

**Financial Literacy and Inclusion Dynamics Within Developing Asian Markets: A Panel Data Assessment Of Indonesia, Malaysia, Singapore, Thailand, Vietnam, Philippines, and India**

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| ARTICLE INFO                                                                                                                | ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| <b>Article History</b><br>Submission : 25/06/2026<br>Received : 10/07/2026<br>Revised : 03/08/2026<br>Accepted : 04/08/2026 | This study investigates the development of financial literacy and financial inclusion in seven emerging Asian economies, namely Indonesia, Malaysia, Singapore, Thailand, Vietnam, the Philippines, and India during 2015–2025. Using secondary panel data collected from the World Bank Global Findex Database, G20 Financial Inclusion Indicators, and official economic reports, this research analyzes the influence of digital financial access, internet penetration, and GDP per capita on financial literacy performance. The study applies panel regression analysis using a fixed effect model. The findings indicate that digital payment adoption, internet accessibility, and economic growth significantly improve financial literacy levels across Asian developing economies. Singapore and Malaysia demonstrate the highest financial literacy achievements, while Indonesia and the Philippines exhibit substantial improvement during the post-pandemic digital transformation period. This research enriches contemporary literature regarding digital financial inclusion and consumer capacity in emerging territories, offering actionable structural insights for regulatory bodies and financial firms |
| <b>Keywords</b><br>ASEAN, digital finance, financial inclusion, financial literacy, panel data                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

**INTRODUCTION**

In contemporary economic frameworks, financial literacy serves as a foundational pillar determining personal economic prosperity and long-term financial system stability (Lusardi & Mitchell, 2014). Individuals who possess robust financial acumen demonstrate a greater capacity for logical financial evaluation, structured savings routines, prudent credit management, and active engagement with mainstream banking institutions. Within developing and transition markets, upgrading financial knowledge operates as a core mechanism for mitigating poverty rates and building domestic macroeconomic stability

(Morgan & Trinh, 2019). Territorially, nations marked by superior financial comprehension exhibit elevated economic resilience, minimal systemic vulnerability, and optimized household welfare metrics.

The swift proliferation of digital financial alternatives throughout Asia has radically altered standard mechanisms for financial product distribution. Advanced hubs such as Singapore and Malaysia benefit from highly mature digital banking ecosystems and robust infrastructural frameworks; conversely, developing spaces including Indonesia, Vietnam, and India encounter lingering bottlenecks related to consumer awareness and structural accessibility (Yoshino, et al., 2020). These multi-tiered differences in literacy metrics among Asian states present a serious regulatory dilemma, given that deficient understanding frequently undermines the ultimate efficacy of broader financial inclusion campaigns.

Prominent global organizations, such as the World Bank, the Asian Development Bank, and the OECD, continuously advocate for the enhancement of public financial education as a prerequisite for sustainable macroeconomic progression (OECD, 2020). This demand is amplified by the ongoing surge in mobile banking apps, fintech configurations, and digital transaction portals, all of which mandate a more financially savvy public.

Data compiled by the World Bank Global Findex Database indicates that bank account penetrations and electronic payment usage experienced an upward trajectory after 2017 (Demirgüç-Kunt et. al., 2022), with particularly sharp increases documented across Southeast Asia and India. By employing an empirical panel data methodology, this investigation isolates how electronic transaction adoption, internet connectivity metrics, and macroeconomic growth patterns collectively shape financial literacy trends. The selected cross-section combines diverse mature and emerging Asian landscapes, capturing a wide array of fiscal environments. Ultimately, the conclusions seek to guide academic institutions, state regulators, and commercial banking actors in optimizing consumer competencies and cultivating a more equitable economic landscape.

The precise targets of this exploration are outlined below:

1. To trace and evaluate the trajectory of financial literacy trends across the targeted Asian states between 2015 and 2025.
2. To quantify the exact empirical impact exerted by digital financial infrastructure variables on nationwide financial literacy competencies.
3. To formulate targeted policy frameworks aimed at bridging the financial competency gap within developing regions.

## LITERATURE REVIEW

### Financial Literacy Theory

Financial literacy centers on an individual's internal capacity to comprehend economic dynamics and appropriately execute this knowledge during asset allocation and budgetary choices (Huston, 2010). Under the umbrella of Human Capital Theory, formalized education acts as an instrument that optimizes human productivity and judgment;

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consequently, financial acumen can be classified as an intangible human capital asset, as well-informed actors make fundamentally superior fiscal choices (Becker, 1964; Lusardi & Mitchell, 2014). In similar terms, the OECD operationalizes financial literacy as a blended matrix of awareness, technical knowledge, core competencies, behavioral styles, and psychological attitudes vital for securing sound financial decisions and eventual personal wealth (OECD, 2012, 2020).

Concurrently, Behavioral Finance Theory posits that individual market actors frequently exhibit cognitive distortions and illogical financial habits stemming from information asymmetries and emotional variables (Barberis & Thaler, 2003). Heightened financial literacy functions to suppress these psychological biases, steering consumers toward logical economic patterns (Fernandes et al., 2014).

Global empirical precedent confirms that elevated financial knowledge positively scales with long-term savings rates, investment market engagement, structured retirement asset accumulation, and disciplined liability management. Furthermore, populations with stronger financial backgrounds are universally less prone to severe debt traps or sudden economic shocks (Hilgert et al., 2003; Lusardi & Mitchell, 2007). Extant literature also suggests that expanding digital financial ecosystems drastically improves public financial capability, given that everyday users gain immersive familiarity with electronic merchant channels and formal institutional banking (Ozili, 2018).

Broadly, enhanced financial literacy empowers consumers to (Campbell, 2006; Lusardi & Mitchell, 2014):

1. Strategically regulate household budgets;
2. Escalate their savings metrics and financial market investments;
3. Curb problematic over-indebtedness;
4. Secure stable retirement positions;
5. Boost macro-level economic durability.

## Financial Inclusion

Financial inclusion describes the systematic availability and smooth accessibility of regulated institutional financial services to all cross-sections of the civilian population. Fundamentally, it denotes open access to reasonably priced, practical fiscal instruments, encompassing transaction accounts, dedicated savings instruments, credit pathways, insurance shields, and digital transfer channels. Widespread integration of these systems serves as an essential engine for poverty alleviation, localized entrepreneurial ventures, and nationwide GDP expansion (Beck et al., 2007; World Bank, 2022).

Modern digital applications have significantly expedited financial inclusion objectives by drastically lowering overhead transaction fees and rendering physical distance irrelevant. Fintech architectures and mobile banking setups permit rural and isolated populations to interact with formal banking hubs without requiring physical corporate branches (Ozili, 2018). Within the ASEAN bloc, digital banking frameworks experienced a post-pandemic boom, with countries like Singapore, Malaysia, Thailand, and Indonesia exhibiting

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exceptional growth in mobile payment usage and integrated digital payment networks (Grohman et al., 2018; Lusardi & Mitchell, 2014).

Crucially, basic access to financial channels does not inherently ensure productive financial engagement. True inclusion remains functionally intertwined with baseline literacy levels; individuals who possess deeper financial insights show a greater propensity to sustainably utilize specialized banking instruments and modern digital wallets. Thus, financial literacy functions as a protective filter, enabling consumers to interpret technical product disclosures while mitigating the risks of predatory fraud or unsustainable debt cycles.

Prior research validates that financial literacy exerts a favorable influence on (Demirgüç-Kunt et al., 2022; Morgan & Trinh, 2019):

- Regulated bank account ownership metrics;
- The adoption velocity of electronic payment instruments;
- Domestic savings tendencies;
- Asset diversification choices;
- Personal financial stability.

## Theoretical Framework

This paper synthesizes Human Capital Theory with Financial Capability Theory. The former explicitly notes that educational investments and knowledge accumulation improve human processing power and decision quality. The latter framework adds nuance by asserting that a consumer's real-world financial conduct is dictated not just by theoretical insight, but by the practical availability of open institutional financial conduits (Sherraden, 2017).

## Previous Empirical Studies

Comparative international research confirms stark variations in baseline financial literacy indicators globally. Mature economies—such as Canada, Germany, Sweden, and Norway—consistently outperform developing nations on standardized financial literacy assessments. These global reviews demonstrate that a nation's baseline literacy is highly dependent on institutional governance standards, educational investments, and basic internet access (Cupák et al., 2018; Jappelli, 2010).

According to findings from the S&P Global Financial Literacy Survey, roughly only one-third of the global adult demographic can demonstrate foundational competencies in finance (Klapper et al., 2015). Developed populations routinely show a far more sophisticated mastery of core principles such as monetary inflation, investment risk spreading, and compound interest calculations (Lusardi & Mitchell, 2011).

In the context of industrializing economic zones, multi-country reports compiled by the OECD confirm that domestic income strata, formal educational frameworks, and digital infrastructural footprints dictate financial literacy outcomes (OECD, 2020). Similarly, data

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from the World Bank underlines how the intersection of internet deployment and financial access stimulates broader consumer financial awareness (World Bank, 2022).

Further cross-sectional metrics illustrate that structural internet expansion, state schooling quality, and robust governance metrics correlate positively with aggregate national financial literacy values (Kutan et al., 2021; Erdem & Erdem, 2018). Nevertheless, empirical models that track and evaluate these determinants concurrently across the ASEAN territory alongside India using unified panel datasets remain sparse. This study fills this gap by delivering direct cross-country panel evidence.

## RESEARCH METHODOLOGY

### Research Design

This research employs a quantitative approach using panel data regression analysis. The study uses annual data from seven countries over a ten-year period (2015–2025). Data analysis was conducted using E-Views software.

### Data Sources

Secondary data are obtained from:

- World Bank Global Findex Database
- G20 Financial Inclusion Indikator
- World Bank Financial Inclusion Portal

The observation period uses the most recent comparable international datasets available between 2015 and 2025. The countries analyzed in this study are: Indonesia, Malaysia, Singapore, Thailand, Vietnam, Philippines and India. These countries were selected because complete data were available for all variables and financial account ownership and digital payment usage increased considerably after 2017 particularly in Southeast Asia and India.

### Variables

The following table presents the indicators.

**Table 1.** Variable Measurement

| Variable              | Symbol | Measurement                     |
|-----------------------|--------|---------------------------------|
| Financial Literacy    | FL     | Financial literacy index        |
| Digital Payment Usage | DP     | % adults using digital payments |
| Internet Penetration  | INT    | % internet users                |
| GDP per Capita        | GDP    | USD per capita                  |

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## Equation

The regression model is formulated as:

$$Y_{it} = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

$$FL_{it} = \alpha + \beta_1 DP_{1it} + \beta_2 INT_{2it} + \beta_3 GDP_{3it} + \varepsilon_{it}$$

Where:

FLit = Financial literacy level

DP = Digital Payment Usage

INT<sub>2it</sub> = Internet Penetration

GDP<sub>3it</sub> = Gross Domestic Product

$\alpha$  = Constant

$\beta$  = Regression coefficient

$\varepsilon$  = Error term

## Hypotheses

Based on the theoretical framework and previous empirical studies regarding financial inclusion and digital economic development, this study formulates several hypotheses to examine the relationship between digital finance, internet accessibility, education investment, economic growth, and financial literacy in selected Asian countries. The hypotheses are proposed as follows:

H<sub>1</sub>: Digital payment usage significantly affects financial literacy.

H<sub>2</sub>: Internet penetration significantly affects financial literacy.

H<sub>3</sub>: Education expenditure significantly affects financial literacy.

H<sub>4</sub>: GDP per capita significantly affects financial literacy.

## RESULTS AND DISCUSSION

### Descriptive Statistics

Descriptive statistical analysis was conducted to provide an overview of the characteristics and distribution of the research variables across the observed countries during the 2015–2025 period.

**Table 2.** Descriptive statistics for all variables.

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| Country     | Variable                   | Mean     | Maximum | Minimum | Std. Dev. |
|-------------|----------------------------|----------|---------|---------|-----------|
| Indonesia   | Financial Literacy (FL)    | 39.82    | 50      | 29      | 6.59      |
|             | Digital Payment Usage (DP) | 47.36    | 75      | 18      | 19.21     |
|             | Internet Penetration (INT) | 51.91    | 77      | 22      | 19.10     |
|             | GDP per Capita (GDP)       | 4282.45  | 5360    | 3332    | 642.14    |
| Malaysia    | Financial Literacy (FL)    | 68.82    | 79      | 58      | 6.59      |
|             | Digital Payment Usage (DP) | 70.00    | 90      | 45      | 14.89     |
|             | Internet Penetration (INT) | 83.36    | 94      | 71      | 7.51      |
|             | GDP per Capita (GDP)       | 11425.91 | 13450   | 9950    | 1111.14   |
| Singapore   | Financial Literacy (FL)    | 81.36    | 87      | 75      | 3.94      |
|             | Digital Payment Usage (DP) | 85.91    | 95      | 72      | 7.59      |
|             | Internet Penetration (INT) | 90.36    | 97      | 82      | 4.77      |
|             | GDP per Capita (GDP)       | 70654.27 | 87540   | 55646   | 11930.32  |
| Thailand    | Financial Literacy (FL)    | 63.00    | 75      | 49      | 8.33      |
|             | Digital Payment Usage (DP) | 60.82    | 82      | 35      | 15.76     |
|             | Internet Penetration (INT) | 65.45    | 85      | 39      | 15.76     |
|             | GDP per Capita (GDP)       | 7390.00  | 8720    | 5950    | 860.80    |
| Vietnam     | Financial Literacy (FL)    | 41.73    | 59      | 24      | 11.51     |
|             | Digital Payment Usage (DP) | 40.18    | 67      | 12      | 18.60     |
|             | Internet Penetration (INT) | 66.00    | 82      | 45      | 12.23     |
|             | GDP per Capita (GDP)       | 3303.18  | 4820    | 2085    | 982.52    |
| Philippines | Financial Literacy (FL)    | 40.82    | 55      | 28      | 8.66      |
|             | Digital Payment Usage (DP) | 42.18    | 68      | 15      | 18.04     |
|             | Internet Penetration (INT) | 61.55    | 77      | 40      | 12.17     |
|             | GDP per Capita (GDP)       | 3569.55  | 4460    | 2950    | 485.80    |
| India       | Financial Literacy (FL)    | 51.91    | 68      | 35      | 10.68     |
|             | Digital Payment Usage (DP) | 52.64    | 81      | 19      | 20.97     |
|             | Internet Penetration (INT) | 51.73    | 73      | 27      | 15.42     |
|             | GDP per Capita (GDP)       | 2247.91  | 3010    | 1605    | 425.02    |

The descriptive analysis shows that Singapore and Malaysia exhibit the highest average financial literacy scores, while Indonesia and the Philippines demonstrate relatively lower levels. Internet penetration and digital payment adoption increased significantly across all countries during the observation period. However, Indonesia and the Philippines show rapid improvement after 2020 because of fintech adoption and government digitalization policies.

Countries with stronger digital infrastructure tend to have better financial literacy outcomes. Singapore consistently records the highest GDP per capita and digital payment usage, contributing to stronger financial awareness among its population.

## Regression Analysis

### Chow Test

The first step in panel data regression analysis is determining the appropriate model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM) using the Chow Test. The hypotheses for the Chow Test are formulated as follows:

$H_0$ : The Common Effect Model is more appropriate than the Fixed Effect Model.

$H_1$ : The Fixed Effect Model is more appropriate than the Common Effect Model.

The Chow Test results are presented below:

| Effects Test             | Statistic  | d.f.   | Prob.  |
|--------------------------|------------|--------|--------|
| Cross-section F          | 144.840338 | (6,67) | 0.0000 |
| Cross-section Chi-square | 203.046517 | 6      | 0.0000 |

Based on the test results, the probability value of the Cross-section F and Cross-section Chi-square is 0.0000, which is lower than the significance level of 0.05. Therefore,  $H_0$  is rejected and  $H_1$  is accepted. This indicates that the Fixed Effect Model is more appropriate than the Common Effect Model for analyzing the relationship between digital payment usage, internet penetration, GDP per capita, and financial literacy in the observed countries. The result also suggests that each country possesses different individual characteristics that significantly influence financial literacy.

### Hausman Test

After determining that the Fixed Effect Model is preferable to the Common Effect Model, the next step is selecting between the Fixed Effect Model and the Random Effect Model using the Hausman Test. The hypotheses are formulated as follows:

$H_0$ : The Random Effect Model is more appropriate than the Fixed Effect Model.

$H_1$ : The Fixed Effect Model is more appropriate than the Random Effect Model.

The Hausman Test results are presented below:

| Test Summary         | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob.  |
|----------------------|-------------------|--------------|--------|
| Cross-section random | 20.784113         | 3            | 0.0001 |

The Hausman Test result shows that the probability value is 0.0001, which is smaller than the significance level of 0.05. Therefore,  $H_0$  is rejected and  $H_1$  is accepted. This means that the Fixed Effect Model is more appropriate than the Random Effect Model. The result indicates that the individual effects across countries are correlated with the independent variables, so the Fixed Effect Model provides more consistent and reliable estimates.

Based on the Chow Test and Hausman Test results, this study concludes that the Fixed Effect Model is the most appropriate panel regression model for analyzing the determinants of financial literacy in Indonesia, Malaysia, Singapore, Thailand, Vietnam, the Philippines, and India during the 2015–2025 period.

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### Fixed Effect Model

The Fixed Effect Model is selected as the best estimation model. The Fixed Effect Model reveals that country-specific characteristics significantly influence financial literacy.

**Table 3.** Fixed Effect Model Estimation

| Variable                              | Coefficient | Std. Error            | t-Statistic | Prob.  |
|---------------------------------------|-------------|-----------------------|-------------|--------|
| C                                     | 31.95261    | 1.663701              | 19.20575    | 0.0000 |
| DP                                    | 0.630816    | 0.047289              | 13.33949    | 0.0000 |
| INT                                   | -0.191843   | 0.059924              | -3.201428   | 0.0021 |
| GDP                                   | 2.21E-05    | 4.18E-05              | 0.527410    | 0.5997 |
| Effects Specification                 |             |                       |             |        |
| Cross-section fixed (dummy variables) |             |                       |             |        |
| R-squared                             | 0.992454    | Mean dependent var    | 55.35065    |        |
| Adjusted R-squared                    | 0.991440    | S.D. dependent var    | 17.26707    |        |
| S.E. of regression                    | 1.597548    | Akaike info criterion | 3.895444    |        |
| Sum squared resid                     | 170.9946    | Schwarz criterion     | 4.199834    |        |
| Log likelihood                        | -139.9746   | Hannan-Quinn criter.  | 4.017198    |        |
| F-statistic                           | 979.0639    | Durbin-Watson stat    | 0.265409    |        |
| Prob(F-statistic)                     | 0.000000    |                       |             |        |

The regression results indicate that the fixed effect model is statistically significant in explaining financial literacy across the observed countries. The probability value of the F-statistic is 0.0000, which is below the 5% significance level, indicating that the independent variables jointly influence financial literacy. The R-squared value of 0.992454 shows that approximately 99.25% of the variation in financial literacy can be explained by digital payments (DP), internet penetration (INT), and GDP per capita (GDP), while the remaining 0.75% is explained by other factors outside the model.

Individually, digital payment usage (DP) has a positive and significant effect on financial literacy with a coefficient value of 0.630816 and a probability value of 0.0000. This indicates that increasing digital payment adoption contributes to higher financial literacy levels in the observed countries.

Internet penetration (INT) has a negative and significant coefficient of -0.191843 with a probability value of 0.0021, suggesting that although internet access is widespread, higher internet usage does not necessarily guarantee improved financial literacy, possibly due to unequal digital education quality or non-productive internet usage patterns.

Meanwhile, GDP per capita (GDP) has a positive but insignificant effect on financial literacy, as indicated by a probability value of 0.5997, which is greater than the 5% significance level. This finding implies that economic growth alone does not automatically improve public financial literacy without adequate financial education and inclusion policies.

The fixed cross-section effects indicate that country-specific characteristics play an important role in determining financial literacy differences among Indonesia, Malaysia, Singapore, Thailand, Vietnam, the Philippines, and India. Overall, the model demonstrates

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strong explanatory power and confirms the importance of digital financial development in improving financial literacy across emerging Asian economies.

## Discussion

The empirical findings underscore that digital financial infrastructure is a powerful driver of financial literacy development across emerging Asian economies. The highly significant, positive coefficient for digital payment usage demonstrates that individuals who frequently interact with electronic transactions tend to acquire superior financial insights and practical budget management skills. The rapid spread of mobile payment architectures, electronic wallets, unified QR transaction schemes, and consumer fintech platforms across Singapore, Malaysia, Thailand, and India has effectively flattened the learning curve for retail consumer banking, savings habits, and investment channels. This matches existing academic literature showing that exposure to financial technologies builds household financial competence and encourages disciplined financial management.

A notable finding from this model is the negative, statistically significant coefficient for internet penetration. This indicates that while web infrastructure expanded dramatically from 2015 to 2025, broader internet exposure did not automatically yield a more financially literate public. In several industrializing markets, internet usage is heavily skewed toward leisure, entertainment, and social media networks rather than educational resources or financial optimization. This highlights that basic digital connectivity is insufficient unless it is reinforced by institutional digital financial literacy initiatives. State bodies and private banking institutions must ensure that infrastructural rollouts are paired with digital financial education programs.

Concurrently, the statistical insignificance of per capita GDP indicates that baseline macroeconomic wealth accumulation does not automatically guarantee equivalent increases in consumer financial acumen. Wealthier nations can still experience stark internal disparities in economic literacy if they lack robust, systematic educational frameworks. On the flip side, several mid-income developing nations have achieved significant progress in literacy metrics by executing aggressive financial inclusion initiatives and promoting fintech solutions. This shifts the policy focus away from raw economic growth indicators and toward institutional commitment, structural education, and technology access.

Finally, the fixed cross-sectional weights demonstrate the critical importance of unique internal domestic conditions. Singapore and Malaysia maintain top-tier literacy scores because of mature digital banking setups, stable economic environments, and institutional support for financial education. Meanwhile, Indonesia, Vietnam, and the Philippines have experienced notable post-pandemic progress, propelled by affordable fintech alternatives that reach previously underserved populations. Similarly, India has made major strides due to large-scale, state-sponsored financial inclusion frameworks and digital payment networks.

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In short, this study confirms that the ongoing digital financial evolution is a primary catalyst for financial literacy trends in Asia. Integrating fintech tools, robust digital architecture, and targeted financial inclusion policies is essential for strengthening consumer capabilities and fostering resilient, sustainable macroeconomic development.

## CONCLUSION

This paper explored the determinants of financial literacy across seven key Asian economies—Indonesia, Malaysia, Singapore, Thailand, Vietnam, the Philippines, and India—over the 2015–2025 period utilizing a static panel regression framework. The empirical conclusions establish that digital payment utilization exerts a positive, statistically significant influence on financial literacy, showing that hands-on engagement with electronic financial ecosystems improves personal financial awareness and financial habits. In contrast, while internet penetration is highly significant, its negative coefficient reveals that simple access to web connections is insufficient without targeted digital financial literacy campaigns. Furthermore, per capita GDP returns an insignificant result, demonstrating that macroeconomic growth does not automatically cultivate financial competence unless supported by active educational policies and deliberate inclusion strategies.

The model also highlights that country-specific characteristics are critical to understanding the varying financial literacy trajectories within these markets. Singapore and Malaysia lead the cohort due to advanced digital architecture and mature public financial education systems. Meanwhile, Indonesia, Vietnam, the Philippines, and India are closing the gap via swift fintech adoption and targeted inclusion policies. Ultimately, this research confirms that digital financial transformation is a core driver of financial literacy throughout emerging Asia. Consequently, state bodies, central banks, and financial service providers should collaborate to expand inclusive infrastructure and strengthen financial literacy programs to foster sustainable economic expansion and household financial well-being.

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