

Determinants of DANA E-Money Adoption in Semi-Urban Indonesia: The Interplay of Security, Service Features, Ease of Use, and Trust

Dewi Audry In Pratiwi, Budi Sukardi

Universitas Islam Negeri Raden Mas Said Surakarta

Email: budi.sukardi@staff.uinsaid.ac.id

Abstract

This study investigates how perceived ease of use, service features and security shape intention to use DANA e-money in Karanganyar Regency, a semi-urban area in Central Java, Indonesia. Digital payment adoption in such settings is increasing, yet user intention remains influenced by trust, security concerns, infrastructure and user readiness. A quantitative survey was conducted with 100 DANA users aged 17 years and above selected through purposive sampling. Data were collected using a five-point Likert questionnaire and analyzed using multiple linear regression in SPSS after validity, reliability and classical assumption tests. The results show that ease of use, service features and security each have a positive and significant effect on intention to use DANA, both partially and simultaneously, with an adjusted R^2 of 0.694. Security emerges as the strongest predictor, followed by service features and ease of use, indicating that perceived protection is more decisive than convenience and functionality in this semi-urban digital payment context. The study contributes regency-level evidence to the digital payment literature and clarifies the relative importance of usability- and security-related perceptions in e-money adoption. Practically, the findings suggest that providers should prioritize visible security safeguards, relevant and integrated service features and simple interfaces to support safe and inclusive cashless transactions in similar regions.

Keywords: DANA E-money, Ease of Use, Service Features, Security, Behavioral Intention, Digital Payment Adoption, Semi-Urban Context.

Abstrak

Studi ini meneliti bagaimana persepsi kemudahan penggunaan, fitur layanan, dan keamanan membentuk niat untuk menggunakan uang elektronik DANA di Kabupaten Karanganyar, daerah semi-perkotaan di Jawa Tengah, Indonesia. Adopsi pembayaran digital di lingkungan seperti ini meningkat, namun niat pengguna masih dipengaruhi oleh kepercayaan, kekhawatiran keamanan, infrastruktur, dan kesiapan pengguna. Survei kuantitatif dilakukan terhadap 100 pengguna DANA berusia 17 tahun ke atas yang dipilih melalui pengambilan sampel bertujuan. Data dikumpulkan menggunakan kuesioner Likert lima poin dan dianalisis menggunakan regresi linier berganda di SPSS

setelah pengujian validitas, reliabilitas, dan asumsi klasik. Hasil menunjukkan bahwa kemudahan penggunaan, fitur layanan, dan keamanan masing-masing memiliki pengaruh positif dan signifikan terhadap niat untuk menggunakan DANA, baik secara parsial maupun simultan, dengan penyesuaian R^2 sebesar 0,694. Keamanan muncul sebagai prediktor terkuat, diikuti oleh fitur layanan dan kemudahan penggunaan, menunjukkan bahwa persepsi perlindungan lebih menentukan daripada kenyamanan dan fungsionalitas dalam konteks pembayaran digital semi-perkotaan ini. Studi ini memberikan bukti tingkat kabupaten pada literatur pembayaran digital dan memperjelas pentingnya persepsi terkait kegunaan dan keamanan dalam adopsi uang elektronik. Secara praktis, temuan ini menunjukkan bahwa penyedia layanan harus memprioritaskan pengamanan yang terlihat, fitur layanan yang relevan dan terintegrasi, serta antarmuka yang sederhana untuk mendukung transaksi tanpa uang tunai yang aman dan inklusif di wilayah serupa.

Kata Kunci: *E-money DANA, Kemudahan Penggunaan, Fitur Layanan, Keamanan, Niat Berperilaku, Adopsi Pembayaran Digital, Konteks Semi-Perkotaan*

Introduction

Indonesia's e-money expansion signals a shift to cashless transactions and digital financial inclusion, driven by fintech growth and demand for efficient payments (Rahmiati et al., 2024; Yang et al., 2021). Platforms like DANA, offering QR payments, transfers and bill settlements, are embedding in daily routines, heightening the need to understand adoption determinants (Heripracoyo et al., 2022; Mawaddah et al., 2019). This study focuses on intention to use DANA in Karanganyar Regency, examining ease of use, service features and security amid rising but uneven semi-urban adoption.

DANA adoption studies highlight usability, trust and service quality, yet they predominantly cover metropolitan areas, overlooking regency-level dynamics (Heripracoyo et al., 2022; Hidayah et al., 2021; Natasia et al., 2021). This gap is critical: semi-urban users face variable digital literacy, infrastructure and transaction risks, altering adoption hierarchies compared to urban contexts (Tanika et al., 2022). Karanganyar exemplifies this, with growing e-wallet use tempered by caution toward security and usability (Rahmiati et al., 2024).

Literature identifies ease of use, service features and security as key intention predictors, but their relative strengths vary by context (Al-Shamali et al., 2025; Siagian et al., 2022). Urban studies often prioritize convenience, while semi-urban ones emphasize security amid lower trust (Joshi & Chawla, 2024; Kurniawan et al., 2023). No prior work tests these factors' comparative effects on DANA intention in Indonesian regencies, where demographic and infrastructural factors may elevate security over ease of use (Handoko et al., 2022; Saragih et al., 2025).

This study addresses the research gap by quantifying the comparative effects of ease of use, service features and security on intention to use DANA e-money among Karanganyar residents. Unlike metropolitan-focused studies, it

tests whether security outweighs convenience in semi-urban contexts where digital literacy and infrastructure vary significantly (Joshi & Chawla, 2024; Saragih et al., 2025). The study contributes empirical evidence on adoption hierarchies at Indonesia's regency level, extending Technology Acceptance Model and trust theories beyond urban settings. Practically, findings guide DANA and similar platforms to prioritize security communication alongside usability improvements, while informing policymakers on targeted digital literacy initiatives for inclusive cashless adoption in comparable regions.

Literature Review and Hypotheses Development

Digital Payment and E-money Adoption

E-money refers to electronically stored monetary value used in digital transactions and has become a critical component of modern payment systems. In the literature, the growth of e-money is connected to broader developments in financial technology, online commerce, smartphone penetration and changing consumer expectations regarding transaction speed and convenience (Rahmiati et al., 2024; Yang et al., 2021). Adoption, however, is not driven by convenience alone. Studies show that behavioral intention toward e-wallets and mobile payment systems is influenced by a combination of perceived ease of use, service quality, trust, risk evaluation, security assurance and facilitating conditions (Abbas et al., 2025; Al-Shamali et al., 2025; Siagian et al., 2022). This means that adoption should be treated as a multidimensional process in which technical and psychological factors interact.

Technology Acceptance Model-based studies generally show that users are more likely to adopt financial technologies when they perceive them as easy to operate and useful in everyday life. In addition, trust-oriented and security-oriented studies demonstrate that adoption decisions become stronger when users believe the system is reliable, safe and professionally managed (Joshi & Chawla, 2024; Kurniawan et al., 2023; Shah et al., 2014). These perspectives are relevant to DANA because digital payment behaviors involves both practical interaction and perceived protection. In other words, the decision to use DANA is not only about whether the application works well, but also about whether users feel comfortable enough to rely on it for real transactions. That is why this study focuses on ease of use, service features and security as the main determinants.

Ease of use and intention to use

Ease of use refers to the extent to which a technology is perceived as understandable, learnable and operable with minimal effort. In digital payment systems, a user-friendly interface can reduce cognitive burden and increase confidence when performing transactions, especially for users who are less familiar with financial technology (Abbas et al., 2025; Kurniawan et al., 2023).

Prior research on digital payment adoption indicates that when an application is perceived as simple, users are more willing to explore its features, complete transactions and continue using it over time (Siagian et al., 2022; Tanika et al., 2022). Ease of use also matters because it can support related constructs such as trust, satisfaction and perceived usefulness, all of which are associated with stronger behavioral intention in e-wallet environments.

For DANA, ease of use is particularly relevant because the platform is designed for a broad user base that may differ in age, digital experience and financial habits. Studies on DANA and related mobile payment systems show that clear menus, straightforward transaction flows and an intuitive interface can positively shape user perception and adoption behaviors (Heripracoyo et al., 2022; Natasia et al., 2021). In a semi-urban setting such as Karanganyar, where users may not all have equally strong digital capability, ease of use becomes even more significant as a factor lowering entry barriers. Based on these arguments and supported by previous findings in e-payment research, this study proposes that ease of use positively influences intention to use DANA e-money.

H1: Ease of use has a positive and significant effect on intention to use DANA e-money.

Service features and intention to use

Service features refer to the functions and service facilities embedded in the application, such as the diversity of transactions, accessibility of information, convenience of operation and product innovation. In competitive digital payment markets, service features are important because they define how useful and relevant a platform is in users' everyday financial routines (Hidayah et al., 2021; Mondego & Gide, 2023). If an application provides features that help users save time, reduce transaction friction and integrate multiple activities into one platform, then users are more likely to perceive it as valuable. This perception of value can increase behavioral intention, satisfaction and platform loyalty, especially when users compare multiple digital wallet options in the same market.

DANA offers services such as bill payment, QR transactions, balance transfer and other digital financial functions that can potentially strengthen user interest. Previous studies show that feature relevance, service diversity and service quality influence user satisfaction and intention to use digital platforms because users evaluate not only system performance but also whether the platform addresses their practical needs (Heripracoyo et al., 2022; Hidayah et al., 2021). From this perspective, service features are not secondary additions but strategic determinants of platform adoption. In a regency setting where users may expect practical, low-friction and multipurpose transaction tools, stronger service features should positively influence intention to use DANA. Therefore, the second hypothesis is formulated as follows.

H2: Service features have a positive and significant effect on intention to use

DANA e-money.

Security and intention to use

Security refers to users' perception that their personal information, transaction data and stored value are protected from misuse, fraud and privacy breaches. In digital payment research, security is frequently identified as one of the most important antecedents of trust and intention because financial technologies require users to rely on systems that manage money and sensitive data (Handoko et al., 2022; Shah et al., 2014). If users doubt the platform's ability to protect them, they may delay adoption or restrict usage, even when the system is easy to use and offers attractive features. This makes security a critical psychological and technical factor in the context of e-wallet and mobile payment behaviors.

Prior studies confirm that perceived security positively affects behavioral intention either directly or through trust, attitude and perceived risk reduction. Research on wallet adoption and digital payment platforms shows that users become more willing to adopt when they perceive strong authentication, visible safety mechanisms and institutional reliability (Al-Shamali et al., 2025; Joshi & Chawla, 2024; Siagian et al., 2022). In semi-urban environments, where digital transaction confidence may still be forming, security can become even more salient than ease of use because users place strong emphasis on avoiding loss and fraud. Since DANA operates in a setting where perceived protection is likely to influence user confidence, this study expects security to positively affect intention to use DANA e-money.

H3: Security has a positive and significant effect on intention to use DANA e-money.

Conceptual model

This study proposes a conceptual model in which ease of use, service features and security act as independent variables affecting intention to use DANA e-money as the dependent variable. The model is consistent with prior digital payment studies that position usability, service quality-related factors and perceived security among the most important predictors of behavioral intention in mobile financial technology environments (Al-Shamali et al., 2025; Siagian et al., 2022; Tanika et al., 2022). The model is intentionally focused and parsimonious because it seeks to test three highly relevant user perception variables in a local Indonesian context. By concentrating on these direct relationships, the study aims to clarify the relative contribution of each predictor within the Karanganyar setting.

Research Methods

This study employs a quantitative approach to examine the effects of ease of use, service features and security on intention to use DANA e-money. Quantitative design is appropriate because the study aims to test hypotheses and estimate the effect of multiple independent variables through statistical analysis rather than interpretive exploration. Similar designs are widely used in digital payment and e-wallet adoption studies, especially when behavioral intention is modelled as a dependent variable influenced by perception-based constructs measured with Likert scales (Alabi & Jelili, 2023). The research design is associated in nature because it seeks to analyze the relationship between variables rather than merely describing user behaviors. The main analytical technique used is multiple linear regression.

The study population consists of active DANA users in Karanganyar Regency. We used the Slovin formula with a 10% margin of error ($n = N / (1 + Ne^2)$) to find the sample size. This gave us 100 respondents from an estimated population of 10,000 DANA users in the area. We chose purposive sampling because it focuses on the quality of data from experienced users (at least 6 months), not on the statistical representation of the population. Inclusion criteria: age ≥ 17 years, resident of Karanganyar, active DANA user. This approach is common in studies of technology adoption that require insights into specific behaviors, even though it limits statistical generalization (Alabi & Jelili, 2023).

Primary data was collected through a structured questionnaire. The instrument used a five-point Likert scale ranging from strongly disagree to strongly agree, which is consistent with previous behavioral intention studies in digital payment and financial technology research (Abbas et al., 2025; Handoko et al., 2022). Ease of use was measured using indicators related to learnability, clarity, flexibility and ease of operation (Rehatta et al., 2026). Service features were measured through indicators related to access to information, transaction diversity, feature diversity and innovation (Saputra et al., 2025). Security was measured through protection-related indicators such as confidentiality, authentication and transaction safety (Al-Shamali et al., 2025; Zehra et al., 2024). Intention to use was measured through willingness to use, willingness to transact and recommendation intention (Heripracoyo et al., 2022; Reni et al., 2025). These variables were then analyzed using regression after the instrument passed validity and reliability testing.

Primary data was collected via a 5-point Likert questionnaire (1=strongly disagree–5=strongly agree). Ease of use (X_1) was measured using four indicators: learnability, clarity, flexibility, and ease of operation (Rehatta et al., 2026). Service features (X_2): information access, transaction diversity, and feature innovation (Saputra et al., 2025). Security (X_3): confidentiality, authentication, and transaction safety (Al-Shamali et al., 2025). Intention to use (Y): willingness to use, transact, and recommend (Heripracoyo et al., 2022). These indicators were chosen because they were proven reliable ($\alpha > 0.70$) in previous Indonesian e-

wallet studies.

Data were analyzed using SPSS through: (1) validity-reliability tests, (2) classical assumptions (normality, multicollinearity, heteroscedasticity, autocorrelation), (3) multiple linear regression: $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e$, (4) F test (simultaneous), t (partial), coefficient of determination. This model is consistent with digital payment adoption studies (Ghazali, 2013; Siagian et al., 2022).

Result and Analyze

Respondent characteristics

The respondent profile shows that the sample was dominated by female users, who accounted for 67 per cent of respondents, while male users accounted for 33 per cent. Most respondents were aged 17–22 years, indicating that the sample was strongly represented by younger users, especially those who are likely to be more familiar with mobile technology and digital transactions. In terms of occupation, the largest group consisted of university students, followed by employees, while smaller proportions were entrepreneurs, civil servants and other occupations. This profile is consistent with prior studies showing that younger, digitally active populations tend to adopt e-payment services more quickly and more frequently than older groups, particularly in mobile-based payment ecosystems (Kurniawan et al., 2023; Yang et al., 2021).

Table 1. Respondent characteristics

Category	Group	Frequency	Percentage
Gender	Male	33	33%
	Female	67	67%
Age	17–22 years	78	78%
	23–28 years	16	16%
	29–34 years	3	3%
	35–40 years	2	2%
	>40 years	1	1%
Occupation	Student (high school)	1	1%
	University student	60	60%
	Employee	25	25%
	Entrepreneur	5	5%
	Civil servant	2	2%
	Other	7	7%

Source: data processed, 2026

Instrument testing

The instrument testing results indicate that all questionnaire items were valid and reliable. Based on the source study, all item-total correlations exceeded

the required threshold, which means that each item adequately measured the construct it was intended to represent. In addition, the Cronbach's alpha values for all variables were above 0.70, indicating acceptable internal consistency. Ease of use had an alpha value of 0.866, service features had 0.797, security had 0.863 and intention to use had 0.872. These values show that the instrument was stable enough to support regression analysis. Reliability levels of this kind are generally accepted in behavioral and technology adoption research using perception-based Likert instruments (Budi Darma, 2021).

Table 2. Reliability test results

Variable	Cronbach's alpha	Interpretation
Ease of use	0.866	Reliable
Service features	0.797	Reliable
Security	0.863	Reliable
Intention to use	0.872	Reliable

Source: data processed, 2026

Classical assumption tests

The Kolmogorov-Smirnov test yields an Asymp. Sig. of 0.019 (<0.05), which indicates that the data are not strictly normally distributed. In small samples, this would typically necessitate the use of non-parametric alternatives. However, this study utilizes a moderate sample size of $n=100$. According to the Central Limit Theorem, the sampling distribution of the means approaches normality as the sample size increases (typically $n > 30$), rendering ordinary least squares (OLS) multiple linear regression robust to non-normal residual distributions (Lumley et al., 2002; Schmidt & Finan, 2018). Furthermore, visualization of the histogram and P-P plot of the residuals confirms only a marginal deviation from the ideal diagonal line, with no severe skewness or extreme outliers. Given that the sample size is sufficient and other classical assumptions (multicollinearity and heteroscedasticity) are satisfied, retaining the parametric linear regression model is statistically justified and accepted in behavioral research.

Table 3. Classical Assumption Test Results

Test	Indicator	Result	Interpretation
		t	
Normality	Asymp. Sig.	0.019	Accepted (Robust due to $n=100$ via Central Limit Theorem)
Multicollinearity	VIF max	2.888	No multicollinearity
Heteroscedasticity	Glejser Sig. (min)	0.562	Homoscedastic
Autocorrelation	Durbin-Watson	2.036	No autocorrelation

Source: data processed, 2026

Regression results and hypothesis testing

The multiple linear regression results show that all three independent variables had positive coefficients, indicating that increases in ease of use, service features and security were associated with higher intention to use DANA e-money. The estimated regression equation was $Y = -0.171 + 0.302X_1 + 0.353X_2 + 0.339X_3 + e$. The adjusted R^2 value was 0.694, which means that 69.4 per cent of the variance in intention to use was explained by the three predictors. The F-test value of 75.988 with a significance level of 0.000 indicates that the model was significant overall. The t-test results show that all three hypotheses were supported, with security emerging as the strongest predictor based on the highest standardized beta coefficient.

Table 4. Multiple Linear Regression Results

Variable	B	Std. Error	Beta	t	Sig.
Constant	-0.171	1.123	–	-0.152	0.879
Ease of use	0.302	0.087	0.278	3.476	0.001
Service features	0.353	0.105	0.318	3.365	0.001
Security	0.339	0.070	0.368	4.842	0.000

Source: data processed, 2026

Table 5. Hypothesis Testing Results

Test	Value	Critical value	Interpretation
Adjusted R^2	0.694	–	69.4% variance explained
F-test	75.988	2.70	Simultaneous effect significant
t-test (X1)	3.476	1.984	H1 supported
t-test (X2)	3.365	1.984	H2 supported
t-test (X3)	4.842	1.984	H3 supported

Source: data processed, 2026

Discussion

Ease of use significantly predicts DANA intention ($\beta = 0.278, p < 0.01$), confirming TAM's core tenet that usability lowers adoption barriers. However, its third-place ranking challenges the universality of convenience as the primary driver in digital payments. In Karanganyar, users tolerate moderate interface complexity when security and functionality outweigh navigational simplicity—unlike mature urban markets where marginal usability gains yield disproportionate intention increases (Siagian et al., 2022). This suggests effort expectancy functions as a threshold rather than optimizer in semi-urban contexts with heterogeneous digital literacy.

Service features rank second ($\beta = 0.318, p < 0.01$), validating functional relevance as a key adoption driver beyond mere existence (Hidayah et al., 2021). Karanganyar users value DANA's bill payments, QR transactions and transfers because these directly substitute fragmented cash-based routines with integrated

digital alternatives. However, features alone cannot overcome security doubts—users reject functionally rich platforms perceived as risky, explaining why service quality trails protection in this hierarchy (Mondego & Gide, 2023).

Security's supremacy ($\beta = 0.368, p < 0.001$) reveals a primacy protection effect unique to semi-urban digital finance. Three mutually reinforcing mechanisms explain this: (1) Risk asymmetry: Financial losses from fraud represent existential threats to lower-income households, while usability flaws cause mere inconvenience (Shah et al., 2014). (2) Trust deficit: Weak institutional memory of cybercrime amplifies perceived vulnerability, making security the gatekeeper of all other attributes (Joshi & Chawla, 2024). (3) Cognitive hierarchy: Maslow-like priorities emerge—physiological safety (fund protection) precedes self-actualization (convenient payments) in emerging digital ecosystems (Al-Shamali et al., 2025). Providers must achieve security thresholds before users evaluate usability or features.

This hierarchy inversion (security > ease) contradicts metropolitan findings where convenience dominates (Tanika et al., 2022), confirming contextual determinism in technology adoption. For DANA, visible security cues (2FA prompts, real-time alerts, privacy badges) become prerequisite infrastructure, enabling usability and features to exert secondary effects. Policymakers should prioritize trust infrastructure (cybersecurity certification, fraud reimbursement guarantees) alongside digital literacy in semi-urban cashless transitions.

Conclusion

Ease of use, service features, and security significantly predict intention to use DANA e-money in Karanganyar Regency, collectively explaining 69.4% of variance (adjusted $R^2 = 0.694$). Security emerges as the strongest predictor ($\beta = 0.368, p < 0.001$), followed by service features ($\beta = 0.318$) and ease of use ($\beta = 0.278$). This hierarchy inversion—where protection outweighs convenience—distinguishes semi-urban adoption patterns from metropolitan findings, confirming all three hypotheses while revealing contextual specificity in digital payment drivers.

Providers should prioritize visible security infrastructure (2FA prompts, real-time alerts, privacy badges) as the adoption gatekeeper before optimizing usability or features. DANA must communicate protection mechanisms explicitly to overcome semi-urban trust deficits. Service features should target daily cash substitutes (bill payments, QR transactions), while interfaces remain simple for heterogeneous digital literacy. Policymakers should deploy trust infrastructure—cybersecurity certification, and fraud guarantees—alongside literacy programs to accelerate inclusive cashless transitions in comparable regencies.

Study limitations include $n=100$ purposive sample constraining statistical generalization, single-platform focus (DANA), and cross-sectional design missing causality dynamics. Future research should: (1) employ probability sampling ≥ 300 respondents, (2) compare multiple e-wallets (OVO, GoPay), (3)

incorporate mediators (trust, perceived usefulness), (4) track longitudinal adoption trajectories, and (5) test demographic moderators (age, income). Multi-regency comparisons would clarify whether Karanganyar's security primacy reflects local conditions or emerges across Indonesia's 500+ regencies.

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