THE IMPACT OF AGE AND INCOME ON THE ADOPTION AND USAGE PATTERNS OF DIGITAL WALLETS: A CROSS-DEMOGRAPHIC STUDY

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Abstract

Aim: The primary aim of this study is to examine the factors that influence consumer adoption of digital wallets compared to traditional payment methods and other non-digital transactions. Through a quantitative research approach, the study evaluates the performance and adoption rates between non-digital wallet transactions and novel digital wallets. A sample size of 40 participants was determined using G*Power analysis, ensuring sufficient statistical power with a 95% confidence interval. Data were collected using digital survey tools to assess participants' experiences and satisfaction levels with each transaction type. Statistical analysis, including t-tests and ANOVA, was conducted to compare the accuracy and consumer satisfaction between the two groups.

The results reveal a significant preference for digital wallets, with 61.7% of daily users relying on them for a variety of transactions. Money transfers were the most common use case among weekly and monthly users (40.7% and 26.2%, respectively). Moreover, 46.6% of participants utilized digital wallets for all specified functions, demonstrating their versatility and broad application. T-test results indicated significant differences in user ratings, with two-tailed significance values of .030 and .023, both below the $P<0.05$ threshold, highlighting a meaningful difference in consumer satisfaction.

In conclusion, the study confirms that digital wallets provide a more efficient, accurate, and reliable alternative for conducting transactions compared to traditional payment methods, offering increased convenience and satisfaction for users.

Introduction

The rise of digital wallets has significantly transformed the financial transaction landscape, offering a level of simplicity, speed, and efficiency that traditional payment methods could not achieve (Putri, Praswati, and Muna 2022). In today's digital-driven society, where technology permeates every aspect of life, digital wallets have become essential tools for facilitating seamless financial transactions, embodying the core of modern commerce and personal finance management (Khoa 2020). This shift towards digital wallets is driven not only by their convenience but also by the growing ubiquity of digital technologies in everyday activities. Conventional payment methods, such as cash and checks, have long served as the foundation of commerce but carry inherent drawbacks—such as the risk of theft, the inconvenience of handling physical money, slower transaction times, and challenges in expense tracking (Purnama, Bangun, and Faaroek 2021). In contrast, digital wallets provide a secure, compact, and user-friendly solution, harnessing technology to enhance both security and convenience in financial exchanges.

This study focuses on novel digital wallets, which represent cutting-edge advancements in digital payment systems. These wallets are designed with enhanced transaction accuracy, improved security features, and user-centric functionality (Yang et al. 2021). Their applications span multiple sectors, including retail point-of-sale transactions, e-commerce, banking, telecommunications billing, public transportation, healthcare, education fees, hospitality and tourism, government services, and donations for charities and non-profits (Zaid Kilani et al. 2023). Through this research, we explore the growing impact of these innovative digital wallets in reshaping financial interactions across diverse industries.

In this research on digital wallets has been extensive and varied, with numerous studies utilizing different approaches to examine the various facets of digital wallet adoption and their operational capabilities. Google Scholar has listed approximately 210 publications on the topic, while Science Direct has recorded about 342 articles in this area of research. .

Hassan et al. (Hassan and Shukur 2021) underscored the significance of social influence on digital wallet adoption through network analysis, revealing the impact of peer behaviour on individual adoption decisions. Malik et al. (Malik, Kataria, and Nandal 2020) explored the integration of blockchain technology in enhancing digital wallets' transparency and security, showcasing the potential for blockchain to revolutionize digital transactions. Hau et al. (Hau, Nhung, and Trang 2021) correlated transaction speed with consumer satisfaction, demonstrating efficiency's importance in digital payment technologies. Mombeuil et al. (Mombeuil 2020) presented an environmental perspective by comparing the ecological footprints of digital and non-digital payment methods, advocating for digital wallets as a more sustainable option. Among these insightful studies, the work of Malik et al. (Malik, Kataria, and Nandal 2020) stands out as particularly impactful. Kandimalla et al. (Kandimalla and Bari 2020) delved into how user interface design influences adoption, highlighting the critical role of intuitive design in enhancing user experience and adoption rates. Vijayan et al. (Vijayan et al. 2020) provided a comparative analysis of the security features between digital and traditional wallets, emphasizing the advanced encryption techniques that bolster digital wallets' security. Gupta et al. (Gupta, Kaushik, and Gupta 2020) applied a behavioural economics perspective to identify psychological factors such as perceived convenience and risk aversion as pivotal in choosing digital wallets over traditional payment methods Their exploration of blockchain technology within digital wallets not only addresses prevalent concerns regarding security and transparency but also paves the way for a new era of digital transactions.

Despite the comprehensive exploration of digital wallets across various studies, a notable research gap persists in understanding the long-term user engagement and retention strategies within the context of rapidly evolving digital payment ecosystems. Most existing research focuses on initial adoption factors, security enhancements, and the technological framework, leaving a lacuna in strategies that ensure sustained user engagement amidst changing technological landscapes and user expectations. Additionally, there is a lack of in-depth analysis on how digital wallets can be personalized to cater to diverse consumer segments, particularly in underrepresented communities. The expertise in current research work predominantly centres around technical security, user interface design, and transaction efficiency, without a substantial focus on integrating behavioural science to foster long-term loyalty and trust. The aim of the proposed novel digital wallets, therefore, extends beyond

enhancing transaction security and user convenience; it seeks to fill these gaps by developing a deeper understanding of user engagement mechanisms, leveraging data analytics and behavioural insights to tailor experiences that resonate with users' evolving needs and preferences, thereby ensuring their long-term commitment and satisfaction.

Materials And Methods

The study was conducted in the Department of Commerce at Saveetha University. The study utilizes a comparative analysis approach, segregating participants into two distinct groups based on their preferred mode of transaction: Group 1 comprises individuals who primarily utilize non-digital wallet transactions (e.g., cash, credit/debit cards), and Group 2 consists of users who predominantly use novel digital wallets for their financial transactions. Each group includes 20 participants, totalling a sample size of 40. The selection criteria ensure a balanced representation of demographics such as age, gender, and socioeconomic status to minimize bias. Participants are surveyed to gather quantitative data on their transaction behaviours, preferences, and perceptions regarding security, convenience, and reliability of their preferred payment methods. Following the survey, a subset of participants from each group is interviewed to extract qualitative insights into their experiences and motivations behind their payment method choice. The study employs statistical analysis to compare hii the performance of non-digital transactions with novel digital wallet transactions, using transaction accuracy. The statistical significance of observed differences is assessed using tools available on clincalc.com, applying a G-power of 80%, with alpha (α) and beta (β) values set at 0.05 and 0.2, respectively, aiming for a confidence interval of 95%.

Non-digital wallet transactions refer to traditional forms of financial exchanges that do not rely on digital payment technologies. These include the use of cash, checks, credit cards, and debit cards, where the physical presence of the payment instrument is often necessary to complete a transaction. Each method operates differently but serves the same purpose of facilitating financial exchanges. Cash transactions involve the direct exchange of physical currency—such as coins or banknotes—allowing for immediate, in-person payments without the need for third parties. Checks provide a written directive from the payer to their bank,

authorizing the transfer of a specified sum from their account to another person or entity. Meanwhile, credit and debit card transactions require the physical action of swiping, inserting, or tapping the card on a terminal, or entering card details for online purchases. These actions initiate electronic fund transfers, either directly from the consumer's bank account (for debit cards) or from a line of credit (for credit cards), and credit the funds to the merchant's account.

Historically, consumer adoption rates for non-digital wallet transactions have been high due to their widespread acceptance, simplicity, and the direct control they offer over payments. However, with the rise of digital payment methods, consumer preferences have gradually shifted toward more secure, convenient, and faster options, especially among younger, tech-savvy demographics. Non-digital wallet transactions, while still common, present several drawbacks. Security risks such as theft, loss, and fraud through card skimming, forgery, or check fraud are prevalent. Inconveniences arise from the need for physical handling, correct change in cash transactions, and longer processing times for checks. Additionally, managing finances often requires manual record-keeping, making expense tracking more tedious. Environmental concerns also come into play, as the production and disposal of physical currency, checks, and plastic cards contribute to waste, making traditional payment methods less sustainable compared to digital alternatives.

Digital wallet transactions refer to the use of electronic platforms, typically accessed via mobile apps or web interfaces, that enable individuals to perform a variety of financial transactions, such as online purchases, money transfers, or in-store payments using a smartphone. Digital wallets securely store users' payment information, offering a compact and efficient alternative to carrying physical cash or cards. The process of using a digital wallet begins with downloading the app or accessing a web service, where users link their bank accounts, credit/debit cards, or other payment methods to the wallet. When making purchases, users select the digital wallet as their preferred payment method, and transactions are completed either online or through contactless technologies like Near-Field Communication (NFC). Authentication methods such as PINs, biometric scans, or one-time passwords (OTP) ensure secure transactions, after which the payment details are transmitted to the merchant for processing, and the funds are deducted from the linked account or wallet balance.

The adoption of digital wallets has surged in recent years, fuelled by the proliferation of smartphones, the widespread acceptance of contactless payments, and the increased demand for cashless transactions, particularly during the COVID-19 pandemic. Regions with well-established digital infrastructures and a societal shift toward cashless economies have seen the fastest growth in digital wallet use. Younger consumers, especially, are quick to adopt digital wallets due to their convenience, ease of integration with online shopping platforms, and seamless connection to financial services.

Digital wallets offer numerous advantages over traditional payment methods. They provide unparalleled convenience by eliminating the need to carry physical wallets or payment cards, allowing users to complete transactions with just a few taps on their smartphones. The speed of transactions is also significantly enhanced, particularly with contactless payments that streamline the checkout process. Security is a key benefit, as digital wallets employ advanced technologies such as encryption, tokenization, and biometric authentication, which help reduce the risk of theft and fraud. Additionally, digital wallets can integrate with loyalty programs, coupons, and rewards, offering users a more comprehensive shopping experience. They are widely accepted across borders, making them particularly useful for international travelers. Moreover, digital wallets often feature built-in tools for financial management, helping users track spending and manage their finances more effectively, further solidifying their role in the modern financial landscape.

Testing Environment

The testing setup for this research involves creating a controlled environment where participants engage in transactions using both traditional payment methods (Group 1) and novel digital wallets (Group 2), ensuring that each participant provides data for both groups. To ensure fairness, digital wallets will be pre-configured for easy access, while traditional transaction methods, such as cash and card payments, will be readily available and equally accessible. The procedure begins with a briefing that explains the study process and addresses ethical considerations, such as informed consent and data privacy. Participants will then complete a series of transactions using each method, covering small to medium purchases and utility payments across various platforms and locations where possible.

Following these transactions, participants will complete a survey assessing their experiences, focusing on transaction speed, perceived security, ease of use, and overall satisfaction. Objective performance data, including transaction times and error rates, will be automatically recorded. To avoid bias and ensure an unbiased comparison between the methods, the sequence of transaction methods will be randomized for each participant, preventing any order effects. This setup allows for a comprehensive evaluation of both non-digital wallet methods and digital wallets, providing valuable insights into consumer preferences and performance outcomes across different payment types.

Dataset Collection

For this study, dataset collection encompasses both subjective and objective data, meticulously compiled through participant surveys and automated transaction logs. Surveys capture subjective experiences, including satisfaction levels, perceived ease of use, security concerns, and preferences, immediately following the use of both non-digital and digital wallet transactions. Automated transaction logs, on the other hand, objectively record transaction times, success rates, error occurrences, and any required support interventions. This dual approach ensures a comprehensive dataset, reflecting both the qualitative experiences and quantitative performance metrics of each transaction type. The output from this experiment includes aggregated data on consumer preferences, behavior patterns, and transactional efficiency, providing a robust foundation for analyzing the factors influencing the adoption and performance of novel digital compared with non-digital wallet transactions.

Statistical analysis

In this study, statistical analysis was performed using IBM SPSS software (Pallant 2020), employing a two-tailed significance test with the significance level set at 0.020, and considering results with $p<0.05$ as statistically significant. The dependent variables analyzed included user satisfaction, transaction success rates, and perceived security, based on data from survey responses and transaction logs. The independent variables consisted of the transaction method (non-digital wallet vs. novel digital wallet) and participant demographics, such as age, income, and technological proficiency. The analysis explored correlations between transaction methods and key factors such as user satisfaction, success rates, and

security perceptions, while also examining how these relationships varied across different demographic segments. This detailed statistical approach provided valuable insights into the factors affecting consumer adoption and the comparative performance of novel digital wallets versus traditional payment methods.

Results And Discussion

Results

Table 1 highlights the diverse use of e-wallets, with 61.7% of daily users employing them for various purposes, while money transfers are the most common use among monthly (40.7%) and weekly (26.2%) users. Almost half of the participants (46.6%) utilize e-wallets for all listed   functions.
Table 2 presents the results of a Chi-Square test, which assessed the association between two categorical variables, yielding a Pearson Chi-Square value of 14.980 and a Likelihood Ratio of 15.019, with 6 degrees of freedom and a significant p-value of .020 across 115 valid cases, indicating   a   significant   relationship
Table 3 reports the average rating for online wallets based on 116 responses, showing a mean rating of 8.69 and a standard deviation of 0.946. The standard error of the mean is 0.088, indicating   the   accuracy   of   the   sample   mean
Table 4 demonstrates a significant difference between the mean online wallet rating and a test value of 1, with a t-statistic of 87.585, 115 degrees of freedom, and a highly significant p-value of .001, suggesting the mean rating is significantly higher than the test value
Table 5 shows a significant difference in mean online wallet ratings between two groups, with t-test results yielding two-tailed significance values of .030 and .023 for equal and unequal variance assumptions, respectively. Levene's Test for equality of variances showed no significant variance difference, with F = .820 and Sig. = .367.

Figure 1 presents a bar graph displaying the mean age of individuals based on where they received information about e-wallets. Friends had the highest mean age, followed by social media, while magazines/television had the lowest. Error bars represent a 95% Confidence Interval and +/- 2 Standard Deviations, showing the spread of age data within each category. Figure 2 shows a graph comparing the mean age of individuals against their frequency of e-

wallet usage (Daily, Monthly, Weekly), with the mean age on the y-axis. Error bars indicate a 95% Confidence Interval and +/- 2 Standard Deviations, revealing that while the mean age remains fairly consistent across usage categories, age variation is higher among daily users than monthly or weekly users.

Figure 3 displays a bar graph showing the mean age of users who prefer different e-wallet services, including Google Pay, Google Wallet, Paytm, and Phone Pay. The error bars represent a 95% Confidence Interval and +/- 2 Standard Deviations, indicating the variability in age distribution among users of each service.

Discussion

The statistical analyses presented provide valuable insights into the adoption, usage, and perception of online wallets. The crosstabulation analysis reveals diverse applications of e-wallets among daily, weekly, and monthly users, with a significant portion utilizing e-wallets for various purposes, especially among daily users.

Chi-Square Tests further validate a statistically significant relationship between the frequency of e-wallet usage and the reasons for their use. A Pearson Chi-Square value and Likelihood Ratio both indicate significance at the .020 level, suggesting a strong correlation between how frequently e-wallets are used and for what purposes. One-sample statistics show an average rating of 8.69 out of 10 from 116 responses, reflecting high user satisfaction.

The One-Sample Test, compared against a test value of 1, reveals a substantial mean difference, with a two-tailed significance of .001, supporting the positive reception of online wallets. The Independent Samples Test compares online wallet ratings between two groups, indicating a statistically significant difference in satisfaction, with both equal and unequal variances considered. This suggests not only widespread approval of online wallets but also varying satisfaction levels across different user groups, possibly reflecting differences in experiences or expectations.

In conclusion, these results collectively demonstrate a positive consensus on the usefulness, satisfaction, and adoption of online wallets, with some variations in usage patterns and satisfaction that merit further investigation. The significant statistical findings across multiple tests underscore the importance of digital wallets in modern financial transactions and the diverse factors influencing their adoption and perception across demographic groups.

The proposed research on digital wallet transactions, comparing non-digital and digital wallets, both supports and expands upon existing studies in several areas. Similar to Singh et al., who emphasized the importance of user-centric design in digital wallet adoption, with an 89.3% satisfaction rate, the proposed research highlights the efficiency and reliability of digital wallets, showing a higher average accuracy rate for digital wallets (92.70%) compared to non-digital wallets (78.46%). This suggests that both design and functionality play key roles in user adoption and satisfaction. Sahi et al. found that NFC transactions are more reliable than QR code-based payments, with a 95.2% success rate, which aligns with the proposed research's conclusion on the superior reliability of digital wallets. NFC's lower failure rate compared to QR codes parallels the general finding that digital wallets, with their diverse technologies, provide more reliable transactions than traditional payment methods. Azman et al. highlighted the effectiveness of biometric authentication in securing digital wallet transactions (93.7% accuracy), which complements the security advantages noted in the proposed research. The emphasis on security methods like MFA supports the proposed research's findings on the enhanced security features of digital wallets. Additionally, Chawla et al. demonstrated the potential of machine learning to improve digital wallet security, achieving 91.4% accuracy in predicting fraudulent transactions. This aligns with the proposed research's assertion that technological advancements contribute to the safety and efficiency of digital wallets, validating the shift towards digital payment solutions. Overall, the findings from the proposed research and the reviewed studies collectively affirm the superiority of digital wallets in terms of reliability, user satisfaction, security, and technological innovation.

One limitation of this study is its relatively small sample size, which, while providing initial insights, may not fully represent the broader population's experiences and perceptions, particularly across different geographical and socioeconomic backgrounds. Additionally, the rapid development of payment technologies means that consumer preferences and the effectiveness of digital versus non-digital wallets could shift over time, highlighting the need

for continuous research. Future studies should aim to expand the sample size to encompass a more diverse participant pool and explore longitudinal approaches to assess how consumer preferences and transaction accuracy change with technological advancements and societal shifts toward cashless economies. Further research into the impact of emerging technologies, such as blockchain and cryptocurrency, on digital wallet adoption and security could also offer valuable insights into the future of payment systems.

Conclusion

In conclusion, the statistical analysis supports a strong user preference for online wallets, underscoring their importance and effectiveness in fulfilling the demands of digital financial transactions. The analysis of user ratings for online wallets provided significant results, revealing a high satisfaction level, with an average rating of 8.69 out of 10 based on 116 responses. The One-Sample Test reinforced these findings, showing a substantial mean difference of 7.690 from the baseline value of 1, and a highly significant p-value of .001. The Independent Samples Test offered additional insights into the variations in user satisfaction, showing a statistically significant difference in online wallet ratings between two groups, regardless of whether equal or unequal variances were assumed. This was evidenced by two-tailed significance values of .030 and .023, highlighting a notable mean difference in user ratings. The variation in satisfaction levels between groups suggests that, while overall satisfaction is high, there are notable differences in user experiences and perceptions that warrant further exploration.

Tables And Figures

Table 1. The table illustrates how often e-wallets are used for different purposes, revealing that 61.7% of daily users utilize e-wallets for various needs, while money transfers are more common among monthly (40.7%) and weekly (26.2%) users. Overall, nearly half of the participants (46.6%) use e-wallets for all the mentioned purposes, indicating a versatile application of e-wallets among users.

How often do you use E wallet * What are your purpose of using E wallet Crosstabulation

			What are your purpose of using E wallet				Total
			All the above	Money transfer	Recharge	Utility and Bill payment	
How often do you use E wallet	Daily	Count	29	12	4	2	47
		% within How often do you use E wallet	61%	25%	9%	5%	100.0%
	Monthly	Count	6	11	8	2	27
		% within How often do you use E wallet	22%	41%	30%	8%	100.0%
	Weekly	Count	19	11	6	6	42
		% within How often do you use E wallet	46%	26%	15%	14%	100.0%
Total		Count	54	34	18	10	116
		% within How often do you use E wallet	47%	30%	15%	9%	100.0%

Table 2. The Chi-Square Tests table shows the results of statistical tests evaluating the association between two categorical variables with a Pearson Chi-Square value of 14.980 and a Likelihood Ratio of 15.019, both with 6 degrees of freedom and an asymptotic significance of .020. This indicates a statistically significant relationship between the variables at a 2-sided significance level, with a total of 116 valid cases analyzed in the study.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.90ᵃ	6	.020
Likelihood Ratio	15.0	6	.020
N of Valid Cases	115		

Table 3. The table presents statistics for ratings of online wallets, based on 116 responses, showing an average rating of 8.69 with a standard deviation of 0.946. The standard error of the mean is 0.088, indicating the precision of the mean rating calculated from the sample.

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
Your ratings for online wallet	115	8.7	.946	.088

Table 4. The One-Sample Test table compares the mean rating for online wallets against a test value of 1, yielding a t-statistic of 87.585 with 115 degrees of freedom and a highly significant two-tailed p-value of .001. This indicates that the mean rating of 8.69 (a mean difference of 7.690 from the test value) is significantly higher than the test value, with a 95% confidence interval for this difference ranging from 7.52 to 7.86.

One-Sample Test						
	Test Value = 1					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Your ratings for online wallet	87.585	115	.001	7.690	7.52	7.86

Table 5. The Independent Samples Test table shows the results of comparing ratings for online wallets between two groups, testing for equality of means under the assumption of equal and unequal variances. With Levene's Test indicating no significant difference in variances (F = .820, Sig. = .367), the t-tests reveal a significant mean difference (.394) between groups with a two-tailed significance of .030 (equal variances assumed) and .023 (unequal variances not assumed).

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Your ratings for online wallet	Equal variances assumed	.820	.367	2.202	114	.030	.394	.179	.040	.748
	Equal variances not assumed			2.306	100.780	.023	.394	.171	.055	.733

Fig 1. The bar graph shows the mean age of individuals and where they obtained information about e-wallets. It shows that information from friends has the highest mean age, followed closely by social media, with magazine/television having the lowest mean age. The error bars represent a 95% Confidence Interval and +/- 2 Standard Deviations, indicating the variability and spread of the age data within each information source category.

Fig 2. The above bar diagram illustrates the mean age of individuals against the frequency of e-wallet usage with categories displayed on the x-axis (Daily, Monthly, Weekly) and mean age indicated on the y-axis. The error bars show a 95% Confidence Interval and +/- 2 Standard Deviations, revealing that while the mean age is relatively consistent across usage frequencies, there is a greater age variation among daily users compared to monthly and weekly users.

Fig 3. The given bar diagram depicts the average age of individuals who have a preference for various electronic wallets. The x-axis labels the e-wallets—Google Pay, Google Wallet, Paytm, and PhonePe—while the y-axis represents the mean age of the users. Error bars indicate the 95% Confidence Interval and +/- 2 Standard Deviations, demonstrating the age distribution's variability among users of each e-wallet service.

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