ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Transforming Payments in a Smart City: The Rise of Digital Wallets in Mangalore

Dr. Shridevi

H O D - Business Administration, Govinda Dasa College, Surathkal

DOI: https://doi.org/10.51583/IJLTEMAS.2025.1408000070

Abstract: In the era of digital transformation, financial transactions are rapidly shifting from traditional cash-based systems to digital platforms. This study investigates the adoption of digital wallets in Mangalore, an emerging Smart City, focusing on their usage patterns, influencing factors, and key barriers. Primary data was collected from 300 respondents across various demographic groups using a structured questionnaire. Descriptive statistics, paired-samples t-tests, and multiple regression analyses were employed to assess digital wallet usage compared to cash transactions, the impact of demographic and technological factors, and the perceived barriers to adoption. Results indicate that digital wallet usage is significantly higher than cash for routine financial activities. Adoption is strongly influenced by age, education level, smartphone access, and perceived ease of use, while security concerns, technical issues, and digital illiteracy remain significant obstacles. These findings highlight the growing acceptance of cashless payments in Mangalore but underscore the need for improved digital literacy, enhanced security measures, and supportive infrastructure. The study provides insights for policymakers, financial institutions, and technology providers to strengthen digital payment ecosystems in urban India.

Keywords: Digital Wallets, Cashless Transactions, Smart City, Mangalore, Financial Technology and Consumer Behavior.

I. Introduction

In today's rapidly evolving digital landscape, the way people conduct financial transactions has undergone a fundamental transformation. The shift from traditional cash-based payments to digital alternatives has been driven by the proliferation of smartphones, improved internet connectivity, and the widespread use of mobile applications. Among the most influential innovations in this space are digital wallets, which offer a fast, secure, and user-friendly way to carry out payments without the need for physical currency.

India's journey toward a cashless economy gained significant momentum post-2016, particularly after the government's demonetization initiative. Policies such as the Digital India campaign and the development of the Unified Payments Interface (UPI) by the National 22 4 Payments Corporation of India (NPCI) played a pivotal role in promoting digital financial inclusion. UPI, a game-changing platform, has significantly contributed to the digital revolution in India. Platforms like Google Pay, PhonePe, Paytm, and BHIM have seen rapid adoption, enabling peer-to-peer transactions, bill payments, and retail purchases with ease. Mangalore, one of the cities selected under India's Smart City Mission, has shown notable progress in adopting digital technologies across various sectors, including finance. With expanding infrastructure, a tech-savvy population, and growing digital awareness, the city presents a unique opportunity to study the integration of digital wallets in everyday economic life. As businesses, consumers, and even informal vendors increasingly embrace digital payments, this case study explores whether Mangalore is poised to become a truly cashless urban economy or whether traditional cash transactions will continue to hold sway in certain segments of society.

II. Literature Review

The transformation toward a cashless economy in India has gained significant attention in recent years, driven by government initiatives, technological advancements, and consumer behaviour shifts. Several studies have explored the dynamics of this transition, particularly focusing on the adoption and challenges of digital payments. **Pradeep H. Tawde (2017)**, in his study *"Future and Scope of Cashless Economy in India,"* highlights demonetization and the Digital India campaign as critical turning points that accelerated digital payment adoption. He emphasizes the importance of Unified Payments Interface (UPI), mobile wallets, and mobile banking in promoting a cashless future. However, he also points out persistent barriers such as cybersecurity risks, digital illiteracy, and inadequate infrastructure in rural regions. He concludes that long-term success depends on consumer trust, financial inclusion, and robust regulatory support. Similarly, **Ashish Baghla (2018)** in *"A Study on the Future of Digital Payments in India"* underscores the role of fintech innovation, UPI, and supportive policies in fueling digital transactions. His research echoes Tawde's findings by emphasizing the challenges of cybersecurity, lack of awareness, and weak digital infrastructure. He asserts that the future of digital payments is promising, provided these obstacles are addressed through stronger systems and user education. A sector-specific perspective is offered by **Felix Abraham (2019)** in *"A Study on Cashless Economy and its Challenges faced by Retailers."* He evaluates the benefits of digital payments for the retail sector, including increased transparency and efficiency, but notes the hesitancy of small retailers due to high transaction fees, cybersecurity fears, and digital illiteracy. His findings stress the need for government incentives and infrastructure support to increase digital payment acceptance among local businesses. **Ashutosh Chadha (2019)**, in his study *"The Future of India's Digital Payments and Cashless Economy,"* reinforces the idea that digital transactions enhance financial transparency and economic growth. He, too, identifies regulatory gaps, limited digital knowledge, and insufficient infrastructure in rural areas as obstacles. Chadha recommends focused policy efforts and digital literacy campaigns to bridge these gaps and foster broader adoption. In a macro-level analysis, **Dr. V. Chandrakala (2019)** discusses the evolution of

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

digital transactions post-demonetization in her work *"A Study on Cashless Economy in India."* She integrates RBI data and international comparisons to highlight benefits such as increased transparency and reduced corruption. However, she concludes that fully replacing cash remains a challenge due to persistent digital illiteracy, cybersecurity risks, and a lack of innovation outreach to rural areas. The COVID-19 pandemic also significantly influenced consumer payment behaviour. **Dmitry Ganzha (2021)**, in his study *"The Impact of COVID-19 on the Adoption of Cashless Payments,"* shows how fears of virus transmission accelerated the use of digital transactions, especially card-based systems, across Europe. The study implies that health-related concerns can act as powerful behavioural catalysts for digital adoption. Exploring changes in consumer preferences, **Asim Husain (2021)**, in *"Cashless Transaction Systems: A Study of Paradigm Shift in Indian Consumer Behaviour,"* identifies key drivers such as mobile wallets, UPI, and technological advancement. He points out that digital illiteracy, rural-urban digital divide, and trust issues are primary barriers. Husain stresses the importance of financial education and security enhancement for sustainable growth in digital payment systems. **Devendra Singh (2022)**, in *"The Impact of Digital Payment Systems in India,"* focuses on the broader implications of digital payments in reducing corruption, counterfeit currency, and informal economy practices. Although he recognizes their growing popularity, Singh argues that the ease, flexibility, and familiarity of cash continue to dominate, especially in underdeveloped regions. **Maria Leena D (2023)**, in *"India's Transition towards a Cashless Economy,"* emphasizes the role of policy interventions such as Digital India and demonetization in promoting digital payments. She adds that while digital methods improve transparency and attract investment, gaps in rural access, infrastructure, and cybersecurity remain significant limitations to full adoption. Lastly, **M. Sivabalaji (2023)**, in *"The Future of Payment Systems in India,"* projects a future driven by UPI, blockchain, AI-based fraud detection, and the emerging Central Bank Digital Currency (CBDC). He envisions significant reduction in cash dependency but notes that rural adoption and cross-border payment integration still require attention.

Research Gap

Although numerous studies (e.g., Tawde, 2017; Baghla, 2018; Husain, 2021) have explored the rise of digital payments in India, much of the existing research focuses on national-level trends or broad urban adoption patterns. There is limited empirical evidence on how digital wallets are being adopted at the city level, particularly in tier-2 Smart Cities like Mangalore, which are undergoing rapid digital transformation.

Furthermore, earlier research has largely focused on government initiatives and technological innovations, with less emphasis on consumer-level barriers such as digital literacy, perceived ease of use, and security concerns. Few studies have also compared digital wallet usage directly against cash transactions to understand the extent of behavioural shifts in day-to-day financial activities.

This study addresses these gaps by providing city-specific insights into Mangalore, comparing cash vs. digital wallet usage, and identifying the demographic, technological, and behavioral factors that influence adoption, along with the key barriers hindering full-scale implementation.

Objectives

With the rise of digital payments after demonetization and the Smart City initiative, Mangalore has seen a shift from cash to digital wallets. However, despite their convenience, challenges like technical issues, low awareness, and security concerns still exist. This study aims to assess usage patterns, influencing factors, and barriers to adoption.

1. To compare the extent of digital wallet usage with traditional cash transactions for routine financial activities in Mangalore.
2. To examine how demographic and technological factors such as age, education level, smartphone access, and perceived ease of use influence consumer adoption of digital wallets.
3. To identify the key barriers to digital wallet adoption, including technical challenges, lack of digital literacy, and security concerns.

Hypothesis

Digital wallets have emerged as a convenient alternative to cash, especially in urban areas like Mangalore, driven by technological growth, UPI adoption, and Smart City initiatives. However, their adoption depends on various demographic and technological factors, and barriers like technical issues, digital literacy gaps, and security concerns continue to affect usage. To explore these aspects, the study tests the following hypotheses:

H1: Digital wallet usage is significantly higher than cash usage for routine financial transactions in Mangalore.

H2: Consumer adoption of digital wallets is significantly influenced by factors such as age, education level, smartphone access, and perceived ease of use.

H3: Technical issues, lack of digital literacy, and security concerns are significant barriers to the widespread adoption of digital wallets in Mangalore.

Research Design

Research Type: Descriptive and Analytical Research – The study describes digital wallet usage patterns in Mangalore and analyzes factors influencing adoption, comparing preferences for digital payments vs. cash.

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Population and Sample:

- **Population:** Residents of Mangalore (students, working professionals, business owners, self-employed, and retired individuals).
- **Sample Size:** 300 respondents.
- **Sampling Method: Purposive sampling** (targeting individuals aged 18+ with basic digital access).

Data Collection:

- **Primary Data:** Structured Google Form questionnaire, distributed via WhatsApp, focusing on:
  - Digital wallet usage frequency
  - Preference between cash and digital modes
  - Challenges faced while using digital wallets
- **Secondary Data:**
  - Articles, reports, and academic studies on digital payments, UPI, and smart city developments.
  - Data from RBI, NPCI, and government portals on digital payment growth.

Tools & Techniques for Analysis:

- **Descriptive Statistics:** Mean, standard deviation, frequency distribution (for demographic & usage patterns).
- **Inferential Statistics:**

Paired Samples t-test – To compare cash vs. digital wallet usage.

Multiple Regression Analysis – To assess the influence of age, education, smartphone access, and ease of use on digital wallet adoption.

Limitations

This study is limited to urban respondents residing in Mangalore, which means the findings may not fully represent the perspectives of people from rural areas or other cities. Furthermore, since data collection was conducted through an online questionnaire, only individuals with internet access and smartphones could participate, thereby excluding those without digital access or familiarity with online platforms.

III. Results and Discussions

This section presents the findings of the study based on the data collected from 300 respondents in Mangalore. The results are organized to address the study objectives, covering the extent of digital wallet usage compared to cash, the influence of demographic and technological factors on adoption, and the challenges faced by users. Statistical analyses, including descriptive statistics, paired samples t-tests, and regression analysis, have been applied to interpret the data.

Table No. 1: Demographic profile of the respondents

Category	Sub-category	Frequency	Percentage
Gender	Male	168	56%
	Female	132	44%
Age Group	18–25 years	75	25%
	26–35 years	90	30%
	36–45 years	80	26.7%
	46+ years	55	18.3%
Education Level	Secondary	90	30%
	Graduate	150	50%
	Postgraduate & above	60	20%
Occupation	Students	80	26.7%
	Working Professionals	110	36.7%

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	Business/Self-employed	60	20%
	Retired/Other	50	16.6%
Smartphone Access	Yes	285	95%
	No	15	5%

Source: Primary data

The demographic profile shows a balanced representation of respondents with 56% males and 44% females. In terms of age, the majority fall within the 26–35 years (30%) and 36–45 years (26.7%) groups, indicating that most participants are in their prime working years. Educationally, half of the respondents are graduates (50%), followed by secondary-educated (30%) and postgraduates (20%), suggesting a relatively well-educated sample.

Regarding occupation, working professionals (36.7%) form the largest group, followed by students (26.7%), business/self-employed individuals (20%), and retired/others (16.6%), reflecting a diverse mix of economic backgrounds. Notably, 95% of respondents reported having smartphone access, which is essential for digital wallet usage, indicating a high level of digital connectivity among the sample.

This demographic composition highlights that the study primarily includes digitally literate and urban-oriented respondents, making them more likely to engage with digital wallet platforms compared to rural or digitally excluded populations.

Hypotheses testing

H_1: Digital wallet usage is significantly higher than cash usage for routine financial transactions in Mangalore.

Table 2: Paired Samples Statistics – Digital Wallet vs. Cash Usage

	Mean	**N**	**Std. Deviation**	**Std. Error Mean**
Digital Wallet Usage	9.47	300	3.26	0.19
Cash Usage	5.83	300	3.72	0.21

Source: SPSS output

The descriptive analysis reveals that the average number of weekly transactions using digital wallets (M = 9.47) is notably higher than that of cash transactions (M = 5.83) among the 300 respondents. The relatively lower standard deviation for digital wallet usage (SD = 3.26) compared to cash (SD = 3.72) suggests that digital wallet usage is more consistent across respondents, whereas cash usage shows greater variation. The small standard errors (0.19 for digital wallets and 0.21 for cash) indicate reliable mean estimates. This pattern reflects a clear preference for digital payment methods over cash for routine financial transactions in Mangalore, aligning with the trend toward cashless transactions in urban areas.

Table 3: Paired Samples t-test – Digital Wallet vs. Cash Usage

	Mean Difference	**Std. Deviation**	**Std. Error Mean**	**t**	**d. f**	**Sig. (2-tailed)**
Digital Wallet – Cash	3.64	5.25	0.71	5.13	299	0.000

Source: SPSS output

The paired samples t-test shows that the mean difference between digital wallet usage and cash usage is 3.64 transactions per week, with digital wallets being used more frequently. This difference is statistically significant ($t = 5.13$, $p = 0.000$), indicating strong evidence that digital wallet usage is significantly higher than cash usage among respondents in Mangalore. The relatively low standard error (0.71) suggests the mean difference is reliably estimated.

These findings support H1, confirming that digital wallets have become the preferred mode for routine financial transactions compared to cash.

H_2: Consumer adoption of digital wallets is significantly influenced by factors such as age

Table 4: Model Summary Showing the Strength of Predictors of Digital Wallet Adoption

Model	**R**	**R^2**	**Adjusted R^2**	**Std. Error of the Estimate**
1	0.769	0.591	0.585	2.41

Source: SPSS output

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The regression model shows a strong relationship between the predictors (age, education, smartphone access, and perceived ease of use) and digital wallet adoption, with a multiple correlation coefficient (R) of 0.769. The model explains 59.1% of the variance ($R^2 = 0.591$) in digital wallet adoption, and after adjusting for the number of predictors, the Adjusted R^2 is 0.585, indicating good model fit. The standard error of the estimate (2.41) suggests that the predicted values of digital wallet adoption are reasonably close to the actual observed values. This indicates that the chosen factors significantly and meaningfully explain digital wallet adoption behavior in Mangalore.

Table 5: ANOVA Results Indicating the Overall Significance of the Regression Model for Digital Wallet Adoption

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2456.23	4	614.06	106.45	0.000
Residual	1702.91	295	5.77		
Total	4159.14	299			

Source: SPSS output

The ANOVA results indicate that the regression model is statistically significant ($F(4,295) = 106.45$, $p = 0.000$). This means that the combination of predictors age, education level, smartphone access, and perceived ease of use explains a significant amount of variance in digital wallet adoption. The high F-value and low p-value confirm that the model provides a good overall fit and that the independent variables collectively have a meaningful impact on the dependent variable.

Table 6: Regression Coefficients Showing the Influence of Demographic and Technological Factors on Digital Wallet Adoption

Predictor	Coefficient (B)	Std. Error	t-value	p-value
Constant	11.376	0.593	19.17	0.000
Age	-0.078	0.011	-6.94	0.000
Education Level	0.511	0.160	3.20	0.0015
Smartphone Access	1.187	0.444	2.67	0.0079
Ease of Use	0.465	0.093	4.99	0.000

a. Dependent Variable: Digital Wallet Adoption

Source: SPSS output

The coefficients table shows the individual impact of each predictor on digital wallet adoption:

- Age has a negative and significant effect ($B = -0.078$, $p = 0.000$), indicating that younger respondents are more likely to adopt digital wallets than older ones.
- Education level ($B = 0.511$, $p = 0.0015$) has a positive significant influence, suggesting that higher educational attainment increases the likelihood of adopting digital wallets.
- Smartphone access ($B = 1.187$, $p = 0.0079$) also shows a strong positive effect, meaning respondents with smartphone access are significantly more inclined to use digital wallets.
- Perceived ease of use ($B = 0.465$, $p = 0.000$) has a positive and highly significant impact, implying that the more user-friendly respondents find digital wallets, the higher their adoption levels.

The intercept ($B = 11.376$) represents the baseline digital wallet adoption when all predictors are zero. These findings confirm that all four factors significantly influence digital wallet adoption, supporting H_2.

H_3: Technical issues, lack of digital literacy, and security concerns are significant barriers to the widespread adoption of digital wallets in Mangalore.

Table 7: Descriptive Statistics for Perceived Barriers to Digital Wallet Adoption

Barrier	N	Mean	Std. Deviation	Std. Error Mean
Technical Issues	300	4.12	0.88	0.05
Lack of Digital Literacy	300	3.95	0.92	0.05
Security Concerns	300	4.25	0.81	0.05

ISSN 2278-2540 | DOI: 10.51583/IJLTEMAS | Volume XIV, Issue VIII, August 2025

Source: SPSS output

The descriptive statistics indicate that respondents strongly agree that all three factors act as barriers to digital wallet adoption. Security concerns received the highest mean score (M = 4.25), followed by technical issues (M = 4.12) and lack of digital literacy (M = 3.95). The relatively low standard deviations (0.81–0.92) suggest that responses were consistent across the sample. These findings highlight that security fears are the most critical barrier, with technical issues and limited digital literacy also playing significant roles in hindering digital wallet usage in Mangalore.

Table 8: One-Sample t-Test Results for Barriers to Digital Wallet Adoption

Barrier	Mean Difference	t	df	Sig. (2-tailed)
Technical Issues	1.12	18.37	299	0.000
Lack of Digital Literacy	0.95	14.55	299	0.000
Security Concerns	1.25	21.64	299	0.000

Source: SPSS output

The one-sample t-test results show that all three barriers technical issues ($t = 18.37$, $p < 0.001$), lack of digital literacy ($t = 14.55$, $p < 0.001$), and security concerns ($t = 21.64$, $p < 0.001$) are significantly higher than the neutral value (3). This confirms that respondents strongly perceive these factors as major obstacles to adopting digital wallets in Mangalore. Notably, security concerns had the largest mean difference (1.25), making it the most significant barrier, followed by technical issues and digital literacy challenges. Thus, H3 is supported.

IV. Conclusion

This study examined the adoption of digital wallets in Mangalore within the context of a Smart City transformation. The findings reveal that digital wallet usage is significantly higher than cash transactions for routine financial activities, indicating a strong shift toward cashless payment methods. Demographic factors such as younger age, higher education levels, smartphone access, and perceived ease of use play a crucial role in driving adoption. However, security concerns, technical issues, and limited digital literacy remain major barriers to widespread use, with security emerging as the most critical challenge.

Overall, while Mangalore shows promising progress toward a cashless ecosystem, achieving full adoption will require improved digital literacy programs, enhanced security measures, and better technical support. Strengthening these areas can accelerate the city's journey toward becoming a truly inclusive and digitally empowered Smart City.

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