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Financial Literacy and Financial Inclusion for MSME Financial Behavior: The Strategic Role of E-Wallet Adoption

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ABSTRACT

This study aims to examine the effects of financial literacy and financial inclusion on e-wallet use and their implications for MSME financial behavior, while assessing the strategic role of e-wallet adoption in translating financial capabilities into financial practices. A quantitative cross-sectional survey was conducted with 210 MSME respondents selected using stratified proportional random sampling. Primary data were collected through a five-point Likert-scale questionnaire and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS. All proposed hypotheses were supported. Financial literacy ($\beta = 0.462$; $t = 9.582$; $p < 0.001$) and financial inclusion ($\beta = 0.429$; $t = 8.527$; $p < 0.001$) positively and significantly influenced e-wallet use. E-wallet use had the strongest effect on MSME financial behavior ($\beta = 0.599$; $t = 12.871$; $p < 0.001$). Financial literacy ($\beta = 0.141$) and financial inclusion ($\beta = 0.246$) also significantly affected financial behavior. The findings highlight e-wallet adoption as a strategic mechanism for translating financial capabilities into better MSME financial behavior. Therefore, financial literacy initiatives should be integrated with practical digital financial technology adoption to strengthen MSME financial management.

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INTRODUCTION

Digital transformation is reshaping how MSMEs operate, compete, and manage financial transactions. This issue matters to society because MSMEs provide livelihoods, stimulate local economic activity, and require accessible financial systems to remain resilient. Digital technologies can improve operational efficiency, market reach, and financial connectivity, but these benefits depend on the capacity of business owners to use them effectively. Hendrawan et al. (2024) and Purba (2026) show that digital transformation and e-commerce adoption can strengthen MSME development, while Lamidi et al. (2025) and Rohaeni et al. (2026) demonstrate the growing importance of digital financial technologies for MSME outcomes. Therefore, digitalization should not be viewed merely as technological adoption. It is also a financial capability issue. Understanding how financial literacy, financial inclusion, and e-wallet adoption shape financial behavior is consequently important for strengthening long-term MSME resilience and promoting more inclusive digital economic development.

Financial literacy provides the cognitive foundation for making informed financial decisions, while financial inclusion provides opportunities to access and use appropriate financial services. The Self-Regulation Theory perspective suggests that financial knowledge supports individuals in monitoring, evaluating, and controlling financial decisions, thereby encouraging deliberate financial practices. Recent MSME evidence shows that financial literacy influences financial management and financial behavior (Azizah et al., 2024; Assanniyah & Setyorini, 2024; Muslichuddin et al., 2025). Meanwhile, financial inclusion perspectives emphasize accessibility, availability, affordability, and usability of financial services as conditions for participation in the financial system. Normawati et al. (2024) and Purwati et al. (2025) demonstrate that digital financial literacy and FinTech contribute to MSME financial inclusion. Thus, financial literacy and financial inclusion represent complementary financial capabilities: one strengthens decision-making capacity, while the other expands opportunities to participate in the formal financial system in practice.

E-wallet adoption can be understood through the Stimulus-Organism-Response (S-O-R) framework, in which digital payment technology functions as a stimulus that can alter internal evaluations and produce behavioral responses. For MSMEs, e-wallets may simplify payments, provide transaction histories, and support more organized financial practices. Recent studies indicate that digital payment adoption is connected with MSME financial inclusion and performance (Bohari et al., 2025; Sari & Sari, 2025; Soim et al., 2026; Tarashtwal et al., 2026). Financial behavior represents the practical expression of financial decision-making through planning, recording, controlling, and allocating business resources. From a self-regulation perspective, these behaviors require knowledge and the ability to translate knowledge into consistent financial actions. Ananda et al. (2026) and Pontoh and Lumapow (2026) show that financial literacy and financial technology payments are associated with MSME financial management behavior. Accordingly, e-wallet adoption may constitute an important behavioral mechanism linking financial capabilities with financial practices.

Despite the opportunities created by digital finance, many MSMEs still face difficulties converting financial access and technological availability into effective financial behavior. The central problem is whether MSME owners possess sufficient knowledge, access, and practical capability to use them productively. Digital financial literacy can influence financial inclusion and MSME outcomes, yet adoption may remain uneven across business actors (Normawati et al., 2024; Novrima et al., 2026; Zulhadi & Afdal, 2025). Similarly, digital payment technologies can facilitate financial transactions, but their benefits depend on users' readiness and behavioral adaptation (Hidayati et al., 2026; Husen et al., 2026). This problem is relevant in West Kalimantan, where financial access and financial understanding do not necessarily develop at the same pace. Consequently, examining the relationships among financial literacy, financial inclusion, e-wallet use, and MSME financial behavior is necessary to identify how digital finance can generate meaningful behavioral improvements.

Previous studies have established separate relationships among financial literacy, financial inclusion, digital payments, and MSME outcomes. Azizah et al. (2024) and Assanniyah and Setyorini (2024) emphasize the role of financial literacy in MSME financial behavior and management, while Normawati et al. (2024) and Purwati et al. (2025) highlight connections between digital financial capabilities, FinTech, and inclusion. Other studies focus on payment technologies and their consequences for MSMEs (Bohari et al., 2025; Lamidi et al., 2025; Abiin, 2026). However, this literature examines financial literacy or inclusion as relatively independent predictors, or focuses on financial performance rather than behavioral change. Consequently, the mechanism through which financial literacy and financial inclusion may encourage e-wallet adoption and subsequently influence financial behavior remains insufficiently integrated. Addressing this gap is important because digital financial access may produce limited benefits when financial capabilities and actual usage are considered separately.

Recent research increasingly recognizes that digital financial literacy, financial behavior, and FinTech adoption are interconnected. Rohaeni et al. (2026) identify financial behavior and digital financial literacy as important elements in understanding FinTech adoption and MSME performance, while Hamam et al. (2026) show that financial inclusion can mediate relationships involving financial literacy and technology adoption. Zaimovic et al. (2025) further demonstrate the importance of digital financial literacy in FinTech behavioral adoption, and Prananingrum et al. (2026) highlight the interaction between financial technology, inclusion, and financial literacy in MSME performance. Nevertheless, existing research has not sufficiently clarified whether e-wallet adoption functions as the behavioral bridge between financial capabilities and MSME financial behavior. This study addresses this gap by examining direct relationships and the position of e-wallet use. This model offers an explanation of how financial capabilities become financial behavior for MSMEs specifically.

The novelty of this study lies in positioning e-wallet adoption as a strategic behavioral mechanism that connects financial literacy and financial inclusion with MSME financial behavior. Rather than treating digital payment adoption simply as an outcome of technological readiness, the study conceptualizes it as a pathway through which financial capabilities can be translated into everyday financial practices. The model evaluates the direct effects of financial literacy and financial inclusion on e-wallet use and financial behavior, allowing digital adoption's relative importance to be identified. Focusing on MSMEs in West Kalimantan provides a context in which differences between financial access and understanding can be assessed in an emerging digital economy. This perspective matters because policies that expand financial access without strengthening digital usage may not automatically improve financial behavior. The study therefore seeks to identify an effective pathway for MSME financial empowerment.

Based on the problem and research gap, this study argues that better financial literacy and broader financial inclusion should increase MSMEs' e-wallet use, while greater e-wallet use should encourage more effective financial behavior. Financial literacy and financial inclusion are also expected to exert direct positive effects on MSME financial behavior. These arguments consequently lead to five hypotheses: H1, financial literacy positively affects e-wallet use; H2, financial inclusion positively affects e-wallet use; H3, e-wallet use positively affects MSME financial behavior; H4, financial literacy positively affects MSME financial behavior; and H5, financial inclusion positively affects MSME financial behavior. By testing these relationships simultaneously, the study seeks to explain whether digital payment adoption provides a practical route for converting financial capability and access into better financial practices. The findings should inform MSME policy, digital financial inclusion strategies, and financial education programs and practice.

RESEARCH METHODS

This study employed a quantitative, cross-sectional survey design to examine the effects of financial literacy and financial inclusion on MSME financial behavior, with e-wallet adoption as a mediating variable. A quantitative design was selected because the study tests hypothesized relationships among measurable constructs using statistical analysis. Recent studies support the use of quantitative approaches to examine financial literacy, financial inclusion, and financial behavior among MSMEs (Azizah et al., 2024; Normawati et al., 2024; Aimah et al., 2025). The research was conducted in West Kalimantan, Indonesia, selected because of the substantial MSME population and the increasing relevance of digital financial services in MSME activities.

The population consisted of 225,713 MSMEs in West Kalimantan. Using the Slovin formula with a 7% margin of error, the study obtained a target sample of 210 respondents. To anticipate incomplete or invalid responses, 240 questionnaires were distributed. Proportional stratified random sampling was applied to ensure adequate representation across MSME groups. Primary data were collected through a structured questionnaire using a five-point Likert scale. The instruments measured financial literacy, financial inclusion, e-wallet adoption, and financial behavior, adapting indicators from recent MSME studies (Assanniyah & Setyorini, 2024; Novrima et al., 2026; Widat et al., 2026). Secondary data were obtained from the relevant government agencies, OJK, and previous studies.

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS. The outer model was evaluated through outer loadings (>0.70), AVE (>0.50), Fornell–Larcker and HTMT criteria, Composite Reliability, and Cronbach's Alpha (>0.70). The inner model was assessed using R^2, f^2, Q^2, and SRMR (<0.10). Hypotheses were tested using bootstrapping, with significance determined by *T*-Statistics >1.96 and *P*-Value <0.05. The mediating role of e-wallet adoption was examined through specific indirect effects. These procedures are consistent with recent studies examining FinTech, financial literacy, financial inclusion, and MSME performance (Lamidi et al., 2025; Rohaeni et al., 2026).

RESULTS AND DISCUSSION

Results

Respondent Characteristics

Table 1 presents the characteristics of the respondents included in the analysis. Of the 210 valid respondents, 54.3% were male and 45.7% were female. In terms of age, most respondents were between 26 and 45 years old (52.0%), followed by those aged 17–25 years (39.5%) and 46–60 years (8.1%). The respondents were predominantly from Pontianak (27.8%), followed by Kubu Raya (20.2%) and Kapuas Hulu (19.5%). Regarding education, most respondents had completed senior high school (45.3%), while 33.6% held a bachelor's degree. In terms of business scale, micro-enterprises represented the largest group (56.1%), followed by small enterprises (37.2%) and medium enterprises (6.7%). These characteristics indicate that the sample represents MSME actors with diverse demographic and business backgrounds.

Table 1. Respondent Characteristics

Characteristics	Category	Total	Percentage
Gender	Female	102	45.7%
	Male	121	54.3%
Age	17–25	88	39.5%
	26–45	116	52.0%
	46–60	18	8.1%
Domicile	Kapuas Hulu	44	19.5%
	Pontianak	62	27.8%
	Kubu Raya	45	20.2%
	Sanggau	25	11.2%
	Sintang	35	15.7%
	Melawi	7	3.1%
	Others	5	3.25%
Education	Elementary School	0	0%
	Junior High School	3	1.3%
	Senior High School	101	45.3%
	Diploma	44	19.7%
	Bachelor's Degree	75	33.6%
Business Category	Micro	125	56.1%
	Small	83	37.2%
	Medium	15	6.7%
Total Valid Respondents	**Meet the criteria**	**210**	**94.17%**
	Do not meet the criteria	13	5.83%

Source: Questionnaire Data (2026).

Measurement Model Evaluation

The measurement model was first evaluated to establish the validity and reliability of the constructs before testing the structural relationships. As shown in Table 2, all indicators obtained outer loading values above the recommended threshold of 0.70. The financial literacy indicators ranged from 0.881 to 0.945, while financial inclusion indicators ranged from 0.950 to 0.971. The e-wallet usage indicators ranged from 0.824 to 0.864, and the MSME financial behavior indicators ranged from 0.889 to 0.983. These results demonstrate that all indicators adequately represent their respective latent constructs. Therefore, no indicator required removal based on the outer loading criterion.

Table 2. Validity Testing Based on Outer Loadings

Indicator	Financial Inclusion	Financial Literacy	E-Wallet Usage	MSME Financial Behavior
X1.1		0.908		
X1.10		0.935		
X1.2		0.881		
X1.3		0.923		
X1.4		0.883		

X1.5		0.945		
X1.6		0.916		
X1.7		0.923		
X1.8		0.903		
X1.9		0.924		
X2.1	0.961			
X2.10	0.962			
X2.2	0.958			
X2.3	0.957			
X2.4	0.966			
X2.5	0.970			
X2.6	0.971			
X2.7	0.955			
X2.8	0.950			
X2.9	0.954			
Y.1				0.924
Y.2				0.946
Y.3				0.911
Y.4				0.889
Y.5				0.939
Y.6				0.983
Y.7				0.958
Y.8				0.934
Z.1			0.850	
Z.2			0.824	
Z.3			0.827	
Z.4			0.843	
Z.5			0.864	

As further evidence of convergent validity and internal consistency, Table 3 reports the AVE, Composite Reliability, and Cronbach's Alpha values for each construct. The AVE values range from 0.709 to 0.922, exceeding the minimum criterion of 0.50. Similarly, Composite Reliability values range from 0.924 to 0.992, while Cronbach's Alpha values range from 0.897 to 0.991. Thus, all constructs demonstrate satisfactory convergent validity and reliability and are appropriate for subsequent structural model analysis.

Table 3. Construct Validity and Reliability

Construct	Cronbach's Alpha	Composite Reliability (rho_c)	AVE
Financial Inclusion	0.991	0.992	0.922
Financial Literacy	0.978	0.981	0.836
E-Wallet Usage	0.897	0.924	0.709
MSME Financial Behavior	0.980	0.983	0.876

Discriminant Validity

Discriminant validity was assessed using both the Fornell–Larcker criterion and the HTMT ratio. As presented in Table 4, the square root of AVE for each construct is greater than its correlations with the other constructs. For example, the square root of AVE for financial inclusion is 0.960, exceeding its correlations with financial literacy (0.040), e-wallet usage (0.447), and MSME financial behavior (0.519). A similar pattern is observed for all other constructs. These results indicate that each construct demonstrates adequate empirical distinctiveness from the other constructs in the model.

Table 4. Discriminant Validity Based on the Fornell–Larcker Criterion

Construct	Financial Inclusion	Financial Literacy	E-Wallet Usage	MSME Financial Behavior
Financial Inclusion	**0.960**			
Financial Literacy	0.040	**0.914**		
E-Wallet Usage	0.447	0.479	**0.842**	
MSME Financial Behavior	0.519	0.438	0.776	**0.936**

Note: Diagonal values in bold represent the square roots of AVE.

The results of the HTMT analysis in Table 5 further confirm discriminant validity. All HTMT values are below the conservative threshold of 0.90. The highest value is 0.827 between e-wallet usage and MSME financial behavior, which remains below the recommended threshold. Accordingly, the findings provide additional evidence that the constructs capture conceptually distinct dimensions and that discriminant validity has been established.

Table 5. Discriminant Validity Based on HTMT

Construct	Financial Inclusion	Financial Literacy	E-Wallet Usage
Financial Inclusion	—		
Financial Literacy	0.044	—	
E-Wallet Usage	0.472	0.507	—
MSME Financial Behavior	0.525	0.445	0.827

Structural Model and Hypothesis Testing

After the measurement model satisfied the required validity and reliability criteria, the structural model was evaluated using the bootstrapping procedure. Table 6 presents the direct effects, effect sizes, explanatory power, predictive relevance, and model fit. All five hypothesized relationships are statistically significant, with t-statistics exceeding 1.96 and p-values below 0.05. Financial literacy positively affects e-wallet usage ($\beta = 0.462$, $t = 9.582$, $p < 0.001$), while financial inclusion also has a positive effect on e-wallet usage ($\beta = 0.429$, $t = 8.527$, $p < 0.001$). E-wallet usage demonstrates the strongest direct effect on MSME financial behavior ($\beta = 0.599$, $t = 12.871$, $p < 0.001$).

Table 6. Structural Model and Hypothesis Testing

Hypothesis	Path	β (O)	T-statistics	P-value	f^2	R^2	Q^2	SRMR
H1	Financial Literacy → E-Wallet Usage	0.462	9.582	0.000	0.364	0.413	0.285	0.038
H2	Financial Inclusion → E-Wallet Usage	0.429	8.527	0.000	0.312	—	—	—
H3	E-Wallet Usage → MSME Financial Behavior	0.599	12.871	0.000	0.609	0.655	0.565	—
H4	Financial Literacy → MSME Financial Behavior	0.141	3.186	0.001	0.042	—	—	—
H5	Financial Inclusion → MSME Financial Behavior	0.246	5.030	0.000	0.133	—	—	—

The remaining results in Table 6 show that financial literacy also has a positive and significant direct effect on MSME financial behavior ($\beta = 0.141$, $t = 3.186$, $p = 0.001$), as does financial inclusion ($\beta = 0.246$, $t = 5.030$, $p < 0.001$). The effect-size results indicate that e-wallet usage has the largest substantive effect on MSME financial behavior ($f^2 = 0.609$), followed by financial literacy on e-wallet usage ($f^2 = 0.364$) and financial inclusion on e-wallet usage ($f^2 = 0.312$). In contrast, the direct effect of financial literacy on MSME financial behavior is relatively small ($f^2 = 0.042$). These findings suggest that digital payment adoption represents an important mechanism through which financial capabilities may translate into improved financial behavior.

Furthermore, Table 6 indicates that the model explains 41.3% of the variance in e-wallet usage ($R^2 = 0.413$) and 65.5% of the variance in MSME financial behavior ($R^2 = 0.655$). The Q^2 values of 0.285 and 0.565 are both greater than zero, indicating adequate predictive relevance. The SRMR value of 0.038 is also below the 0.10 criterion, suggesting an acceptable model fit. Overall, the structural model demonstrates adequate explanatory and predictive capability, while the hypothesis-testing results provide empirical support for all five proposed direct relationships.

Discussion

The findings demonstrate that financial literacy significantly and positively influences e-wallet usage among MSMEs in West Kalimantan ($\beta = 0.462$; $t = 9.582$; $p < 0.001$), with a relatively substantial effect size ($f^2 = 0.364$). This result is consistent with recent evidence that financial literacy strengthens MSMEs' ability to understand and utilize digital financial services (Azizah et al., 2024; Sari & Sari, 2025). The finding also extends previous research by showing that financial literacy is not merely associated with conventional financial management but can facilitate the transition toward digital payment practices. The relatively strong coefficient suggests that MSME actors with better financial knowledge are more capable of recognizing the usefulness, risks, and operational benefits of e-wallets. Thus, the contribution of this finding lies in positioning financial literacy as an important behavioral foundation for digital financial adoption rather than treating it solely as an outcome-related capability.

The positive effect of financial inclusion on e-wallet usage ($\beta = 0.429$; $t = 8.527$; $p < 0.001$) further indicates that access to financial services facilitates MSMEs' engagement with digital payments. The finding supports Normawati et al. (2024), who identified digital financial literacy as an important antecedent of financial inclusion and MSME performance, and Purwati et al. (2025), who emphasized the contribution of FinTech to MSME financial inclusion. However, the present result adds an important dimension by demonstrating that financial inclusion can operate as a pathway toward specific digital payment behavior. The R^2 of 0.413 indicates that financial literacy and financial inclusion jointly explain 41.3% of e-wallet usage. This suggests that access alone is insufficient; its behavioral realization depends partly on users' financial capabilities. The finding therefore contributes to the literature by linking financial inclusion directly with e-wallet adoption in the MSME context.

The strongest relationship in the model is the effect of e-wallet usage on MSME financial behavior ($\beta = 0.599$; $t = 12.871$; $p < 0.001$), accompanied by the largest effect size ($f^2 = 0.609$). This finding is consistent with Aflagaly et al. (2025), who reported that e-wallet adoption contributes to MSME financial performance, and Lamidi et al. (2025), who found that payment gateway adoption and digital financial literacy are associated with improved MSME financial outcomes. Nevertheless, the present study provides a different emphasis by demonstrating that the strongest consequence of digital payment adoption occurs at the behavioral level, rather than directly at the performance level. E-wallets can facilitate transaction recording, payment monitoring, and financial organization, potentially encouraging more disciplined financial practices. Theoretically, this finding extends the S-O-R perspective by positioning e-wallet adoption as a digital stimulus capable of transforming MSMEs' financial responses.

Financial literacy also has a positive and significant direct effect on MSME financial behavior ($\beta = 0.141$; $t = 3.186$; $p = 0.001$), although its effect size is relatively small ($f^2 = 0.042$). This finding is consistent with Assanniyah and Setyorini (2024), who found that financial literacy contributes to MSME financial management. Similarly, Ananda et al. (2026) demonstrate that financial literacy remains important in shaping MSME financial management in the digital era, although its effects may not always be straightforward. The relatively weak direct effect found here provides an important qualification to the existing literature: financial knowledge alone may not be sufficient to produce strong behavioral changes. Instead, its practical influence may become stronger when translated into actual digital financial practices. This finding therefore contributes to the literature by identifying a potential behavioral gap between knowing financial principles and applying them through digital financial technologies.

The positive effect of financial inclusion on MSME financial behavior (β = 0.246; t = 5.030; $p < 0.001$) is stronger than the direct effect of financial literacy, as reflected by its larger effect size (f^2 = 0.133 versus 0.042). This result supports Dahrani et al. (2022), who demonstrated the importance of financial literacy and inclusion in MSME financial management, while Hamam et al. (2026) showed that financial inclusion plays an important role in translating financial capabilities and technology adoption into MSME performance. The finding suggests that access to formal financial services can encourage more structured financial practices by integrating MSMEs into formal transaction and financial-management systems. However, the present study advances previous findings by demonstrating that financial inclusion has both a direct behavioral role and a digital adoption dimension, as it simultaneously predicts e-wallet usage. This dual role strengthens the argument that financial inclusion should be understood not only as access but also as an enabler of financial behavior transformation.

Taken together, the findings reveal an important pattern: e-wallet usage has the strongest relationship with MSME financial behavior, while financial literacy has the weakest direct effect. At the same time, financial literacy and financial inclusion both significantly predict e-wallet usage. This pattern is consistent with Rohaeni et al. (2026), who identified financial behavior and digital financial literacy as important elements in the relationship between FinTech adoption and MSME performance, and Novrima et al. (2026), who highlighted the interconnectedness of digital financial literacy, financial inclusion, and financial behavior. The distinctive contribution of this study is therefore its integrated model, which brings these constructs together and empirically demonstrates the strategic position of e-wallet usage within their relationship. The findings suggest that digital payment adoption should not be treated merely as a technological convenience but as a potential behavioral mechanism linking financial capability with MSME financial practices.

The study consequently contributes both theoretically and practically. Theoretically, it extends the literature by integrating financial literacy, financial inclusion, e-wallet usage, and MSME financial behavior into a single explanatory framework, with e-wallet adoption emerging as the most influential behavioral factor. This provides a more nuanced explanation than models focusing solely on financial knowledge or financial access. Practically, the findings indicate that MSME development programs should combine financial literacy education with hands-on digital financial training, rather than implementing the two independently. This recommendation is supported by Hidayati et al. (2026), who found that digital financial literacy and government support influence MSME financial performance through digital payment adoption, and Zaimovic et al. (2025), who highlighted the role of digital financial literacy in FinTech behavioral adoption. The novelty therefore lies in demonstrating that strengthening financial capability becomes more meaningful when converted into actual digital financial practices through e-wallet adoption.

CONCLUSION

This study concludes that financial literacy and financial inclusion significantly strengthen e-wallet usage and MSME financial behavior, with e-wallet usage demonstrating the strongest effect on financial behavior ($\beta = 0.599$). The key lesson is that financial knowledge and access to financial services become more meaningful when translated into actual digital financial practices. Scientifically, this study contributes an integrated perspective by positioning e-wallet adoption as a strategic behavioral mechanism connecting financial capabilities with MSME financial behavior, thereby extending existing discussions of financial literacy, financial inclusion, and digital finance. However, the study is limited by its cross-sectional design, self-reported questionnaire data, and focus on MSMEs in West Kalimantan, which may restrict causal interpretation and broader generalization. Future research should employ longitudinal or mixed-method designs, include MSMEs from other regions, and examine additional factors such as digital financial literacy, perceived risk, trust, digital competence, and technological readiness to provide a more comprehensive explanation of MSMEs' digital financial behavior.

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