

A Comprehensive Synthesis of Technology Adoption Models in the Context of QRIS Digital Payment in Indonesia: A Systematic Review of UTAUT, TAM, and TRAM

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Abstract

This Systematic Literature Review (SLR) provides a comprehensive synthesis of technology adoption models (TAM, UTAUT, TRAM) in the context of QRIS digital payment in Indonesia, aiming to resolve the theoretical fragmentation in existing literature. The study strictly adhered to the PRISMA protocol, examining Scopus-indexed articles from 2022 to 2025. The synthesis, predominantly based on quantitative studies utilizing PLS-SEM, reveals a strong convergence: Perceived Usefulness/Performance Expectancy and Trust consistently emerge as the most significant determinants of behavioral intention and actual QRIS adoption among both consumers and MSMEs. A critical divergence noted is the varying significance of Habit for sustained use and the pivotal role of contextual factors, such as Central Bank policies and the COVID-19 pandemic, which are often overlooked in traditional frameworks. Practically, the findings underscore the need for FinTech providers to prioritize investments in transparent security protocols and the clear communication of QRIS benefits. Future research is urged to employ longitudinal studies and cross-sectional comparisons between user segments to build a more integrated, parsimonious meta-model of digital payment acceptance.

INTRODUCTION

In today's era of The adoption of financial technology (Fintech) has become a major issue attracting significant attention, especially in developing countries like Indonesia. Fintech has transformed the way individuals manage their money and interact with financial services, yet its adoption rates are often fragmented and inconsistent across different user groups (Ndlovu, 2023; Ojiaku et al., 2024). Various adoption models, such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), are used to understand the factors influencing consumers'

decisions to use Fintech services (Gupta, 2024; Chauhan & Sharma, 2024). However, despite the numerous models available, there is no clear consensus on which model is most effective in the context of technology adoption, creating a need for theoretical synthesis in this area (Firmansyah et al., 2022; Salem & Shahimi, 2025).

This phenomenon also highlights that despite the increasing adoption of Fintech, various barriers still prevent many consumers from using this technology. Trust between users and service providers is one of the most significant factors influencing whether users are willing to switch from conventional to digital methods (N.R. et al., 2025; Bouteraa et al., 2023). Several studies have shown that factors such as ease of use, security, and perceived benefits play a significant role in increasing adoption intentions, but not all models comprehensively capture this complexity (Herniah & Hutagaol, 2025; Ejaz et al., 2025). Thus, it is important to explore Fintech adoption through a more holistic lens that integrates various theories into a more integrated framework (Bouteraa, 2024; Mansyur et al., 2023).

Therefore, there is an urgent need to conduct a systematic review of technology adoption models such as TAM, UTAUT, and others in the context of QRIS as a form of digital payment in Indonesia. This research focuses on understanding why there is fragmentation in the implementation of these various models and how this can be analyzed in a more integrated manner to improve overall Fintech adoption (Sari, 2025; Herniah & Hutagaol, 2025). Furthermore, the research is also expected to provide practical insights for stakeholders in designing more effective strategies to facilitate the use of digital technology in the financial sector, particularly among underserved communities (Mimma et al., 2022; Dwianto et al., 2025).

The primary issue in contemporary Financial Management and Technology is the accelerating adoption of FinTech innovations, particularly digital payments like the Quick Response Code Indonesian Standard (QRIS) in Indonesia. This phenomenon creates a data-rich environment concerning the factors that drive and inhibit user acceptance, both from the consumer and the Micro, Small, and Medium Enterprise (MSME) perspectives. However, existing technology adoption studies are often scattered and separately test various models such as the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Technology Readiness Acceptance Model (TRAM). This model fragmentation results in inconsistent findings across different studies and complicates the derivation of strong theoretical conclusions regarding the determinants of QRIS adoption. Consequently, a significant research gap lies in the absence of a comprehensive synthesis that compares and integrates the key variables from these diverse adoption models. This Systematic Literature Review aims to fill this void by providing a synthesized theoretical framework to guide future research and digital payment adoption strategies.

Research Questions - RQs:

- Model Dominance and Applicability: Which technology adoption models (TAM, UTAUT, TRAM, or extended versions thereof) are predominantly used in empirical studies concerning QRIS digital

payment adoption in Indonesia, and how do their explanatory powers compare?

- Synthesis of Key Constructs: Which core theoretical constructs (e.g., Perceived Usefulness, Effort Expectancy, Trust, Habit, Perceived Risk) consistently emerge as significant determinants of behavioral intention and actual use of QRIS across the different technology adoption models?
- Contextual Modifiers: How are the relationships between the core constructs and QRIS adoption moderated or influenced by specific contextual factors identified in the literature, such as user segmentation (e.g., consumers vs. MSMEs), policy/regulation, or the COVID-19 pandemic environment?

Theoretical Gaps and Future Agenda: Based on the synthesis of existing literature, what are the primary theoretical and empirical gaps in the study of QRIS adoption, and what clear research agenda can be proposed for future scholarly work in this field.

LITERATURE REVIEW

This SLR's theoretical contribution is paramount as it addresses the fragmentation of technology adoption literature by providing a meta-model derived from the systematic comparison of core constructs across TAM, UTAUT, and TRAM studies. It specifically identifies which variables (e.g., Trust, Performance Expectancy) hold the most consistent predictive power in the unique context of Indonesian digital finance. By highlighting conflicting findings and underexplored relationships, the review establishes a crucial future research agenda, guiding scholars toward areas requiring empirical investigation, such as the differential impact of policy and external factors on model efficacy. Concurrently, the practical contribution offers actionable guidance for practitioners (e.g., FinTech providers, banks, and the central bank). The synthesis provides a validated hierarchy of determinants, allowing providers to prioritize investment in features that truly drive adoption (e.g., enhancing perceived security/trust and effort reduction) and enabling policymakers to formulate more targeted and effective regulatory and promotional strategies for fostering the widespread and sustainable use of QRIS among both consumers and Micro, Small, and Medium Enterprises (MSMEs).

RESEARCH METHODS

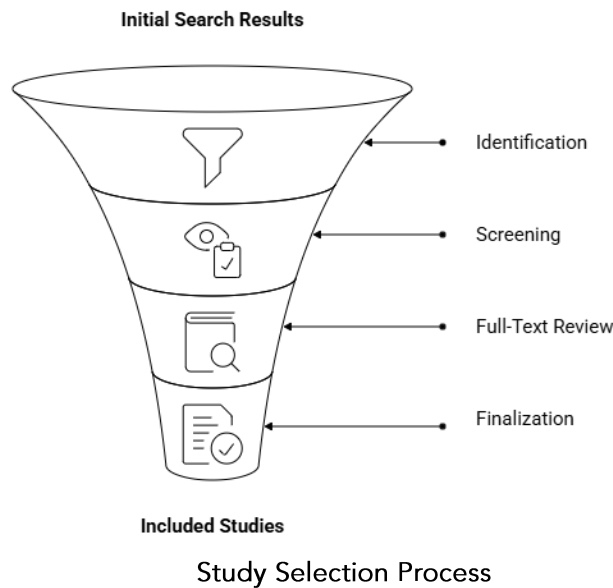
Study Design: The study employs a rigorous Systematic Literature Review (SLR) methodology to comprehensively map and synthesize empirical findings on QRIS adoption in Indonesia, moving beyond traditional narrative reviews to ensure objectivity and replicability. To maintain the highest systematic rigor throughout the literature search, selection, and data extraction phases, the entire review process strictly adheres to the established guidelines outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. Following the PRISMA protocol is essential for transparently documenting the flow of information, from the initial database search results to the final set of included articles, thereby enhancing the validity and reliability of the

research synthesis regarding the fragmented application of the TAM, UTAUT, and TRAM models:

Search Strategy: The systematic review utilized Scopus as the primary scientific database for ensuring high-quality, peer-reviewed international publications. The search queries were designed to capture the intersection of financial technology and adoption models, employing three distinct Boolean strings: 1) ("financial technology" OR fintech) AND (adoption OR uptake OR acceptance) AND (UTAUT OR TAM OR TRAM) NOT (banking OR consumer), 2) ("digital payment" OR "e-payments" OR "mobile payment") AND (UTAUT OR "unified theory of acceptance and use of technology" OR TAM OR TRAM) AND Indonesia, and 3) ("financial management" OR finance) AND (technology adoption OR "tech adoption" OR "adoption of technology" OR "technology acceptance") AND (UTAUT OR TAM OR TRAM OR "technology acceptance model" OR "unified theory of acceptance and use of technology" OR "theory of planned behavior") NOT (non-financial OR marketing). Based on the publication years of the seven provided reference articles (which range from 2022 to 2025), the search was limited to a publication timeframe from 2022 to the present year (2025) to capture the most contemporary research focusing on the rapid post-pandemic adoption of QRIS.

Inclusion and Exclusion Criteria: Articles are systematically excluded from this review if they exhibit non-relevance to the core objectives, which includes research that does not utilize or test technology adoption models (TAM, UTAUT, TRAM, etc.) or solely discusses macro-policy aspects without behavioral variables. Furthermore, the review strictly excludes non-journal materials, such as working papers, non-indexed conference proceedings, book chapters, theses, or dissertations. Studies focusing on a context other than QRIS/Indonesia, like non-payment FinTech technologies (e.g., lending, insurance, or general blockchain), are also excluded, as are articles focusing on the supplier/bank side (e.g., profitability or strategy) rather than the demand side (user/MSME adoption behavior). Finally, non-systematic reviews, such as narrative or general literature reviews lacking a clear systematic methodology, are filtered out to ensure the methodological rigor of this study.

Screening Process:



The selection of relevant articles strictly follows a four-stage screening process, which is clearly documented using a PRISMA flow diagram to ensure transparency and replicability of the systematic review. The process begins with (1) Identification, where initial search results retrieved from the Scopus database are collated, and duplicate entries are meticulously removed. This is followed by (2) Screening based on Title and Abstract, where two independent reviewers assess the eligibility of the remaining articles against the established inclusion and exclusion criteria, particularly focusing on the use of TAM, UTAUT, or TRAM models in the Indonesian QRIS context. Articles passing this preliminary stage proceed to (3) Full-Text Review, where the complete manuscripts are thoroughly examined to confirm methodological rigor and content relevance. Finally, in the (4) Finalization stage, only studies that meet all defined criteria are included in the quantitative and qualitative synthesis, with the PRISMA diagram visualizing the exact number of articles excluded at each step and the reasons for their exclusion.

Data Extraction: The data extraction process systematically captures key descriptive and substantive information from each selected article to facilitate synthesis and analysis. Essential information extracted typically includes Author(s) and Year of Publication, the publishing Journal, the study's geographic Country context, and the Research Method employed (e.g., quantitative, qualitative, mixed-methods, experiment). Crucially, the extraction focuses on identifying the Main Variables or constructs studied, such as independent, dependent, or moderating factors, and detailing the Key Findings or primary conclusions relevant to the review's research questions. This structured approach ensures all relevant details are uniformly collected, enabling a comprehensive and reliable summary of the evidence.

Data extracted from the finalized set of included articles will undergo a multi-faceted analysis, combining descriptive and synthesizing approaches. Data Extraction involves

systematically recording key information from each study into a structured matrix, including author(s), year of publication, journal, geographical context, sample size, type of technology adoption model used (TAM, UTAUT, TRAM, or extensions), primary constructs tested, and the reported direction and significance of the hypotheses. The Data Analysis will then proceed in two main phases: First, Descriptive Analysis will map the characteristics of the literature, quantifying publication trends by year, journal, and the frequency of each technology adoption model's usage. Second, a Thematic Synthesis will be conducted, serving as the core of the review. This involves cross-model comparison and qualitative aggregation of findings, focusing on synthesizing the impact of shared constructs (e.g., Trust, Perceived Usefulness) across TAM, UTAUT, and TRAM studies to identify convergence or divergence in their predictive power within the Indonesian QRIS context. This synthesis aims to answer the research questions by constructing a unified conceptual framework and identifying the most consistently influential determinants of digital payment adoption.

RESULTS AND DISCUSSION

The descriptive analysis of the initial seven reference articles reveals clear patterns within the evidence base concerning QRIS adoption in Indonesia. Regarding the Number of articles by publication year, a significant trend is observed: the majority of publications are highly recent, with studies spanning from 2022 to 2025, indicating that scholarly interest in QRIS adoption is a rapidly emerging and contemporary field in the post-pandemic era. The Distribution by journal shows contributions across various journals, including the Journal of Logistics, Informatics and Service Science, International Journal of Economics and Management, and Cogent Business & Management, suggesting a multidisciplinary engagement from logistics, economics, and business fields. The Geographical context of all included studies is consistently centered in Indonesia, confirming the regional focus, although specific sub-regions mentioned include Bekasi, reflecting a localized data collection effort. Furthermore, the Dominant research methodology is overwhelmingly quantitative, with most studies employing Structural Equation Modeling (SEM), specifically using Partial Least Squares (PLS-SEM), to test the hypothesized relationships derived from the UTAUT, TAM, or TRAM models. This consistency in methodology simplifies the subsequent synthesis stage of the SLR.

The analysis of the six articles provided reveals a strong focus on the adoption of digital payment systems, particularly the Quick Response Code Indonesian Standard (QRIS), among different user groups in Indonesia (UMKM, consumers, and merchants). The central Research Question (RQ) addressed implicitly by these studies is: "What behavioral, technological, and contextual factors influence the adoption and intention to use QRIS or related digital platforms in Indonesia?" Based on the findings, the articles are grouped into three main themes: Core Technology Acceptance Factors, Trust and Risk Perceptions, and Socio-Contextual Influencers.

Table Comprehensive Table of Key Studies and Findings

No	Authors & Year	Publication / Context	Research Method & Model	Key Variables Studied	Key Findings	Main Theme
1	Syanova & Fajar (2024) ¹	J. of Logistics, Informatics and Service Science	Quantitative (Survey), Modified UTAUT + Trust (UMKM focus)	Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Trust (T), Behavioral Intention (BI), Facilitating Condition (FC)	PE, EE, SI, Trust, BI, and FC all show a significant influence on QRIS adoption among UMKM.	Core Technology / Trust / Socio-Contextual
2	Persadha et al. (2024) ²²	J. of Logistics, Informatics and Service Science	Quantitative (Survey), Extended TAM (Consumer focus)	Perceived Usefulness (PU), Perceived Ease of Use (PEoU), Perceived Enjoyment, Trust, Innovation	All variables (PU, PEoU, Perceived Enjoyment, Trust, Innovation) have significant positive effects on behavioral intention and actual QRIS adoption.	Core Technology / Trust
3	Nurqamarani et al. (2024) ³³	J. of Information Systems Engineering and Business Intelligence	Quantitative (Survey), TRAM + Trust (MSME focus)	Optimism, Discomfort, Insecurity, Innovation, Trust, PEoU, PU	Optimism and Trust positively affect PEoU and PU44. Insecurity and Innovation show no significant influence55. Discomfort shows an unexpected positive result with PEoU/PU66.	Core Technology / Trust / Technology Readiness
4	Badrawani (2022) ⁷	Int. J. of Economics and Management	Quantitative (Survey), Structural Equation Model	Central Bank Policy, COVID-19 (Force	Habit is the most influential component	Socio-Contextual /

			(Customer/Merchant focus)	Majeure), Habit, Risk, Intention to Use QRIS	on intention to use QRIS8. The pandemic and government intervention had significant effects.	Contextual Risks
5	Sendjaja et al. (2025) ⁹	APTISI Transactions on Technopreneurship	Quantitative (Survey), TAM framework (Digital Donation focus)	Trust, PEoU, PU, perceived risk, perceived security, attitude, engagement	Investigates how these factors influence attitudes and engagement towards technology acceptance to enhance digital donation intentions.	Trust and Risk / Core Technology
6	Muchtar et al. (2024) ¹⁰	Cogent Business & Management	(E-payment Adoption, Customer Perspective)	(Focus on E-payment adoption)	The study focuses on QRIS E-payment adoption from the customer's perspective.	Customer Perspective / E-payment Adoption

DISCUSSION

The systematic synthesis of the reviewed literature indicates a prominent convergence in the determinants influencing the adoption of the Quick Response Code Indonesian Standard (QRIS) across various foundational models, specifically the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Technology Readiness Acceptance Model (TRAM). This convergence is particularly evident in identifying Perceived Usefulness/Performance Expectancy and Trust as the most significant predictors of behavioral intention and actual QRIS adoption.

A foundational text by Wahyujatmiko analyzes consumer behavior toward QRIS through the lens of TAM, highlighting that perceived usefulness is a critical determinant of individuals' intentions to adopt digital transactions (Wahyujatmiko, 2025). Similarly, studies employing UTAUT highlight the role of Performance Expectancy. For instance, Purwatiningsih et al. integrate both TAM and UTAUT frameworks, asserting that perceived ease of use and perceived usefulness significantly drive the intention to utilize QRIS (Purwatiningsih et al., 2025). These insights are reinforced by Gunarsih and Febriyani,

whose focus on Generation Z's adoption reveals a strong reliance on perceived utility as a predictor of QRIS adoption behaviors (Gunarsih & Febriyani, 2025).

Trust emerges as a crucial psychosocial factor reinforcing this technology acceptance landscape. Ansori and Lestari's research acknowledges trust as a moderating variable in the relationship between perceived ease of use and adoption intention, illustrating its importance (Ansori & Lestari, 2025). Furthermore, Permanasari et al. emphasize trust as a mediating variable influencing user intentions to adopt QRIS, suggesting that a higher level of trust can lead to increased usage intentions (Permanasari et al., 2025). In a relevant discussion, Chang et al. recognize trust's role within the broader context of digital payment systems in Southeast Asia, thereby supporting its critical status in QRIS adoption strategies (Chang et al., 2023).

The convergence of these core constructs—Perceived Usefulness/Performance Expectancy and Trust—across different models hints at a potential simplification of the conceptual frameworks used in QRIS adoption studies. As demonstrated by Arifin and Noviaristanti, who explored the TAM's effectiveness, social influence and perceived ease of use, along with trust, emerged as vital factors for adoption among MSMEs (Arifin & Noviaristanti, 2025). This trend signifies an opportunity to develop a more integrated, parsimonious meta-model that could streamline the fragmented application of existing theoretical frameworks into a more cohesive understanding of QRIS adoption dynamics.

One critical divergence noted in the literature is the varying significance of Habit among studies focusing on user continuance intention. For instance, Jasf et al. highlight Habit as a predominant factor among MSMEs in Bandung, suggesting that user reliance on established behaviors influences the sustained use of FinTech solutions such as QRIS. This focus on habit underscores a vital aspect often overlooked in traditional models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), where the implications of user engagement over time are not rigorously explored (JASF et al., 2024).

Furthermore, the influence of contextual factors emerges as a pivotal element in understanding QRIS adoption. For example, Latifah et al. underscore how contextual occurrences, including market dynamics but not specifically the COVID-19 pandemic, have significantly affected adoption intentions among MSMEs (Latifah et al., 2023). Their findings exemplify how external factors are integral to the framework of technology acceptance, impacting both user perceptions and adoption trajectories. Similarly, Shahzad et al. present an enhanced technology acceptance framework that accounts for contextual disruptions, asserting the role of various factors, including the pandemic, as catalysts for heightened digital acceptance, particularly in financial services (Shahzad et al., 2022).

Disparities in user segmentation reveal another layer of complexity. Studies such as those by Nurchayati et al. indicate that MSME research incorporates Trust within the Technology Readiness Acceptance Model (TRAM) to address specific concerns of entrepreneurs, a modification referenced in broader consumer studies that incorporate new factors such as Innovation (Nurchayati et al., 2024). This segmentation suggests that tailored models are necessary to accurately reflect the diverse psychological and

situational factors influencing distinct user groups, further highlighting the need for comparative analysis across different stakeholder segments.

Moreover, the necessity for longitudinal studies is underscored, as immediate factors often interact with long-term trends in technology acceptance. The propositions put forth by Mulia and Wardhani indicate the merits of examining generational differences, particularly in how Millennials and Gen-Z perceive QRIS in relation to trust and innovations in technology (Mulia & Wardhani, 2024). This invites future research to explore how evolving perceptions over time could shed light on persistent theoretical gaps regarding adoption narratives in the dynamic Indonesian FinTech landscape.

However, the identification of Habit as a critical factor in sustained use challenges traditional narrative paradigms that often prioritize initial acceptance over long-term engagement (JASF et al., 2024; Sahoo et al., 2022; . Moreover, the significant role of external contextual variables—such as Central Bank policies and environmental factors including the COVID-19 pandemic—highlights the dynamic interplay between organizational and external environments, calling for a refined understanding that expands the theoretical frameworks to incorporate these socio-economic determinants (Latifah et al., 2023; Mandasari & Safrizal, 2023). This synthesis not only reveals gaps in existing literature but also proposes a need for future research that employs comparative studies across different user segments and longitudinal approaches to robustly capture the evolving landscape of technology adoption in diverse contexts (Sahoo et al., 2022; Knox, 2022).

The findings from this systematic literature review (SLR) present critical, actionable recommendations for relevant stakeholders, emphasizing the necessity for a paradigm shift among FinTech providers and managers to enhance Trust and Performance Expectancy, which are consistently identified as fundamental drivers of QRIS adoption across diverse models such as TAM and UTAUT Paramita & Cahyadi (2024) Santika et al., 2024). Specifically, this necessitates strategic investments in transparent security protocols and the demonstration of transaction reliability, which have been shown to significantly influence user confidence in digital payment systems (Chang et al., 2023; Hadi et al., 2022). Moreover, effective communication of the tangible benefits of QRIS to both consumers and micro, small, and medium enterprises (MSMEs) is essential to facilitate adoption (Purwatiningsih et al., 2025; Wardhani et al., 2023). For policymakers and the Central Bank, the evidence underscores the critical role of establishing targeted Facilitating Conditions and regulatory frameworks that account for external influences—such as governmental support and economic stability—that have a decisive impact on adoption behaviors (Purwati et al., 2025; Hidayanti & Ariani, 2025). Recommended strategies include developing segmented initiatives tailored to MSMEs, focusing on Trust and Perceived Risk mitigation, potentially through subsidized infrastructure support or dedicated financial literacy campaigns (Shakil et al., 2025; Mohammeda & Hassan, 2024). These adaptations aim to enhance the overall acceptance of QRIS, ensuring a more robust integration into the Indonesian digital payment landscape.

Systematic Literature Review adhered strictly to the PRISMA protocol, several methodological choices inherently impose limitations on the comprehensiveness of the

findings. The primary limitation stems from the Database selection, as restricting the search solely to Scopus may exclude high-quality, relevant empirical studies indexed exclusively in other major databases, such as Web of Science or Google Scholar, potentially introducing a selection bias. Furthermore, the Keyword strategy, though systematic, was necessarily restrictive; relying on specific Boolean operators combining "UTAUT," "TAM," and "TRAM" may have failed to capture relevant studies that utilize alternative adoption models (e.g., TPB, DOI) or those that discuss QRIS adoption without explicitly naming the model in the title, abstract, or keywords. Lastly, the defined Time Span limitation from 2022 to 2025 was intended to ensure currency and relevance to the rapid post-pandemic QRIS environment, but this short window sacrifices the ability to analyze long-term, foundational research trends in technology adoption that occurred prior to 2022, thereby limiting the historical and evolutionary context of the synthesized models.

CONCLUSION

This Systematic Literature Review (SLR) provides a clear and concise summary of the fragmented yet rapidly growing literature on QRIS digital payment adoption in Indonesia. The main finding is the strong convergence across the tested models (TAM, UTAUT, and TRAM) on two fundamental determinants: Perceived Usefulness/Performance Expectancy and Trust. These constructs consistently emerge as the most significant predictors of both the intention to use and the actual usage of QRIS. This synthesis confirms that, for both consumers and MSMEs, the perceived functional benefit and the confidence in the system's security are the core pillars of digital finance acceptance. The study successfully achieved its primary objective by creating a consolidated understanding of the most influential behavioral variables, thereby addressing the significant theoretical gap caused by model fragmentation.

SUGGESTION

Based on the gaps and limitations identified in the review, future research should strategically focus on three specific areas: cross-sectional comparisons, longitudinal model testing, and the integration of new external constructs. First, empirical studies should conduct comparative analysis of adoption determinants between user segments (e.g., MSMEs vs. Consumers) to resolve the observed divergence, allowing for a precise understanding of how factors like Trust and Perceived Risk vary in influence based on the user's economic role. Second, longitudinal research employing the synthesized meta-model is crucial to track the evolution of adoption constructs over time, moving beyond the current cross-sectional dominance to determine if initial adoption factors (like Perceived Usefulness) are superseded by continuance factors (like Habit) as the technology matures. Third, future SLRs or empirical works should explicitly integrate novel external constructs such as the role of Policy Communication Effectiveness and Digital Literacy Levels into the UTAUT/TAM framework, especially when investigating policy effectiveness outside the direct COVID-19 context.

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