Journal of
Information Systems Engineering
and Business Intelligence

Vol.10, No.3, October 2024
Available online at: http://e-journal.unair.ac.id/index.php/JISEBI

Revolutionizing Payment Systems: The Integration of TRAM and Trust in QRIS Adoption for Micro, Small, and Medium Enterprises in Indonesia

Adisthy Shabrina Nurqamarani [1)] [*], Sarah Fadilla [2)], Ari Juliana [3)]

[1)2)3)] *Universitas Terbuka, Tangerang Selatan, Indonesia*

[1)]adisthy@ecampus.ut.ac.id, [2)]sarahf@ecampus.ut.ac.id, [3)]ari@ecampus.ut.ac.id

Abstract

Background: In an era where digital finance is growing rapidly, the Quick Response Code Indonesian Standard (QRIS) revolutionizes the payment system through a single unifying code. This study brings novelty in integrating TRAM and Trust in the adoption of QRIS in micro, small, and medium enterprises (MSMEs) in Indonesia, for which studies are still limited.
Objective: To observe determinants of QRIS adoption by integrating the Technology Readiness Acceptance Model (TRAM) and Trust in the emerging Indonesian market where QRIS is in a growing stage.
Methods: This study collects data through the survey of 210 MSME owners and staff who are familiar with and/or have used QRIS through convenience sampling. In analyzing the data, this study uses the Structural Equation Model-Partial Least Square (PLS-SEM) to examine the relationship between variables that explain influencing factors of QRIS adoption.
Results: The results show that 7 of 13 hypotheses were accepted; optimism and trust positively significantly affect perceived ease of use and perceived usefulness, while insecurity and innovation have no significant influence on perceived ease of use and perceived usefulness. Besides, this study shows unexpected positive results between discomfort, perceived ease of use, and perceived usefulness. Overall, the proposed TRAM and Trust model contributes 60.9 % in explaining QRIS adoption.
Conclusion: This study emphasizes the importance of optimism, discomfort, trust, perceived ease of use, and perceived usefulness in influencing QRIS adoption in micro and small businesses in Indonesia. It guides QRIS providers, policymakers, financial institutions, and MSMEs in having effective QRIS adoption in business operations.

Keywords: Micro Small and Medium Enterprises, QRIS, TRAM, Trust

Article history: Received 4 December 2023, first decision 23 January 2024, accepted 13 March 2024, available online 28 October 2024

I. INTRODUCTION

The Fourth Revolution Industry and the global pandemic have drastically altered the usage of technology information including in global financial transactions [1]. The rapid transformation is apparent through the widespread of non-cash transactions, fostered by financial technology innovations such as e-money and mobile banking [2]. In Indonesia, many micro, small, and medium enterprises (MSMEs) use a variety of e-money including OVO, Shopee Pay, Dana, etc. Recently, Quick Response Code Indonesian Standard (QRIS), introduced by the Central Bank of Indonesia [3], stands out by unifying many QR codes into one standardized QR code. This facilitates easier transactions, accessibility, and efficiency for micro and small businesses and consumers [4][5]. QRIS adoption in MSMEs becomes a fascinating issue to discuss as MSMEs contribute 97.2 % to employment [6], thereby the adoption of QRIS by MSMEs will provide a mass contribution to increased users of digital financial services and increased financial inclusion.

Despite its strength in revolutionizing digital payment, the adoption of QRIS is not even across the region [7], as telecommunication infrastructure is not uniform, especially between urban and rural areas as well as Java vs non-Java areas [8]. This uneven adoption in different regions may cause constraints in achieving financial inclusion [9] as well as in achieving a digital finance innovation roadmap that includes digital payment. This study examines the determinants of QRIS adoption within a specific geographical area, considering that QRIS adoption is not uniformly distributed across regions in Indonesia. Moreover, this study primarily focuses on QRIS adoption in MSMEs domicile at DKI Jakarta, Banten, West Java, and East Kalimantan. The selection of those specific regions offers perspectives that have not been covered in earlier works.

[*] Corresponding author

ISSN 2443-2555 (online) 2598-6333 (print)
doi: http://dx.doi.org/10.20473/jisebi.10.3.314-327

This study recognizes the importance of personal traits and perceptions about technology acceptance and usage, which is explained in TRI. It is measured through dimensions of personal traits which include endorsers and inhibitors in perceiving technology [10]. TRI is categorized into stimulants and inhibitors, whereby stimulants include optimism in using the technology and the tendency to be Innovative and technology pioneer while inhibitors include perception and feelings of discomfort and insecurity in using a particular technology [11]. Besides TRI, perceived ease of use and perceived usefulness in TAM are also considered determinants of technology acceptance [12].

TRI and TAM fused into one model, known as the Technology Readiness Acceptance Model (TRAM), offer a comprehensive model to explicate the determinants of QRIS adoption. Besides, integrating trust into the model is significant considering its contribution to explaining technology acceptance in digital payment [13]. Moreover, the concepts of TRI, TAM, and trust have been studied extensively in the past in separate studies [14]–[16]. Nevertheless, there were limited studies that have combined the three concepts into one model, particularly in QRIS adoption. The lack of study that integrates the proposed model in examining QRIS adoption as well as the fact that QRIS adoption is not uniformly used across the region in Indonesia has created an urgency to conduct this study. Additionally, QRIS adoption is still in a growing stage in the Indonesian digital financial ecosystem. This has become fascinating to discuss since digital payment platforms are rapidly evolving and becoming more complex [17].

II. Literature Review

A. Quick Response Code Indonesian Standard (QRIS)

QR codes consist of two-dimensional barcode that works as storage systems [18]. QR codes are usually displayed in print or on display and then scanned by a specialized scanner [19]. QR codes of customers can be scanned by sellers, and vice versa [20], [21]. In QR development, it can be used to make payments for products and/or services through mobile devices [18], [22]. In Indonesia, the QR technology was developed by the Central Bank of Indonesia to standardize the payment system, referred to as QRIS.

QRIS aims to streamline and boost payment systems [23]. QRIS was created to ease the transactions, boost efficiency, user-friendly, and cost-effective [24]. QRIS revolutionizes the payment system as it can accommodate transactions from a diverse range of merchants or QR providers [25]. Before QRIS is launched, a merchant can have multiple QR code payments and multiple accounts at Payment Service Providers (PJSP). QRIS enables seamless connectivity and interoperability among Payment Service Providers so that merchants now only require a single QR code and a single PJSP account to receive payment from numerous PJSP applications [26]. Despite the advantages offered by QRIS, many MSMEs are hesitant to use QRIS [24]. The adoption of QRIS experiences challenges due to unstable connections [27], and network infrastructure primarily focused on Java [28]. Adoption of QRIS also faces difficulties due to low digital literacy [25] and low acceptance in several regions [29]. Accordingly, it is of paramount need to study the determinants of QRIS adoption.

B. Technology Readiness Index (TRI)

Technology readiness relates to the tendency of personal traits that belong to endorsers or inhibitors in accepting and applying new technology to achieve goals [30]. Technology readiness can be seen as the result of personality traits: optimism, innovation, discomfort, and insecurity. TRI differs significantly from TAM variables like Perceived Usefulness and Perceived Ease of Use, which can be distinct across technologies, vendors, and situations [13].

C. TAM (Technology Acceptance Model)

The purpose of TAM is to comprehend how individuals accept technology by perceiving its effectiveness and implementation [31]. Although TAM was applied to different technologies, some scholars noted its limitation in exploring external variables, leading to uncertainties [32]. This concern prompted the development of an enhanced version, TAM2, which combined constructs like voluntariness, image, subjective norms, and output quality [13].

D. Hypotheses Development and the Proposed Conceptual Model

This study uses TRAM. It has been implemented by previous researchers [15], [33], [34]. In this study, the integrated TRAM model is also extended with a trust variable, considering the suitability of the model for digital payment. Integrating trust into TRAM is feasible for several reasons. Firstly, they were introduced to elucidate the acceptance of technology [15], [35]. Secondly, they vary in terms of concept; TRI describes technology acceptance through individuals' overall predispositions, whereas TAM relies on system-specific perceptions [36] while trust is commonly perceived as an influencing factor of usage intention in digital payment [37], [38]. Fig. 1 demonstrates the conceptual model in current research.

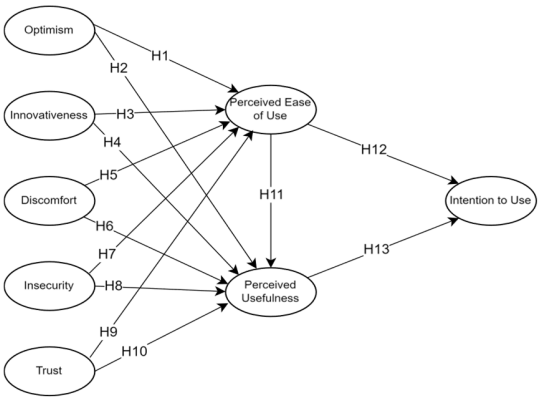

Fig. 1 Proposed Conceptual Model

1) Optimism

Optimism is characterized by a positive opinion of technology, whereby individuals are capable of enhanced control, flexibility, as well as productivity in their routine [39]. QRIS provides mobility freedom, flexibility, and efficiency as it enables seamless, anytime, anywhere transactions via smartphones, liberating consumers and businesses from the limitations of cash and traditional banking [16]. Rather than cash and traditional banking, QRIS offers easier setting up and operation, better tracking of transactions, and financial management [23]. Digital records of payments also help MSMEs monitor their spending and budget more effectively and make informed financial decisions [40]. It is recognized that customers who embrace optimistic thoughts about a novel technology tend to exhibit favorable attitudes toward it. Past studies suggested that optimism holds a positive relationship with perceived ease of use and usefulness, as individuals who have optimistic tendencies approach situations more openly and positively, minimizing their focus on potential negatives [41]. Consequently, the hypotheses are formulated:

H1: Optimism has a positive significant influence towards Perceived Ease of Use

H2: Optimism has a positive significant influence towards Perceived Usefulness

2) Innovativeness

Innovativeness can be defined as the inclination to be a leader and innovator in technology [42], [43]. Innovative thinking will influence someone to enhance their capabilities in using technology [44]. Past research has shown that innovativeness has a positive and significant influence on perceived ease of use and perceived usefulness [41]. Innovativeness is seen as a catalyst for technology readiness, potentially enhancing the perceived usefulness and ease of use of specific technologies [41]. People characterized by innovativeness are expected to hold positive opinions toward technology [43]. Thus, hypotheses are formulated:

H3: Innovation has a positive significant influence on Perceived Ease of Use

H4: Innovation has a positive significant influence on Perceived Usefulness

3) Discomfort

Discomfort is individuals' perception of lack of ability to control technology which leads to feelings of unease and overcome by the technology [41]. Discomfort is regarded as one of the inhibiting factors to use new technology [11]. Technology that is not user-friendly may cause discomfort which would affect ease of use and usefulness. Previous studies also showed that discomfort affected PU and PEOU in a negative direction [41], [45]. When people feel discomfort, it makes people tend to take longer time to accept the usefulness and ease of use of the technology, thus negatively affecting perceived ease of use and perceived usefulness [45]. Accordingly, hypotheses are formulated:

H5: Discomfort has a negative significant influence on Perceived Ease of Use

H6: Discomfort has a negative significant influence on Perceived Usefulness

4) Insecurity

Insecurity refers to an absence of trust in technology, doubt in the capability of technology to make work more effective [46], as well as worries regardingits potentially harmful consequences [11], [47]. Additionally, an updated TRI 2.0 was developed to cater to issues that have not been covered in original research regarding the impact of technology in dehumanizing society. This issue is about over-dependence on technology, lower quality of personal relationships, and a tendency to become distracted to a point that could be harmful [11]. This condition falls into the insecurity construct [47].

Past studies suggested that insecurity negatively affects perceived usefulness, as insecurity towards technology leads to haziness and minimal utilization of technology [48]. These insecurities can diminish the perceived usefulness of the technology, as users may not see the technology as beneficial or safe enough to outweigh their concerns [48]. Besides, when consumers feel insecure, their assessment of the technology's ease of use and usefulness diminishes, potentially affecting their willingness to adopt and use new technologies [49]. Thus, hypotheses are formulated:

H7: Insecurity has a negative significant influence on Perceived Ease of Use

H8: Insecurity has a negative significant influence on Perceived Usefulness

5) Trust

Trust is one of the most widely used constructs in the Extended TAM model and is one of the causes of why people use QRIS [24]. Related to the financial aspect, trust can be obtained through safe and secure transactions, as well as the reliability and trustworthiness of the sellers and/or payment providers [50]. Previous studies also mentioned for technologies related to finance, it is recommended to utilize an expanded version of the TAM that incorporates additional variables related to trust [13]. Besides, consumer trust holds a vital role in fintech adoption [51]. Thus, hypotheses are formulated:

H9: Trust has a positive significant influence on Perceived Ease of Use

H10: Trust has a positive significant influence on Perceived Usefulness

6) Perceived Ease of Use

Perceived Ease of Use is an opinion that using technology is simple [52]. [53] discussed the importance of user interface, particularly simplicity (including UI design elements like layout, organization, and functionality) as an important factor in defining perceived ease of use. Users who feel the ease of use in using technology tend to perceive greater benefits from its utilization [33]. The primary factors influencing the intent to use mobile payment are perceived usefulness and perceived ease of use [45]. Technologies have revolutionized payment methods, making transactions faster and more efficient. This convenience in payment facilitates seamless financial transactions, encouraging widespread adoption and utilization of the technology [3]. When people perceive technology as simple and convenient, they tend to use the technology [54]. So, the hypotheses are formulated:

H11: Perceived Ease of Use has a positive significant influence on Perceived Usefulness

H12: Perceived Ease of Use has a positive significant influence on Intention to Use Digital Payment QRIS

7) Perceived Usefulness

Perceived Usefulness can be defined as a personal's perception that the utilization of technology is useful and beneficial [54]. Several studies proved that Perceived Usefulness has a significant relationship with the intention to use [55][56]. When people perceive technology as useful, they are more likely to embrace and use it [57]. The belief in the usefulness of technology will motivate people to adopt and utilize the technology, as they expect it to bring tangible benefits, efficiency, or satisfaction, aligning with their goals or needs [41]. Previous studies specified that perceived usefulness positively influences intention to use, as the belief that technology boosts job performance can raise the intention to use that technology [47][58]. Therefore, the hypotheses are formulated:

H13: Perceived Usefulness has a positive significant influence on Intention to Use Digital Payment QRIS

8) Intention to Use

Intention to use can be defined as personal willingness to utilize the technology [59]. Intentions are collectively affected by personal attitude and the subjective norm linked to the actions [60]. Intention to use a system has a significant correlation with its actual usage [61]. They noted that behavioral intention is a key factor in determining user behavior, while additional factors could indirectly affect user behavior through this intention [62]. Therefore, intention to use is a paramount construct in influencing actual usage.

III. METHODS

A. Data Collection

The study took place from March to November 2023, involving the distribution of questionnaires both online via Google Form, and online to respondents in Jakarta, Bogor, Depok, Tangerang (Banten), Bandung, and Samarinda. All respondents have already given their permission to be part of this research, after being informed of all relevant aspects necessary for their decision to participate. The respondents are MSMEs in the food, craft, and fashion industries that have previously known or used QRIS mobile payment services. MSMEs who did not use QRIS were also recruited, as this study examined MSMEs' intentions to use QRIS. Convenience sampling was employed as the sampling

technique. The sample size referred to the formulas [63] by due to the unknown population size. The minimum sample requirement was set at five times the number of research indicators, resulting in a minimum of 145 respondents for the 29 indicators in this study.

As of August 20, 2021, the provinces with the highest number of QRIS merchants in Indonesia were West Java, DKI Jakarta, East Java, Central Java, Banten, North Sumatra, Bali, South Sulawesi, Yogyakarta Special Region, and South Sumatra [64], which justifies the selection of DKI Jakarta, Banten, West Java as research locations. Besides, Samarinda, being the capital of East Kalimantan and a potential future capital of Indonesia, was chosen to understand the perception of technology adoption, particularly QRIS, among MSMEs. The number of QRIS users in East Kalimantan has experienced a significant increase, and in recent years, East Kalimantan has become the region with the highest number of QRIS users on the island of Kalimantan [65].

B. Instrument Development

The questionnaire uses a 5-point Likert scale ranging from strongly disagree to strongly agree. The current study uses a 5-point Likert scale as it provides a balanced, precise, and statistically compatible method for capturing the complexities of personal traits and technology readiness towards new technologies as it not only allows respondents to state agree or disagree but also the intensity of their feelings (strongly agree and strongly disagree). Additionally, with a middle option (neutral), respondents who genuinely feel neutral about a question can express their stance, reducing the pressure to choose a side when unsure.

TABLE 1
RESEARCH INSTRUMENT

Concept	Variables	Items	Items	References
TRI	Optimism	X1.1	QRIS supports higher degree of agility	[47]
		X1.2	QRIS boosts business's productivity	[47]
		X1.3	QRIS gives more control over daily lives	[47]
		X1.4	QRIS contributes to a better quality of life	[47]
	Innovation	X2.1	Typically, I am one of the early adopters in my friends or community in using QRIS.	[47]
		X2.2	I can generally understand new high-tech products and services on my own without requiring assistance from others.	[47]
		X2.3	I stay informed about the most recent technological advancements in the areas that interest me.	[47]
	Discomfort	X3.1	Technical support lines are unhelpful to me as they fail to explain things in a manner that I can comprehend.	[47]
		X3.2	At times, I believe that technology systems are not created for the convenience of ordinary people	[47]
		X3.3	There is no manual for a high-tech product or service that is written in straightforward language.	[47]
	Insecurity	X4.1	People rely excessively on technology to perform tasks on their behalf.	[47]
		X4.2	Excessive use of technology can be harmful as it leads to distracting people to an unhealthy extent.	[47]
		X4.3	The quality of relationships is diminished by technology as it diminishes personal interactions.	[47]
		X4.4	I do not feel confident making mobile payments through QRIS	[47]
Trust	Trust	X5.1	Based on my experience, I believe that the transaction through QRIS is always safe	[50]
		X5.2	Based on my experience, I believe that the transaction through QRIS is always reliable	[50]
		X5.3	Based on my experience, I do not think that things may go wrong with my transaction through QRIS	[50]
		X5.4	Based on my experience, I can say that QRIS is trustworthy	[50]
TAM	Perceived usefulness	X6.1	QRIS increases productivity in transactions	[66]
		X6.2	QRIS increases the effectiveness of transactions	[66]
		X6.3	QRIS is useful in making transactions	[66]
		X6.4	QRIS provides more benefits in transactions	[66]
	Perceived ease of use	X7.1	QRIS can be learned easily	[66]
		X7.2	QRIS can be accessed anytime	[66]
		X7.3	QRIS is clear and easy to understand	[66]
		X7.4	QRIS is easy to use in the transaction	[66]
	Intention to Use	Y1.1	If I had access to the QRIS, I intend to use it	[47], [67]
		Y1.2	If I had access to QRIS, I predict that I would use it	[47], [67]
		Y1.3	I intend to use QRIS each time I need it for mobile payment	[47], [67]

In developing the research instrument, the process involves several stages, including reviewing literature, brainstorming, and discussing among the researchers to suit the reference with local language (paraphrasing and adapting the questionnaire to suit local culture), then distributing the questionnaire to 30 samples to measure whether the instrument is valid and reliable. The variables included optimism, innovation, trust, discomfort, insecurity, Perceived Ease of Use, Perceived Usefulness, and interest in using QRIS. Structural Equation Modelling (SEM) with Partial Least Square (PLS) was employed to examine the data. PLS connects a set of independent variables to many dependent variables, handling multicollinearity on the predictor side [68]. Table 1 shows the concepts, constructs, indicators, and references of the research instrument.

IV. RESULTS

After distributing questionnaires both offline and online, the researcher successfully collected 248 responses. The data used as the basis for this analysis consists of 210 responses after excluding incomplete questionnaires and respondents outside the targeted geographic area. Table 2 displays the respondent profile based on employment status in the business, gender, age, education level, type of business, business size, usage, and geographic areas.

TABLE 2
PROFILE OF RESPONDENTS

Description	Frequency	Percentage (%)
Status		
Owner	114	54%
Staff	96	46%
Gender		
Female	137	65%
Male	73	35%
Age		
<17 years old	7	3%
17-25 years old	70	33%
26-34 years old	52	25%
35-50 years old	71	34%
>50 years old	10	5%
Education level		
Elementary	6	3%
Middle School	8	4%
High School	114	54%
Diploma	2	1%
Bachelor	67	32%
Master	13	6%
Type of Business		
Producer	113	54%
Distributor	15	7%
Retail	82	39%
Business Size		
Micro	169	80%
Small	32	15%
Medium	9	5%
Usage		
User	178	85%
Non-User	32	15%
Geographic Region		
West Java	88	42%
DKI Jakarta	35	17%
East Borneo	74	35%
Banten	13	6%

A. Analysis of reliability and validity

Composite Reliability (CR) and Cronbach's alpha were employed to test whether the instruments were valid and reliable. Cronbach Alpha value > 0.6 is considered reliable [69] and a CR value > 0.7 indicates good reliability[70]. Based on the table below, All Cronbach Alpha values were acceptable, most of them surpassing the recommended threshold of 0.6. Besides, all values of composite reliability exceed 0.7, affirming the reliability [71].

TABLE 3
RELIABILITY AND VALIDITY ANALYSIS

Variables	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Optimism (X1)	0.870	0.875	0.9122	0.722
Innovation (X2)	0.691	0.960	0.807	0.592
Discomfort (X3)	0.763	0.844	0.855	0.666
Insecurity (X4)	0.619	0.770	0.743	0.500
Trust (X5)	0.896	0.903	0.928	0.763
Perceived usefulness (X6)	0.933	0.935	0.952	0.834
Perceived ease of use (X7)	0.921	0.925	0.944	0.808
Intention to Use (Y)	0.917	0.918	0.948	0.858

B. Convergent Validity

Convergent validity is obtained by ensuring that the measures of a variable are substantially connected [72]. Convergent Validity can be determined based on the Average Variance Extracted (AVE), which should exceed 0.5 [63]. As indicated in Table 3, all AVE values exceed 0.5 which confirms the convergent validity.

C. Discriminant Validity

Discriminant validity refers to an attribute that can be distinguished from other traits, which could be measured through the Fornell-Larcker Criterion [70], [73]. Based on that, the square root of the AVE must exceed the correlation between the construct and any other construct to achieve discriminant validity [74]. Table 4 shows the square root of the AVE exceeds its correlation with any other latent variables. For example, for X3, the Fornell-Larcker Criterion value is 0.816.

TABLE 4
DISCRIMINANT ANALYSIS

Variables	Discomfort (X3)	Innovation (X2)	Insecurity (X4)	Intention to Use (Y)	Optimism (X1)	Perceived ease of Use (X7)	Perceived usefulness (X6)	Trust (X5)
Discomfort (X3)	0.816							
Innovation (X2)	0.044	0.769						
Insecurity (X4)	0.426	0.085	0.707					
Intention to Use (Y)	0.237	0.388	0.160	0.926				
Optimism (X1)	0.114	0.502	-0.002	0.606	0.849			
Perceived ease of use (X7)	0.247	0.400	0.177	0.762	0.569	0.899		
Perceived usefulness (X6)	0.279	0.413	0.173	0.713	0.589	0.804	0.913	
Trust (X5)	0.160	0.391	0.173	0.619	0.572	0.666	0.673	0.874

D. Hypothesis testing

Table 5 shows the findings of hypotheses testing. The hypotheses testing result (Table 5) supported that optimism about QRIS positively influences Perceived Ease of Use (PEOU) (t statistic 2.595, p-value< 0.05), thus H1 is accepted. MSMEs were optimistic about QRIS, which positively affects Perceived Ease of Use. Besides, the findings specify optimism about QRIS positively affects Perceived Usefulness (t statistic 2.069, p-value < 0.05), so, H2 is accepted. The innovation factor does not affect Perceived Ease of Use (t statistic 1.262, p-value > 0.05). Thus, H3 is not supported. Besides, the results show that the innovation factor also does not affect Perceived Usefulness (t statistic 0.948, p-value > 0.05). Hence, the H4 is not accepted.

The study found that discomfort positively affects how easy and useful people perceive QRIS to be, with a statistical analysis (t statistic 2.382, a p-value < 0.05) showing this effect is significant. However, this is contrary to the initial prediction which expected discomfort to have a negative impact. Therefore, the hypothesis that discomfort would negatively affect perceptions of ease and usefulness is not supported, because the actual result showed a positive impact instead (H5 is not supported).

Discomfort positively affects the perceived usefulness (p-value < 0.05, t statistic of 2.318), thus H6 is unsupported. because the direction of its effect is positive. This outcome contradicts the original hypothesis, which anticipated a negative influence. This means, just as with the earlier statement, the expectation that certain factors would negatively impact perceptions has been challenged by results showing a positive effect instead.

The finding of hypotheses testing does not support that insecurity has a negative relationship with perceived ease of use (t statistic 0.553, p-value > 0.05). So, H7 is not accepted. H8 is also not accepted due to the t statistic of 0.092, and p-value > 0.05, therefore insecurity does not affect perceived ease of use. Additionally, there is also no significant relationship between insecurity and Perceived Usefulness (t statistic 0.092, p-value >0.05). Consequently, H8 is not accepted.

TABLE 5
HYPOTHESES TESTING

Path	Hypothesis Number	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Significance
Optimism (X1) → Perceived ease of use (X7)	H1	0.252	0.095	2.595	0.010	Significant
Optimism (X1) → Perceived usefulness (X6)	H2	0.128	0.060	2.069	0.039	Significant
Innovation (X2) → Perceived ease of use (X7)	H3	0.094	0.069	1.262	0.208	Insignificant
Innovation (X2) → Perceived usefulness (X6)	H4	0.047	0.047	0.948	0.344	Insignificant
Discomfort (X3) → Perceived ease of use (X7)	H5	0.120	0.053	2.382	0.018	Significant
Discomfort (X3) → Perceived usefulness (X6)	H6	0.095	0.041	2.318	0.021	Significant
Insecurity (X4) → Perceived ease of use (X7)	H7	0.042	0.065	0.553	0.581	Insignificant
Insecurity (X4) → Perceived usefulness (X6)	H8	-0.002	0.046	0.092	0.926	Insignificant
Trust (X5) → Perceived ease of use (X7)	H9	0.454	0.096	4.843	0.000	Significant
Trust (X5) → Perceived usefulness (X6)	H10	0.194	0.078	2.489	0.013	Significant
Perceived ease of use (X7) → Perceived usefulness (X6)	H11	0.559	0.061	9.261	0.000	Significant
Perceived ease of use (X7) → Intention to Use (Y)	H12	0.529	0.097	5.518	0.000	Significant
Perceived usefulness (X6) → Intention to Use (Y)	H13	0.287	0.096	2.951	0.003	Significant

Trust in QRIS affects Perceived Ease of Use positively (t statistic 4.843, p-value <0.05) and affects positively to Perceived Usefulness (t statistic 2.489, p-value < 0.05). So, H9 and H10 are supported. The results of hypotheses testing supported that Perceived Ease of Use affects Perceived Usefulness (t statistic 9.261, p-value < 0.05, thus H11 is supported. Perceived Ease of Use positively influences the intention to use (t statistic 5.518, p-value <0.001). Accordingly, H12 is accepted. QRIS is very useful in making transactions fast and convenient, as well as useful for both customers and sellers. Consequently, it affects the willingness to utilize QRIS. The hypotheses testing also indicates that the Perceived Usefulness of QRIS positively affects the intention to use (t statistic 2.951, p < 0.001). Therefore, H13 is accepted.

Fig. 2 shows that intention of use is 60.9 % influenced by perceived ease of use and perceived usefulness. Perceived ease of use is affected by variables of optimism, innovation, discomfort, and trust by 52.2 % while Perceived usefulness is affected by variables of optimism, innovation, discomfort, trust, and perceived ease of use by 70.2 %.

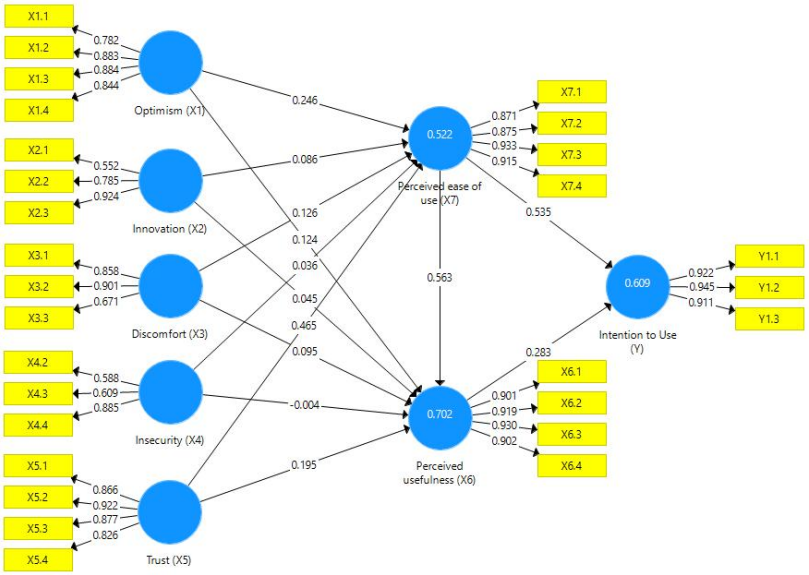

Fig. 2 Partial Least Square (PLS) Model

V. DISCUSSION

A. Hypotheses Measurement Result

Optimism positively affects perceived ease of use and perceived usefulness. The positive and significant result aligns with the research conducted by [75], [76], which found that optimism has a positive and significant impact on perceived usefulness and perceived ease of use. Acceptance of H1 and H2 demonstrates that QRIS users have an optimistic attitude and a positive view that QRIS payment methods are beneficial in their lives because QRIS provides ease in payment transactions and can enhance the quality of payment transactions to be faster and more efficient.

According to [75], "Individuals with an optimistic attitude tend to easily accept and perceive the ease of use, influencing their opinion of the usefulness of the application, which will provide more benefits".

Innovation does not positively affect perceived ease of use and perceived usefulness. Table 5 shows that H3 and H4 are rejected. This finding differs from the research by [75], [76] which states that innovation significantly and positively impacted perceived usefulness and perceived ease of use. This indicates higher tendency of innovativeness in individuals can improve perceptions of ease of use. However, this study is coherent with the study of [77], [78] who found that innovation is not significant to perceived usefulness.

In this study, innovation is measured through several indicators, including whether users are pioneers in their group to use new technology (QRIS), understand updated and advanced products without assistance, and stay updated with the newest technology developments. In the context of this study, respondents have less tendency of innovativeness. Regarding QRIS usage, on average, respondents tend to be followers rather than first users of technology, understand sophisticated products and services through assistance, and do not actively follow the latest technology developments. This may suggest that merely adding innovative features to QRIS may not be sufficient to change user perceptions. However, innovation focused on usability and ease may be more effective. This is reinforced by a claim stating that individuals with lower technology readiness prefer simple functionality but require additional support [11].

Discomfort positively affects the perceived ease of use and perceived usefulness. The rejection of hypotheses related to discomfort suggests that discomfort has a positive and significant impact on perceptions of ease of use or usefulness. This is conversely to previous findings of [76], [79]who found that discomfort negatively influenced perceived ease of use and perceived usefulness. This is also contrary to the findings of [54], [80] who found that discomfort did not influence both perceptions.

This may be because when MSMEs experience discomfort in using a product or service, they may try to overcome this discomfort. This adaptive process allows them to better identify and understand how to use the product or service. Over time, initial discomfort can turn into confidence in using the product or service, ultimately positively affecting perceptions of usefulness. In the context of this study, discomfort indicators include statements such as customer service is unhelpful because they explain terms/language that is not easily understood, the technology system is not intended to be used by commoners, and no user-friendly guide or manual for sophisticated products or services composed in easily understandable language. Field findings show that customer service is rarely helpful when there are obstacles, and there is no user manual for using QRIS. In addition, initial discomfort is often caused by a lack of skills or knowledge. Over time, users adapt and develop the necessary skills, thereby enhancing their opinion that such technology is easy and beneficial.

This may explain why QRIS users (seller perceptions) feel they do not face obstacles even without customer service and user manuals because they have adapted over time to the influence of the environment using QRIS. This explains why the discomfort variable has a positive and significant effect. Besides, Bandura's social learning theory (1977) explains that the process of learning in a social context can be obtained through imitation, observation, and modelling. This theory explains how individuals can adopt and improve skills in using new technology by observing and imitating others, as well as through feedback and reinforcement from their environment [81].

Insecurity does not significantly affect perceived ease and perceived usefulness. Based on Table 5, both hypotheses are rejected because they are not significant. In the context of this study, insecurity indicators include aspects of over-dependence on technology which may harm the users, the impact of technology on the quality of relationships, and confidence in using QRIS. The findings imply that the users do not think that over-use of QRIS may be harmful or diminish their relationship with others. Besides, consumers tend to feel confident using QRIS technology when they have trust in the technology or technology providers. If users have high trust in the QRIS technology provider, typically from a banking institution, they may feel more secure and not significantly consider insecurity factors in their assessment of the technology. The findings are supported by previous research with similar findings[45], [76], stating that insecurity does not influence perceived ease of use.

Trust positively affects perceived ease of use and perceived usefulness. The confirmation of these hypotheses proves that users feel safe using QRIS and it implies opinions of its benefit and easiness. Trust in technology is an essential factor. If users believe that QRIS is safe and reliable, it will increase their interest in using the system. Efforts to increase trust may include improving system security and transparency in communication with users.

Perceived ease of use positively affects perceived usefulness. This indicates that the easier QRIS is perceived, the more beneficial users perceive it. This is in line with the research of [41], [45], [76] who found that perceived ease of use positively influences perceived usefulness. Perceived Usefulness and Perceived Ease of Use positively affect Intention to Use. The results obtained from this test, as seen in Table 5, show that both hypotheses are accepted. Based on the testing of the twelfth hypothesis, it is evident that the perceived ease of use has a positive and significant impact on the intention to use. According to [82], when someone feels there is ease in doing their work, they will often use technology. With this ease, payments become faster and more effective. From the customer's perspective, users are

facilitated in payments through smartphones, eliminating the need to carry cash for sales transactions at merchants [83]. From the seller's perspective, this provides payment options to consumers who want to transact but do not bring cash or debit cards. With the increasing demand for non-cash transactions by consumers, it leads sellers to be responsive to changes in consumer behavior. This finding alo strengthens previous research by [84], [85], which concludes that the perceived ease of use has a positive and significant impact on the intention to use.

With the increasing perceived ease of use, users' interest in using mobile QRIS transactions will increase. Perceived usefulness becomes one of the considerations before users use applications related to digital payments [86], [87]. Users have an interest in using applications when they perceive the applications to be useful [88]. There is a positive and significant influence between perceived usefulness and the intention to use, as stated in previous studies [76], [89], concluding that. On the contrary, this research is different from the findings of [90] who claimed that for optimistic or innovative individuals, perceived usefulness may not have a substantial effect to affect their intention to use.

B. Contributions And Implications

This study applied the extended TRAM model to expand its usefulness in boosting digital financial inclusion in Indonesia. TRI Constructs include optimism and discomfort have a significant, direct, and positive impact on the perceived ease of use and perceived usefulness of QRIS. Besides, trust had a significant impact on perceived ease of use and perceived usefulness. The study concluded that the intention to use QRIS is influenced by several factors directly, namely perceived ease of use and perceived usefulness. These findings offer insight into improving and advancing digital payment, particularly QRIS in the future. Since perceived ease of use and perceived usefulness were found to directly affect the intention to use QRIS, then it is important to consider the user interface which eases the transaction and makes sure it functions properly.

PJSP should prioritize user-friendliness to ensure ease of use. Besides, the results also show that personal traits influence the adoption. Optimism and Trust positively and significantly influence perceived ease of use and perceived usefulness, which means the more optimism and trust in individuals towards QRIS, the higher they perceive that QRIS is easy and beneficial. It implies that when PJSP promotes the use of QRIS, they should consider the personality traits and technology readiness index as they might influence adoption decisions [91]. Optimistic users tend to share their positive experiences while trust plays a vital role in the digital payment context including privacy or financial transactions [92], [93]. Trust and optimism are related to positive word of mouth. By having positive word of mouth, PJSP gets benefits as positive word of mouth may influence people to use/buy the product [94], [95]. Furthermore, PJSP should accustom the promotional message to suit the diversity of segments of the target audience based on their technology readiness and personal traits. For instance, messages that focus on innovative aspects suit segments that are technologically ready, while promotional messages for segments that are not technologically ready should focus on ease of use and usefulness.

Moreover, enhancing internet connectivity in remote areas and providing support to disadvantaged and vulnerable groups is crucial. BPS-Statistics Indonesia, Village Potential Data Collection (2022) shows the Number of Villages by Province that have no Cellular Phone Internet Signal is around 3045 villages (urban and rural), and the internet user percentage in rural areas was around 55.92 percent in 2022 [96]. It shows a high percentage of non-internet users and areas of internet coverage. Survey results on national financial literacy in 2022 show that Indonesia's financial literacy index is still 49.68 percent [97]. Even, in urban areas, the literacy rate is a mere 50.52 % in 2022. It shows that there is a need to broaden and enhance digital financial literacy for both sellers and consumers. The PJSP should have a greater emphasis on providing a better user experience, convenience, and utility of the service, which simultaneously fosters trust among sellers and consumers. This study anticipates that an improved digital payment service will contribute to increased financial inclusivity and benefit the overall economy.

C. Limitations and Future Research

The study findings focus on MSMEs in Jabodetabek, West Java, and East Kalimantan, Indonesia. Thus, forthcoming researchers should focus on other areas within Indonesia and/or across borders with larger samples. Moreover, the research solely focused on MSMEs' perspective (sellers), and future studies can explore the perspective of consumers regarding the adoption of QRIS. Additionally, it is paramount to recognize that this study has not discussed the measure of personal traits and technology readiness. Future Research may also look out for other personal traits, such as age, education, income levels, social influence, and technological familiarity among individuals. By exploring these additional relevant factors and employing a more diverse methodological framework, future research can significantly contribute to digital payment platform adoption, providing insights that are crucial for policymakers, businesses, and consumers alike.

VI. CONCLUSIONS

This study observed the influencing factors of intention to use QRIS in MSMEs by integrating TRAM and Trust. The findings indicate that optimism and trust were found to positively affect the perceived ease of use and perceived usefulness, and perceived ease of use and perceived usefulness significantly affect the intention of micro, small, and medium businesses to utilize QRIS. It also indicates that these eight variables reveal 60.9% of QRIS acceptance among MSMEs. Hence, from an academic standpoint, this study proposes that the potential of QRIS could be harnessed for the benefit of MSMEs in Indonesia. The current research provides practical contributions to the broader field of financial technology and, more specifically, digital payments.

Author Contributions: *Adisthy Shabrina Nurqamarani*: Conceptualization, Methodology, Writing - Original Draft, Writing - Review & Editing, Supervision. *Sarah Fadilla*: Investigation, Create Questionnaire instrument, Collect Data, Data Interpretation, Writing - Original Draft. *Ari Juliana*: Investigation, Create Questionnaire instrument, Collect Data, Review

All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by LPPM Universitas Terbuka

Conflicts of Interest: The authors declare no conflict of interest.

Data Availability: The accessibility of the data and/or source code that underlies the results presented in this paper.

Institutional Review Board Statement: Not applicable.

Informed Consent: Informed Consent was obtained, and a detailed explanation was presented in the Methods section.

Animal Subjects: There were no animal subjects.

ORCID:
Adisthy Shabrina Nurqamarani: https://orcid.org/0000-0002-7533-8650
Sarah Fadilla: https://orcid.org/0000-0002-5950-150X
Ari Juliana: https://orcid.org/0000-0002-4541-2362

REFERENCES

[1] R. De', N. Pandey, and A. Pal, "Impact of digital surge during Covid-19 pandemic: A viewpoint on research and practice," *Int. J. Inf. Manage.*, vol. 55, p. 102171, Dec. 2020, doi: 10.1016/J.IJINFOMGT.2020.102171.

[2] L. D. W. Thomas, A. Vernet, and D. M. Gann, "Adoption readiness in service innovation: The case of digital money," *Ind. Innov.*, vol. 23, no. 4, pp. 353–381, 2016, doi: 10.1080/13662716.2016.1156519.

[3] E. Hamzah Muchtar *et al.*, "Quick response code Indonesia standard (QRIS) e-payment adoption: Customers perspective," *Cogent Bus. Manag.*, vol. 11, no. 1, p., 2024, doi: 10.1080/23311975.2024.2316044.

[4] A. C. Sari and H. H. Adinugraha, "Implementation of QRIS-based payments towards the digitalization of Indonesian MSMEs," *Ekon. SYARIAH J. Econ. Stud.*, vol. 5, no. 2, pp. 124–139, 2021, doi: http://dx.doi.org/10.30983/es.v5i2.5027.

[5] I. W. A. Setiawan and L. P. Mahyuni, "QRIS di mata umkm: Eksplorasi persepsi dan intensi umkm menggunakan QRIS," *E-Jurnal Ekon. dan Bisnis Univ. Udayana*, vol. 9, no. 10, p. 921, 2020, doi: 10.24843/eeb.2020.v09.i10.p01.

[6] Z. Abidin, N. A. Hamid, F. R. Zaenal, and U. Chair, "The effect of age, sales volume and number of employees on MSMe business performance in South Sulawesi, Indonesia," in *Proceedings of the 2nd International Conference on Democracy and Social Transformation (ICON-DEMOST 2023), Advances in Social Science, Education and Humanities Research 793*, Atlantis Press SARL, 2023, pp. 155–159. doi: 10.2991/978-2-38476-174-6_26.

[7] M. Sinulingga, "The effect of the QRIS application and the ease of using QRIS on the digital payment process in Medan city communities," in *Journal of Proceedings*, 2023, pp. 85–93.

[8] M. Hafel, J. Jamil, M. Umasugi, and A. Anfas, "Challenges of e-government implementation in the region archipelago characteristics," *JAKPP (Jurnal Anal. Kebijak. Pelayanan Publik)*, vol. 8, no. 1, pp. 44–58, 2022, doi: 10.31947/jakpp.v8i1.21282.

[9] L. T. H. Van, N. T. Nguyen, H. L. P. Nguyen, and D. H. Vo, "The asymmetric effects of institutional quality on financial inclusion in the Asia-pacific region," *Heliyon*, vol. 8, no. 12, p. e12016, 2022, doi: 10.1016/j.heliyon.2022.e12016.

[10] Z. Qasem, "The effect of positive TRI traits on centennials adoption of try-on technology in the context of e-fashion retailing," *Int. J. Inf. Manage.*, vol. 56, no. March 2020, p. 102254, 2021, doi: 10.1016/j.ijinfomgt.2020.102254.

[11] A. Parasuraman and C. L. Colby, "An updated and streamlined technology readiness index: TRI 2.0," *J. Serv. Res.*, vol. 18, no. 1, pp. 59–74, 2015, doi: 10.1177/1094670514539730.

[12] Y. J. Ma, H. J. Gam, and J. Banning, "Perceived ease of use and usefulness of sustainability labels on apparel products: application of the technology acceptance model," *Fash. Text.*, vol. 4, no. 3, 2017, doi: 10.1186/s40691-017-0093-1.
[13] A. S. Nurqamarani, E. Sogiarto, and N. Nurlaeli, "Technology adoption in small-medium enterprises based on technology acceptance model: A critical review," *J. Inf. Syst. Eng. Bus. Intell.*, vol. 7, no. 2, p. 162, Oct. 2021, doi: 10.20473/jisebi.7.2.162-172.
[14] M. A. Nangin, I. R. G. Barus, and S. Wahyoedi, "The Effects of perceived ease of use, security, and promotion on trust and its implications on fintech adoption," *J. Consum. Sci.*, vol. 5, no. 2, pp. 124–138, 2020, doi: 10.29244/jcs.5.2.124-138.
[15] M. Aisyah and I. M. Eszi, "Determinants of intention to use e-wallet using TRAM model," *J. Akunt. dan Audit. Indones.*, vol. 24, no. 2, pp. 167–178, 2020, doi: https://doi.org/10.20885/jaai.vol24.iss2.art10.
[16] O. B. Saputri, "Preferensi konsumen dalam menggunakan quick response code Indonesia standard (QRIS) sebagai alat pembayaran digital," *Journals Econ. Bus. Mulawarman*, vol. 17, no. 2, pp. 1–11, 2020, doi: https://doi.org/10.30872/jkin.v17i2.7355.
[17] K. Khando, M. S. Islam, and S. Gao, "The emerging technologies of digital payments and associated challenges: A systematic literature review," *Future Internet*, vol. 15, no. 1. MDPI, Jan. 2023. doi: 10.3390/fi15010021.
[18] I. R. de Luna, F. Liébana-Cabanillas, J. Sánchez-Fernández, and F. Muñoz-Leiva, "Mobile payment is not all the same: The adoption of mobile payment systems depending on the technology applied," *Technol. Forecast. Soc. Change*, vol. 146, pp. 931–944, Sep. 2019, doi: 10.1016/j.techfore.2018.09.018.
[19] A. Mishra and M. Mathuria, "A review on QR code," *Int. J. Comput. Appl.*, vol. 164, no. 9, pp. 17–19, 2017, doi: 10.5120/ijca2017913739.
[20] L. Lou, Z. Tian, and J. Koh, "Tourist satisfaction enhancement using mobile QR code payment: An empirical investigation," *Sustain.*, vol. 9, no. 7, Jul. 2017, doi: 10.3390/su9071186.
[21] Y. W. Cheng, S. Y. Hsu, and C. P. Lo, "Innovation and imitation: Competition between the US and China on third-party payment technology," *J. Chinese Econ. Foreign Trade Stud.*, vol. 10, no. 3, pp. 252–258, 2017, doi: 10.1108/JCEFTS-05-2017-0012.
[22] T. Dahlberg, J. Guo, and J. Ondrus, "A critical review of mobile payment research," *Electron. Commer. Res. Appl.*, vol. 14, no. 5, pp. 265–284, Sep. 2015, doi: 10.1016/j.elerap.2015.07.006.
[23] S. A. Natalina, A. Zunaidi, and R. Rahmah, "Quick response code Indonesia standard (QRIS) sebagai strategi survive usaha mikro kecil dan menengah (UMKM) di masa pandemi di Kota Kediri," *Istithmar J. Stud. Ekon. Syariah*, vol. 5, no. 2, Dec. 2021, doi: 10.30762/istithmar.v5i2.85.
[24] A. S. Nurqamarani, S. Fadilla, and A. Juliana, "Adoption of QRIS as a digital payment mode in the culinary subsector: A conceptual framework study," in *Proceedings of the 5th Open Society Conference (OSC 2023)*, South Tangerang: Atlantis Press, 2023, pp. 60–73. doi: 10.2991/978-94-6463-290-3_6.
[25] A. A. Puspitasari and I. Salehudin, "Quick response Indonesian standard (QRIS): Does government support contribute to cashless payment system long-term adoption?," *J. Mark. Innov.*, vol. 2, no. 1, pp. 1–15, 2022, doi: 10.35313/jmi.v2i1.29.
[26] N. Putu Ani Karniawati, G. Sri Darma, L. P. Mahyuni, and I. G. Sanica, "Community perception of using QR code payment in era new normal," *PalArch's J. Archaelogy Egypt / Egyptol.*, vol. 18, no. 1, pp. 3986–3999, 2021.
[27] E. T. Kurniawati, I. Zuhroh, N. Malik, and U. M. Malang, "Literasi dan edukasi pembayaran non tunai melalui aplikasi QR code Indonesian standard (QRIS) pada kelompok milenial," *Stud. Kasus Inov. Eknomi*, vol. 5, no. 1, pp. 23–30, 2021.
[28] N. Butarbutar, E. Grace, L. A. Putra, C. Loist, and A. Sudirman, "Behavioral intention constituent analysis of QRIS digital payment tools in MSMEs in Pematangsiantar city," *Ideas J. Pendidikan, Sos. dan Budaya*, vol. 8, no. 4, p. 1537, Nov. 2022, doi: 10.32884/ideas.v8i4.1023.
[29] N. M. Puriati, I. W. Sugiartana, and N. P. E. Mertaningrum, "Efektivitas penerapan sistem pembayaran quick response code Indonesia standard (QRIS) pada UMKM di Kabupaten Karangasem," *J. Ilm. Akunt. dan Humanika*, vol. 13, no. 3, pp. 332–338, 2023, doi: 10.23887/jiah.v13i3.70942.
[30] R. Panday, "The effect of technology readiness on technology acceptance in using services delivery of academic information system," osf.io, 2018. doi: https://doi.org/10.31227/osf.io/8wx4y.
[31] M. S. Rosli, N. S. Saleh, A. Md. Ali, S. Abu Bakar, and L. Mohd Tahir, "A systematic review of the technology acceptance model for the sustainability of higher education during the COVID-19 pandemic and identified research gaps," *Sustain.*, vol. 14, no. 18, 2022, doi: 10.3390/su141811389.
[32] Y. Zhong, S. Oh, and H. C. Moon, "Service transformation under industry 4.0: Investigating acceptance of facial recognition payment through an extended technology acceptance model," *Technol. Soc.*, vol. 64, p. 101515, Feb. 2021, doi: 10.1016/j.techsoc.2020.101515.
[33] F. Yusuf, N. Mirantika, T. S. Syamfithriani, E. Darmawan, and D. Irawan, "Technology readiness and acceptance model as a factor for the use intention of LMS e-learning in Kuningan University," *J. Phys. Conf. Ser.*, vol. 1933, no. 1, p. 012005, Jun. 2021, doi: 10.1088/1742-6596/1933/1/012005.
[34] C. H. Jin, "Predicting the use of brand application based on a TRAM," *Int. J. Human–Computer Interact.*, vol. 36, no. 2, pp. 156–171, 2020, doi: 10.1080/10447318.2019.1609227.
[35] R. Khadka and P. Kohsuwan, "Understanding consumers' mobile banking adoption in Germany: An integrated technology readiness and acceptance model (TRAM) perspective," *Catalyst*, vol. 18, pp. 56–67, 2018.
[36] R. K. Kampa, "Combining technology readiness and acceptance model for investigating the acceptance of m-learning in higher education in India," *Asian Association of Open Universities Journal*. emerald.com, 2023. doi: 10.1108/AAOUJ-10-2022-0149.
[37] M. A. H. Pontoh, F. G. Worang, and F. J. Tumewu, "The influence of perceived ease of use, perceived risk and consumer trust towards merchant intention in using QRIS as a digital payment method," *J. EMBA J. Ris. Ekon. Manajemen, Bisnis dan Akunt.*, vol. 10, no. 3, p. 904, Sep. 2022, doi: 10.35794/emba.v10i3.42664.
[38] R. P. Kurniawati, "Prosedur pembayaran non tunai melalui quick response code Indonesian standard (QRIS) di UMKM toko La Rissa Gayungan," eprints.perbanas.ac.id, 2022.
[39] C.-M. Chao and T.-K. Yu, "The moderating effect of technology optimism," *Online Inf. Rev.*, vol. 43, no. 1, pp. 161–180, Jan. 2019, doi: 10.1108/OIR-11-2016-0316.
[40] A. Yuwono, T. Heriana, S. Dewi, and M. D. Sari, "The importance of digital-based payment management knowledge for MSME drivers : A study of financial literacy," *Budapest Int. Res. Critics Institute-Journal*, vol. 5, no. 2, pp. 9073–9084, 2020, [Online]. Available: https://eprints.unmer.ac.id/id/eprint/3304
[41] S. Shin and W. Lee, "The effects of technology readiness and technology acceptance on NFC mobile payment services in Korea," *J. Appl. Bus. Res.*, vol. 30, no. 6, p. 1615, Oct. 2014, doi: 10.19030/jabr.v30i6.8873.

[42] N. C. Lago, A. Marcon, J. L. D. Ribeiro, Y. Olteanu, and K. Fichter, "The role of cooperation and technological orientation on startups' innovativeness: An analysis based on the microfoundations of innovation," *Technol. Forecast. Soc. Change*, vol. 192, p. 122604, 2023, doi: https://doi.org/10.1016/j.techfore.2023.122604.

[43] V. A. López-Pérez, P. E. Ramírez-Correa, and E. E. Grandón, "Innovativeness and factors that affect the information technology adoption in the classroom by primary teachers in Chile," *Informatics Educ.*, vol. 18, no. 1, pp. 165–181, 2019, doi: 10.15388/infedu.2019.08.

[44] R. P. J. Rajapathirana and Y. Hui, "Relationship between innovation capability, innovation type, and firm performance," *J. Innov. Knowl.*, vol. 3, no. 1, pp. 44–55, 2018, doi: https://doi.org/10.1016/j.jik.2017.06.002.

[45] P. Godoe and T. S. Johansen, "Understanding adoption of new technologies: Technology readiness and technology acceptance as an integrated concept," *J. Eur. Psychol. Students*, vol. 3, no. 1, p. 38, May 2012, doi: 10.5334/JEPS.AQ.

[46] H. Mahmud, A. K. M. N. Islam, and R. K. Mitra, "What drives managers towards algorithm aversion and how to overcome it? Mitigating the impact of innovation resistance through technology readiness," *Technol. Forecast. Soc. Change*, vol. 193, p. 122641, 2023, doi: https://doi.org/10.1016/j.techfore.2023.122641.

[47] K. Koivisto, M. Makkonen, L. Frank, and J. Riekkinen, "Extending the technology acceptance model with personal innovativeness and technology readiness: a comparison of three models," in *BLED 2016 Proceedings*, Association for Information Systems AIS Electronic Library (AISeL), 2016, pp. 113–128.

[48] R. Pillai, B. Sivathanu, and Y. K. Dwivedi, "Shopping intention at AI-powered automated retail stores (AIPARS)," *J. Retail. Consum. Serv.*, vol. 57, Nov. 2020, doi: 10.1016/j.jretconser.2020.102207.

[49] F. Sudirjo, M. R. Tawil, S. Imanirubiarko, L. Judijanto, and T. R. Fauzan, "The influence of insecurity, perceived of technology innovativeness, perceived ease of use and perceived usefulness on consumers intention to use electronic toll payment cards," *J. Inf. dan Teknol.*, vol. 5, no. 4, pp. 92–97, Nov. 2023, doi: 10.60083/jidt.v5i4.421.

[50] B. Ganguly, S. B. Dash, D. Cyr, and M. Head, "The effects of website design on purchase intention in online shopping: the mediating role of trust and the moderating role of culture," *Int. J. Electron. Bus.*, vol. 8, pp. 302–330, 2010, doi: 10.1504/ijeb.2010.035289.

[51] E. A. Firmansyah, M. Masri, M. Anshari, and M. H. A. Besar, "Factors affecting fintech adoption: A systematic literature review," *FinTech*, vol. 2, no. 1, pp. 21–33, Dec. 2022, doi: 10.3390/fintech2010002.

[52] E. I. Tyas and E. S. Darma, "Pengaruh perceived usefulness, perceived ease of use, perceived enjoyment, dan actual usage terhadap penerimaan teknologi informasi: Studi empiris pada karyawan bagian akuntansi dan keuangan baitul maal wa tamwil wilayah Daerah Istimewa Yogyakarta," *Reviu Akunt. dan Bisnis Indones.*, vol. 1, no. 1, 2017, doi: 10.18196/rab.010103.

[53] D. Lee, J. Moon, and Y. J. Kim, "The effect of simplicity and perceived control on perceived ease of use," in *Association for Information Systems - 13th Americas Conference on Information Systems, AMCIS 2007: Reaching New Heights*, 2007, pp. 1764–1776.

[54] M. A. Nugroho and M. Andryzal Fajar, "Effects of technology readiness towards acceptance of mandatory web-based attendance system," *Procedia Comput. Sci.*, vol. 124, pp. 319–328, 2017, doi: 10.1016/j.procs.2017.12.161.

[55] R. Nurhapsari and E. Sholihah, "Analysis of the factors of intention to use QRIS for MSMEs in Semarang City's traditional market," *J. Ekon. Mod.*, vol. 18, no. 2, pp. 199–211, 2022, doi: 10.21067/jem.v18i2.7291.

[56] Y. Luo, Q. Ye, and L. Meng, "An empirical research on influence factor of college students' continued intentions of online self-regulated learning based on the model of ECM and TAM," in *2017 3rd International Conference on Social Science and Higher Education*, Atlantis Press, 2017, pp. 521–528. doi: 10.2991/icsshe-17.2017.132.

[57] Venkatesh; Viaswanath and Davis; Fred D., "A theoretical extension of the technology acceptance model: Four longitudinal field studies," *Manage. Sci.*, vol. 46, no. 2, pp. 186–204, 2000, [Online]. Available: https://www.jstor.org/stable/pdf/2634758.pdf

[58] S. A. Kamal, M. Shafiq, and P. Kakria, "Investigating acceptance of telemedicine services through an extended technology acceptance model (TAM)," *Technol. Soc.*, vol. 60, Feb. 2020, doi: 10.1016/j.techsoc.2019.101212.

[59] T. Teo, "Students and teachers' intention to use technology: Assessing their measurement equivalence and structural invariance," *J. Educ. Comput. Res.*, vol. 57, no. 1, pp. 201–225, 2019, doi: 10.1177/0735633117749430.

[60] H. Xia, T. Chen, and G. Hou, "Study on collaboration intentions and behaviors of public participation in the inheritance of ICH based on an extended theory of planned behavior," *Sustain.*, vol. 12, no. 11, 2020, doi: 10.3390/su12114349.

[61] K. Rattanaburi and R. Vongurai, "Factors influencing actual usage of mobile shopping applications: Generation Y in Thailand," *J. Asian Financ. Econ. Bus.*, vol. 8, no. 1, pp. 901–913, 2021, doi: 10.13106/jafeb.2021.vol8.no1.901.

[62] O. Giandi, I. Irawan, and R. Ambarwati, "Determinants of behavior intention and use behavior among Bukalapak's consumers," *IPTEK J. Technol. Sci.*, vol. 31, no. 2, p. 158, 2020, doi: 10.12962/j20882033.v31i2.5585.

[63] J. F. Hair, C. M. Ringle, and M. Sarstedt, "PLS-SEM: Indeed a silver bullet," *J. Mark. Theory Pract.*, vol. 19, no. 2, pp. 139–152, 2011, doi: 10.2753/MTP1069-6679190202.

[64] K. M. Rafiani, R. A. Yunanda, and T. Rusmanto, "Determinants of QRIS usage as a digital payment tool for MSMEs," *J. Theor. Appl. Inf. Technol.*, vol. 102, no. 3, pp. 1158–1171, 2024.

[65] K. L. Agustin and E. S. Apriani, "Comparative analysis of income before and after using QRIS at the Bintang Mawar Ayam Pedas depot in Balikpapan," *MEC-J (Management Econ. Journal)*, vol. 7, no. 3, pp. 291–302, 2023, doi: 10.18860/mec-j.v7i3.23813.

[66] M. Olivia and N. Kezia Marchyta, "The influence of perceived ease of use and perceived usefulness on e-wallet continuance intention: Intervening role of customer satisfaction," *J. Tek. Ind.*, vol. 24, no. 1, 2022, doi: 10.9744/jti.24.1.13−22.

[67] S. Gao, J. Krogstie, and K. Siau, "Developing an instrument to measure the adoption of mobile services," *Mob. Inf. Syst.*, vol. 7, no. 1, pp. 45–67, 2011, doi: 10.3233/MIS-2011-0110.

[68] O. Sohaib, W. Hussain, M. Asif, M. Ahmad, and M. Mazzara, "A PLS-SEM neural network approach for understanding cryptocurrency adoption," *IEEE Access*, vol. 8, pp. 13138–13150, 2020, doi: 10.1109/ACCESS.2019.2960083.

[69] S. T. EL Hajjar, "Statistical analysis: Internal-consistency reliability and construct validity," *Int. J. Quant. Qual. Res. Methods*, vol. 6, no. 1, pp. 27–38, 2018.

[70] G. W. Cheung, H. D. Cooper-Thomas, R. S. Lau, and L. C. Wang, "Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations," *Asia Pacific J. Manag.*, pp. 1–39, Jan. 2023, doi: 10.1007/s10490-023-09871-y.

[71] J. F. Hair, M. Sarstedt, L. Hopkins, and V. G. Kuppelwieser, "Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research," *Eur. Bus. Rev.*, vol. 26, no. 2, pp. 106–121, 2014, doi: 10.1108/EBR-10-2013-0128.

[72] K. D. Carlson and A. O. Herdman, "Understanding the impact of convergent validity on research results," *Organ. Res. Methods*, vol. 15, no. 1, pp. 17–32, Dec. 2010, doi: 10.1177/1094428110392383.

[73] D. T. Campbell and D. W. Fiske, "Convergent and discriminant validation by the multitrait-multimethod matrix.," *Psychol. Bull.*, vol. 56, no. 2, pp. 81–105, Mar. 1959, doi: 10.1037/h0046016.
[74] J. F. Hair, B. J. Babin, and N. Krey, "Covariance-based structural equation modeling in the Journal of Advertising : Review and recommendations" *J. Advert.*, vol. 46, no. 3, p. 454, 2017, doi: 10.1080/00913367.2017.1329496.
[75] K. A. Pradana and E. M. Sagoro, "analisis faktor-faktor minat penggunaan mobile payment pada usaha kecil dan mikro (UKM) di Yogyakarta," *J. Profita Kaji. Ilmu Akunt.*, vol. 9, no. 3, pp. 17–30, 2021.
[76] H. Ahmad, A. H. Butt, A. Khan, M. N. Shafique, and Z. Nawaz, "Reluctance to acceptance: Factors affecting e-payment adoption in Pakistan (The integration of TRI and TAM)," *SMART J. Bus. Manag. Stud.*, vol. 16, no. 2, p. 49, 2020, doi: 10.5958/2321-2012.2020.00016.0.
[77] A. E. Hadisuwarno and R. Bisma, "Analisis penerimaan pengguna aplikasi e-Kinerja dengan metode TRAM dan EUCS pada kepolisian," *Teknol. J. Ilm. Sist. Inf.*, vol. 10, no. 2, pp. 93–109, 2020.
[78] Jefferson and T. C. Efrata, "Personal innovativeness, perceived usefulness, perceived ease of use, and trust as determinants of mobile payment utilization," *Rev. Manag. Entrep.*, vol. 07, p. 2, 2023.
[79] S. Shin and W. Lee, "The effects of technology readiness and technology acceptance on NFC mobile payment services in Korea," *J. Appl. Bus. Res.*, 2014.
[80] C. Lemke, K. Kirchner, L. Anandarajah, and F. Herfurth, "Exploring the student perspective: Assessing technology readiness and acceptance for adopting large language models in higher education," *Eur. Conf. e-Learning*, vol. 22, no. 1, pp. 156–164, Oct. 2023, doi: 10.34190/ecel.22.1.1828.
[81] D. H. Schunk and M. K. DiBenedetto, "Albert Bandura's legacy in education," *Theory Pract.*, vol. 62, no. 3, pp. 205–206, Jul. 2023, doi: 10.1080/00405841.2023.2226560.
[82] Y. He, Q. Chen, and S. Kitkuakul, "Regulatory focus and technology acceptance: Perceived ease of use and usefulness as efficacy," *Cogent Bus. Manag.*, vol. 5, no. 1, 2018, doi: 10.1080/23311975.2018.1459006.
[83] M. R. I. Bhuiyan, M. S. Akter, and S. Islam, "How does digital payment transform society as a cashless society? An empirical study in the developing economy," *J. Sci. Technol. Policy Manag.*, Jan. 2024, doi: 10.1108/JSTPM-10-2023-0170.
[84] M. Yang, A. Al Mamun, M. Mohiuddin, N. C. Nawi, and N. R. Zainol, "Cashless transactions: A study on intention and adoption of e-wallets," *Sustain.*, vol. 13, no. 2, pp. 1–18, 2021, doi: 10.3390/su13020831.
[85] M. Y.-P. Peng and X. Yan, "Exploring the influence of determinants on behavior intention to use of multiple media kiosks through technology readiness and acceptance model.," *Front. Psychol.*, vol. 13, p. 852394, 2022, doi: 10.3389/fpsyg.2022.852394.
[86] K. Shateri and A. A. Hayat, "Investigating the mediating role of organizational trust in the relationship between perceived organizational support and Knowledge sharing," *Knowl. Manag. E-Learning*, vol. 12, no. 3, pp. 298–314, 2020, doi: 10.34105/j.kmel.2020.12.016.
[87] R. Raninda, W. Wisnalmawati, and H. Oetomo, "Effect of perceived usefulness, perceived ease of use, perceived security, and cashback promotion on behavioral intention to the DANA e-wallet," *J. Ilm. Manaj. Kesatuan*, vol. 10, no. 1, pp. 63–72, 2022, doi: 10.37641/jimkes.v10i1.1218.
[88] D. Sugandini, "The role of uncertainty, perceived ease of use, and perceived usefulness towards the technology adoption," *Int. J. Civ. Eng. Technol.*, vol. 9, no. 4, pp. 660–669, 2018.
[89] A. W. Setyaningsih, O. Usman, and A. M. Musyaffi, "Analysis of perceived usefulness, perceived security, and perceived easy of use on intention to use QRIS through trust as mediation in DKI Jakarta," *Int. J. Curr. Econ. Bus. Ventur.*, vol. 1, no. 3, pp. 560–574, 2023, [Online]. Available: https://scholarsnetwork.org/journal/index.php/ijeb
[90] Y. Yi, L. L. Tung, and Z. Wu, "Incorporating technology readiness (TR) into TAM : Are individual traits important to understand technology acceptance ?," *Digit Proc.*, no. 2, pp. 1–27, 2003, [Online]. Available: http://aisel.aisnet.org/digit2003/2
[91] M. Martens, O. Roll, and R. Elliott, "Testing the technology readiness and acceptance model for mobile payments across Germany and South Africa," *Int. J. Innov. Technol. Manag.*, vol. 14, no. 6, Dec. 2017, doi: 10.1142/S021987701750033X.
[92] A. G. Chin, G. Onwujekwe, and M. A. Harris, "Consumer trust in mobile payments: An initial review and synthesis," *Inf. Inst. Conf.*, no. April, pp. 1–16, 2020.
[93] A. S. Al-ajam and K. Nor, "Internet banking adoption : Integrating technology acceptance model and trust," vol. 5, no. 3, pp. 207–215, 2013.
[94] T. Rahman, M. Noh, Y. S. Kim, and C. K. Lee, "Effect of word of mouth on m-payment service adoption: A developing country case study," *https://doi.org/10.1177/0266666921999702*, vol. 38, no. 2, pp. 268–285, Mar. 2021, doi: 10.1177/0266666921999702.
[95] R. Juwita, S. Purwanti, and A. N. Rohmah, "Digital victim: Castellian perspective on education in rural Indonesia," *J. Komun. Indones.*, vol. 10, no. 1, 2021, doi: 10.7454/jkmi.v10i1.1020.
[96] Badan Pusat Statistik Indonesia, "Statistik Telekomunikasi Indonesia 2022." 2022.
[97] OJK International Information Hub | Otoritas Jasa Keuangan, "PRESS RELEASE - 2022 national financial literacy and inclusion survey." Accessed: Feb. 11, 2024. [Online]. Available: https://www.ojk.go.id/iru/policy/detailpolicy/9625/press-release-2022-national-financial-literacy-and-inclusion-survey