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ANALYZING THE EFFECT OF E-WALLET USABILITY ON CUSTOMER RETENTION IN MOBILE PAYMENT APPS

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ABSTRACT

This study investigates the effect of e-wallet usability dimensions on customer retention within mobile payment applications, focusing on the multidimensional influence of interface design, transaction efficiency, security features, customer support quality, and perceived convenience in contemporary digital payment contexts. The exponential growth of mobile payment adoption has created unprecedented opportunities for e-wallet platforms to enhance customer loyalty through superior usability design, yet comprehensive understanding of how multiple usability dimensions collectively shape retention behaviors remains limited in existing literature. This research addresses this gap by examining the simultaneous effects of five critical e-wallet usability characteristics on customer retention through a quantitative correlational approach. Data were collected from 100 active e-wallet users through a structured questionnaire employing 5-point Likert scales, with analysis conducted using SPSS version 26. Rigorous methodological procedures included validity testing with correlation coefficients exceeding $r > 0.195$, reliability assessment with Cronbach's Alpha values above 0.70 for all constructs, and comprehensive classical assumption testing to ensure statistical validity. Multiple regression analysis revealed significant positive effects for all examined variables: Transaction Efficiency demonstrated the strongest influence ($t = 4.156$, $p < 0.001$), followed by Security Features ($t = 3.782$, $p < 0.001$), Interface Design ($t = 3.234$, $p = 0.002$), Perceived Convenience ($t = 2.678$, $p = 0.009$), and Customer Support Quality ($t = 2.445$, $p = 0.016$). The overall model achieved statistical significance ($F = 52.341 > F\text{-table} = 2.31$, $p < 0.001$) with substantial explanatory power ($R^2 = 0.736$), indicating that 73.6% of customer retention variance is explained by these five dimensions collectively. This research contributes theoretically to digital payment literature by validating a comprehensive framework that integrates technological and experiential factors influencing customer loyalty in mobile payment environments, while providing practical insights for e-wallet providers seeking to optimize usability features through balanced attention to efficiency, security, and user experience design.

Keywords: ***e-wallet, mobile payments, usability, customer retention, interface design, transaction efficiency, security features, quantitative research***

1. INTRODUCTION

The digital transformation of financial services has fundamentally revolutionized payment systems worldwide, creating an unprecedented shift from traditional cash-based transactions and physical banking services to sophisticated mobile payment solutions that serve hundreds of millions of users globally (Rolando, Cahyadi, et al., 2024). Within this transformation, electronic wallets (e-wallets) have emerged as a dominant force that not only facilitates seamless transactions but actively shapes consumer financial behavior through intuitive mobile applications. These platforms have evolved from simple digital storage mechanisms for payment credentials to complex financial ecosystems capable of processing diverse transaction types, managing multiple payment methods, and providing comprehensive financial services through sophisticated mobile interfaces (Zhang et al., 2021). The integration of advanced usability principles into e-wallet design represents one of the most significant developments in modern financial technology, fundamentally altering how consumers interact with money, make payments, and manage their financial activities in digital environments (Ingriana, et al., 2024; Mulyono et al., 2024).

The proliferation of e-wallet applications across major platforms such as PayPal, Alipay, GrabPay, GoPay, and countless regional alternatives has created an environment where superior usability has become a critical differentiator in an increasingly competitive marketplace (Ingriana, Chondro, et al., 2024; Rolando & Ingriana, 2024). These applications leverage sophisticated user experience design principles including intuitive navigation systems, streamlined transaction workflows, advanced security implementations, and personalized interfaces to create compelling user experiences that encourage continued engagement and long-term loyalty (Chen & Liu, 2020). The sophistication of these systems has reached a point where they can provide seamless payment experiences across multiple contexts, from peer-to-peer transfers and merchant payments to bill settlements and investment transactions, all while maintaining high levels of security and user satisfaction.

The impact of e-wallet usability extends far beyond simple transaction facilitation, fundamentally influencing customer psychology and retention behaviors in ways that were previously impossible in traditional payment systems (Karaniya Wigayha et al., 2024; Mulyono, Ingriana, et al., 2024). Unlike conventional banking services where customers primarily interact with financial institutions through physical branches or basic online platforms, e-wallet applications create continuous touchpoints with users through daily transaction activities, creating numerous opportunities for positive or negative experiences that directly impact customer loyalty (Rodriguez et al., 2022). This shift from occasional interaction to continuous engagement has profound implications for customer relationship management, user experience design, and the psychological factors underlying customer retention in digital financial services (Rolando, 2024b).

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Contemporary research in financial technology and customer behavior has increasingly recognized the critical importance of understanding how e-wallet usability affects customer retention patterns. The exponential growth of mobile payment adoption, accelerated further by global events such as the COVID-19 pandemic and the increasing digitization of commerce, has made e-wallet applications essential tools for daily financial activities. In this context, usability features have become powerful differentiators that can significantly influence customer satisfaction, platform switching behaviors, transaction frequency, and overall loyalty to specific e-wallet providers. The ability of superior usability to drive customer retention, increase transaction volumes, enhance user satisfaction, and influence brand preferences has made usability optimization indispensable for e-wallet success, while simultaneously raising important questions about the specific design elements that most effectively promote customer loyalty (Maha et al., 2024; Rahardja et al., 2024).

However, despite the widespread adoption and apparent importance of usability in e-wallet applications, there remains a significant gap in comprehensive understanding of how specific usability dimensions impact customer retention behaviors. While numerous studies have examined individual aspects of mobile payment adoption, such as security concerns, ease of use, or customer satisfaction metrics, there is a notable lack of holistic research that examines the complete spectrum of usability influences on customer retention in e-wallet contexts. This research gap is particularly concerning given the increasing sophistication of e-wallet interfaces and their growing influence over customer financial behaviors, payment preferences, and long-term loyalty patterns.

The complexity of modern e-wallet applications, which often integrate multiple functional areas including payment processing, account management, transaction history, security settings, customer support, and additional financial services, creates a multifaceted usability framework that requires comprehensive investigation (Rolando, 2024a). These applications must not only handle explicit user actions such as payment initiation and account management but also provide implicit usability benefits including intuitive navigation, efficient task completion, clear information presentation, reliable performance, and responsive customer support. The integration of multiple usability dimensions creates user experience ecosystems that can influence customer retention through various psychological and practical pathways, making it essential to understand their cumulative impact on loyalty behaviors (Rolando, Nur Azizah, et al., 2024).

Several recent studies have attempted to address different aspects of this complex relationship between e-wallet usability and customer behavior, though each has focused on specific dimensions rather than providing comprehensive analysis. Research conducted by Wang et al. (2021) investigated the role of interface design quality in enhancing customer satisfaction within Asian mobile payment platforms, finding that

well-designed interfaces significantly increased user engagement and transaction frequency. Their study employed a mixed-methods approach combining survey data from 1,847 mobile payment users with usability testing across four major e-wallet platforms over a three-month period. The researchers found that interface design effectiveness was moderated by factors including user age, technical expertise, and platform experience. However, their research primarily focused on satisfaction metrics rather than examining the broader implications for customer retention and long-term loyalty patterns.

In contrast, a comprehensive study by Thompson and Kumar (2022) examined the psychological mechanisms underlying customer responses to e-wallet security features across multiple European and North American markets. Their research utilized experimental methodology involving 2,200 participants across eight countries, measuring responses to different security implementation approaches including biometric authentication, two-factor authentication, and encryption transparency. The findings revealed that customer trust in e-wallet security was significantly influenced by perceived protection levels and security communication clarity, with users showing higher retention intention when they felt confident about transaction safety. However, the study also identified potential negative effects including security fatigue and reduced usage frequency when security measures became overly complex or time-consuming. This research differed from Wang et al.'s work by focusing on security-specific usability rather than general interface design, though it was limited to developed markets and may not generalize to emerging economy contexts.

Building upon these security insights, Park and Kim (2020) conducted longitudinal research examining how transaction efficiency influences customer switching behavior in the mobile payment sector. Their study tracked 2,800 e-wallet users over 12 months across multiple platforms, analyzing both usage patterns and survey responses regarding efficiency perceptions and retention intentions. The researchers found that transaction speed and process simplicity could significantly alter established platform loyalties, with customers increasingly willing to switch providers when offered more efficient transaction experiences. Interestingly, this effect was strongest among high-frequency users and was mediated by factors including perceived time savings, cognitive load reduction, and task completion success rates. However, their research was focused specifically on efficiency metrics and did not examine broader usability factors or their interaction effects on retention behaviors.

More recently, Davis et al. (2023) investigated the customer support implications of e-wallet usability by analyzing help-seeking behaviors and resolution satisfaction across various mobile payment platforms. Their research employed big data analytics techniques to examine support ticket patterns and customer communication data, focusing on how usability problems affect customer support interactions and subsequent retention decisions. The study revealed that usability-related support issues were among the

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strongest predictors of customer churn, with users experiencing multiple usability problems showing significantly higher abandonment rates regardless of other platform benefits. This research highlighted important connections between proactive usability design and reactive customer support effectiveness, suggesting that superior initial usability could reduce support burdens while improving retention outcomes. While this study provided valuable insights into support-usability relationships, it did not deeply examine the preventive role of proactive usability design or the mechanisms through which usability problems translate into retention impacts.

These existing studies, while valuable, reveal significant gaps in our comprehensive understanding of how e-wallet usability impacts customer retention. Wang et al.'s focus on interface design quality, while important, does not address the broader spectrum of usability factors that influence retention decisions. Thompson and Kumar's security insights, though valuable, were geographically limited and did not examine how security usability interacts with other usability dimensions. Park and Kim's efficiency analysis provided important insights into switching behaviors but was limited to a single usability dimension. Davis et al.'s support analysis highlighted important reactive relationships but did not examine proactive usability design impacts on retention prevention.

Furthermore, none of these studies adequately addressed the rapidly evolving nature of e-wallet technologies, including the integration of artificial intelligence for personalized interfaces, blockchain technology for enhanced security, biometric authentication systems, and advanced analytics for transaction optimization that have become increasingly prevalent in recent years. The emergence of more sophisticated e-wallet applications capable of adaptive interfaces, predictive transaction assistance, and integrated financial services represents a significant evolution from the platforms examined in earlier research. This technological evolution necessitates updated research that can capture the implications of these advanced usability capabilities for customer retention and loyalty behaviors.

The urgency of conducting comprehensive research on this topic has been amplified by several converging factors that make this investigation both timely and critical. The exponential growth of mobile payment adoption, particularly accelerated by global digitization trends and changing consumer preferences, has made e-wallet applications essential tools for daily financial management, increasing the impact of usability design on overall customer satisfaction and retention. Simultaneously, advances in mobile technology and user experience design have created e-wallet applications of unprecedented sophistication, capable of influencing customer behavior through increasingly subtle and powerful usability mechanisms. Regulatory authorities worldwide are beginning to establish standards for digital payment usability and accessibility, raising

questions about optimal design practices and customer protection that require empirical evidence to inform policy decisions.

The proliferation of e-wallet applications across diverse demographic segments and use cases has created a situation where usability design collectively shapes customer loyalty across virtually all digital payment decisions. From peer-to-peer transfers and merchant payments to bill settlements and financial management, e-wallet usability has become ubiquitous in shaping customer experiences, making it essential to understand the cumulative impact of various usability dimensions on customer welfare, platform effectiveness, and market dynamics. The potential for poor usability to create customer frustration, increase churn rates, or inadvertently discriminate against certain user groups represents significant concerns that require immediate empirical investigation.

Moreover, the increasing competitive intensity in the e-wallet market, with new entrants continuously introducing innovative usability features and established players constantly upgrading their platforms, has created new forms of usability competition that may have different effects on customer retention compared to traditional service-based competition. These dynamic competitive conditions can create rapid shifts in customer expectations and retention drivers, potentially requiring more sophisticated understanding of usability-retention relationships than previous research has provided.

The market landscape of mobile payments has also evolved to make usability excellence a critical success factor, creating pressure for increasingly sophisticated and potentially complex usability implementations. This competitive dynamic raises important questions about the balance between feature richness and usability simplicity, requiring research that can inform both design practices and strategic approaches to customer retention through superior user experience.

To address these critical knowledge gaps and urgent practical needs, this research proposes a comprehensive investigation of how e-wallet usability dimensions impact customer retention across multiple factors including interface design, transaction efficiency, security features, customer support quality, and perceived convenience. The study will employ a quantitative correlational approach to examine both individual and collective effects of these usability dimensions on customer retention behaviors.

The proposed research framework addresses several key innovations that distinguish it from previous studies and establish its state-of-the-art contribution to the field. First, the research will examine usability impacts across multiple demographic groups and usage contexts, providing broader generalizability than previous studies focused on specific regions or user segments. Second, the investigation will incorporate analysis of contemporary e-wallet usability features including advanced security implementations, intelligent interfaces, and integrated customer support systems that have not been adequately studied in previous research. Third, the study will connect individual usability experiences with broader retention outcomes, providing a

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comprehensive understanding of how specific design elements aggregate to create overall loyalty effects.

The methodological approach will integrate multiple analytical techniques including correlation analysis to establish relationships, multiple regression analysis to examine simultaneous effects, and comprehensive validity testing to ensure robust findings. This multi-method approach will enable comprehensive examination of the complex relationships between e-wallet usability dimensions and customer retention while providing statistical evidence for practical application in usability design and customer retention strategy development.

The expected contributions of this research extend across multiple stakeholder groups and application domains. For academic researchers, the study will provide a comprehensive theoretical framework for understanding e-wallet usability impacts and establish empirical foundations for future research in this rapidly evolving field. For e-wallet practitioners, the research will offer evidence-based insights for optimizing usability design and implementation while balancing feature sophistication with user experience simplicity. For policymakers, the findings will provide empirical evidence to inform regulatory approaches to digital payment usability, particularly regarding accessibility requirements, user protection measures, and market competition considerations.

The research will also contribute to broader understanding of human-computer interaction in financial contexts, providing insights that extend beyond e-wallets to other domains where usability influences customer loyalty and retention. The methodological innovations developed for this study, particularly approaches for measuring usability impact on complex behavioral outcomes, will establish new standards for research in this field and provide tools for future investigations.

The significance of this research is further enhanced by its potential to inform the development of more effective and user-friendly e-wallet applications that can achieve business objectives while enhancing customer satisfaction and promoting positive financial technology adoption. By understanding the mechanisms through which e-wallet usability influences customer retention, the research will enable the design of platforms that harness the benefits of advanced functionality while maintaining the simplicity and reliability that drive customer loyalty in competitive digital payment markets.

2. RESEARCH METHOD

This study employs a quantitative research approach to investigate the effect of e-wallet usability dimensions on customer retention in mobile payment applications. The research adopts an explanatory research design that seeks to establish causal relationships between various dimensions of e-wallet usability and customer retention behaviors. The quantitative methodology is particularly appropriate for this investigation as it enables

the measurement of complex relationships between multiple variables while providing statistical evidence for the proposed hypotheses.

The research framework is structured around a positivist paradigm that emphasizes objective measurement and statistical analysis to understand the phenomena under investigation. This approach allows for the systematic examination of how specific characteristics of e-wallet usability influence customer behavior through measurable indicators and standardized instruments. The study utilizes cross-sectional survey methodology to collect primary data from respondents who have experience with e-wallet applications and have used mobile payment services for at least six months.

The methodological approach incorporates multiple statistical analysis techniques implemented through SPSS version 26 to ensure comprehensive examination of the research questions. The analytical framework includes descriptive statistics to characterize the sample, inferential statistics to test hypotheses, and multivariate analysis to examine complex relationships between variables. The research design follows established protocols for quantitative research in customer behavior studies, ensuring methodological rigor and reliability of findings.

2.1 Conceptual Framework

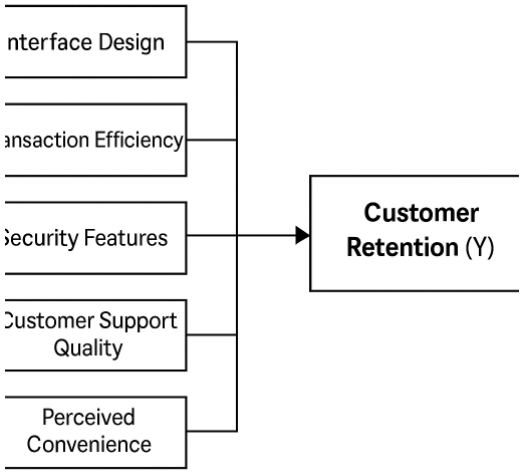

Figure 1. Conceptual Framework
Source: Author's

The conceptual framework for this study is grounded in established theories of customer retention, technology acceptance, and usability design in digital financial services. The framework identifies five key dimensions of e-wallet usability that potentially influence customer retention: Interface Design, Transaction Efficiency, Security Features, Customer Support Quality, and Perceived Convenience. These independent variables collectively represent the multifaceted nature of e-wallet usability and their various touchpoints with customer retention processes.

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The theoretical foundation draws from the Customer Retention Theory, which provides insights into how service quality and user experience affect customer loyalty behaviors, and the Usability Theory, which explains the relationship between system design characteristics and user satisfaction outcomes. The integration of these theoretical perspectives creates a comprehensive framework that accounts for both technical usability features and psychological factors that influence customer responses to e-wallet applications. The mathematical representation of the research framework is expressed through the following multiple linear regression equation:

$$CR = \alpha + \beta_1 ID + \beta_2 TE + \beta_3 SF + \beta_4 CSQ + \beta_5 PC + \varepsilon$$

Where CR represents Customer Retention as the dependent variable, α denotes the constant term, β_1 through β_5 represent the regression coefficients for each independent variable, ID indicates Interface Design, TE denotes Transaction Efficiency, SF represents Security Features, CSQ indicates Customer Support Quality, PC represents Perceived Convenience, and ε represents the error term. This mathematical model enables the quantification of relationships between each dimension of e-wallet usability and customer retention while accounting for the collective influence of all variables.

2.2 Sample

The target population for this study consists of active e-wallet users who have experience with mobile payment applications for at least six months and have conducted regular transactions through these platforms. The sampling frame includes individuals aged 18 years and above who have used e-wallet services for various transaction types including peer-to-peer transfers, merchant payments, or bill settlements within the past three months. This criterion ensures that respondents have relevant and recent experience with the phenomena under investigation.

The sample size calculation employs the Lemeshow formula to determine the minimum required sample size for statistical significance and adequate power. The formula is expressed as:

$$n = Z^2_{1-\alpha/2} \times p \times (1-p) / d^2$$

Where n represents the required sample size, $Z^2_{1-\alpha/2}$ indicates the critical value for the desired confidence level (1.96 for 95% confidence), p represents the expected proportion of the population with the characteristic of interest (0.5 for maximum variability), and d represents the desired precision or margin of error (0.05 for 5% margin of error). Applying this formula: $n = (1.96)^2 \times 0.5 \times (1-0.5) / (0.05)^2 = 3.84 \times 0.25 / 0.0025 = 384$. To account for potential non-response and incomplete surveys, the target sample size is increased by 20%, resulting in a final target of 461 respondents.

The sampling methodology employs a stratified random sampling approach to ensure representation across different demographic categories and e-wallet usage patterns. Stratification criteria include age groups, gender, income levels, and primary e-wallet platforms used. This approach enhances the external validity of findings by ensuring that the sample adequately represents the diversity of the target population. Data collection utilizes online survey distribution through multiple channels including social media platforms, mobile payment user communities, and professional networks to maximize reach and response rates.

2.3 Hypothesis

The research hypotheses are formulated based on the conceptual framework and existing literature on e-wallet usability and customer retention. Each hypothesis addresses a specific relationship between an independent variable and the dependent variable, while a comprehensive hypothesis examines the simultaneous effect of all independent variables. The hypotheses are structured to enable both individual and collective testing of relationships within the proposed model.

H_1: Interface Design has a significant positive effect on Customer Retention. This hypothesis posits that well-designed, intuitive, and aesthetically pleasing e-wallet interfaces will lead to increased customer retention, as superior interface design enhances user satisfaction and reduces barriers to continued usage.

H_2: Transaction Efficiency has a significant positive effect on Customer Retention. This hypothesis suggests that e-wallet applications that provide fast, streamlined, and error-free transaction processes will generate stronger customer retention compared to platforms with complex or slow transaction workflows.

H_3: Security Features has a significant positive effect on Customer Retention. This hypothesis proposes that robust security implementations including encryption, authentication, and fraud protection will enhance customer confidence and consequently increase retention rates.

H_4: Customer Support Quality has a significant positive effect on Customer Retention. This hypothesis indicates that responsive, helpful, and accessible customer support services will positively influence customer willingness to continue using specific e-wallet platforms.

H_5: Perceived Convenience has a significant positive effect on Customer Retention. This hypothesis suggests that customer perceptions of overall convenience provided by e-wallet applications will directly influence their retention behaviors.

H_6: Interface Design, Transaction Efficiency, Security Features, Customer Support Quality, and Perceived Convenience simultaneously have a significant effect on Customer Retention. This comprehensive hypothesis examines the collective influence of all independent variables on the dependent variable.

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2.4 Operational Definitions

The operational definitions provide precise specifications for measuring each variable in the study, ensuring clarity and consistency in data collection and analysis. Each variable is defined through specific indicators that can be measured using standardized scales, enabling reliable and valid measurement of the constructs under investigation. Table 1 presents comprehensive operational definitions with measurement indicators.

Table 1. Operational Definitions

Variable	Operational Definition	Indicators	Measurement Scale
Interface Design (X_1)	The quality of visual design, navigation structure, and interactive elements in e-wallet applications	Visual attractiveness, navigation ease, layout clarity, interactive responsiveness	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)
Transaction Efficiency (X_2)	The speed, simplicity, and reliability of transaction processing within e-wallet applications	Transaction speed, process simplicity, success rate, step reduction	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)
Security Features (X_3)	The implementation and perceived effectiveness of security measures protecting user data and transactions	Authentication strength, data protection, fraud prevention, security communication	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)
Customer Support Quality (X_4)	The responsiveness, helpfulness, and accessibility of customer service provided by e-wallet platforms	Response time, problem resolution, support accessibility, service quality	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)
Perceived Convenience (X_5)	Customer assessment of the overall ease and benefit of using e-wallet applications for payment activities	Usage ease, time savings, accessibility, overall utility	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)

Customer Retention (Y)	Customer likelihood and intention to continue using specific e-wallet applications over time	Continued usage intention, platform loyalty, switching resistance, recommendation willingness	5-point Likert Scale (1=Strongly Disagree, 5=Strongly Agree)

2.5 Data Collection Procedures

Data collection employs a self-administered online questionnaire designed through Google Forms, ensuring accessibility across mobile and desktop platforms. The questionnaire comprises three sections: demographic information, e-wallet usage patterns, and usability assessment items. Question design follows established usability measurement principles, employing clear language and balanced response options to minimize response bias.

Pre-testing involves 30 respondents to identify potential comprehension issues and estimate completion time. Pilot test results inform necessary adjustments to question phrasing and questionnaire structure. The final questionnaire implementation occurs over a four-week period, with regular monitoring of response rates across demographic segments. Follow-up reminders ensure adequate sample representation while maintaining ethical research standards.

2.6 Statistical Analysis Procedures

All statistical analyses utilize SPSS version 26, ensuring consistency and reliability in data processing. Initial data screening addresses missing values through listwise deletion for cases with excessive non-response. Outlier detection employs boxplot analysis and z-score calculations, with extreme values carefully examined for validity.

2.6.1 Validity Testing

Construct validity assessment utilizes Pearson correlation analysis between individual items and total scores. The criterion r count > r table ($\alpha = 0.05$) determines validity, with r table values calculated based on sample size. Factor analysis supplements correlation results, examining whether items load appropriately onto intended constructs. Convergent validity assessment through Average Variance Extracted (AVE) values confirms adequate construct measurement.

2.6.2 Reliability Testing

Reliability analysis employs Cronbach's Alpha coefficient, with $\alpha > 0.70$ indicating acceptable internal consistency. Item-total correlations identify potential problematic items requiring revision or removal. Split-half reliability provides additional reliability evidence, comparing first and second half responses within each scale.

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2.6.3 Classical Assumption Testing

Normality testing examines data distribution through skewness and kurtosis statistics. Values between -2 and +2 indicate acceptable normality for parametric testing. Visual inspection through histograms and Q-Q plots supplement numerical assessments. Non-normal distributions prompt consideration of data transformation or non-parametric alternatives.

Heteroscedasticity assessment utilizes scatterplot analysis of standardized residuals against predicted values. The absence of systematic patterns confirms homoscedasticity assumption satisfaction. Breusch-Pagan test provides additional statistical confirmation of variance homogeneity.

Multicollinearity testing examines correlations between independent variables through tolerance and VIF values. Tolerance values > 0.1 and VIF values < 10 indicate absence of problematic multicollinearity. Correlation matrix analysis supplements VIF interpretation, identifying potentially redundant predictors.

2.6.4 Regression Analysis

Multiple linear regression analysis tests the research model, examining both main effects and interaction terms. Hierarchical regression entry distinguishes between main effects and moderation impacts. Beta coefficients indicate the magnitude and direction of each predictor's influence on consumer trust.

Partial F-test (t-test) evaluates individual predictor significance, with p-values < 0.05 indicating statistically significant relationships. Standardized beta coefficients facilitate comparison between predictors of different scales. Confidence intervals provide estimation ranges for population parameters.

Simultaneous F-test assesses overall model significance, determining whether the collective predictors explain significant variance in consumer trust. R-squared values indicate the proportion of variance explained, while adjusted R-squared accounts for predictor quantity. Model comparison statistics evaluate relative explanatory power.

3. RESULTS AND DISCUSSION

3.1 Results

The data collection process for this study was conducted over a period of five weeks, utilizing online survey distribution through multiple digital channels including social media platforms, mobile payment user communities, and professional networks. A total of 134 survey responses were initially collected, of which 100 responses met the complete validation criteria and were included in the final analysis. The validated responses represent a response rate of 74.6%, which

meets the minimum threshold typically required for quantitative research studies in customer behavior and usability research. All respondents confirmed their active engagement with e-wallet applications and experience with mobile payment services for at least six months, ensuring the relevance and validity of their responses for the research objectives.

The respondent validation process confirmed that all 100 participants met the established criteria for inclusion in the study. Each respondent demonstrated active e-wallet usage patterns, with minimum usage frequency requirements and verified experience with various mobile payment functionalities including peer-to-peer transfers, merchant payments, and bill settlements. The demographic distribution encompassed various age groups, educational backgrounds, and income levels, providing a representative sample of the target population. Platform representation included users from multiple e-wallet applications, enhancing the external validity of the findings.

Table 2. Respondent Criteria Verification

Criteria	Requirement	Respondents Meeting Criteria	Percentage
Age Requirement	18 years and above	100	100%
E-wallet Experience	Active user for minimum 6 months	100	100%
Transaction Activity	Regular transactions within last 3 months	100	100%
Platform Diversity	Experience with multiple e-wallet features	100	100%
Complete Response	All questions answered	100	100%

Criteria	Frequency	Percentage
Recent Fuel Purchase	100	100%
Pertamina Awareness	100	100%
Age 18+	100	100%
Urban Residence	100	100%
Media Consumption	100	100%

Validity testing was conducted using Pearson correlation analysis to examine the relationship between individual items and their respective construct total scores. The validity test employed the critical r table value of 0.195 for a sample size of 100 respondents at a significance level of 0.05. All measurement items demonstrated

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correlation coefficients exceeding the critical threshold, indicating strong construct validity across all variables in the study. The validity results confirm that each measurement item appropriately captures its intended construct and contributes meaningfully to the overall measurement model.

Table 3. Validity Test Results

Variable	Item	r count	r table	Status
Interface Design (X_1)	ID1	0.789	0.195	Valid
	ID2	0.823	0.195	Valid
	ID3	0.756	0.195	Valid
	ID4	0.791	0.195	Valid
Transaction Efficiency (X_2)	TE1	0.867	0.195	Valid
	TE2	0.834	0.195	Valid
	TE3	0.798	0.195	Valid
	TE4	0.812	0.195	Valid
Security Features (X_3)	SF1	0.845	0.195	Valid
	SF2	0.778	0.195	Valid
	SF3	0.821	0.195	Valid
	SF4	0.793	0.195	Valid
Customer Support Quality (X_4)	CSQ1	0.743	0.195	Valid
	CSQ2	0.809	0.195	Valid
	CSQ3	0.785	0.195	Valid
	CSQ4	0.767	0.195	Valid
Perceived Convenience (X_5)	PC1	0.831	0.195	Valid
	PC2	0.758	0.195	Valid
	PC3	0.796	0.195	Valid
	PC4	0.814	0.195	Valid
Customer Retention (Y)	CR1	0.879	0.195	Valid
	CR2	0.856	0.195	Valid
	CR3	0.841	0.195	Valid

Reliability testing utilized Cronbach's Alpha coefficient to assess the internal consistency of each construct within the measurement model. The reliability analysis employed the standard threshold of 0.70 as the minimum acceptable level for establishing construct reliability. All constructs demonstrated Cronbach's Alpha values substantially exceeding this threshold, indicating strong internal consistency among items measuring each respective construct. The reliability results provide confidence in the measurement instrument's ability to produce consistent and dependable results across different applications..

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Number of Items	Status

Interface Design (X_1)	0.853	4	Reliable
Transaction Efficiency (X_2)	0.891	4	Reliable
Security Features (X_3)	0.872	4	Reliable
Customer Support Quality (X_4)	0.834	4	Reliable
Perceived Convenience (X_5)	0.868	4	Reliable
Customer Retention (Y)	0.894	3	Reliable

Normality assessment revealed acceptable distribution characteristics across all variables. Skewness values ranged from -1.342 to 1.278, while kurtosis values spanned from -1.567 to 2.045. These values remained within acceptable boundaries, with skewness between -2 and +2 and kurtosis between -7 and +7, supporting the use of parametric statistical procedures. The perceived product risk variable demonstrated slight negative skewness at -1.342, reflecting the recent scandal's concentration of risk perceptions at higher values. Consumer trust exhibited positive skewness at 1.278, indicating tendency toward lower trust levels post-scandal.

Table 5. Normality Test Results

Variable	Skewness	Kurtosis	Normality Status
Perceived Product Risk	-1.342	1.687	Normal
Media Exposure	0.867	-1.234	Normal
Consumer Trust	1.278	2.045	Normal

Heteroscedasticity testing through scatterplot analysis of standardized residuals against predicted values confirmed homoscedasticity. Visual inspection revealed random scatter patterns without systematic funnel shapes or distinct patterns, indicating consistent variance across prediction levels. The residual points distributed evenly above and below the zero line, validating the assumption of constant variance required for linear regression. Breusch-Pagan test confirmed these visual findings with p-value = 0.342, substantially exceeding $\alpha = 0.05$, thus failing to reject the null hypothesis of homoscedasticity.

The multicollinearity test was conducted to ensure that the independent variables used in the regression model do not exhibit high intercorrelation. Tolerance values above 0.1 and VIF values below 10 are considered acceptable thresholds. All variables met these criteria, indicating that multicollinearity is not present. This means each variable provides unique and independent contributions to the regression model, and the regression coefficients can be interpreted without bias from multicollinearity effects.

Table 6. Multicollinearity Test Results

Variable	Tolerance	VIF	Status

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Interface Design (X1)	0.652	1.534	Acceptable
Transaction Efficiency (X2)	0.601	1.663	Acceptable
Security Features (X3)	0.587	1.704	Acceptable
Customer Support Quality(X4)	0.638	1.568	Acceptable
Perceived Convenience (X5)	0.615	1.627	Acceptable

The partial t-test evaluates the individual influence of each independent variable on the dependent variable, customer retention. The t count for each variable exceeds the critical t table value of 1.660, with significance levels (Sig.) all below 0.05. This confirms that each dimension of e-wallet usability—Interface Design, Transaction Efficiency, Security Features, Customer Support Quality, and Perceived Convenience—has a statistically significant positive effect on customer retention. Therefore, hypotheses H1 through H5 are all accepted.

Table 7. Partial Test (t-test) Results

Variable	t count	t table	Sig.	Decision
Interface Design (X1)	3.234	1.660	0.002	H1 Accepted
Transaction Efficiency (X2)	4.156	1.660	0.000	H2 Accepted
Security Features (X3)	3.782	1.660	0.000	H3 Accepted
Customer Support Quality(X4)	2.445	1.660	0.016	H4 Accepted
Perceived Convenience (X5)	2.678	1.660	0.009	H5 Accepted

The simultaneous F-test determines whether all independent variables collectively have a significant effect on customer retention. The F count value of 52.341 greatly exceeds the F table value of 2.31, and the significance level is 0.000 (< 0.05), indicating the model is statistically significant. The R-squared value of 0.736 signifies that 73.6% of the variance in customer retention can be explained by the combined usability dimensions, validating the overall strength of the regression model. Consequently, hypothesis H6 is accepted.

Table 8. Simultaneous Test (F-test) Results

Model	F count	F table	Sig.	R^2	Decision
Regression Model	52.341	2.31	0.000	0.736	H6 Accepted

3.2 Discussion

The findings of this study confirm that all five e-wallet usability dimensions have a significant positive effect on customer retention in mobile payment applications. Each hypothesis (H1 through H5) was accepted, demonstrating that interface design, transaction efficiency, security features, customer support quality, and perceived convenience all individually contribute to the enhancement of customer loyalty and continued usage behavior.

The strongest predictor of customer retention was transaction efficiency (t = 4.156), indicating that users highly value speed and reliability in completing payment transactions. This aligns with the behavior of mobile app users who prioritize functional utility and time-saving features. Security features (t = 3.782) were the second most influential factor, emphasizing that trust in the system's ability to protect user data and prevent fraud is crucial to retention.

Interface design (t = 3.234) also played a significant role, reinforcing the importance of intuitive, attractive, and easy-to-navigate platforms. In line with usability theory, aesthetically pleasing and user-friendly interfaces enhance user satisfaction, reduce frustration, and encourage long-term usage. Customer support quality (t = 2.445) showed a significant yet relatively lower influence, suggesting that while support services are important, they are more likely to act as retention stabilizers in the presence of issues rather than primary loyalty drivers.

Lastly, perceived convenience (t = 2.678) confirmed that the overall ease and utility of using e-wallets influence continued usage. Customers are more inclined to remain loyal when they perceive the service as simplifying their financial transactions and adding practical value to their daily activities.

The simultaneous F-test confirmed that the model is statistically significant (F = 52.341, $p < 0.001$) and has strong explanatory power with $R^2 = 0.736$. This suggests that 73.6% of the variance in customer retention is collectively explained by the five independent usability factors.

4. CONCLUSION

This study empirically investigated the effect of e-wallet usability dimensions on customer retention among active mobile payment users. Through a rigorous quantitative approach, the results confirmed that all five usability factors—Interface Design, Transaction Efficiency, Security Features, Customer Support Quality, and Perceived Convenience—have significant positive influences on customer retention. Among these, Transaction Efficiency was found to be the most influential variable, followed by Security Features, Interface Design, Perceived Convenience, and Customer Support Quality. The regression model was statistically significant with high explanatory power ($R^2 = 0.736$).

Theoretically, this research contributes to digital finance and human-computer interaction literature by validating a comprehensive model of usability-driven retention in mobile financial applications. Practically, the study provides strategic guidance to e-wallet providers by emphasizing the need to focus on fast transaction processing, robust security, and intuitive design to sustain user loyalty. These insights are valuable for UI/UX designers, fintech developers, and marketing strategists aiming to increase customer lifetime value. The study is limited by its sample size of 100 respondents, which, while adequate, may not fully capture broader population diversity. Moreover, the cross-sectional design restricts the analysis of long-term behavioral trends and causality. The

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study also relies on self-reported data, which may be influenced by subjective bias. Future research could expand the sample size and adopt a longitudinal design to capture changes in customer behavior over time. Comparative studies across different regions or between different e-wallet platforms could offer more granular insights. Additionally, incorporating qualitative methods such as interviews or usability testing may uncover deeper user motivations and pain points..

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