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Research Article

eWAQ Insight360: An AI-Powered Digital Financial Inclusion Analytics System for Assessing e-Wallet Acceptance Among Low-Income Communities in Malaysia

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Abstract:

eWAQ Insight360 is an AI-driven digital inclusive finance analysis system designed for Malaysia's B40 low-income group. Developed to address barriers to e-wallet adoption among this population, the system relies on the validated eWAQ questionnaire and the Technology Acceptance Model (TAM). It can assess adoption readiness, identify existing barriers, and generate evidence-based recommendations. Having undergone three types of validation, eWAQ Insight360 serves a wide range of relevant stakeholders, aligns with the relevant targets of the United Nations Sustainable Development Goals (SDGs), and advances the development of financial inclusion.



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1. INTRODUCTION

Malaysia's push to transition into a cashless society could originally have effectively boosted financial inclusion. Digital financial technology is reshaping consumers' financial transaction patterns (Hassan et al., 2025), and e-wallets, which integrate convenience, accessibility, and efficiency, represent its core innovative form. The Malaysian government has successively launched MyDIGITAL (The Edge Malaysia, 2021), JENDELA, and a series of cashless payment incentive policies, yet it still faces the bottleneck of low digital finance penetration among low-income groups (Kamis et al., 2023). Problems including insufficient trust (Patil et al., 2020), poor perceived security (Tounekti et al., 2021), weak

digital literacy (Al-Dmour et al., 2021), and limited awareness are particularly prominent (Garg & Kumar, 2020). Policymakers and financial institutions urgently need reliable tools to clarify the factors influencing adoption behavior. This study finds that the penetration rate of e-wallets among the country's low-income groups has remained persistently unstable, and this situation has not improved despite the government's sustained policy support and the rapid iterative development of digital technologies (Muthusamy et al., 2024). The existing promotion models currently overseen by separate responsible entities face multiple limitations. This study puts forward the core requirement of building a dedicated intelligent support system and subsequently introduces the self-developed AI-driven eWAQ Insight360 system. Built on the validated eWAQ questionnaire, this system can convert survey feedback into actionable intelligence to support policy implementation.

2. LITERATURE REVIEW

2.1 e-Wallet Adoption and Financial Inclusion

E-wallets are a core mechanism for advancing financial inclusion, as they can support convenient, secure, low-cost digital transactions, reduce reliance on cash, and enable more entities to smoothly integrate into the formal financial system. Kamis et al. (2024) corroborate their positive effects across the dimensions of economic efficiency, financial accessibility, and digital transformation. However, adoption among low-income groups still faces three categories of barriers—technological, behavioral, and socioeconomic—which encompass four specific issues, including security concerns and lack of trust. This study will conduct a systematic analysis targeting these problems.

2.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is currently the most widely applied research framework for explaining users' technology adoption behavior (Davis, 1989). Its core proposition holds that user acceptance is mainly affected by perceived ease of use and perceived usefulness, and most subsequent studies have extended the model's constructs to fit specific scenarios. In the field of e-wallet adoption, Garrouch (2021) identified four core influencing factors including security and trust; Chawla and Joshi (2021) noted that attitude is a commonly used mediating variable. This study takes attitude as a mediator to examine the impact of five categories of factors on e-wallet acceptance among low-income groups in Malaysia, and its findings can provide support for relevant industry practices and policy formulation.

2.3 Digital Financial Inclusion Analytics

The popularization of digital data has spawned a large number of analysis-driven solutions that support policy formulation and decision-making processes. While traditional research generates high-value information, it lacks real-time insights and predictive intelligence. Our independently developed eWAQ Insight360 can convert survey feedback into actionable recommendations, accurately filling this industry gap.

2.4 Research Gap

Prior research on e-wallet adoption has reached a core consensus, but its conclusions diverge across demographic groups. Specifically, findings related to low-income groups are inconsistent, and very few studies have translated measurement tools into practical, implementable decision support systems.

3. METHODOLOGY

This study adopts a quantitative research approach under the positivist paradigm and uses a cross-sectional survey design to explore the factors influencing e-wallet acceptance among low-income groups in West Malaysia. This study focuses on e-wallet usage among Malaysia's B40 low-income group, with its full research process carried out in an orderly sequence across four core stages. The first stage implemented population sampling. The target group was limited to B40 members in Peninsular Malaysia (West Malaysia) who had a monthly household income below RM4850 and prior experience using e-wallets. Due to the lack of an official sampling frame and restrictions imposed by data protection regulations, non-probability stratified sampling was adopted. The sample covered four geographic regions of Peninsular Malaysia: Central, Northern, Southern, and East Coast, and 265 valid samples were ultimately collected. The second stage developed the research instrument.

A dedicated questionnaire, the eWAQ, was built based on the Technology Acceptance Model and previous empirical studies. The initial version included 57 items that measured seven constructs, including perceived ease of use and perceived security. Four types of stakeholders were invited to verify the questionnaire's content validity and face validity. The third stage completed reliability and validity testing. A pilot survey was conducted, and an evaluation was carried out using tools including Cronbach's alpha and exploratory factor analysis, which confirmed that all constructs had good reliability and validity. The fourth and final stage launched the formal analysis tool. Based on the finalized eWAQ, the eWAQ Insight360 was rolled out, which integrates five functional modules and can convert user feedback into predictive analysis results and evidence-based recommendations.

Table 1. Reliability Results

Construct	Number of Items	Cronbach's Alpha	Reliability Level
Perceived Ease of Use	5	0.91–0.93	Excellent
Security	7	0.92–0.93	Excellent
Government Intervention	6	0.91	Excellent
Social Influence	6	0.86–0.89	Very Good
Trust	8	0.95–0.96	Excellent
Attitude	5	0.89–0.92	Very Good
E-Wallet Acceptance	6	0.87–0.90	Very Good

4. RESULTS AND INNOVATION FEATURES

The inclusive digital finance intelligent platform eWAQ Insight360, launched in this study, is an upgraded iteration of traditional questionnaire tools. It can collect user behavioral data via web and mobile terminals, and complete full-link analysis relying on AI algorithms. The platform has a three-tier core architecture: an input layer that receives users' evaluation feedback, an analysis layer that conducts AI behavioral analysis and adoption probability prediction, and an output layer that outputs panel analysis and policy recommendations. The platform focuses on identifying the factors influencing electronic wallet adoption among low-income groups and has four core innovations including AI analysis and digital readiness scoring. The corresponding schematic diagram is provided as Figure 1. Paired with three sets of precise intervention programs, it can support governments in conducting inclusive finance monitoring, banks in implementing user stratification, and universities in obtaining research support.

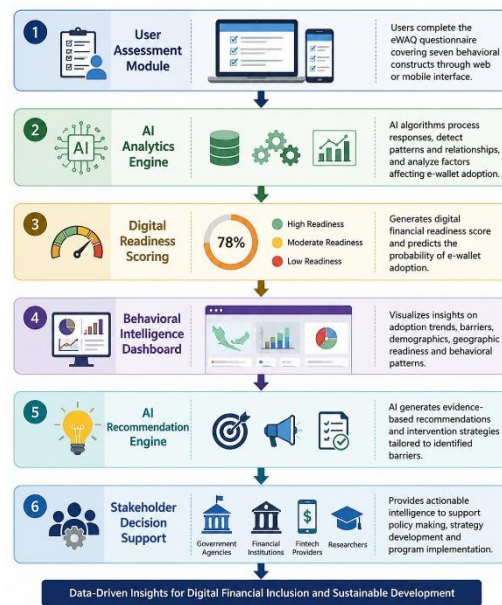


Figure 1. eWAQ Insight360 System Architecture

5. CONCLUSION

This study draws on a validated e-wallet acceptance questionnaire to launch eWAQ Insight360, a new self-developed AI-powered digital inclusive finance analysis system. Leveraging three core technologies—artificial intelligence, predictive analytics, and dashboard visualization—the system converts behavioural data accumulated from traditional surveys into actionable practical intelligence. It serves four groups of stakeholders: policymakers, financial institutions, researchers, and fintech service providers to identify barriers to digital finance adoption and design evidence-based intervention measures. The eWAQ Insight360 that we launched integrates five core modules, including validated behavioral measurement and artificial intelligence analysis, into a single platform. It overcomes the key limitation of traditional survey tools, which only focus on data collection, and can convert behavioral data into actionable intelligence that supports evidence-based decision-making. This platform fits six types of entities including governments and financial institutions, and enables them to assess digital financial readiness, identify implementation barriers, and advance financial inclusion projects. The system holds commercialization potential and scalability and is capable of supporting Malaysia's digital economy transformation agenda. As a core service platform in the digital finance sector, eWAQ Insight360 can be aligned with multiple United Nations Sustainable Development Goals, with clear and definite on-the-ground implementation and support pathways for each: advancing inclusive finance for low-income groups to support SDG1, improving digital financial literacy to support SDG4, encouraging the participation of digital financial service providers to support SDG8, integrating AI-powered fintech analysis to support SDG9, and eliminating financial exclusion of vulnerable groups to support SDG10.

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