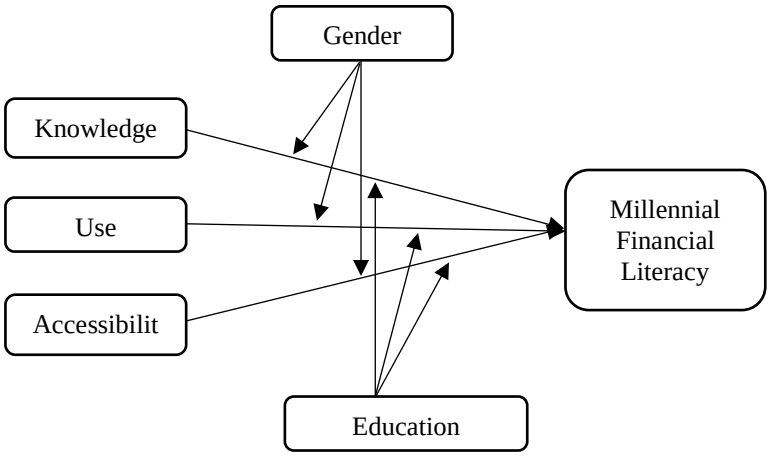

Figure 1. Conceptual Model
Source: Research finding.

Based on Figure 1, the mathematical equations for the direct and moderating effect models in this study can be written as follows:

1) Direct Effect Model:

$$MFL = \alpha + \beta_{11}KNO + \beta_{12}USE + \beta_{13}ACC + \beta_{14}GDR + \beta_{15}EDU + \zeta_1 \quad (1)$$

2) Moderating Effect Model of Education:

$$MFL = \alpha + \beta_{21}KNO + \beta_{22}USE + \beta_{23}ACC + \beta_{24}EDU + \beta_{25}KNO*EDU + \beta_{26}USE*EDU + \beta_{27}ACC*EDU + \zeta_3 \quad (2)$$

3) Moderating Effect Model of Gender:

$$MFL = \alpha + \beta_{31}KNO + \beta_{32}USE + \beta_{33}ACC + \beta_{34}GDR + \beta_{35}KNO*GDR + \beta_{36}USE*GDR + \beta_{37}ACC*GDR + \zeta_2 \quad (3)$$

Where MFL is Millennials' Financial Literacy, KNO is knowledge, USE is use, ACC is accessibility, GDR is Gender and EDU education, α denotes the intercept or constant term in the regression model, β_{1-3} are coefficients that indicate the strength and direction of the influence of each respective variable, and ζ_{1-3} represent the error terms in each respective equation, accounting for unobserved factors or random disturbances that may influence the outcomes.

Based on the research framework, the hypotheses proposed in this study are as follows:

H_1: Fintech knowledge has a significant effect on improving the financial literacy of the millennial generation in Aceh, Indonesia.

H_2: Fintech usage has a significant effect on improving the financial literacy of the millennial generation in Aceh, Indonesia.

H_3: Fintech accessibility has a significant effect on improving the financial literacy of the millennial generation in Aceh, Indonesia.

H_4: Education level moderates the relationship between fintech knowledge and the financial literacy of the millennial generation in Aceh, Indonesia.

H_5: Education level moderates the relationship between fintech usage and the financial literacy of the millennial generation in Aceh, Indonesia.

H_6: Education level moderates the relationship between fintech accessibility and the financial literacy of the millennial generation in Aceh, Indonesia.

H_7: Gender moderates the relationship between fintech knowledge and the financial literacy of the millennial generation in Aceh, Indonesia.

H_8: Gender moderates the relationship between fintech usage and the financial literacy of the millennial generation in Aceh, Indonesia, Indonesia.

H_9: Gender moderates the relationship between fintech accessibility and the financial literacy of the millennial generation in Aceh, Indonesia, Indonesia.

4. Results and Discussion

4.1 Descriptive Statistics

This study involved 328 respondents selected using a purposive sampling technique. A structured questionnaire consisting of 57 items was distributed directly to participants. Data collection was conducted from April 7 to July 15, 2022. Respondents were Millennials who met the sampling criteria. Descriptive

statistics were used to summarize the demographic characteristics and fintech-related behaviors of the participants. The details of the respondents' profiles, including gender, age, education, income, frequency of fintech use, and level of trust in fintech security, are presented in Table 1.

Table 1. Respondent Demographics

No	Characteristics of Respondents	Frequency	Percentage
1	**Gender:**		
	Female	250	76%
	Male	78	24%
2	**Age:**		
	Under 20 years old	181	55%
	20-25 years old	112	34%
	26-30 years old	9	3%
	31-35 years old	11	3%
	Over 35 years old	15	5%
3	**Education:**		
	High School (SMA/MAN)	219	67%
	Bachelor's Degree (S-1)	96	29%
	Master's Degree (S-2)	9	3%
	Other	4	1%
4	**Income:**		
	Less than IDR 2,500,000	282	86%
	IDR 2,500,000 – IDR 5,000,000	15	5%
	IDR 5,000,001 – IDR 10,000,000	12	4%
	More than IDR 10,000,000	19	6%
	Routine/Frequency of Use of Financial Technology:		
		212	65%
	Often	116	35%
	Rarely		
	Trust in Fintech Security:		
	Trust	216	66%
	Doubtful	106	32%
	Do not trust	6	2%

Source: Research finding.

Table 1 shows that 76% of the respondents are female, while 24% are male. The majority of respondents fall into the under-20 age category (55%), followed by those aged 20–25 years (34%). In terms of education level, 67% of respondents are at the high school level (SMA/MAN), while 34% hold a bachelor's degree (S1), and 4% have a master's degree (S2). Regarding income, the majority of respondents (86%) earn less than IDR 2,500,000, while 5% earn between IDR 2,500,000 and IDR 5,000,000, and 4% and 6% earn between IDR 5,000,000–10,000,000 and above IDR 10,000,000, respectively. The use of financial technology among respondents was assessed based on usage frequency. The results show that 65% of respondents frequently use financial technology, while 35% do not use it frequently. In terms of confidence in the security of financial technology, 66% of respondents trust its security, 32% are uncertain, and the remaining 2% do not trust the security of financial technology.

4.2 Measurement and Data Diagnostics

4.2.1 Validity Test

The validity test aims to examine the relationship between the observed indicators and their corresponding latent variables within the measurement model. Combining the testing of the measurement model and the structural model allows researchers to account for measurement error as an integral part of Structural Equation Modeling. This approach also enables simultaneous factor analysis and hypothesis testing. The measurement model test results are illustrated in Figure 2.

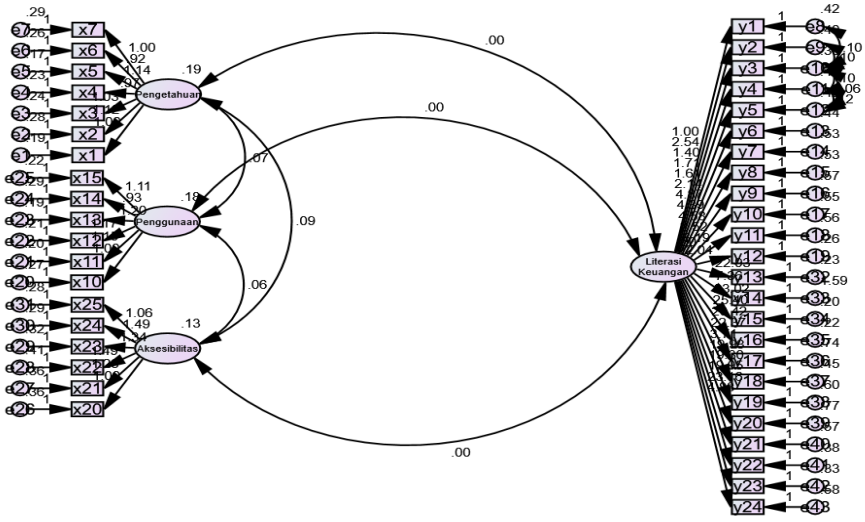

Figure 2. Measurement Model
Source: Research finding.

The results of the loading factor calculations, which represent the validity of each indicator in measuring the latent variables, are presented in Table 2.

Table 2. Loading Factors of the Measurement Model

		Variable	**Estimate**
x1	<---	Knowledge	0.703
x2	<---	Knowledge	0.675
x3	<---	Knowledge	0.675
x4	<---	Knowledge	0.663
x5	<---	Knowledge	0.767
x6	<---	Knowledge	0.615
x7	<---	Knowledge	0.629
y1	<---	Financial Literacy	0.044
y2	<---	Financial Literacy	0.114
y3	<---	Financial Literacy	0.073
y4	<---	Financial Literacy	0.071
y5	<---	Financial Literacy	0.071
y6	<---	Financial Literacy	0.092
y7	<---	Financial Literacy	0.188
y8	<---	Financial Literacy	0.17
y9	<---	Financial Literacy	0.171
y10	<---	Financial Literacy	0.097
y11	<---	Financial Literacy	0.231
y12	<---	Financial Literacy	0.78
x10	<---	Use	0.629
x11	<---	Use	0.737
x12	<---	Use	0.735
x13	<---	Use	0.758
x14	<---	Use	0.584
x15	<---	Use	0.709
x20	<---	Accessibility	0.518
x21	<---	Accessibility	0.593
x22	<---	Accessibility	0.644
x23	<---	Accessibility	0.654
x24	<---	Accessibility	0.706
x25	<---	Accessibility	0.587
y13	<---	Financial Literacy	0.806
y14	<---	Financial Literacy	0.165
y15	<---	Financial Literacy	0.825

		Variable	Estimate
y16	<---	Financial Literacy	0.839
y17	<---	Financial Literacy	0.563
y18	<---	Financial Literacy	0.69
y19	<---	Financial Literacy	0.136
y20	<---	Financial Literacy	0.545
y21	<---	Financial Literacy	0.59
y22	<---	Financial Literacy	0.681
y23	<---	Financial Literacy	0.754
y24	<---	Financial Literacy	0.178

Source: Research finding.

Based on the calculation results shown in Table 2, the factor loadings of the observed items were evaluated. Items Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, Y9, Y10, Y11, Y14, Y19, and Y24 exhibited loading factors below the acceptable threshold of 0.5, indicating that these items do not adequately represent their latent variables. Consequently, these items were removed from the model.

Following the removal of items with loading factors below 0.5, the model was retested. The results of this re-estimation are presented in Figure 3 and Table 3. They show that all remaining items have loading factors above 0.5, which meets the validity criteria. This confirms that the measurement model has acceptable convergent validity.

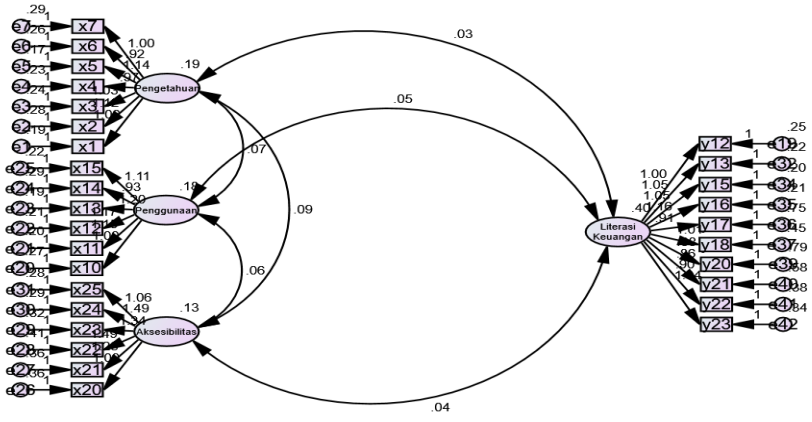

Figure 3. Confirmatory Factor Analysis Test Results
Source: Research finding.

Table 3 presents the loading factors of the measurement model after the removal of invalid items. All remaining items show loading factors above the 0.5 threshold, indicating improved model validity.

Table 3. Loading Factors of the Measurement Model

		Variable	Estimate
x1	<---	Knowledge	0.703
x2	<---	Knowledge	0.675
x3	<---	Knowledge	0.675
x4	<---	Knowledge	0.663
x5	<---	Knowledge	0.767
x6	<---	Knowledge	0.615
x7	<---	Knowledge	0.629
x10	<---	Use	0.629
x11	<---	Use	0.737
x12	<---	Use	0.735
x13	<---	Use	0.758
x14	<---	Use	0.584
x15	<---	Use	0.709
x20	<---	Accessibility	0.519
x21	<---	Accessibility	0.593
x22	<---	Accessibility	0.644
x23	<---	Accessibility	0.653
x24	<---	Accessibility	0.705
x25	<---	Accessibility	0.588
y12	<---	Financial_Literacy	0.782
y13	<---	Financial_Literacy	0.814
y15	<---	Financial_Literacy	0.833
y16	<---	Financial_Literacy	0.848
y17	<---	Financial_Literacy	0.554
y18	<---	Financial_Literacy	0.688
y20	<---	Financial_Literacy	0.534
y21	<---	Financial_Literacy	0.582
y22	<---	Financial_Literacy	0.677
y23	<---	Financial_Literacy	0.75

Source: Research finding.

4.2.2 Reliability Test

The reliability test measures the consistency of a measuring instrument in producing similar results when repeated on the same subject. A variable is

considered reliable if its Cronbach's alpha coefficient is 0.5 or higher. Table 4 below presents the results of the reliability test for the variables in this study.

Table 4. Reliability Test Results

No	Variable	Construct Reliability	Result
1	Knowledge	0.853	Reliable
2	Use	0.847	Reliable
3	Accessibility	0.785	Reliable
4	Financial Literacy	0.838	Reliable
5	Education	0.920	Reliable
6	Gender	0.586	Reliable

Source: Research finding.

Based on the results presented in Table 4, since all construct reliability values are above 0.50, it can be concluded that all constructs in this study are reliable and suitable for use.

4.2.3 Outliers Test

The outlier test aims to identify observations with extreme values that deviate significantly from the overall data pattern, either as univariate or multivariate outliers (Ghozali, 2005). In this study, the detection of multivariate outliers was conducted using the Mahalanobis distance approach. The results of the analysis indicate that none of the cases exceeded the critical Mahalanobis distance value of 480.954, which was determined based on the chi-square distribution at the appropriate degrees of freedom and significance level. This finding suggests that the dataset does not contain multivariate outliers and is therefore suitable for further analysis.

4.2.4 Multicollinearity Assumption

The multicollinearity test was conducted to examine the degree of correlation among the independent variables in the model. The results of this test are presented in Table 5.

Table 5. Multicollinearity Test

Model	(Constant)	Collinearity Statistics Tolerance	VIF
	Knowledge	0.743	1.346
	Use	0.862	1.160
	Accessibility	0.732	1.365
	Gender	0.623	1.620
	Education	0.207	1.567

Source: Research finding.

As shown in Table 5, all Variance Inflation Factor (VIF) values are below the commonly accepted threshold of 10, indicating that multicollinearity is not present among the independent variables. Thus, the assumption of no multicollinearity in the dataset is satisfied.

4.2.5 Normality test

The evaluation of data normality was conducted using the critical ratio (CR) of skewness, with a threshold of ±2.58 at a 0.01 significance level (1%). Data are considered normally distributed if the skewness and kurtosis critical ratio values fall within ±1.96 (Ghozali, 2005). The results of the normality test, conducted using AMOS 24, are presented in Table 6.

Table 6. Multicollinearity Test

Variable	skew	kurtosis
y24	-1.076	.467
y21	-.729	-.113
y20	-.530	-.362
y19	-.901	.556
y17	-.593	-.437
x25	-.888	.430
x23	-.909	.247
x21	-.705	-.310
x20	-.674	-.209
x14	-.548	-.058
x13	-.794	.269
x11	-.646	-.120
x10	-.933	.626
y7	-.372	-.670
x6	-.517	-.392
x5	-.855	.159

Variable	skew	kurtosis
x3	-.950	.416
x2	-.899	.539

Source: Research finding.

Based on the results presented in Table 6, all skewness and kurtosis critical ratio values fall within the acceptable range of ±1.96. This indicates that the data are normally distributed and thus suitable for further analysis.

4.2.6 Goodness of Fit

The goodness of fit evaluation assesses how well the proposed model fits the observed data, using several fit indices and corresponding cut-off values. Table 7 summarizes the results of the model fit assessment.

Table 7. Goodness of Fit Index

Goodness of Fit Index	Cut off Value	Model Test Result	Information
Degree of Freedom	Positive (+)	84	Positive
Chi-Square	177.21	230.79	Moderate
CMIN/DF	≤2,00	1.876	Acceptable
GFI	≥0,90	,929	Acceptable
RMSEA	0,05-0,08	,052	Acceptable
AGFI	≥0,90	0, 901	Acceptable
TLI	≥0,90	0.964	Acceptable
CFI	≥0,90	0, 971	Acceptable
NFI	≥0,90	0.940	Acceptable
PNFI	0,60-0,90	0.756	Acceptable

Source: Research finding.

Based on Table 7, all goodness-of-fit indicators meet the required thresholds, indicating that the model has a good fit with the empirical data. Although the chi-square value is relatively high, this is acceptable given the sensitivity of the chi-square statistic to sample size. Therefore, the overall model can be considered appropriate for further structural analysis.

4.3 Structural Model Analysis

Structural model analysis aims to examine the relationships among latent variables, assess the significance of path coefficients, and evaluate the explanatory power of the model using R-square values. This analysis follows the confirmation of the

measurement model's validity and the overall model fit, as previously presented. Figure 4 illustrates the full structural model, which includes the relationships among the latent variables: Knowledge, Usage, Accessibility, and Financial Literacy. These relationships are analyzed based on the Goodness of Fit (GoF) indices discussed in Table 7, which indicate that the model meets acceptable fit criteria and is suitable for further interpretation.

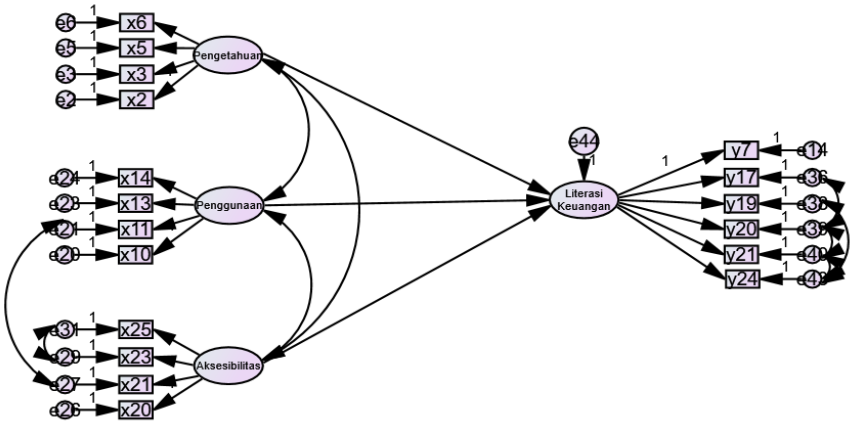

Figure 4. Full SEM Model
Source: Research finding.

The results of the path analysis, including estimated coefficients, standard errors, critical ratios, and p-values, are presented in Table 8 below.

Table 8. Direct Effect Test Results

Variable			Estimate	S.E.	C.R.	P
Financial_Literacy	<---	Usage	.335	.139	2.411	.016
Financial_Literacy	<---	Knowledge	.265	.107	2.470	.014
Financial_Literacy	<---	Accessibility	.349	.177	1.968	.049

Source: Research finding.

As shown in Table 8, all independent variables — Usage, Knowledge, and Accessibility — have a statistically significant effect on Financial Literacy, with p-values below 0.05. This indicates that each of these variables plays a meaningful role in influencing financial literacy levels. A visual representation of the path analysis results is also presented in Figure 5.

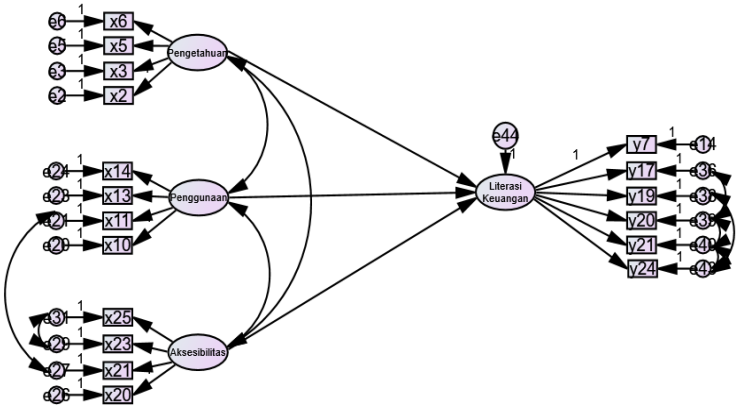

Figure 5. SEM Analysis Results
Source: Research finding.

4.3.1 The Effect of Fintech Knowledge on Financial Literacy

The structural estimation presented in Table 8 indicates that knowledge has a significant and positive influence on financial literacy, with a standardized coefficient of 0.265 (26.5%), a critical ratio (CR) of 2.470, and a p-value of 0.014. Given that the p-value is below the 0.05 threshold, this result supports the acceptance of Hypothesis 1, which posits that financial knowledge significantly affects the financial literacy of the millennial generation in Aceh. This finding suggests that as millennials in Aceh become more knowledgeable about financial concepts and practices, their level of financial literacy improves accordingly. Financial knowledge, therefore, serves as a foundational component in shaping individuals' ability to manage personal finances effectively. According to Palameta et al. (2016), acquiring financial knowledge from an early age is crucial, as it can evolve into applicable skills that enhance day-to-day financial decision-making. Furthermore, Rai et al. (2019) emphasize that financial knowledge underpins responsible financial attitudes and behaviors, including long-term financial planning such as retirement preparation. These results are in line with prior studies by Robb and Woodyard (2011) as well as Yuliani et al. (2019), both of which affirm that financial knowledge is a key determinant of financial literacy. Overall, the findings reinforce the importance of educational interventions and policies aimed at improving financial literacy by strengthening financial knowledge among young adults.

4.3.2 The Effect of Fintech Usage on Financial Literacy

As presented in Table 8, the structural model estimation shows that fintech usage has a significant and positive effect on financial literacy, with a standardized coefficient of 0.335 (33.5%), a critical ratio (CR) of 2.411, and a p-value of 0.016. These results confirm the acceptance of Hypothesis 2, which posits that the use of financial technology significantly contributes to the financial literacy of the millennial generation in Aceh. This implies that increased engagement with fintech platforms enhances millennials' ability to manage personal finances effectively. In practical terms, every 100-unit increase in fintech usage corresponds to a 33.5-unit improvement in financial literacy. The findings suggest that the adoption of fintech tools not only facilitates more efficient financial transactions but also fosters greater knowledge, confidence, and decision-making capabilities. Through frequent use of fintech services—such as digital banking, e-wallets, investment apps, or peer-to-peer lending—users are more exposed to financial products, terms, and best practices, which in turn improve their financial literacy. This result is consistent with studies by Mulasiswi and Julialevi (2020), Marpaung (2021), and Mustikasari and Noviardy (2020), all of which highlight the strong link between fintech adoption and enhanced financial literacy. These studies emphasize that fintech usage enables users to better understand and access financial services, thereby supporting informed financial behaviors and long-term financial well-being.

4.3.3 The Effect of Accessibility on Financial Literacy

Based on the results in Table 8, fintech accessibility is shown to have a significant and positive influence on financial literacy, with an estimated coefficient of 0.349 (34.9%), a critical ratio (CR) of 1.968, and a p-value of 0.049. These findings indicate that Hypothesis 3 is accepted at the 5% level of significance, affirming that increased accessibility to fintech services contributes to higher levels of financial literacy among the millennial generation in Aceh. This result suggests that as fintech platforms become more easily accessible—via mobile devices, internet connectivity, and user-friendly applications—individuals are more likely to engage with these technologies, which enhances their understanding of financial tools and services. Specifically, a 100-unit increase in fintech accessibility leads to an estimated 34.9-unit improvement in financial literacy. The convenience and flexibility offered by fintech reduce traditional barriers such as geographic limitations and banking hours, enabling millennials to explore, learn, and adopt financial services more effectively. These findings align with previous studies by

Usmayanti and Kadar (2022), Sugiarti et al. (2019), and Marpaung (2021), which emphasize that increased access to fintech not only promotes the usage of digital financial tools but also strengthens financial knowledge and skills. The ease of access allows users to explore features such as online savings, investment tracking, digital budgeting, and e-payment systems, ultimately encouraging responsible financial behavior. Thus, fintech accessibility serves as a gateway to broader financial inclusion and literacy, particularly for tech-savvy young adults in regions like Aceh.

4.4 Multigroup Moderation Effect Test

The results of the structural analysis of the multi-group moderating variables are shown in Figure 6.

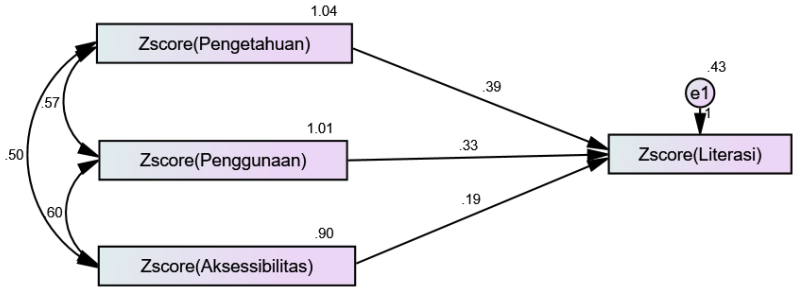

Figure 6. Multigroup Moderation Test Results
Source: Research finding.

4.4.1 Multigroup Moderation Effect of Education

The multigroup moderation test employed a Moderated Multiple Regression (MMR) approach to assess whether the relationship between the independent variables (knowledge, usage, and accessibility) and financial literacy differed across education levels. The initial evaluation was conducted using the structural weights invariance test, the results of which are presented in Table 9.

Table 9. The Significance of Education Level Multigroup Moderation

Model	DF	CMIN	P
Structural weights	3	1.264	.738

Source: Research finding.

As shown in Table 9, the p-value for the structural weights test is 0.738, which exceeds the 5% significance threshold. This indicates that there is no

significant difference in the structural path coefficients across different education levels. In other words, millennials, regardless of their educational attainment, exhibit similar patterns in how knowledge, usage, and accessibility affect their financial literacy. Therefore, education level does not have a significant moderating effect on the overall structural model. However, to further understand the contribution of each predictor within the educational subgroups, a path-specific analysis was conducted. The results of this path analysis are shown in Table 10.

Table 10. Results of Path Analysis for the Moderation of Multigroup Education

Variable			Estimate	S.E.	C.R.	P	Label
ZLiteracy	<---	ZKnowledge	.357	.055	6.527	.000	b1_1
ZLiteracy	<---	ZUsage	.346	.061	5.710	.000	b2_1
ZLiteracy	<---	ZAccessibility	.176	.062	2.831	.005	b3_1

Source: Research finding.

Table 10 indicates that, in the multigroup moderation analysis, the education variable significantly moderates the influence of the exogenous variables on the financial literacy of millennials in Aceh, as evidenced by significance levels below 5%.

4.4.1.1 The Effect of Millennial Generations' Fintech Knowledge on Financial Literacy Moderated by Education

The results of the multigroup moderation analysis presented in Table 10 indicate that education significantly moderates the relationship between fintech knowledge and financial literacy among the millennial generation in Aceh. The estimated standardized coefficient is 0.357, with a critical ratio (CR) of 6.527 and a p-value of 0.000, which is well below the 5% significance threshold. This implies that for every 100-unit increase in fintech knowledge, financial literacy increases by 35.7 units, depending on the level of education. These findings confirm Hypothesis 4, suggesting that the education level of millennials plays a significant role in strengthening the positive impact of fintech knowledge on their financial literacy. The more educated the individuals are, the more effectively they can translate their fintech knowledge into improved financial decision-making. This result aligns with previous studies by Abreu and Mendes (2010), Ameer and Khan (2020), and Mahdzan and Tabiani (2013), who also found education to be a crucial moderating factor in enhancing the effects of financial knowledge on literacy outcomes.

4.4.1.2 The Effect of Millennial Generation Fintech Usage on Financial Literacy Moderated by Education

The multigroup moderation analysis presented in Table 10 reveals that education significantly moderates the relationship between fintech usage and financial literacy among the millennial generation in Aceh. The estimated path coefficient is 0.346, with a critical ratio (CR) of 5.710 and a p-value of 0.000, indicating statistical significance at the 5% level. This means that a 100-unit increase in fintech usage corresponds to a 34.6-unit improvement in financial literacy, contingent upon the level of education. These findings confirm Hypothesis 5, which posits that education plays a moderating role in the relationship between fintech usage and financial literacy. In essence, the ability of millennials to translate their fintech usage into financial literacy is strengthened when they possess a higher level of education. This result aligns with prior studies conducted by Abreu and Mendes (2010), Ameer and Khan (2020), and Mahdzan and Tabiani (2013), which emphasize the pivotal role of educational attainment in enhancing the effectiveness of financial technology in improving financial understanding and behavior.

4.4.1.3 The Effect of Millennial Generation Fintech Accessibility on Financial Literacy Moderated by Education

The multigroup moderation analysis shown in Table 10 indicates that education significantly moderates the effect of fintech accessibility on financial literacy among the millennial generation in Aceh. The estimated path coefficient is 0.176, with a critical ratio (CR) of 2.831 and a p-value of 0.005, confirming significance at the 5% level. This implies that a 100-unit increase in fintech accessibility is associated with a 17.6-unit increase in financial literacy, moderated by the educational level of millennials. These findings support the hypothesis that education plays a moderating role in enhancing the impact of fintech accessibility on financial literacy. This result is consistent with prior research by Abreu and Mendes (2010), Ameer and Khan (2020), and Mahdzan and Tabiani (2013), which emphasizes the importance of education in strengthening the positive influence of financial technology access on individuals' financial knowledge and skills.

4.4.2 Multigroup Moderation Effect of Gender

The multigroup moderation analysis was conducted to examine whether there are differences in the influence of the research variables on financial literacy based on gender groups. The results of this analysis are presented in Table 11.

Table 11. Gender Multigroup Moderation Significance Test Results

Variable			Estimate	S.E.	C.R.	P	Label
ZLiterasi	<---	ZKnowledge	.369	.113	3.266	.001	b1_1
ZLiterasi	<---	ZUsage	.337	.109	3.088	.002	b2_1
ZLiterasi	<---	ZAccessibility	.131	.118	1.110	.267	b3_1

Source: Research finding.

Based on Table 11, the multigroup moderation path analysis indicates that fintech usage significantly influences financial literacy among millennial males and females in Aceh, with p-values well below the 5% significance threshold. However, fintech accessibility does not have a significant effect, as evidenced by its p-value of 0.267.

4.4.2.1 The Moderating Effect of Gender on the Relationship Between Fintech Knowledge and Financial Literacy among the Millennial Generation

The multi-group moderation analysis presented in Table 11 examines the moderating role of gender in the relationship between fintech knowledge and financial literacy among millennials in Aceh, Indonesia. The results reveal a significant indirect effect of 0.369, or 36.9%, indicating that an increase of 100 units in fintech knowledge, when moderated by gender, corresponds to a 36.9-unit increase in financial literacy within this population. The critical ratio (CR) of 3.266 and a probability value of 0.001 confirm that this effect is statistically significant at the 5% level. These findings provide strong empirical support for Hypothesis 7 (H7), which posits that gender moderates the relationship between fintech knowledge and financial literacy among the millennial generation in Aceh. This means that the influence of fintech knowledge on financial literacy varies between male and female millennials, highlighting gender as a key factor in shaping financial literacy outcomes in the context of fintech usage. The moderation effect suggests that interventions aiming to improve financial literacy through fintech education should consider gender-specific strategies to maximize effectiveness. This outcome aligns with prior research suggesting that gender differences impact financial behaviors and the acquisition of financial knowledge, emphasizing the need for tailored financial education programs (Albaity and Rahman, 2019; Silva et al., 2022). In conclusion, gender plays a crucial role in moderating how fintech knowledge translates into enhanced financial literacy among millennials in Aceh, underscoring the importance of inclusive and gender-sensitive financial literacy initiatives.

4.4.2.2 The Moderating Effect of Gender on the Relationship between Fintech Usage and Financial Literacy among the Millennial Generation

The multi-group moderation analysis, as shown in Table 11, investigates the moderating role of gender in the relationship between fintech usage and financial literacy among the millennial generation in Aceh, Indonesia. The results indicate a significant indirect effect of 0.337, or 33.7%, meaning that for every 100-unit increase in fintech usage, moderated by gender, financial literacy among millennials increases by 33.7 units. This effect is statistically significant, with a critical ratio (CR) of 3.088 and a probability level of 0.002, well below the 5% significance threshold. These findings provide strong evidence to support Hypothesis 8 (H8), which states that gender moderates the relationship between fintech usage and financial literacy of millennials in Aceh. The moderation effect reveals that the impact of fintech usage on financial literacy differs between male and female millennials, underscoring the importance of considering gender dynamics when developing fintech-related financial education programs. This conclusion aligns with previous studies by Albaity and Rahman (2019) and Silva et al. (2022), which emphasize that gender influences financial behavior and the assimilation of financial technologies. Therefore, to effectively enhance financial literacy through fintech platforms, gender-specific approaches should be incorporated to address the distinct needs and usage patterns of male and female millennials. In summary, gender significantly moderates the influence of fintech usage on financial literacy in Aceh's millennial population, highlighting the necessity for tailored financial literacy interventions that acknowledge gender differences.

4.4.2.3 The Moderating Effect of Gender on the Relationship between Fintech Accessibility and Financial Literacy among the Millennial Generation

The results of the multi-group moderation analysis in Table 11 indicate an indirect influence value of 0.131 or 13.1% for the relationship between fintech accessibility and financial literacy, moderated by gender. The critical ratio (CR) is 1.110, and the probability value is 0.267, which exceeds the 5% level of significance. These results suggest that gender does not significantly moderate the relationship between fintech accessibility and financial literacy among millennials in Aceh. Accordingly, Hypothesis 9 (H_9), which posits that gender moderates the relationship between fintech accessibility and the financial literacy of the millennial generation in Aceh, is not supported. Although fintech accessibility remains a relevant factor in improving financial literacy, its impact appears to be consistent across both male and female groups.

4.4.3 Coefficient of Determination (R^2) of Financial Literacy

The results of the structural model evaluation indicate a coefficient of determination (R^2) for the financial literacy variable of 0.698. This means that approximately 69.8% of the variance in financial literacy among millennials in Aceh can be explained by the fintech variables—namely, fintech knowledge, fintech usage, and fintech accessibility. This high explanatory power confirms that the model has strong predictive relevance, indicating that the chosen fintech indicators are substantial contributors to understanding financial literacy within this demographic. Furthermore, the model satisfies the required goodness-of-fit indices, affirming the robustness and validity of the structural relationships tested in this study.

5. Conclusion and Implications

This study concludes that fintech knowledge, fintech usage, and fintech accessibility significantly influence the financial literacy of millennials in Aceh. Furthermore, the results indicate that both gender and education level serve as moderating variables in these relationships. However, the effect of moderation does not differ significantly between male and female groups, nor across educational strata. In other words, while gender and education moderate the relationships between fintech factors and financial literacy, their moderating effects are equally applicable across demographic segments.

These findings offer several practical and theoretical implications. First, the strong impact of fintech-related variables underscores the importance of integrating fintech education into broader financial literacy initiatives. Policymakers and financial service providers should consider targeted strategies to enhance millennials' exposure to and understanding of fintech, particularly through accessible platforms and inclusive financial education programs. Second, the non-differentiated moderating effects across gender and education suggest that interventions aimed at improving financial literacy through fintech can be designed as broadly applicable programs rather than requiring group-specific tailoring. This reinforces the need for inclusive policy frameworks that ensure equitable access to financial knowledge and tools for all millennials, regardless of gender or educational background.

Nonetheless, the scope of this research is geographically limited to Aceh, Indonesia, which may constrain the generalizability of its findings. Future research should consider expanding the study to other regions or countries with varying fintech ecosystems and demographic profiles. Additionally, longitudinal studies

may help capture how fintech literacy evolves and interacts with other socio-economic dynamics. In summary, this research contributes to the growing discourse on digital financial inclusion by demonstrating that fintech knowledge, use, and accessibility are key drivers of financial literacy among millennials, and that both gender and education can enhance this effect—albeit uniformly across different groups. This insight is valuable for shaping inclusive and effective financial literacy strategies in the digital era.

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