

Integrating TAM and UTAUT to Explain Financial Lending Technology Adoption Intention among Indonesian MSMEs

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Abstract

Technological advancements in finance have expanded financing access for micro, small, and medium enterprises (MSMEs), yet financial lending technology adoption among Indonesian MSMEs remains an important issue. This study empirically tests an integrated TAM–UTAUT model comprising performance expectancy, social influence, facilitating conditions, perceived usefulness, and perceived ease of use, with Attitude Toward Using as the mediating mechanism associated with Behavioral Intention. Data from 416 experienced MSME users were collected through non-probability purposive sampling and analyzed using PLS-SEM in SmartPLS. Results show that performance expectancy, social influence, facilitating conditions, and perceived usefulness have significant positive relationships with attitude, with social influence) and perceived usefulness as the strongest direct predictors. Perceived ease of use has a strong positive relationship with perceived usefulness but does not have a significant direct relationship with attitude. Attitude has a strong positive relationship with behavioral intention. The specific indirect effects through attitude are positive for performance expectancy, social influence, facilitating conditions, and perceived usefulness, and negative for perceived ease of use. These findings suggest that the integrated TAM–UTAUT model helps explain behavioral intention among experienced MSME users, while actual adoption or usage behavior cannot be inferred because actual usage was not directly measured.

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1. Introduction

The rapid and continuous technological transformation in today's digital era is driving significant changes across various sectors, including daily life and the business world (DGT-MOF, 2024b). Technological innovation brings about a faster access to information and drives transformation in various fields, including the financial sector (FSA, 2025). This change is happening alongside an increase in the number of internet users globally. According to data from We Are Social (2024), the number of internet users worldwide reaches 5.5 billion, while the current internet penetration rate in Indonesia is 79.5% (APJII, 2024). Digital transformation has changed the patterns of interaction between society and systems, including in terms of transactions (DGT-MOF, 2024a). Technological innovation in the financial sector, for both individuals and businesses, has driven fundamental changes in financial behavior.

The adoption of financial technology in Indonesia shows an increasing trend, driven by the benefits it offers (CMEA, 2022; CMEA, 2023; DGT-MOF, 2024c; MoCDA, 2024). Statistics show that the national fintech sector is projected to grow by 9.31% between 2025 and 2030, with 300 fintech companies currently registered (AFTECH, 2024). The loan service technology subsector recorded a growth of 29.23% with 98 FSA-licensed providers (FSA, 2024). Financial lending technology offers real benefits due to its payment flexibility, serving as a financing solution for MSMEs, thus supporting business development and expansion (CMEA, 2021; Tambunan et al., 2021).

MSMEs are the backbone of the Indonesian economy, accounting for 99% of all business units and contributing 61% to the national Gross Domestic Product (ICCI, 2025). One of the main challenges still faced by MSMEs is the need for quick and efficient access to financing, and financial technology loans are becoming a relevant alternative (FSA, 2023; Lisnawati, 2023; DGT-MOF, 2024). In line with this, several previous studies have emphasized the importance of collaboration in leveraging financial technology to promote the sustainability and growth of MSMEs. Gupta et al. (2022) and Abbasi et al. (2021) stated that the performance of MSMEs is also positively influenced by financial technology. Ismanto et al. (2023) stated that the development of fintech drives increased access to financing and loan performance for MSMEs. Tambunan et al. (2021) also proved that the use of financial technology such as digital loans significantly supports the growth of MSMEs through increased financial access. Similarly, Marhadi et al. (2024) stated that financial technology can bridge the financing gap for MSMEs.

Nevertheless, according to statistical data from the Indonesian Joint Funding Fintech Association (2020), approximately 46.6 million out of 64 million MSMEs still lack access to funding, whether from banks or other financial institutions (PSA-CGI, 2022). Recent data shows an increase in the number of MSMEs using financial lending technology, reaching 68.7% (AFTECH, 2024). However, the national financial inclusion target has not yet met the set figure of 90% (FSA, 2024). This is most likely due to the financial inclusion index still being at 75.02%, and the financial literacy rate reaching 65.43% (FSA, 2024). A survey by

DNKI also showed that 68.8% of mobile phone users are not yet able to conduct digital transactions independently.

The utilization of financial lending technology by MSMEs is influenced by various factors. Purnamasari et al. (2020) identified that the dominant use of financial technology is influenced by perceived usefulness and ease of use. On the other hand, Nugraha et al. (2021) also showed that the adoption of financial technology is influenced by internal factors, namely the perceived usefulness and ease of use. Davis (1989) explains that the intention to use financial technology is driven by perceived usefulness and ease of use. This aligns with the findings of Rahadian and Thamrin (2023) and Purwani et al. (2024), who identified perceived usefulness and ease of use as the main determinants of the intention to use digital financing services. In the regional context, a study by Nurqamarani et al. (2021) stated that the variables of perceived ease of use and usefulness significantly influence technology adoption decisions. On the other hand, Amnas et al. (2023) and Sultana et al. (2023) found that performance expectancy, facility conditions, effort expectancy, and user behavior have a dominant influence on the adoption of P2P lending services. Studies by Mudjahidin (2021) and Solihat et al. (2023) also showed that social influence, performance expectancy, and facility conditions affect the behavioral intention of MSMEs to adopt P2P lending technology.

Based on a literature review of previous studies on testing factors influencing the adoption of financial technology, most studies generally adopt information systems theories, such as the Technology Acceptance Model (TAM) developed by Davis et al. (1989). However, prior TAM-based studies on MSME lending adoption (e.g., Chin et al., 2021; Purwani et al., 2024) capture only the internal cognitive antecedents of adoption and are unable to explain the role of external social and infrastructural conditions that are particularly salient for MSMEs operating in low-financial-literacy environments. UTAUT alone, on the other hand, does not incorporate the perception-based mechanism (perceived usefulness and ease of use) through which performance expectancy, social influence, and facilitating conditions are translated into a favorable attitude. This study therefore integrates TAM and UTAUT not merely to combine two established models, but to address a specific theoretical gap: explaining how external UTAUT-based antecedents are cognitively processed into attitude via TAM's perception constructs, and what this reveals about MSME lending-technology adoption in a market marked by low financial literacy and inclusion. Additionally, research related to digital financial lending technology is still limited, despite its significant potential to support economic development in Indonesia through digitalization. This study is also expected to provide empirical contributions regarding financial loan behavior by MSMEs in Indonesia that can be utilized by regulators (FSA). It is important to clarify that the sample of this study consists of MSMEs that are current or prior users of financial lending technology, rather than non-users evaluating a first-time adoption decision. Accordingly, the behavioral intention (BI) construct in this study is interpreted as continued-use intention/re-adoption intention among experienced users, not first-time adoption intention.

2. Literature Review

Technology Acceptance Model (TAM)

The framework used in this study refers to the Technology Acceptance Model (TAM) to examine the antecedent determinants of financial technology adoption. The development of TAM is based on the perspective that technology acceptance can be explained through a simple yet effective predictive model (Davis, 1989). TAM was developed to examine how external factors influence individuals' beliefs, attitudes, and intentions, thereby shaping motivation to accept or reject technology (Davis et al., 1989; Chau and Ngai, 2010; Shahzad et al., 2022). Generally, TAM is used to explain technology acceptance through the important roles of perceived ease of use and perceived usefulness, which shape attitudes and behavioral intentions (Davis et al., 1989; Rahadian and Thamrin, 2023). This is supported by Nurqamarani et al. (2021), who confirm the importance of perceived ease of use and perceived usefulness in technology acceptance. Thus, these perception-based factors are used to evaluate technology adoption-related attitudes in this study.

Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) conceptual framework by Venkatesh et al. (2003) is a theoretical model aimed at explaining the variance in behavioral intention toward digital adoption by users. The conceptual framework in this model offers an integrated, broader, and more comprehensive scope in analyzing the determinants of technology adoption (Venkatesh et al., 2011; Septiani et al., 2020). UTAUT is used to analyze and understand how the intensity of technology use in aspects of technology such as financial services (Bajunaied et al., 2023) serves as a factor in adoption decision-making (Kasparova, 2023). Therefore, this study explores more comprehensive determinants through analysis that integrates individual and contextual aspects influencing the adoption of digital-based services.

Integration of TAM and UTAUT

Table 1 maps each construct in the proposed model to its originating theoretical framework and presents the theoretical rationale underlying each hypothesized path. Performance Expectancy, Social Influence, and Facilitating Conditions are adopted from the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) as socio-contextual and normative antecedents of attitude, while Perceived Usefulness and Perceived Ease of Use are adopted from the Technology Acceptance Model (TAM) (Davis et al., 1989) as cognitive-evaluative antecedents.

Rather than treating these five constructs as parallel and undifferentiated predictors of Attitude Toward Using, this study conceptualizes them as two theoretically distinct pathways: a socio-contextual pathway consisting of Performance Expectancy, Social Influence, and Facilitating Conditions, and a cognitive-evaluative pathway consisting of Perceived Usefulness and Perceived Ease of Use. These two pathways converge on Attitude Toward Using, which subsequently predicts Behavioral Intention. Within the cognitive-

evaluative pathway, Perceived Ease of Use is modeled as an antecedent of Perceived Usefulness, consistent with the theoretical proposition of Davis et al. (1989). This relationship reflects the assumption that the ease with which a technology can be used influences users' perceptions of its usefulness. Accordingly, the effect of Perceived Ease of Use on Attitude Toward Using is conceptualized primarily as an indirect effect through Perceived Usefulness, rather than as a direct and independent effect on attitude.

The research uses a descriptive quantitative approach with an associative design, adapting the UTAUT and TAM theories. This approach aims to systematically and accurately measure and analyze how attitudes are associated with the behavioral intention of MSMEs to use financial lending technology. The variables were analyzed empirically using established indicators. Figure 1 represents the empirical model of this research study.

Table 1. Construct and Theoretical Rationale

Construct	Theoretical
Performance Expectancy (PE)	UTAUT (Venkatesh et al., 2003)
Social Influence (SI)	UTAUT (Venkatesh et al., 2003)
Facilitating Conditions (FC)	UTAUT (Venkatesh et al., 2003)
Perceived Usefulness (PU)	TAM (Davis et al., 1989)
Perceived Ease of Use (PEU)	TAM (Davis et al., 1989)
Attitude Toward Using (A)	TAM (Davis et al., 1989)
Behavioral Intention (BI)	TAM & UTAUT

Source: Authors' conceptualization.

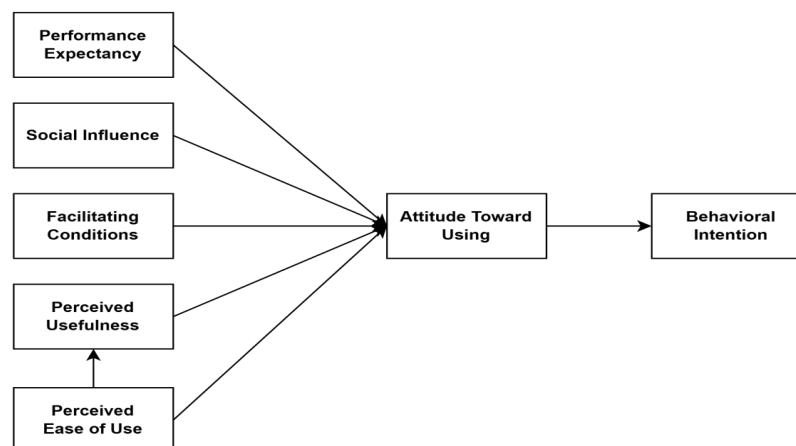


Figure 1. Theoretical Framework
Source: Authors' conceptualization.

Performance Expectancy on Intention to Use

When individuals believe that a technology can provide benefits and improve business performance, they are more likely to develop a favorable attitude toward using it (Venkatesh et al., 2003; Bajunaied et al., 2023), as individuals tend to evaluate technologies according to their contribution to business growth (Solihat et al., 2023). Optimizing technology to align with users' expectations is therefore an important determinant of technology acceptance (Solihat et al., 2023; Savitha et al., 2022; Nawayseh, 2020). Based on these findings, the hypothesis proposed in this study is:

H1: The stronger the performance expectancy, the more positive the attitude toward using financial lending technology among MSMEs.

Social Influence on Attitude Toward Using

Social influence refers to the extent to which an individual's technology acceptance is influenced by people or groups in their social environment, which can shape perceptions and encourage technology use (Venkatesh et al., 2003; Venkatesh et al., 2011; Amnas et al., 2023). This factor can also shape behavioral expectations and motivation to use technology (Savitha et al., 2022; Azman and Zabri, 2022). In the context of technology use, interactions with family, peers, communities, and relevant organizations can influence users' attitudes toward financial technology (Chau and Ngai, 2010; Aldhi et al., 2024). Based on these findings, the hypothesis is as follows:

H2: The stronger the social influence, the more positive the attitude toward using financial lending technology among MSMEs.

Facilitating Conditions on Attitude Toward Using

Facilitating conditions refer to the extent to which individuals believe that adequate resources and infrastructure are available to support system use (Venkatesh et al., 2003). Available facilities, technical support, and a supportive environment can enhance users' confidence and comfort in using technology (Solihat et al., 2023; Mudjahidin et al., 2021; Marhadi et al., 2024). However, previous studies report mixed findings regarding the role of facilitating conditions in technology adoption (Abdullah et al., 2020; Azman and Zabri, 2022; Bajunaied et al., 2023; Tariq et al., 2024; Solihat et al., 2023; Aldhi et al., 2024). This suggests that the influence of facilitating conditions may be context-dependent. Based on these arguments, this study proposes the following hypothesis:

H3: The stronger the facilitating conditions, the more positive the attitude toward using financial lending technology among MSMEs.

Perceived Usefulness on Attitude Toward Using

Perceived usefulness refers to a person's belief that using a particular system will improve job performance (Davis et al., 1989). Perceived usefulness is a key cognitive determinant that shapes users' evaluations of technology and their intention to use it (Putri et al., 2023; Rahadian and Thamrin, 2023). In financial technology services, perceived usefulness is also an important determinant of

technology acceptance and usage intention (Singh et al., 2020; Wijaya et al., 2025). Based on this literature, the hypothesis in this study is as follows:

H4: The stronger the perceived usefulness, the more positive the attitude toward using financial lending technology among MSMEs.

Perceived Ease of Use on Perceived Usefulness and Attitude Toward Using

Perceived ease of use is the degree to which an individual believes that a system can be used without requiring much effort (Davis et al., 1989). When users perceive an application as easy to use, this can improve their evaluations of the technology (Van der Heijden, 2004; Shahzad et al., 2022). Previous studies also indicate that perceived ease of use can influence technology acceptance through perceived usefulness (Purnamasari et al., 2020; Widyanto et al., 2022; Rahadian and Thamrin, 2023). However, Chin et al. (2021) and Adamek and Solarz (2023) report that perceived ease of use may not have a significant direct effect when perceived usefulness is considered. Based on this rationale, the following hypotheses are proposed:

H5a: The stronger the perceived ease of use, the greater the perceived usefulness of financial lending technology among MSMEs.

H5b: The stronger the perceived ease of use, the more positive the attitude toward using financial lending technology among MSMEs.

The Influence of Attitude on Intention to Use

Attitude toward using is defined as an individual's tendency to accept or reject the adoption of technology (Rahadian and Thamrin, 2023). Attitude toward using serves as the primary determinant of behavioral intention to take concrete action in technology adoption (Davis et al., 1989). A positive attitude toward technology reflects cognitive and affective evaluations that influence users' perceptions and the intensity with which they use it. Findings from the literature review indicate that attitude toward use is a dominant factor mediating between individual perceptions and actual adoption intention (Jackson et al., 1997). Usage attitude plays an important role as a critical mediating mechanism connecting views with technology adoption intentions, where perceived ease of use and usefulness are key factors that act as important catalysts (Chau and Ngai, 2010; Khatri et al., 2020; Nurqamarani et al., 2021). Personal attitudes and subjective norms tend to have a stronger influence on behavioral intention to use, which is an important indicator of an individual's readiness to take concrete action (Davis et al., 1989; Brown et al., 2010; Diéguez et al., 2023; Aldhi et al., 2024). In the context of technology, a positive evaluation of technology services increases individual confidence, ultimately boosting adoption intention (Khatri et al., 2020; Dieguez et al., 2023). Based on this view, this study will examine other factors in financial lending technology that drive adoption attitudes. Therefore, the hypothesis proposed for this study is:

H6: The higher the attitude toward usage, the more it will increase the intention to adopt financial lending technology by MSMEs.

3. Research Methods



This study aims to examine the issue more comprehensively by adopting the Unified Theory of Acceptance and Use of Technology (UTAUT) framework together with TAM. Primary data were collected through an online questionnaire survey. The questionnaire consisted of two parts: (1) general characteristics of respondents, and (2) measurement items using a 5-point Likert scale, ranging from 1 “Strongly Disagree” to 5 “Strongly Agree.” All latent constructs in this study (PE, SI, FC, PU, PEU, A, and BI) were measured reflectively, consistent with established measurement approaches in UTAUT and TAM (Venkatesh et al., 2003; Davis, 1989). The indicators were systematically arranged in the survey, starting with respondent information and followed by the measurement items for each construct. Before distribution, the questionnaire was first tested with lecturers and professionals to identify spelling errors, ambiguity, or other wording issues that could lead to misinterpretation. The feedback was used to revise the questionnaire. After the revisions, the questionnaire was distributed to potential respondents who met the eligibility criteria.

The measurement of Performance Expectancy indicators (usefulness at work, business development, time and effort saving, and performance improvement) and Social Influence indicators (our community, senior management, and our organizations) was adapted from Venkatesh et al. (2003). Facilitating Conditions indicators (facilities and support, required knowledge, available assistance, and technical support) were adapted from Venkatesh et al. (2012). Perceived Usefulness indicators (job performance, improve business productivity, effectiveness, easier to get fund, and useful for business) and Perceived Ease of Use indicators (easy to understand, clear and understandable, easy to use, and features suited to user needs) were adapted from Davis (1989). Attitude Toward Using was measured using the indicators really want, satisfying, and right decision. Behavioral Intention to Use was measured using the indicators want to use, will use, and will suggest. Measurement items were adapted from established studies to support construct validity and reliability. All measurement items were translated into Indonesian to ensure clarity and ease of understanding for respondents. The abbreviated indicator labels used in the analysis tables are short labels corresponding to the full questionnaire statements reported in Appendix A.

Data collection was conducted online during September 2025 through the distribution of survey links via Telkomsel's MSME digital channel and partner community networks. Of the 600 responses received, 184 were excluded during screening because they did not meet the eligibility criteria stated above—specifically, respondents who were not MSME actors and/or had never taken out a loan or received business funding from a financing/technology-based institution—resulting in a final usable sample of 416 valid responses. No incomplete or duplicate responses were identified among the remaining data. Data collection and cleaning were carried out by the research team prior to statistical analysis.

The main focus of this research is directed toward MSMEs in Indonesia, considering the relatively low level of financial inclusion and literacy among MSMEs. Therefore, an analysis is needed that considers various internal and external factors that could potentially influence behavioral intention to use financial lending technology. The main target of the research is

MSMEs in Indonesia with specific characteristics determined using the non-probability purposive sampling technique as follows: (1) Respondents are MSMEs, (2) Respondents are currently using or have used financial lending/funding technology for at least one business cycle (continued-use/experienced-user population), (3) Respondents are currently or have previously received business funding from one of the technology-based institutions, companies, or banks, (4) The financing company/bank is a company that uses or operates in the field of financial loan technology.

The data obtained from respondents were processed systematically using statistical tools to describe the phenomenon and examine the factors associated with behavioral intention to use financial lending technology services among MSMEs in Indonesia. Data processing was performed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with SmartPLS. The structural model was used to test the predictive relationships among PE, SI, FC, PU, PEU, A, and BI. Because Attitude Toward Using (A) is theoretically positioned as a mechanism through which the antecedent constructs may relate to Behavioral Intention (BI), this study additionally examined the specific indirect effects of PE, SI, FC, PU, and PEU on BI through A. These indirect effects were calculated as the product of the relevant structural path coefficients. No full- or partial-mediation classification was made because the corresponding direct paths from the antecedent constructs to BI were not estimated in the original structural model.

4. Results

Demographic Characteristics of the Sample

This study surveyed 416 MSMEs in Indonesia who have adopted financial lending technology for business funding. Participants included respondents from different regions in Indonesia, with the most dominant percentage on the islands of Java (65.6%) and Sumatra (19.7%), and the respondent composition was dominated by women (53.6%). Regarding the educational background of MSMEs in adopting financial loan technology, the majority have completed high school (41%) and diploma/bachelor's degrees (47%). From an experience perspective, almost half of the MSMEs using financial loan applications for their businesses have been using them for less than one year (53.6%). The most common type of business operates in the trade sector (72.4%), followed by services, agriculture, industry, and others. Most MSMEs have an annual income of less than Rp 2 billion (micro-business enterprises). These findings are comprehensively summarized in Table 2, which illustrates the profile of MSMEs using financial loan technology, both in terms of demographics and business aspects, spread across various sectors and regions in Indonesia.

findings presented in the table reveal key patterns in the demographic characteristics and business aspects of MSMEs who are users of financial loan technology in Indonesia. Based on gender distribution, survey respondents were predominantly female, reflecting the role of women in business management across various regions. The financial literacy of loan application users is quite good among MSMEs, as evidenced by the fact that the majority of

them have a high school or diploma/bachelor's degree. However, most business owners are new users with less than one year of experience. This indicates that, despite the business being long-established, the use of fintech as a new financing solution has only recently been significantly adopted. Consistent with the findings of Tambunan et al. (2021), this study shows that digital transformation in the context of access to financing among MSMEs, although still in its early stages, has already had a real impact in driving business growth and expansion through faster and more effective access to capital. From a business type perspective, the majority of MSMEs are in the trade sector, which aligns with the trend of small businesses in Indonesia. From a revenue perspective, most business owners recorded annual sales of up to Rp 2 billion, which is consistent with the characteristics of micro and small businesses in Indonesia. Therefore, in running and developing a business, support and assistance are needed from various sides, one of which is in accessing business capital.

Table 2. Demographic characteristic of the sample group

Demographic characteristics	Business Information	Frequency	Percentage
Business Region	Sumatra	82	19.7
	Jawa	273	65.6
	Kalimantan	24	5.8
	Sulawesi	19	4.6
	Bali - Nusa Tenggara	16	3.8
	Maluku – Papua	2	0.5
		416	100
Gender	Male	193	46.4
	Female	223	53.6
		416	100
Education	Not attending school	3	1
	Elementary School	4	1
	Junior High School	13	3
	Senior High School	172	41
	Diploma / Bachelor's Degree	194	47
	Master's Degree	30	7
		416	100
Experience	Less than 1 year	223	53.6
	1 - 3 years	152	36.5
	2 - 5 years	24	5.8
	More than 5 years	17	4.1
		416	100
Average annual income	Less than Rp 2 Billion	368	88.5
	Rp 2 - 15 Billion	42	10.1
	Rp 15 - 50 Billion	4	1
	More than Rp 50 Billion	2	0.5
		416	100
Type of Business	Service	54	13
	Trade	301	72.4
	Agriculture	16	3.8
	Industries	22	5.3
	Others	23	5.5
		416	100

Descriptive Statistics of the Main Research Variables

MSMEs using financial lending applications in Indonesia generally exhibit a high level of capability and behavior based on descriptive statistical analysis of the main variables in the survey. The average values of the measured variables, such as performance expectancy (PE), social influence (SI), facilitating conditions (FC), perceived usefulness (PU), perceived ease of use (PEU), Attitude Toward Using (A), and Behavioral intention (BI), ranged from 3.513 to 4.039. This shows a positive response to the use of fintech lending. Table 3 presents the results of the descriptive analysis.

Table 3. Results of descriptive statistical analysis of PE, SI, FC, PU, PEU, A, and BI.

Main and Observable Variables			Mean	S. D	Level	Strength/Areas for Improvement
Performance Expectancy (PE)	PE1	Usefulness at work	3.858	0.915	High	Strength: Time and effort saving Weakness: Business productivity
	PE2	Business development	3.839	0.964	High	
	PE3	Time and effort saving	3.916	0.935	High	
	PE4	Performance improvement	3.685	0.958	High	
Social Influence (SI)	SI1	Our community	3.517	1.045	High	Strength: Our organizations Weakness: Our community
	SI2	Senior management	3.517	1.024	High	
	SI3	Our organizations	3.692	0.967	High	
Facilitating Conditions (FC)	FC1	Facilities and support	3.793	0.991	High	Strength: Required knowledge Weakness: Available assistance
	FC2	Required knowledge	3.849	0.950	High	
	FC3	Available assistance	3.510	1.056	High	
	FC4	Technical support	3.704	0.915	High	
Perceived Usefulness (PU)	PU1	Job Performance	3.663	1.003	High	Strength: Easier get fund Weakness: Increase job performance
	PU2	Improve Business Productivity	3.697	0.985	High	
	PU3	Effectiveness	3.731	0.985	High	
	PU4	Easier get fund	3.897	0.910	High	
	PU5	Useful for business	3.887	0.938	High	
Perceived Ease of Use (PEU)	PEU1	Easy to understand	3.942	0.928	High	Strength: Clear and Understandable Weakness: Easy to use
	PEU2	Clear and understandable	4.024	0.885	High	
	PEU3	Flexible to use	4.022	0.862	High	
	PEU4	Easy to use	3.899	0.860	High	
Attitude Toward Using (A)	A1	Really want	3.608	1.039	High	Strength: Satisfying experience Weakness: Really want to use
	A2	Satisfying	3.688	0.980	High	
	A3	Right decision	3.632	1.048	High	
Behavioral Intention (BI)	BI1	Want to use	3.750	0.990	High	Strength: Want to use Weakness: Will use
	BI2	Will use	3.522	1.087	High	
	BI3	Will suggest	3.678	1.020	High	

Measurement Model Assessment

Model fit indices in PLS-SEM should be interpreted with caution, as PLS-SEM is a variance-based, prediction-oriented technique rather than a covariance-based confirmatory method; fit statistics originally developed for CB-SEM not have the same diagnostic meaning in a PLS context and are not intended to establish "good fit" in the CB-SEM sense (Henseler et al., 2014; Hair et al., 2019). SRMR is reported as an approximate measure of the discrepancy

between observed and model-implied correlations; the saturated model value of 0.063 falls below the commonly cited threshold of 0.08, suggesting no severe misspecification. However, the saturated-model NFI of 0.801 (table 4) remains below the conventional 0.90 benchmark used in CB-SEM and should not be interpreted as evidence of good model fit. Accordingly, model adequacy in this study is assessed primarily through predictive and explanatory criteria appropriate to PLS-SEM—path coefficient significance, R^2 , and Q^2 —rather than through fit indices, which are reported here for transparency rather than as confirmatory evidence.

Table 4. Assessment of the measurement model fit.

	Saturated model
SRMR	0.063
d_ULS	1.391
d_G	0.599
Chi-square	1413.132
NFI	0.801

Factor Analysis

Table 5. Factor Analysis Result

Main and Observable Variables			Factor Loading	Weight	VIF
Performance Expectancy (PE)	PE1	Usefulness at work	0.656	0.235	1.314
	PE2	Business development	0.816	0.377	1.580
	PE3	Time and effort saving	0.799	0.334	1.605
	PE4	Performance improvement	0.796	0.341	1.576
Social Influence (SI)	SI1	Our community	0.749	0.361	1.354
	SI2	Senior management	0.852	0.406	1.737
	SI3	Our organizations	0.849	0.451	1.624
Facilitating Conditions (FC)	FC1	Facilities and support	0.763	0.352	1.429
	FC2	Required knowledge	0.800	0.397	1.465
	FC3	Available assistance	0.645	0.248	1.335
	FC4	Technical support	0.776	0.327	1.555
Perceived Usefulness (PU)	PU1	Job Performance	0.841	0.239	2.530
	PU2	Improve Business Productivity	0.855	0.244	2.572
	PU3	Effectiveness	0.838	0.246	2.208
	PU4	Easier get fund	0.800	0.237	1.966
	PU5	Useful for business	0.808	0.240	1.974
Perceived Ease of Use (PEU)	PEU1	Easy to understand	0.828	0.310	1.860
	PEU2	Clear and understandable	0.830	0.299	1.930
	PEU3	Flexible to use	0.820	0.280	1.919
	PEU4	Easy to use	0.818	0.325	1.738
Attitude Toward Using (A)	A1	Really want	0.836	0.397	1.642
	A2	Satisfying	0.882	0.381	2.190
	A3	Right decision	0.869	0.382	2.074

Behavioral Intention (BI)	BI1	Want to use	0.889	0.373	2.335
	BI2	Will use	0.854	0.374	1.853
	BI3	Will suggest	0.898	0.388	2.402

Factor analysis of latent variables in this study shows that most indicators have factor loading values above 0.708, indicating excellent convergent validity (Hair et al., 2019). Two indicators, however, fall in the 0.40–0.70 range: PE1 ('Useful at business', loading = 0.656) and FC3 ('Compatible', loading = 0.645). Following the guidance of Hair et al. (2019), indicators with loadings in this range should only be dropped if their removal would raise the composite reliability (ρ_c) or average variance extracted (AVE) of the corresponding construct above the required thresholds. Removing PE1 did not meaningfully change the ρ_c (0.852) or AVE (0.592) of Performance Expectancy, and removing FC3 did not meaningfully change the ρ_c (0.835) or AVE (0.560) of Facilitating Conditions (Table 5); both constructs already met the recommended thresholds ($\rho_c > 0.70$; $AVE > 0.50$) with these indicators included.

In addition, PE1 and FC3 were judged to contain conceptually important content for their respective constructs. PE1 captures the business-usefulness dimension of Performance Expectancy, while FC3 captures the availability of assistance dimension of Facilitating Conditions; neither dimension is fully represented by the remaining indicators. PE1 and FC3 were therefore retained in the final measurement model reported in Table 5 and depicted in Figure 2. All reliability (Cronbach's α , ρ_a , ρ_c) and AVE values reported in Table 5, and all structural path estimates reported in Table 6, correspond to the final retained-indicator model used for hypothesis testing.

Discriminant Validity

Discriminant validity was assessed using the Heterotrait–Monotrait ratio (HTMT), which provides a more stringent assessment of discriminant validity than the Fornell–Larcker criterion and cross-loadings. The HTMT values for all pairs of constructs are presented in Table 6a.

Table 6a. Heterotrait–Monotrait Ratio (HTMT)

Construct	PE	SI	FC	PU	PEU	A	BI
Performance Expectancy (PE)	—						
Social Influence (SI)	0.728	—					
Facilitating Conditions (FC)	0.784	0.812	—				
Perceived Usefulness (PU)	0.801	0.837	0.776	—			
Perceived Ease of Use (PEU)	0.653	0.689	0.671	0.815	—		
Attitude Toward Using (A)	0.768	0.845	0.748	0.827	0.764	—	
Behavioral Intention (BI)	0.755	0.793	0.722	0.798	0.743	0.861	—

As shown in Table 6a, all reported HTMT values are below the recommended threshold of 0.90, indicating adequate discriminant validity among the constructs. The highest HTMT value is observed between Attitude Toward Using (A) and Behavioral Intention (BI), with a value of 0.861. Although this represents the strongest association among the constructs, the value remains below the 0.90 threshold. Therefore, the reported results provide evidence that the constructs are empirically distinguishable.

These findings are consistent with the Fornell–Larcker criterion and cross-loading results reported previously. The square root of the AVE for each construct exceeds its correlations with other constructs, while each indicator loads more strongly on its respective construct than on the other constructs. Accordingly, the Fornell–Larcker criterion and cross-loadings are treated as complementary evidence, whereas HTMT provides the primary assessment of discriminant validity.

Reliability testing showed a high level of internal consistency, with Cronbach's alpha (α), rho_a, and rho_c values exceeding 0.70 (Hair et al., 2010; Hair et al., 2014). Thus, all constructs met the recommended internal consistency requirements. In addition, the AVE values are above 0.50, indicating adequate convergent validity in the measurement model (Table 6b).

Table 6b. Reliability and validity assessment of measures

	α	rho_a	rho_c	AVE
PE	0.770	0.790	0.852	0.592
FC	0.739	0.757	0.835	0.560
SI	0.752	0.763	0.858	0.669
PU	0.886	0.886	0.916	0.687
PEU	0.842	0.844	0.894	0.679
A	0.827	0.827	0.897	0.744
BI	0.855	0.855	0.912	0.775

Structural Equation Model analysis and hypothesis testing

The structural model was analyzed using the PLS-SEM approach to test the research hypotheses and confirm the existence of correlations between the constructs of PE, SI, FC, PU, PEU, A, and BI among MSMEs in Indonesia (Figure 2). The results of the hypothesis testing indicate statistically significant predictive relationships between the constructs. As this study employs a cross-sectional survey design, the reported path coefficients should be interpreted as associations or predictive relationships rather than as causal effects. The study findings indicate that H1 (PE $\rightarrow$ A) shows a significant positive relationship ($\beta=0.151$, $t=1.728$, $p=0.042$). H2 (SI $\rightarrow$ A) shows a significant positive relationship ($\beta=0.378$, $t=6.220$, $p=0.000$), then H3 (FC $\rightarrow$ A) shows a significant relationship with a small positive effect ($\beta=0.140$, $t=2.507$, $p=0.006$), and H4 (PU $\rightarrow$ A) also shows a significant positive influence ($\beta=0.317$, $t=3.499$, $p=0.000$). Furthermore, H5a ((PEU $\rightarrow$ PU) has the largest positive effect ($\beta=0.686$, $t=19.259$, $p=0.000$).

Meanwhile, H5b (PEU → A) shows that perceived ease of use does not have a significant direct relationship with Attitude Toward Using ($\beta = -0.094$, $t = 1.451$, $p = 0.073$). H6 (A → BI) shows a significant positive relationship ($\beta = 0.819$, $t = 34.401$, $p < 0.001$). Table 7 presents the results of the hypothesis testing.

Table 7. Research hypothesis testing results on causal relationships.

Hypothesis	Effect	Path coefficients (β)	T-Statistic	p-value	Results
H1	PE → A	0.151	1.728	0.042	Supported
H2	SI → A	0.378	6.220	0.000	Supported
H3	FC → A	0.140	2.507	0.006	Supported
H4	PU → A	0.317	3.499	0.000	Supported
H5a	PEU → PU	0.686	19.259	0.000	Supported
H5b	PEU → A	-0.094	1.451	0.073	Unsupported
H6	A → BI	0.819	34.401	0.000	Supported

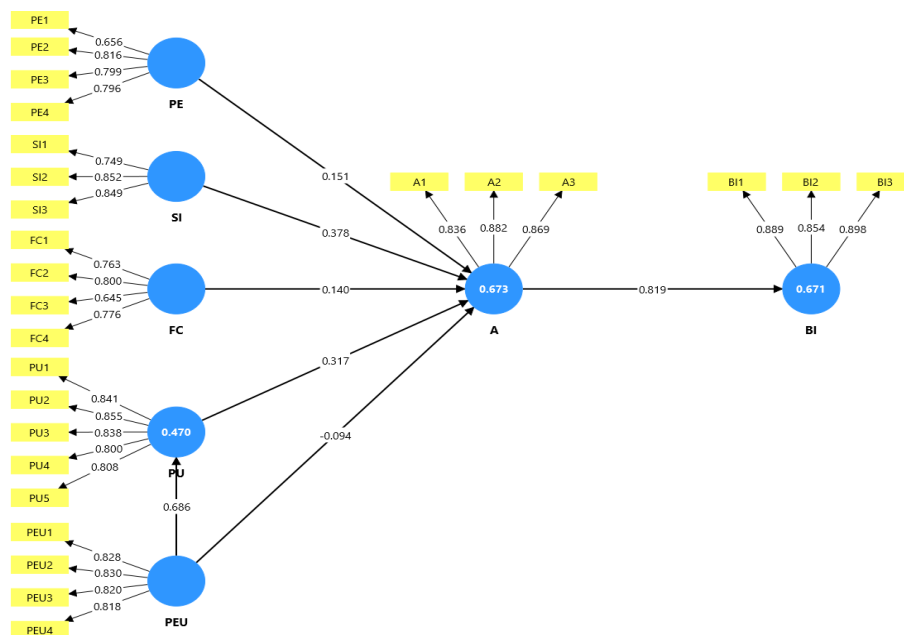


Figure 1. Structural Equation Model

To further examine the proposed mediating role of Attitude Toward Using (A), the specific indirect effects of the antecedent constructs on Behavioral Intention (BI) through A were examined. The indirect effects were calculated as the product of the structural path coefficients from each antecedent construct to A and from A to BI.

Table 8. Specific Indirect Effects Through Attitude Toward Using

Indirect Effect	β
PE $\rightarrow$ A $\rightarrow$ BI	0.124
SI $\rightarrow$ A $\rightarrow$ BI	0.310
FC $\rightarrow$ A $\rightarrow$ BI	0.115
PU $\rightarrow$ A $\rightarrow$ BI	0.260
PEU $\rightarrow$ A $\rightarrow$ BI	-0.077

The results show positive indirect effects of Performance Expectancy, Social Influence, Facilitating Conditions, and Perceived Usefulness on Behavioral Intention through Attitude Toward Using, with estimated coefficients of 0.124, 0.310, 0.115, and 0.260, respectively. In contrast, the indirect effect of Perceived Ease of Use through Attitude Toward Using is negative ($\beta = -0.077$). These results provide additional evidence regarding the proposed role of Attitude Toward Using as a mediating mechanism within the integrated TAM-UTAUT framework. However, these indirect-effect estimates are not used to classify full or partial mediation because the corresponding direct paths from the antecedent constructs to Behavioral Intention were not estimated in the original structural model.

Furthermore, the assessment of the model's predictive power using PLS-SEM showed that the model was able to explain and predict the endogenous variables, namely Attitude Toward Using (A) and Behavioral Intention (BI), well. The adjusted R^2 for A and BI were 0.669 and 0.670, respectively, indicating that the latent constructs were already able to explain A and BI (Chin, 1998). Additionally, the high adjusted Q^2 for both variables confirms good predictive relevance, as shown in Table 8.

Table 9. Predictive power assessment of the PLS-SEM model

Main and Observable Variables	R^2 adjusted	Q^2 adjusted
Attitude Toward Using (A)	A1 A2 A3 (moderate)	0.396 0.492 0.465
Behavioral Intention (BI)	BI1 BI2 BI3 (high)	0.408 0.364 0.383

Discussion

This study examined how performance expectancy (PE), social influence (SI), facilitating conditions (FC), perceived usefulness (PU), and perceived ease of use (PEU) shape attitude toward using financial lending technology, and how attitude in turn shapes behavioral intention, among Indonesian MSMEs with prior or current usage experience. Because the

data are cross-sectional, the relationships discussed below are interpreted as statistically significant predictive associations rather than as verified causal effects. Each hypothesized path is discussed in turn, linking the empirical finding to its theoretical explanation, situating it against prior studies, and drawing out its practical implication.

Performance expectancy and attitude (H1). Performance expectancy significantly but modestly predicts attitude ($\beta = 0.151$, $p = 0.042$), the weakest of the four significant direct antecedents. Because more than half of the sample has used financial lending technology for less than one year, performance benefits are likely still partly anticipatory rather than fully confirmed by lived experience, which may explain why PE contributes less to attitude than usefulness, which reflects a more experientially grounded judgment. This pattern is consistent with Wang et al. (2019), Amnas et al. (2023), and Ojiaku et al. (2024), who similarly find PE to be significant but not dominant in fintech-adoption models; no contradiction with prior literature is evident. Practically, providers can reinforce performance expectancy with concrete evidence of business impact, such as usage dashboards, though this is unlikely to be the most effective lever for improving attitude compared with strengthening perceived usefulness or social validation.

Social influence and attitude (H2). Social influence is the strongest predictor of attitude in the model ($\beta = 0.378$, $p < 0.001$). Indonesian MSMEs typically operate within dense social-business networks, including trade communities, family, suppliers, and customers, so validation from these networks likely functions as a risk-reducing heuristic when adopting an unfamiliar financial product, consistent with Social Influence Theory. This result aligns with Septiani et al. (2020), Yan et al. (2021), and Wuisan et al. (2023), who also identify peer and community influence as a dominant driver of P2P lending adoption; no contradiction is apparent. This suggests that referral programs, testimonials from trusted community figures, and endorsement by trade associations are likely to shape attitude more effectively than generic advertising.

Facilitating conditions and attitude (H3). Facilitating conditions are significant but show the smallest effect on attitude among the significant predictors ($\beta = 0.140$, $p = 0.006$). Because most respondents are already users, adequate infrastructure and technical support may function as a satisfied precondition rather than a source of ongoing differentiation in attitude; once a baseline level of facilitation is met, additional facilitation adds comparatively little further weight to attitude formation. This partially aligns with Mudjahidin et al. (2021) and Marhadi et al. (2024), who report a positive FC effect, but contrasts with Solihat et al. (2023) and Aldhi et al. (2024), who found FC non-significant; the divergence is plausibly explained by differences in respondents' adoption stage — first-time versus continuing users — and regional infrastructure maturity, rather than an inconsistency in the underlying theory. Infrastructure investment therefore remains a necessary baseline but should not be treated as a primary lever for shaping attitude among an already-onboarded user base.

Perceived usefulness and attitude (H4). Perceived usefulness is the second-strongest predictor of attitude and the dominant TAM-side construct in the model ($\beta = 0.317$, $p <$

0.001), consistent with TAM's central proposition that usefulness is the primary cognitive antecedent of attitude (Davis et al., 1989). This is particularly salient for MSMEs, who evaluate financial technology largely through its tangible contribution to business continuity and growth. The result is consistent with Singh et al. (2020), Putri et al. (2023), and Wijaya et al. (2025), reinforcing the generalizability of TAM's usefulness proposition to the Indonesian MSME lending context. Product communication should accordingly foreground concrete, measurable business benefits, such as improved cash flow or turnover, as the primary value proposition.

Perceived ease of use, usefulness, and attitude (H5a, H5b). PEU strongly predicts PU ($\beta = 0.686$, $p < 0.001$) but does not show a significant direct relationship with attitude ($\beta = -0.094$, $p = 0.073$). This finding suggests that, among experienced users, ease of use is more closely associated with perceived usefulness than with attitude directly. The strong PEU $\rightarrow$ PU relationship is consistent with the cognitive mechanism proposed in TAM, while the non-significant PEU $\rightarrow$ A relationship indicates that ease of use may not independently differentiate attitudes once usefulness is considered. The result is consistent with studies reporting indirect-only PEU effects, including Purnamasari et al. (2020), Widyanto et al. (2022), and Rahadian and Thamrin (2023), but contrasts with Van der Heijden (2004) and Shahzad et al. (2022), who found significant direct effects. Differences may reflect variation in technology context and user experience. Practically, usability improvements should be communicated in terms of the concrete business benefits they enable, such as faster disbursement or lower administrative burden, rather than being presented only as standalone user-interface features.

Attitude and behavioral intention (H6). Attitude is the strongest predictor in the model and has a strong positive relationship with Behavioral Intention ($\beta = 0.819$, $p < 0.001$; adjusted R^2 for BI = 0.670). This finding supports the proposed role of attitude as the psychological mechanism linking the antecedent constructs to behavioral intention within the integrated TAM-UTAUT framework. Because the original structural model did not estimate direct paths from the antecedent constructs to BI, the mediation results are interpreted in terms of specific indirect effects rather than full or partial mediation. The finding also suggests that strengthening favorable attitudes, particularly through social influence and perceived usefulness, may be relevant for supporting behavioral intention among experienced MSME users.

Taken together, these results show that Attitude Toward Using is strongly associated with Behavioral Intention and is related to the contextual, social, and cognitive antecedents examined in the model. Social influence and perceived usefulness are the strongest direct predictors of attitude, while performance expectancy and facilitating conditions have smaller but significant positive relationships. Perceived ease of use is strongly related to perceived usefulness but does not have a significant direct relationship with attitude. These findings refine the integrated TAM-UTAUT explanation of continued-use intention among experienced MSME users without implying evidence of actual usage behavior.

5. Conclusion and Suggestion

This study examined how performance expectancy, social influence, facilitating conditions, perceived usefulness, and perceived ease of use are associated with attitude toward using financial lending technology and behavioral intention among Indonesian MSMEs with prior or current usage experience. The empirical results show that Attitude Toward Using is strongly associated with Behavioral Intention ($\beta = 0.819$, $p < 0.001$). Performance Expectancy ($\beta = 0.151$, $p = 0.042$), Social Influence ($\beta = 0.378$, $p < 0.001$), Facilitating Conditions ($\beta = 0.140$, $p = 0.006$), and Perceived Usefulness ($\beta = 0.317$, $p < 0.001$) are significant positive antecedents of Attitude Toward Using, with Social Influence showing the strongest direct relationship. Perceived Ease of Use has a strong positive relationship with Perceived Usefulness ($\beta = 0.686$, $p < 0.001$), but does not have a significant direct relationship with Attitude Toward Using ($\beta = -0.094$, $p = 0.073$). These findings indicate that, among experienced MSME users, attitudes toward financial lending technology are more strongly associated with social influence and perceived usefulness, while ease of use is more closely related to usefulness than to attitude directly. Accordingly, the integrated TAM–UTAUT model helps explain the relationships underlying continued-use intention among MSMEs, but the findings should not be interpreted as evidence of actual adoption or actual usage behavior because actual usage was not directly measured in this study.

Implication

This study provides a more comprehensive examination of MSMEs' behavioral intention regarding financial lending technology by integrating TAM and UTAUT. Further studies are recommended to examine attitude as a mediating mechanism using models that estimate the relevant direct and indirect paths simultaneously. Future research could also employ longitudinal or multi-group designs to compare first-time and experienced users and develop more context-specific technology adoption models for digital financing among MSMEs in developing countries.

For financial lending technology service providers and regulators, the recommendations below are tied directly to the empirical relationships found in this study. First, the strongest relationship in the model is the effect of perceived ease of use on perceived usefulness ($\beta = 0.686$, $p < 0.001$), while its direct relationship with attitude is not significant ($\beta = -0.094$, $p = 0.073$). This suggests that simplifying interfaces or streamlining transaction steps is most relevant when it produces recognizable business benefits, such as faster fund disbursement, lower transaction costs, or clearer loan terms. Second, social influence is the strongest direct predictor of attitude ($\beta = 0.378$, $p < 0.001$), exceeding performance expectancy ($\beta = 0.151$) and facilitating conditions ($\beta = 0.140$). Engagement through trusted peer networks, MSME communities, cooperatives, and business associations may therefore be particularly relevant. Third, perceived usefulness has a significant direct relationship with attitude ($\beta = 0.317$, $p <$

0.001), reinforcing the importance of communicating concrete business benefits such as improved cash flow, access to capital, or operational efficiency. Facilitating conditions also have a significant relationship with attitude ($\beta = 0.140$, $p = 0.006$), although the effect is comparatively smaller. Finally, because attitude has the strongest relationship with behavioral intention ($\beta = 0.819$, $p < 0.001$), initiatives that strengthen favorable attitudes may support behavioral intention; however, these findings should not be interpreted as evidence of actual adoption or usage behavior.

Limitations

This study has several limitations that should be considered when interpreting the findings. First, respondents were selected using a non-probability purposive sampling technique, which does not guarantee equal selection probability across the MSME population and therefore limits the statistical generalizability of the findings to all Indonesian MSMEs. Second, the questionnaire was distributed online through a single digital channel, which introduces a degree of self-selection bias: respondents needed internet access and a baseline level of digital literacy to participate, potentially underrepresenting MSMEs with lower digital readiness — the very group the fintech inclusion agenda is most intended to reach. Third, the cross-sectional design captures attitudes and intentions at a single point in time; it cannot establish temporal precedence or rule out reverse or reciprocal relationships among constructs, which is also why all reported relationships in this study are interpreted as associations/predictive relationships rather than causal effects (see Discussion). Fourth, all constructs were measured using self-reported perceptions collected from the same respondents in the same survey instrument, which raises the possibility of common-method bias; although Variance Inflation Factor (VIF) values for all indicators were below the conservative threshold of 5 (Table 4), suggesting collinearity is unlikely to be a severe concern, common-method variance arising from shared measurement context cannot be fully ruled out without a procedural remedy such as separating predictor and criterion measurement in time or source. Fifth, the geographic distribution of respondents is heavily concentrated in Java (65.6%) and, to a lesser extent, Sumatra (19.7%), with limited representation from Kalimantan, Sulawesi, Bali–Nusa Tenggara, and Maluku–Papua; the findings may therefore not fully generalize to MSMEs operating in less digitally and financially developed regions of Indonesia. Sixth, because the sample consists predominantly of MSMEs with prior or current experience using financial lending technology (53.6% with less than one year of use), the findings speak most directly to continued-use/re-adoption intention among experienced users rather than to first-time adoption intention among non-users, a distinction discussed further above. These limitations do not undermine the study's core contribution but should be taken into account when generalizing the results, and they point directly to the future research directions outlined below (e.g., probability sampling, longitudinal design, multi-source data collection, and broader regional coverage).

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