

ORIGINAL ARTICLE



Analysis of Financial Education, Risk Management, and Accessibility of Technology-Based Loans on Improving Village Economic Resilience

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Abstract

Village economic resilience is critical for sustainable rural development, yet remains challenged by limited financial literacy, inadequate risk management, and restricted access to capital. This study examines how financial education, risk management, and technology-based loan accessibility influence economic resilience among culinary sector MSMEs in Syiah Kuala District, Banda Aceh. Using a quantitative approach, data were collected through Likert-scale questionnaires distributed to 68 respondents selected via proportional stratified random sampling from 217 culinary MSMEs. Multiple linear regression analysis reveals that all three independent variables significantly and positively affect village economic resilience. Technology-based loan accessibility emerged as the most dominant factor, followed by financial education and risk management. The findings suggest that integrated interventions combining digital financial inclusion, financial literacy programs, and risk management training can substantially strengthen rural economic resilience. This research contributes empirical evidence on the synergistic effects of these factors in developing economies and provides actionable insights for policymakers designing resilient rural economic development strategies. From a policy perspective, the findings highlight the importance of integrated rural economic policies that simultaneously promote financial education, strengthen risk management capacity, and expand responsible access to technology-based lending. Policymakers and local governments are encouraged to design village-level financial literacy programs and fintech regulations that support productive MSME financing while minimizing financial vulnerability.

Introduction

Economic resilience in rural communities represents a fundamental pillar for sustainable development and poverty alleviation in developing nations. Rural economies play a crucial role in supporting national economic stability, particularly through micro, small, and medium enterprises (MSMEs) that generate employment and sustain household incomes [1]. In Indonesia, village economies continue to face persistent structural challenges, including limited access to formal financial services, low levels of financial literacy, and heightened exposure to business and environmental risks [2,3]. These constraints limit economic growth, weaken business sustainability, and increase vulnerability to economic shocks [4].

This study is grounded in the theory of economic resilience, which emphasizes the ability of economic actors to absorb shocks, adapt to changing conditions, and sustain productive activities over time [5–7]. In the context of micro, small, and medium enterprises (MSMEs), economic resilience is closely related to financial capability, risk management capacity, and access to financial resources [8,9]. Financial education strengthens human capital by improving

financial decision-making, risk management enhances adaptive capacity, and access to technology-based loans supports financial inclusion [10–12]. Together, these elements form a comprehensive framework explaining how MSMEs can maintain stability and continuity amid economic uncertainty [13].

The capacity of rural communities to withstand economic disturbances, adapt to changing economic conditions, and recover from adverse events determines not only household welfare but also broader regional development outcomes [14]. Economic shocks such as price volatility, supply chain disruptions, and declining consumer demand can have disproportionate impacts on rural MSMEs due to their limited financial buffers and informal business structures [6]. Strengthening village economic resilience is therefore essential to ensure long-term economic stability and inclusive development [15].

Financial education has emerged as a critical determinant of economic resilience, serving as the foundation for sound financial decision-making among rural households and entrepreneurs [9]. Prior research demonstrates a strong positive relationship between financial literacy and economic well-being, where individuals with higher financial knowledge exhibit better budgeting behavior, increased savings, and more effective debt management [5,16]. Despite its importance, financial literacy levels in Indonesian rural areas remain relatively low, as reported by the Financial Services Authority [17]. This condition limits households' ability to evaluate financial products, increases dependence on informal lending, and exposes rural entrepreneurs to predatory and high-cost credit practices. Effective financial education covering budgeting, saving, investment, and debt management plays a crucial role in enhancing financial stability and strengthening economic resilience at the village level [8,18].

In addition to financial education, risk management constitutes an essential component of economic resilience for rural enterprises [19,20]. Rural MSMEs operate in highly uncertain environments characterized by agricultural dependency, commodity price fluctuations, natural disasters, and market instability [21]. Studies emphasize that systematic risk management enables enterprises to identify potential risks, anticipate uncertainties, and implement preventive measures to minimize financial losses [22,23]. Without adequate risk mitigation strategies, rural businesses are more vulnerable to operational disruptions and financial distress, making recovery from economic setbacks increasingly difficult. Weak risk management capacity ultimately perpetuates cycles of vulnerability and undermines the sustainability of village economies [24].

The rapid development of financial technology (fintech) has further transformed the landscape of rural finance by expanding access to technology-based lending services [14,19]. Digital financial platforms offer speed, convenience, and flexibility that are often unavailable through conventional banking institutions, particularly in rural and remote areas [25,26]. Empirical evidence suggests that fintech has the potential to enhance financial inclusion for low-income populations by reducing transaction costs, overcoming geographical barriers, and simplifying credit approval processes [2,27]. However, the benefits of fintech are not without risks. Without adequate financial literacy and risk awareness, technology-based borrowing may lead to excessive debt accumulation and increased financial vulnerability [28–30]. Consequently, fintech accessibility must be accompanied by sufficient financial education and risk management capacity to contribute positively to economic resilience [31].

Despite extensive research on financial education, risk management, and fintech accessibility, existing studies largely examine these factors independently [32]. Empirical investigations that analyze their combined and interactive effects on economic resilience, particularly within rural Indonesian contexts, remain limited [33]. Moreover, most prior studies focus on urban settings or broader national samples, leaving village based MSMEs underrepresented in the literature [13]. Sector-specific analyses especially within the culinary MSME sector, which constitutes a

significant source of income and employment in rural communities are also relatively scarce [1,34].

Culinary MSMEs in Syiah Kuala District were selected as the focus of this study due to their strategic economic role and unique characteristics. Syiah Kuala District represents a dynamic urban–academic area with high business competition, a dense student population, and strong demand for culinary products. Culinary MSMEs in this district are highly dependent on daily cash flow, digital payment systems, and short-term financing, making them particularly vulnerable to financial and operational risks. These characteristics make culinary MSMEs in Syiah Kuala District an appropriate and relevant setting for examining the roles of financial education, risk management, and technology-based loan accessibility in strengthening village economic resilience.

Based on these considerations, this study focuses on analyzing the combined effects of financial education, risk management, and accessibility of technology-based loans on village economic resilience. Specifically, this research aims to examine how these factors influence the resilience of culinary MSMEs in Syiah Kuala District, Banda Aceh. This study contributes to the existing literature by providing an integrated empirical analysis of financial capability, risk management, and digital financial access within a rural MSME context. Furthermore, the findings are expected to offer practical insights for policymakers and development stakeholders in formulating strategies to strengthen inclusive and sustainable village economic resilience

Materials and Methods

Data Collection

The research was conducted at culinary sector MSMEs in Syiah Kuala District, Banda Aceh, Indonesia, employing a quantitative method that involved the study of populations and randomly selected samples. This research followed a quantitative associative approach with the aim of identifying relationships between multiple variables and developing empirical evidence to explain, predict, and control economic resilience phenomena. The data in this study were obtained from questionnaires collected from a population consisting of culinary MSMEs in Syiah Kuala District. The sample size of 68 respondents, representing the target population of 217 culinary MSMEs, was determined using the Slovin formula with a 10% margin of error and selected through proportional stratified random sampling. In our research, we investigated how financial education, risk management, and technology-based loan accessibility, as independent variables, affect village economic resilience.

Validity and Reliability Tests

We performed validity and reliability tests before conducting regression analysis in our research study. The validity test helped confirm that our data collection methods and research instruments accurately measured the specific concepts we intended to investigate, ensuring that our research addressed the right questions. Validity is the precision of a measurement tool to achieve a specific goal and the accuracy of the measurement tool in performing its measuring function [35]. The validity test employed Pearson Product-Moment Correlation, comparing r-count of each statement item to the critical value ($r\text{-table} = 0.235$ at 10% significance level for $n=68$). Conversely, the reliability test ensured that our research instruments consistently yielded similar results when applied to the same subjects or under similar conditions, providing confidence in the consistency of our data. Cronbach's Alpha coefficient with acceptance threshold >0.60 was used to assess reliability [36]. These tests played a crucial role in enhancing the credibility and trustworthiness of our research findings [37,38].

Analytical Flow of the Study

This study follows a structured analytical flow to examine the influence of financial education, risk management, and technology-based loan accessibility on village economic resilience. The research process begins with data collection through questionnaires distributed to culinary MSME actors in Syiah Kuala District. The collected data were then tested for validity and reliability to ensure measurement accuracy. Subsequently, classical assumption tests were conducted, followed by multiple linear regression analysis to examine the relationships between variables. Finally, hypothesis testing and interpretation of results were performed to draw conclusions and formulate policy implications in Figure 1.

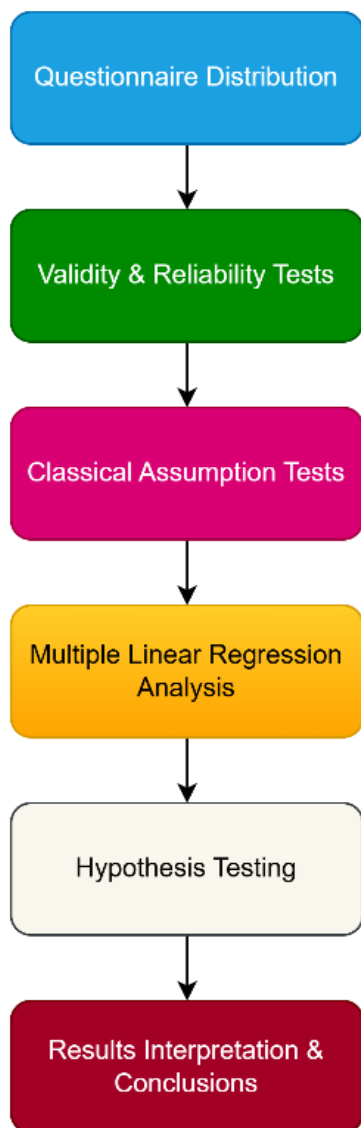


Figure 1. Analytical flow of the study.

Multiple Linear Regression

Multiple Linear Regression is a statistical method used to analyze the relationship between multiple independent variables and a single dependent variable. Multiple correlation and regression analysis is the examination of the relationship between one dependent variable and two or more independent variables [39]. To test its hypotheses, it is conducted using the F-test and the t-test.

The basis for formulating the multiple linear regression model used in this research is as follows:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e \quad (1)$$

The multiple linear regression model employed in this study is specified as follows:

$$VER = a + b_1FED + b_2RIM + b_3TLA + e \quad (2)$$

Where VER denotes village economic resilience, FED represents financial education, RIM refers to risk management, and TLA indicates accessibility of technology-based loans. The parameter a is the constant term, b_1 – b_3 are regression coefficients, and e represents the error term [40].

In statistical analysis, classical assumptions are rigorously examined, encompassing assessments for normality, multicollinearity, and heteroscedasticity, depending on the context of the analysis. Furthermore, in hypothesis testing, t-tests, F-tests and Coefficient of Determination tests are employed to evaluate the significance of individual coefficients and the overall model fit in regression analysis. Collectively, these tests play a vital role in upholding the integrity of statistical analyses, enabling the drawing of reliable conclusions, the assessment of relationships in data, and the making of inferences about population parameters based on sample data [41].

Results and Discussion

Respondent Characteristics

This subsection presents the demographic characteristics of respondents to provide a clearer overview of the study sample. The respondents consist of culinary MSME owners operating in Syiah Kuala District. Table 1 presents the distribution of respondents based on gender, age, education level, and business duration.

Table 1. The distribution of respondents.

Characteristics	Category	Frequency
Gender	Male	28
	Female	40
Age	≤ 25 years	30
	26–35 years	22
	≥ 36 years	16
Education	Primary/Secondary	5
	High School	35
	Diploma/Bachelor	28

Table 1 presents the demographic characteristics of the respondents involved in this study. A total of 68 culinary MSME owners in Syiah Kuala District participated in the survey, consisting of 28 male and 40 female respondents. The majority of respondents were aged ≤ 25 years, followed by those aged 26–35 years and ≥ 36 years. In terms of education level, most respondents had a high school background, followed by diploma or bachelor's degrees, while only a small proportion had primary or secondary education.

Validity Test

The validity test aims to measure whether the data obtained from the questionnaire results is valid or not. The validity of each statement item in the research questionnaire is determined by comparing the correlation coefficient (r_{count}) of each statement to the critical value (r_{table}). The statement item is declared valid if r_{count} is greater than r_{table} . The results of r_{count} are compared with r_{table} , where $df = n - 2$ with a 5% significance level. As seen in Table 2, all question items have a value of $r_{count} > r_{table}$, which leads to the conclusion that all items are declared valid.

Table 2. Results of validity test.

Variable	Question Item	Correlation Coefficient (rcount)	Critical Value (rtable)	Conclusion
FED	FED_1	0.668	0.235	Valid
	FED_2	0.68		Valid
	FED_3	0.661		Valid
	FED_4	0.747		Valid
	FED_5	0.688		Valid
	FED_6	0.561		Valid
	FED_7	0.65		Valid
	FED_8	0.476		Valid
	FED_9	0.747		Valid
	FED_10	0.688		Valid
RIM	RIM_1	0.791	0.235	Valid
	RIM_2	0.562		Valid
	RIM_3	0.803		Valid
	RIM_4	0.275		Valid
	RIM_5	0.596		Valid
	RIM_6	0.791		Valid
	RIM_7	0.562		Valid
	RIM_8	0.803		Valid
	RIM_9	0.777		Valid
	RIM_10	0.562		Valid
TLA	TLA_1	0.582	0.235	Valid
	TLA_2	0.542		Valid
	TLA_3	0.441		Valid
	TLA_4	0.635		Valid
	TLA_5	0.728		Valid
	TLA_6	0.761		Valid
	TLA_7	0.654		Valid
	TLA_8	0.721		Valid
	TLA_9	0.683		Valid
	TLA_10	0.761		Valid
VER	VER_1	0.37	0.235	Valid
	VER_2	0.809		Valid
	VER_3	0.584		Valid
	VER_4	0.798		Valid
	VER_5	0.571		Valid
	VER_6	0.754		Valid
	VER_7	0.773		Valid
	VER_8	0.571		Valid
	VER_9	0.798		Valid
	VER_10	0.571		Valid

Reliability Test

The reliability test is used to assess the consistency of the questionnaire as a measurement tool for the research variables. A questionnaire is considered reliable if the Cronbach's Alpha value exceeds 0.60. As shown in Table 3, the results indicate that the utility, convenience, security, and interest variables all have Cronbach's Alpha values greater than 0.60. Therefore, all measurement items used in this study are considered reliable.

Table 3. Results of reliability test.

Variable	Question Item	Cronbach's Alpha	Critical Value	Conclusion
FED	10	0.849	0.60	Reliable
RIM	10	0.841		Reliable
TLA	10	0.849		Reliable
VER	10	0.85		Reliable

Normality Test

As shown in Table 4, the one-sample Kolmogorov–Smirnov test produces a significance value of 0.20, exceeding 0.05, indicating that the data are normally distributed.

Table 4. Results of normality test.

Test	Residual	Critical Value	Conclusion
Kolmogorov-Smirnov Z	0.200	0.05	Normal

Multicollinearity Test

Multicollinearity was tested using Tolerance and Variance Inflation Factor (VIF) values. As shown in Table 5, all independent variables have Tolerance values greater than 0.10 and VIF values less than 10, indicating the absence of multicollinearity in the regression model.

Table 5. Correlation coefficient and VIF.

Variable	Tolerance	VIF
FED	0.989	1.011
RIM	0.933	1.072
TLA	0.942	1.062

Heteroskedasticity Test

As shown in Figure 2, the scatterplot indicates that the residuals are randomly distributed both above and below the Y-axis and do not form a specific pattern. Therefore, it can be concluded that the regression model does not exhibit heteroskedasticity and satisfies the assumption of homoskedasticity.

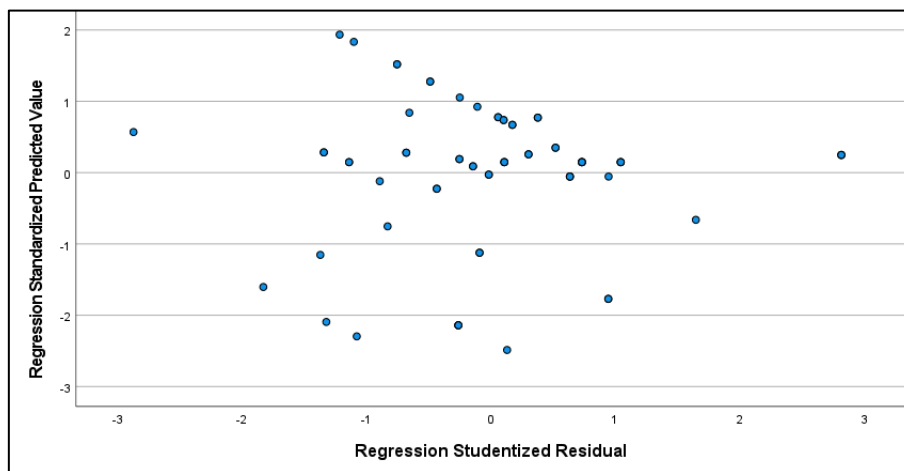


Figure 2. Scatterplot (dependent variable: village economic resilience).

Multiple Linear Regression

The multiple linear regression analysis was conducted to examine the effect of financial education (FED), risk management (RIM), and accessibility of technology-based loans (TLA) on village economic resilience (VER). The results of the regression analysis are presented in Table 6.

Table 6. Results of multiple linear regression.

Variable	Standardized Coef.	t-stat.	Signif.
FED	1.189*	2.930	0.005
RIM	0.347*	2.694	0.009
TLA	1.546*	3.683	0.001

Note : * (significant at 0.01 level)

Based on Table 6, financial education (FED) has a positive and significant effect on village economic resilience, with a standardized coefficient of 1.189, a t-statistic of 2.930, and a significance value of 0.005, which is below the 0.01 significance level. This indicates that an increase in financial education significantly improves village economic resilience.

Similarly, risk management (RIM) shows a positive and significant influence on village economic resilience, as indicated by a standardized coefficient of 0.347, a t-statistic of 2.694, and a significance value of 0.009. This result suggests that better risk management practices contribute significantly to strengthening village economic resilience.

Furthermore, technology-based loan accessibility (TLA) also has a positive and significant effect on village economic resilience, with a standardized coefficient of 1.546, a t-statistic of 3.683, and a significance value of 0.001. Among the independent variables, TLA exhibits the strongest influence on village economic resilience. Overall, the partial test results confirm that all independent variables significantly affect village economic resilience.

Simultaneous Test (F-test)

The simultaneous test (F-test) was conducted to determine whether financial education, risk management, and technology-based loan accessibility jointly affect village economic resilience. The results of the F-test are shown in Table 7.

Table 7. Results of F-test.

Sum of Squares	Mean Square	Fcount	Significant
790.500	263.500	2.775	0.000

As presented in Table 7, the calculated F-value is 2.775 with a significance value of 0.000, which is lower than the 0.05 significance level. With $df_1 = 3$ and $df_2 = 64$, the F-table value at the 5% significance level is 2.75. Since the F-count value (2.775) is greater than the F-table value (2.75), it can be concluded that financial education, risk management, and technology-based loan accessibility simultaneously have a significant effect on village economic resilience. Therefore, the regression model used in this study is statistically significant and suitable for explaining variations in village economic resilience.

Coefficient of Determination (R^2) Test

The coefficient of determination test was conducted to measure how much variation in village economic resilience can be explained by the independent variables. The results of the R^2 test are presented in Table 8.

Table 8. Results of the coefficient of determination test.

R	R^2	Adjusted R^2	Explanation
0.735	0.541	0.519	Strong correlation

Based on Table 8, the value of R is 0.735, indicating a strong correlation between the independent variables and village economic resilience. The R^2 value of 0.541 suggests that 54.1% of the variation in village economic resilience can be explained by financial education, risk management, and technology-based loan accessibility. Meanwhile, the Adjusted R^2 value of 0.519 indicates that after adjusting for the number of independent variables, 51.9% of the variation in village economic resilience is explained by the model, while the remaining 48.1% is influenced by other factors not examined in this study.

Financial Education on Interest in Improving Village Economic Resilience

Financial education has a significant influence on improving village economic resilience, as it equips village communities with the knowledge and skills needed to manage financial resources

effectively. Based on the analysis of the data collected in this study, a higher level of financial education enables individuals to plan income, control expenditures, manage savings, and make informed financial decisions, which collectively strengthen economic stability at the village level.

The results indicate that financial education has a positive and significant effect on village economic resilience. This finding suggests that MSME actors with higher financial knowledge are better equipped to manage income, control expenditures, and make informed financial decisions, thereby enhancing their ability to withstand economic shocks. This result is consistent with previous studies that emphasize the role of financial literacy in strengthening economic stability and resilience. In the context of rural MSMEs, financial education becomes particularly crucial as it reduces dependence on informal credit and improves the effective utilization of financial resources.

This finding is consistent with research conducted by Lusardi and Mitchell [16], which indicates that financial literacy plays a crucial role in enhancing economic resilience and long-term financial well-being. This result is also supported by Shi et al., [31] who argue that individuals with better financial knowledge are more capable of adapting to economic changes and mitigating financial risks, thereby contributing to stronger economic resilience in rural communities.

Risk Management on Interest in Improving Village Economic Resilience

Risk management has a significant influence on improving village economic resilience, as effective risk management practices help village communities anticipate and mitigate potential economic uncertainties. The results of this study show that the ability to identify, evaluate, and manage financial risks such as income instability and market fluctuations supports the sustainability of economic activities at the village level.

The positive effect of risk management on village economic resilience indicates that MSMEs with stronger risk identification and mitigation practices are more capable of sustaining their operations amid uncertainty. This finding aligns with prior research emphasizing that structured risk management enhances resilience by reducing vulnerability to income fluctuations and market instability. In rural settings, where MSMEs face higher exposure to external shocks, effective risk management plays a key role in ensuring business continuity.

This finding aligns with research conducted by Hopkin [23], which states that proper risk management enhances an organization's capacity to withstand economic shocks and maintain stability. Furthermore, this result is supported by Eltweri et al., [42], who emphasize that structured risk management strategies contribute to long-term economic resilience by reducing vulnerability to financial disruptions.

Technology-Based Loan Accessibility on Interest in Improving Village Economic Resilience

Technology-based loan accessibility has a significant influence on improving village economic resilience, as it facilitates easier and faster access to financial capital for village communities. Based on the findings of this study, the availability of digital loan services supports productive economic activities, encourages entrepreneurship, and helps sustain small-scale businesses in villages.

Technology-based loan accessibility emerged as the most influential factor in improving village economic resilience. This result suggests that digital financial services significantly enhance MSMEs' access to capital, enabling them to maintain liquidity and support productive activities. Consistent with earlier studies on fintech and financial inclusion, this finding highlights the transformative role of digital lending in overcoming traditional banking barriers in rural areas. However, the effectiveness of fintech-based loans is closely linked to adequate financial education and risk management, underscoring the need for an integrated policy approach.

This finding is in line with research by Demirgüç-Kunt et al., [43] which shows that digital financial services significantly improve financial inclusion and economic resilience in rural areas. This statement is further supported by Ozili [20] who suggests that improved access to technology-based financial services strengthens economic stability by enabling communities to respond more effectively to economic challenges.

Conclusions

This study examines the influence of financial education, risk management, and technology-based loan accessibility on village economic resilience among culinary MSMEs in Syiah Kuala District, Banda Aceh. The results indicate that all three variables have a positive and significant effect on village economic resilience, both individually and simultaneously, confirming the proposed hypotheses. Among these factors, technology-based loan accessibility emerges as the most dominant contributor, highlighting the importance of digital financial services in supporting business sustainability and economic stability at the village level.

The findings of this study imply that strengthening village economic resilience requires an integrated policy approach. Local governments should prioritize financial education programs specifically designed for culinary MSMEs, focusing on cash flow management, debt control, and digital financial literacy. Additionally, risk management training should be incorporated into MSME development programs to help entrepreneurs anticipate operational and financial uncertainties.

Furthermore, policymakers should promote responsible technology-based lending by improving collaboration between fintech providers, cooperatives, and village authorities. Ensuring that technology-based loans are accessible, affordable, and accompanied by adequate financial guidance will enhance their contribution to sustainable MSME growth rather than increasing financial vulnerability.

This study has several limitations. First, the research focuses only on culinary MSMEs in Syiah Kuala District, which may limit the generalizability of the findings to other sectors or regions. Second, the study relies on cross-sectional data, which does not capture changes in MSME resilience over time. Future research is encouraged to expand the scope to different business sectors and regions, as well as to employ longitudinal designs to better understand the dynamic nature of economic resilience. Additionally, future studies may incorporate qualitative approaches to gain deeper insights into MSME financial behavior and decision-making processes.

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