DEMOGRAPHIC INFLUENCES AND ADOPTION BEHAVIOR OF UPI APPLICATIONS: AN EMPIRICAL ANALYSIS

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ABSTRACT

India's digital payments landscape is rapidly transforming, with more individuals adopting digital transactions due to advancements in payment infrastructure. One of the key drivers of this shift is the widespread use of Unified Payments Interface (UPI) applications, which facilitate real-time transfers, support e-commerce, and enable smooth merchant payments. This study explores user satisfaction with UPI apps, focusing on spending behavior, user preferences, and the influence of gender and regional differences. Primary data was gathered from 183 respondents across rural and urban settings, using a structured quantitative research design. Various statistical tools, including T-tests, Chi-square tests, and ANOVA, were employed to identify differences and relationships in UPI usage patterns among diverse user groups.

The findings indicate that Google Pay (GPay) emerges as the most widely used UPI application, with consistent preference across both genders and regional locations. However, a significant difference was observed in average monthly transaction amounts, with male users showing higher spending levels compared to female users. Despite this, demographic factors like gender and region had minimal impact on overall app preference. More crucially, user satisfaction was found to depend on functional factors such as ease of use, transaction speed, perceived security, and app features rather than personal characteristics. These results suggest that service quality is a more important driver of satisfaction than user demographics. The study

offers valuable insights for fintech companies and policymakers by emphasizing the need to improve app security, interface quality, and usability to promote broader digital adoption and financial inclusion in India.

Keywords: UPI applications, customer satisfaction, digital payments, demographic analysis, mobile payments, fintech.

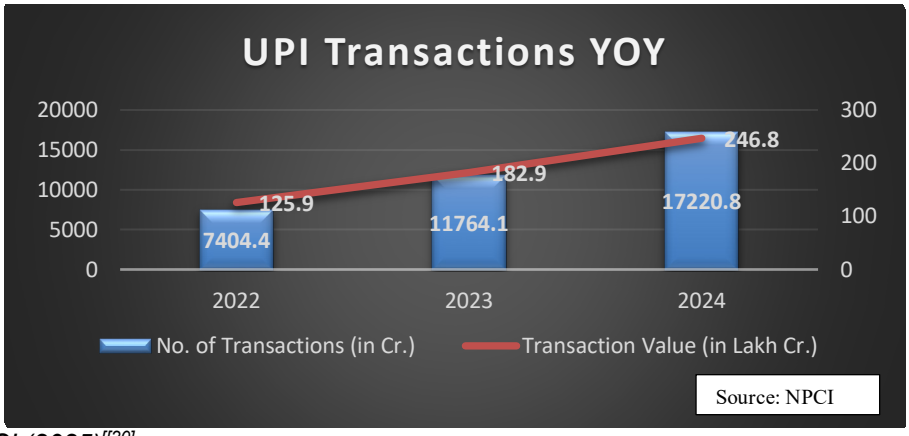
INTRODUCTION

The quick advancements of digital payment methods across demographics have significantly changed India's financial environment. The increased use of smartphones among Gen Z, aided by the latest technology and legislative efforts to support a cashless economy, has all contributed to a cashless society. UPI use, especially among urban customers, has significantly helped application developers boost their effectiveness, which has led to a rise in the use of digital payment methods among Gen Z. UPI is one of the most popular and convenient digital payment options available today. UPI has become a ground-breaking platform that makes smooth, instantaneous financial transactions possible. UPI applications facilitate peer-to-peer transactions, shop online, pay for utilities, and hassle-free, quick fund transfers to others can be completed. Tshewang and Raza (2024)[33] mention in their study, "Banks face ongoing challenges in retaining highly skilled employees, primarily due to competition from other sectors and the increasing demand for specialized skills". Therefore, in this context, using UPI can allow companies to completely handle regular transactions without relying on people, which improves the speed of service and provides customers with the ability to resolve their issues themselves using technology by offering the customers with self-service options.

National Payments Corporation of India (NPCI) has launched UPI, which can facilitate digital transactions on a larger scale since interoperability can be achieved by enabling collaboration between banks and payment service providers that can consequently lead to the popularization of digital transactions. Owing to its multiple security lines and user-friendly interface, UPI has today become popular among many demographic groups. Understanding user contentment with UPI applications by knowing what the users think is essential to improving their efficacy, efficiency because UPI is simple and safe to use, encouraging wider acceptance as digital payments continue to grow and expand.

Originally, UPI was developed for financial settlements, but now it forms the central structure of the country’s online payments. Organizations in India and the government have contributed significantly to increasing UPI adoption by taking actions such as promoting cashless payments in 2016. Increasing demand for cashless payment systems occurred after the demonetization efforts made by both the Indian

government and regulatory organizations. Over time, the UPI ecosystem has grown significantly, with major financial institutions, fintech startups, and digital wallets incorporating UPI into their systems. Major banks, startups in the financial industry, and digital wallets are now using UPI because the ecosystem has grown significantly over the years. The rising trust in transacting online over payment gateways has helped the customers use the UPI app, with transaction volumes increasing a great deal over a period of time. More transactions are being processed each year than ever before, proving that UPI payment has a large following.



Source: NPCI (2025)[[20]]

Figure 1: UPI Transactions and Transaction Value Year-On-Year

Payments in India have shifted primarily because of digital methods, and UPI applications lead the way. It's fast and easy to send and receive money through these apps, so people can quickly pay their bills, order online, and transfer money immediately. With more individuals using UPI for daily transactions, here we pay attention to how pleased the latest generation of users, Gen Z, are with the apps and what leads them to spend money on them.

UPI has played an active and transformative role in driving India's shift toward a cashless economy, especially given the government's transferred it for digital payments and widespread smartphone adoption. Although the reality is that UPI apps provide many benefits, such as 24/7 access, no additional fees, and bank integration, some customers are concerned about security threats, transaction failures, and fraud. Customer satisfaction has a major impact on major features like as quickness, reliability, ease of use, and customer service, all of which play an important role in determining whether users continue to use these apps.

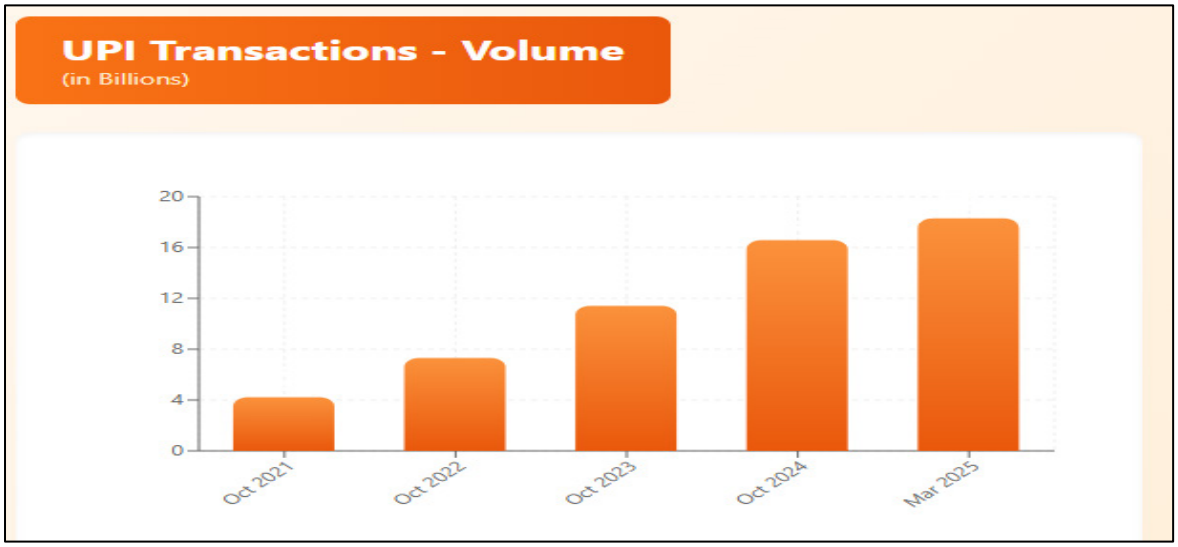
Based on the latest official data and recent trends, here are the fascinating numbers that justify the critical importance of UPI adoption:

Another crucial feature of UPI adoption is how different demographics use these apps. People's age, gender, and location can all have an impact on what apps they like to

use and which ones they choose. Younger people like Gen Z, who are more comfortable with technology, are more likely to use UPI apps, but older users may be wary due to trust issues or difficulties with digital payments. Both men and women prefer UPI apps for various purposes, like extra security, perks like cashback, or access to more services. This research will look at these variations and see how they affect Customer Satisfaction with UPI apps.

Significance of Unified Payments Interface (UPI)

Unified Payments Interface (UPI) continued its robust growth trajectory in early 2025, processing 18.3 billion transactions worth ₹24.77 trillion in March 2025, a substantial rise from previous months (DD News, 2025)[6] . This growth reflects a consistent upward trend, as evidenced by the 16.6 billion transactions recorded in October 2024, which averaged around 535 million transactions per day (NPCI, 2024)[27] . According to Press Information Bureau (2024)[27] , the expansion in both volume and value highlights UPI's increasing acceptance and usage across consumer segments and industries, reinforcing its position as a cornerstone of India's digital payment ecosystem. The revolution of digital payments in India seems to find a transnational moving force as both UPI and RuPay are conquering adjacent markets at a fast pace. UPI is now in use across seven countries, and some of the chief locations are in the UAE, Singapore, Bhutan, Nepal, Sri Lanka, France, and Mauritius (Press Information Bureau, 2024)[27] .



Source: National Payments Corporation of India (NPCI) [17] (2025)

Figure 1 UPI Transactions - Volume

The data reflects a significant 4.3-fold increase in UPI transactions from October 2021 to March 2025, highlighting a steady year-over-year growth trend. In March 2025 alone, the system recorded over 590 million transactions per day, based on the most recent figures published by NPCI. The updated chart more effectively captures UPI's

exponential adoption curve, providing a stronger contextual foundation for understanding its rising significance in the digital payment landscape.

Purpose of the Study

The purpose of this analysis is to see which UPI services are used most, analyse how populations affect the type of app used, and determine what matters most when customers are fulfilled with an app. The purpose of this study is to better understand how people think and decide when using UPI apps and to find areas where they can be improved by using statistical methods t-tests and chi-square testing. Research results will support improvements in security, the look and feel of applications, and customer help, delivering a better user experience. Understanding the reasons behind user satisfaction, motivation, and their choices is fundamental for the future growth of UPI! As a result, service companies will know how to strengthen their services and satisfy customer requirements. The findings from the research will empower service providers to make digital payment systems better and serve as a guide for cosmopolitan and rural demography on its journey to a cashless economy.

This study aims to learn which main UPI services people choose, examine how age, location, or income affect their preferences, and study important aspects impacting satisfaction among Gen Z users. Also, the research will provide essential information to help improve digital payment systems and support the country's progress towards a fully cashless economy.

OBJECTIVES

- To identify the key factors influencing the use of UPI applications through a review of existing literature.
- To evaluate gender-based differences in spending behavior across various purposes on UPI platforms.
- To examine the association between gender and user preference for UPI usage.
- To analyze the relationship between residential location (urban vs. rural) and UPI application preference.

LITERATURE REVIEW

The literature review looks at how Unified Payments Interface (UPI) is adopted, and the perceptions of its users, focusing on the UPI mode. Mobile payment systems are being widely adopted because of what users, especially students, think about them. The adoption of mobile payment systems is significantly influenced by customer perceptions, particularly among younger demographics such as Gen Z. Research indicates that factors like perceived usefulness, ease of use, and trust play crucial

roles in shaping these perceptions and, consequently, the intention to use and adoption rates of mobile payment technologies.

- **Perceived Usefulness**: Users often adopt mobile payments because they believe these systems enhance transaction efficiency and convenience. Studies show that a majority of respondents view mobile payments as beneficial for their daily transactions (Aakshi et al., 2024)[1] .
- **Perceived Ease of Use**: The simplicity of mobile payment applications is a critical factor. Users are more likely to adopt systems that are user-friendly and intuitive, as evidenced by findings that highlight a strong correlation between ease of use and adoption intentions (Yan & Yang, 2014)[35] .
- **Trust and Security**: Trust remains a significant barrier, with many users expressing concerns about the security of their personal information. Research indicates that building user trust through secure systems is essential for increasing adoption rates (Yan & Yang, 2014; Aakshi et al., 2024) [35] [1] .

Despite the positive attitude for mobile payment adoption is on rise, challenges such as security concerns and differences in awareness among different demographic and age groups persist. Addressing these issues is vital for enhancing user confidence and expanding the user base in mobile payment systems, suggesting the platform's widespread popularity and trustworthiness.

Kumarasamy and Sheeba (2024) examined the evolution of marketing and business transactions, emphasizing the significant role of money transactions in various marketing phases. They highlight the transition from traditional barter systems to modern online marketing, noting that UPI has become a prevalent method for facilitating quick and efficient transactions between buyers and sellers. The authors focus on assessing user satisfaction with online money transfers via UPI in the Thanjavur District[16] .

Kirmani et al. (2022) investigated and examined the customer satisfaction factors in systems based on UPI in the context of the COVID-19 pandemic and determined whether customer satisfaction resulted in a persistence intention to use these systems even after the COVID-19 pandemic. The research took place under 3 stages: pre-testing, where they developed and worked on getting the questionnaire ready by pre-testing, doing a pilot study to verify its consistency, and then surveying 369 people who adopted UPI as the COVID-19 outbreak started. Data collected were analyzed with structural equation modeling to identify important underlying trends and behaviors of adoption. To further take off on this, Sekar (2024) applies a divergent strategy by studying user perceptions (in UPI transactions) using Artificial Intelligence (AI) and Natural Language Processing (NLP). This study will focus on the automated sentiment

analysis to develop a better insight into understanding the user experiences and provide an insight into the interaction and sentiments that people have concerning UPI transactions[14] .

Dam and George (2024) in a study on Customer Perceptions about the UPI explored the factors influencing customer perceptions and adoption of UPI-based mobile payment applications. Through a comparative analysis of three prominent UPI apps, which are Google Pay (GPay), PhonePe, and Paytm. The research identifies some key elements, such as trust, market coexistence, and the preferences encouraged by how much money customers spend. According to the research, it reveals a strong association between users' income levels, educational backgrounds, and how likely people are to engage in mobile app transactions. These findings offer valuable insights into the motivators and preferences that drive consumer adoption of UPI-based payment systems[4] .

In their research article, User Survey of UPI-Enabled Payment Apps (2022), Chavan, Gore, and Bhutkar (2022) examined how the Indian population uses and prefers various UPI-based payment apps. They focused on five major apps: Google Pay, PhonePe, Paytm, Amazon Pay, and BHIM. To gain insights, they conducted an online survey via Google Forms, gathering 228 valid responses from individuals of different age groups and genders. Their research aimed to identify the most popular payment app, understand why users prefer certain platforms, and explore the reasons some people avoid digital payments. The findings revealed that GPay is the most widely used app, particularly among users aged 18–30. Additionally, the study provided recommendations for app developers and designers to enhance user experience and encourage wider adoption[3] .

Similarly, Ganapathyraman, Suresh, and Thomas (2023)[29] examined how users perceive UPI transactions, focusing on awareness levels, satisfaction, common issues, and resolution times. As UPI now accounts for 48% of retail clearing and settlement activities in India, the study aimed to assess user experiences across key parameters, including how well they understand UPI, their satisfaction levels, the challenges they face while using the platform, and how quickly those issues are resolved.

Khanna, Sidhu, and Khare (2023) studied user preferences related to UPI-based payment systems in Northern India, explored how UPI services influence customer satisfaction and perceptions in comparison to traditional payment methods. Their research sheds light on how digital payments are shaping user experiences and preferences in the region. The research utilizes a questionnaire to assess respondents' satisfaction levels across various parameters. Analysis shows that the

customers have a favorable perception toward electronic fund transfer service, where there is a strong correlation between the use of UPI services and the educational status of the respondents. The study concludes that UPI has significantly enhanced the convenience and efficiency of financial transactions in Northern India[13] .

Prayudha et al. (2020)[25] studied how satisfied postgraduate students were with "UPI SPOT e-learning"; this study was conducted in Indonesia, using the Fuzzy-Servqual Method. The authors studied both the various features of e-learning service quality and how user satisfaction is evaluated. The authors highlight the significance of evaluating service quality in educational settings, particularly in e-learning platforms, to enhance user experiences and outcomes. Edburg et al. (2024)[6] examined through an empirical study the rapid adoption of Unified Payment Interface (UPI) applications in India and the associated challenges related to payment transaction frauds. The authors point out that these companies have had a transformative influence; Google Pay, PhonePe, and Paytm have made a huge difference, as they collectively manage over 90% of online payments across India. The convenience and ease of use offered by these applications have significantly contributed to their widespread acceptance among consumers. Customers increasingly choose the UPI for digital payments due to its convenience, security, and the transformative impact it has on purchasing behavior. UPI has emerged as a preferred payment method, particularly among younger consumers, who appreciate its user-friendly features and real-time transaction capabilities. The following sections elaborate on the key reasons for this preference. Fund transfers with UPI using a smartphone are simple, speedy, and easy. UPI enables the transfer of money through bank accounts within seconds using a smartphone, and transactions are now really fast and time-saving (Harikrishnan, 2023)[10] . The system allows both peer-to-peer and peer-to-merchant transactions, which increases the level of user experience, encouraging the regular use of the system (Singh & Khan, 2024)[30].

UPI enables people to transfer funds instantly between their bank accounts using their phones (Harikrishnan, 2023) [10] . The system allows users to interact with each other or with businesses, making the platform a pleasant experience and encouraging more frequent use (Singh & Khan, 2024)[30]. According to Pan (2019)[24] , customer adoption of digital payments through UPI is influenced by several key factors. A Study was conducted to understand why customers choose UPI for Digital Payments, and the rapid advancement of technology, particularly the widespread use of smartphones, and its impact on the growth of cashless transactions in mobile payments. The study was carried out in Kattankulathur, located in the Kancheepuram District of Chennai, with data collected from 60 respondents and analysed using the SPSS software. It highlights the significant digital transformation taking place in developing countries like

India, which has a vast and growing economy. A key factor in this shift has been the Indian Government's Digital India initiative, launched in 2015, which has played a crucial role in driving economic growth. While UPI has gained significant traction, challenges such as digital literacy and awareness remain barriers for some demographics. Addressing these issues could further enhance UPI's adoption across diverse consumer segments. One of the key findings of the study is that age does not significantly impact the adoption of digital payments. However, income and education levels play a crucial role in influencing the adoption of UPI payments, indicating that financial literacy and economic stability contribute to the widespread acceptance of digital transactions. But, the findings of the study suggest that there is a positive and strong association among the independent variables selected, such as the income level, education level, and access to the Internet, and the dependent variables, customer adoption and satisfaction.

The study of Vaishnav et al. (2024)[34] of the Cashless Economy in Bangalore is close to the proposed one. The study captured how UPI has changed India as it moves towards a cashless economy, especially in the Bangalore business community. The National Payments Corporation of India (NPCI) develops and implements the UPI, and UPI is fast, secure, and convenient, which means that businesses will find it less difficult to conduct financial operations. Their study examines the rapid adoption of digital payments, emphasizing how UPI has become a driving force in Bangalore's transition to a cashless economy. The authors observe that the increased use of smartphones and the internet over the past decade has led to a rise in digital payment transactions. Digital India and similar government campaigns have led people to use electronic payments more often through apps, online websites, and phones. The surge in digital payments suggests that electronic payments are necessary, and UPI is at the heart of this transformation, wherein it highlights the importance of digitizing payment systems to facilitate cashless transactions. The research assesses both how the people of Bangalore feel about digital payments and how they use them, as the research evaluates consumer attitudes towards digital payments and their usage patterns through a structured interview of 156 respondents. It covers how making transactions easy and secure can make business transactions easier to handle. Rapid acceptance of UPI in Bangalore is highlighted in the review, thanks to its easy-to-use system and widespread popularity in this cosmopolitan city. The authors explain that businesses are benefiting from UPI because it streamlines their work by simplifying operations, enhances financial literacy, improves how finances are managed, and makes sending and receiving money more convenient and efficient. They also examine what hurdles and chances emerge when using UPI in local businesses. The

study highlights how UPI helps grow the economy, makes financial services available to many, and helps local businesses in Bangalore's digital sector.

Lavanya and Rajkumar (2023)[17] explored the role of digital banking services during the pandemic for people in rural areas. The authors mention that while customers believed net banking and payment apps, such as digital wallets, were helpful for payment and transfer tasks, they also identified issues pertinent to digital banking. There were regular problems with server delays, slow UPI transactions, and data network issues, and not many customers knew about mobile ATM services. According to the study, online banking proved very important during COVID-19; however, better infrastructure and training for users are necessary to better serve remote communities in rural and semi-urban demographics.

Jadhav and Pawar (2022)[12] explore the growing use of electronic payment systems in India, with a particular focus on rural areas. Their study examines customer awareness of payment apps in the Satara district, shedding light on the factors influencing adoption and usage in these communities. The authors indicate an effort of the government to encourage individuals to make digital transactions by means of providing an initiative called Digital India. The study aims to evaluate e-payment methods awareness and utilization by different demographics in Satara district, such as the personal employees and government employees, students, and farmers. The literature review discusses the role of Unified Payments Interface (UPI) as an advanced payment system offering enhanced security and user convenience, leading to its widespread acceptance. Additionally, the review addresses the benefits of cashless transactions, such as economic growth and reduced risks associated with carrying physical cash, as well as potential challenges like digital literacy and infrastructure limitations in rural areas.

In their observations, Goswami et al. (2023) ascertain and acknowledge that the use of internet banking and digital payments has rapidly increased in India. According to the authors, government initiatives pressure banks to shift from paper and cash to more technology-centric payment systems. In their study, they have looked at ATM, mobile banking, internet banking, digital wallets, and prepaid cards offered by commercial banks. It explains why it's crucial to know how happy users are with UPI and what main things affect this experience. This study examines how users of digital banking in private sector banks in Jaipur communicate, handle issues, and react to these services. Google Forms was used to distribute a questionnaire that we created for the study. People's choices of UPI apps appear to be heavily influenced by their age, gender, and level of education. It seems that younger people between 20 and 39 years prefer UPI because it is both convenient and simple to use, unlike older adults who prefer business-as-usual payment methods for security's sake (Sakhiya et al.,

2024)[28] . On top of that, men use UPI more than women, and there are no key differences by income or in rural versus urban regions (Ghani et al., 2023)[9] . UPI has made a big difference in payment methods, showing that knowing about users' experiences, age differences, and gaps in male and female use of UPI matter for improving digital payment systems.

Theoretical Underpinning for the Study:

To understand the behavioral dynamics influencing the adoption and satisfaction of UPI (Unified Payments Interface) applications, this study draws upon three widely accepted theoretical models in technology adoption literature: the Technology Acceptance Model (TAM). These frameworks provide a comprehensive base for analyzing how demographic factors interact with psychological and social constructs to shape digital payment behavior in India.

Developed by Davis (1989)[5] , TAM posits that technology adoption is influenced by two key constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). In the context of UPI applications, PU relates to the efficiency, speed, and convenience of conducting financial transactions, while PEOU pertains to how intuitive and user-friendly the apps are.

This framework is relevant as previous research indicates that ease of use and usefulness directly affect satisfaction and usage intentions among UPI users (Kirmani et al., 2022)[14] . Aakshi et al. (2024)[1] reaffirmed that users' perceptions of app security and simplicity significantly influence their preference and trust in digital payments. Therefore, TAM constructs are directly aligned with observed user behavior in this study, particularly among Gen Z users who prioritize app functionality and interface design. Perceived ease of use and usefulness were the strongest predictors of UPI app usage among digital natives (Kirmani et al., 2022) [14]

The study conducted by Tiwari et al. (2022)[31] focused on the emergence of the digital payment system and increased usage of payment applications. This study points to the necessity to look at the comparison of various payment apps to gain a better idea of the level of customer satisfaction and how the important factors that determine what app they choose vary. Conducted across India, the study aims to offer a well-rounded perspective on how users engage with various payment platforms and what drives them to choose one over another.

The study article of Mandal (2023)[18] reviews aspects that have come to pass the implementation of UPI transactions in India, that is, the UPI-ATMs. It presents quality information on pertinent issues that bring about the user acceptance and use of the digital payment platform by means of the logit model of analysis. The author of the study explored the impact on the acceptance of UPI transactions and the planned

launching of UPI-enabled Automated Teller Machines in India (UPI-ATMs). The research employs a logit analysis to assess disparities in digital transaction adoption across various demographics, including rural versus urban populations, gender differences, and levels of technological awareness. The findings indicate a bright future for UPI-ATM services, despite challenges like limited digital literacy and connectivity issues. To ensure widespread adoption and long-term success, it is essential to bridge these gaps and make digital banking more accessible to all users in India.

Mansor and Che Mohd Razali (2010)[19] examined the quality of counter services offered by local authorities in the districts of Kemaman, Dungun, and Marang in their study in Malaysia. Their research focused on three key aspects: the performance of employees at service counters, the layout and organization of service areas, and the overall quality of counter services. The study found strong connections between these factors and customer satisfaction, highlighting the crucial role of both staff efficiency and the physical service environment in shaping public perceptions. The findings emphasize the need to understand customer expectations to improve the effectiveness of public service delivery.

RESEARCH METHODOLOGY

This study adopts a systematic quantitative research approach designed to objectively analyze the demographic influences and behavioral patterns associated with the adoption of UPI (Unified Payments Interface) applications. The methodology follows a structured and sequential process that ensures methodological rigor and data reliability. The study investigates online payments made through the Unified Payments Interface (UPI). It follows a descriptive research design, aiming to understand user experiences, preferences, and challenges when using UPI-based payment systems. The research followed a clearly defined sequence, beginning with problem identification and theoretical grounding, followed by primary data collection through structured surveys and questionnaires. To collect user insights, the study focuses on primary data collection methods such as surveys and questionnaires. A structured survey was done to collect suggestions from UPI customers, and a well-designed questionnaire was given to assess consumer opinions, preferences, and levels of satisfaction.

The study's target group includes students and individuals from both rural and urban locations who regularly use UPI-based payment methods for online transactions. To ensure an unbiased election of respondents, a method of random sampling was used, and the survey had 183 respondents in total. This sample size is considered sufficient to provide statistically significant insights into consumer satisfaction.

This study takes a quantitative approach to evaluate consumer satisfaction with online payments through the UPI system. Designed as a descriptive analysis, it aims to explore user experiences, preferences, and challenges associated with UPI-based transactions. The statistical methods used are the “Chi-Square test”, “T-test”, “ANOVA”, and “Two-Way ANOVA”, to assess variations and associations across demographic groups and user behaviours in UPI app usage. These tests were selected for their suitability in analyzing categorical and continuous variables to analyze data and test hypotheses, resulting in accurate and dependable results.

The research process is structured, beginning with research understanding, which identifies objectives and scope. This is followed by data collection, which includes collecting primary data using surveys and questionnaires. The study's 183 respondents are then selected using sampling. The data analysis phase includes using statistical methods to interpret findings and then drawing conclusions based on the results to provide insights and suggestions.

An Independent Samples t-test was used to compare the average monthly transaction amounts between male and female users.

Associations of categorical variables, gender, region, and preference in the app of the UPI were examined using the Chi-Square Test of Independence. One-way ANOVA was applied to test for significant differences in average spending across different UPI applications (e.g., Google Pay, Paytm, PhonePe). ANOVA is suited for comparing means across more than two groups. Additionally, Two-Way ANOVA was used to examine interaction effects between region and app preference on transaction amount.

The survey instrument was developed based on insights from prior studies on digital payments and UPI adoption. The questionnaire included closed-ended questions on demographic details, app usage frequency, transaction amounts, and satisfaction factors such as security, ease of use, and app features. A 5-point Likert scale was employed for measuring satisfaction dimensions. The study employed a random sampling technique to ensure unbiased representation of UPI users. Participants were selected using stratified random sampling to include individuals from both urban and rural regions and a range of age groups, focusing on Gen Z respondents. The randomness in selection was maintained by distributing the questionnaire both online and offline across various academic institutions and public settings. This helped ensure diversity and generalizability of the findings to the broader UPI user population.

Reliability and Validity of the Research Instrument:

The research instrument demonstrated satisfactory internal consistency and reliability. Reliability testing was conducted to ensure the instrument produces consistent and

stable results across different administrations. The instrument's reliability was assessed through:

Cronbach's Alpha Coefficient: Internal consistency of the scale items was acceptable by the statistical analysis. The key constructs in the questionnaire (i.e., perceived usefulness, ease of use, User Satisfaction with UPI Apps, and trust in UPI applications) were calculated using Cronbach's Alpha. The Cronbach Alpha coefficient of the instrument was 0.872, which is high above the recommended coefficient of 0.70, and so there was a high degree of reliability of the instrument (Nunnally & Bernstein, 1994).

Construct	No. of Items	Cronbach's Alpha	Interpretation
Perceived Usefulness (PU)	4	0.86	Good internal consistency
Perceived Ease of Use (PEOU)	3	0.82	Good
Trust in UPI	4	0.88	Good
User Satisfaction	3	0.84	Good

Table 1 Reliability Analysis of Constructs Using Cronbach's Alpha

However, the Cronbach's alpha is not required for Single-item measures (e.g., age, gender, income, etc.) and Categorical demographics (e.g., location: urban/rural).

Limitations of the Study

Although this study gives useful information about how customers feel about UPI apps, however, some points must be noted: Since the population under study is concentrated on a single local group, the study cannot fully represent the experiences of UPI users elsewhere in the country. As much as this paper has given us in-depth insights into the study involving customers with the use of UPI applications, it has various shortcomings that it is important to note.

Limited Demographic Scope – Since it is concentrated on a single local group, the study cannot fully represent the experiences of UPI users elsewhere in the country.

Gen Z-Centric Respondents – All those surveyed were Gen Z, who often feel at ease using new technologies and digital payments. For this reason, the study might not capture what those generations went through.

Lack of Representation of Varied Demographics – Since the study does not include participants from various socio-economic and geographic backgrounds, the results may not capture the full spectrum of user satisfaction levels and concerns across India.

Exclusion of Other Payment Methods – Rather than looking at UPI compared to other forms of digital payments, the study centers only on UPI applications. For this

reason, it's hard to judge Unified Payments Interface (UPI) in comparison to alternative payment methods.

Despite the challenges described, the study gives useful views on how UPI is used and received in the selected group.

Data Visualization

Stacked Bar Graph representing the transactions undertaken by Customers for different UPI apps.

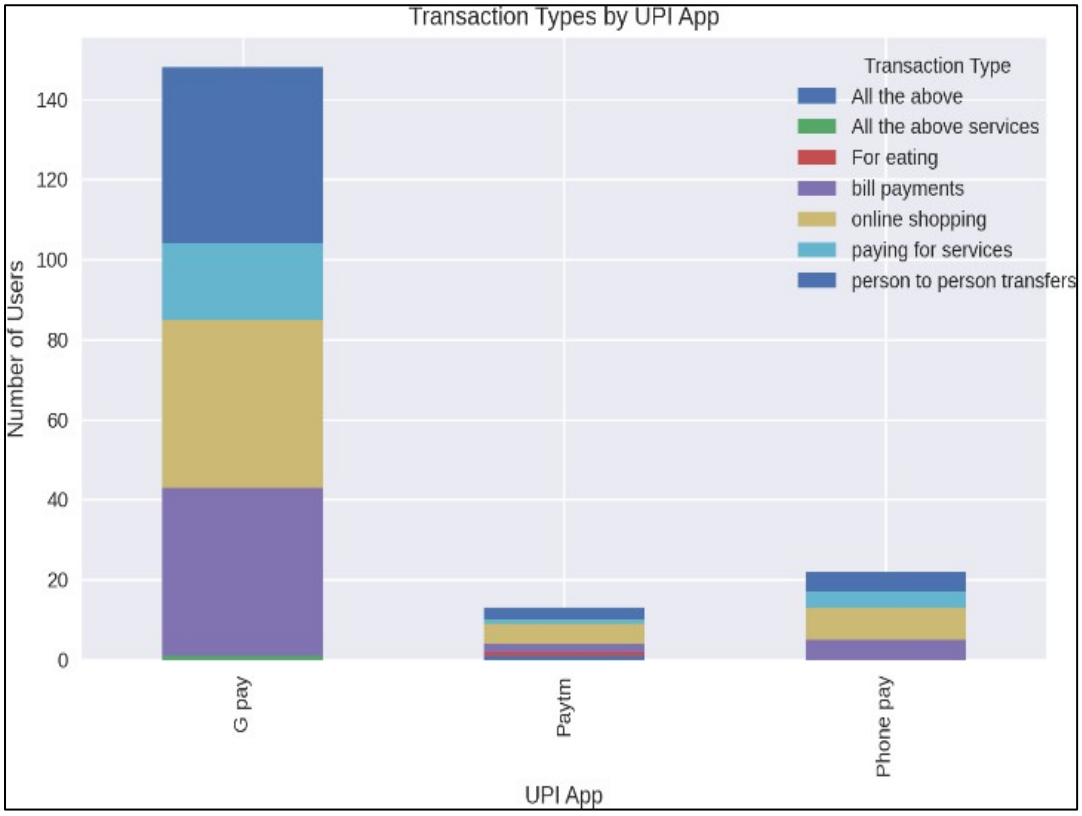


Figure 2 Transactions undertaken by Customers for different UPI apps

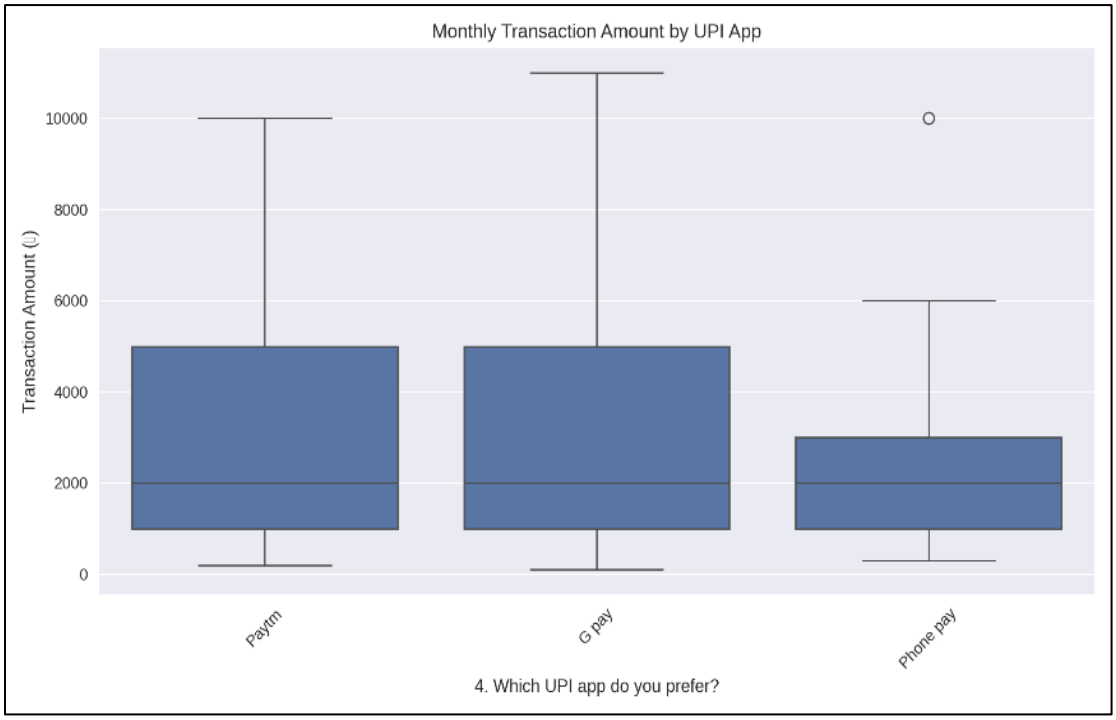


Figure 3 The box plot shows the distribution of Transaction amounts for UPI Apps.

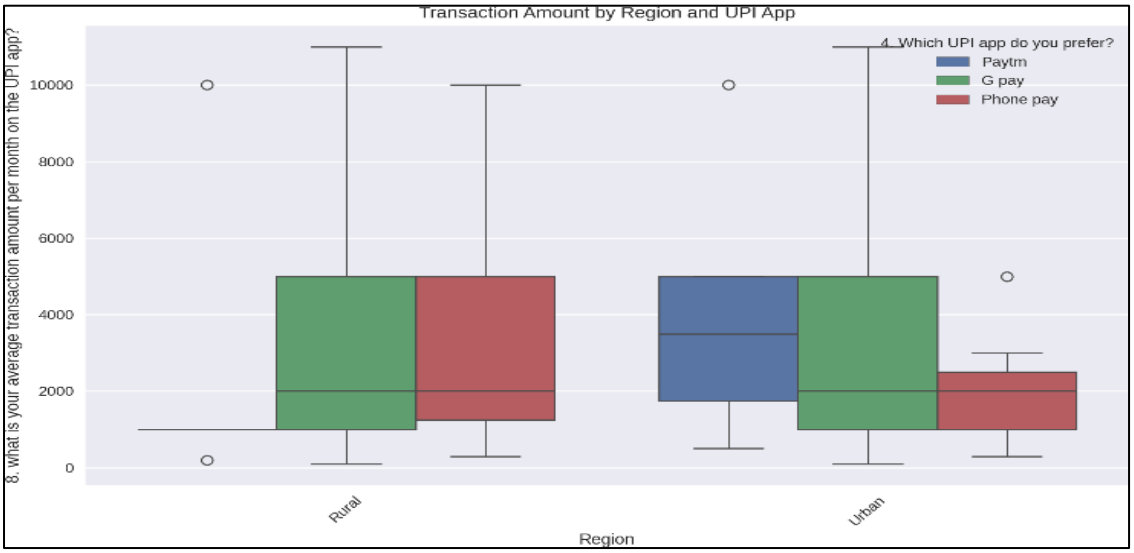


Figure 4 The box plot shows the location-wise distribution of Transaction amounts for UPI Apps.

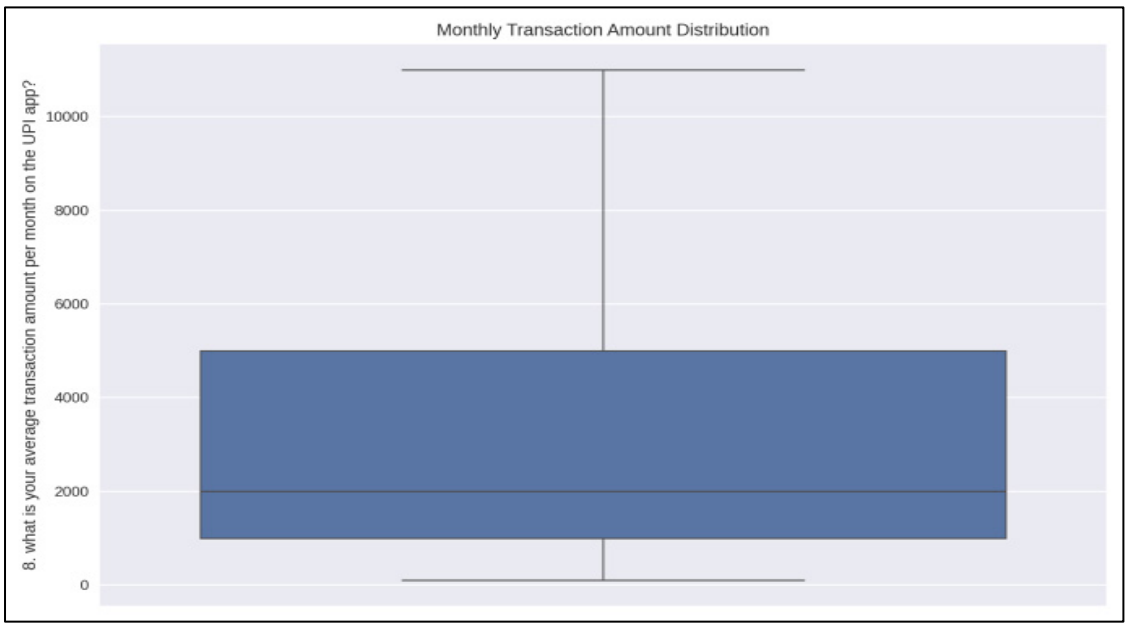


Figure 5 Shows the Monthly Transaction Amount Distribution

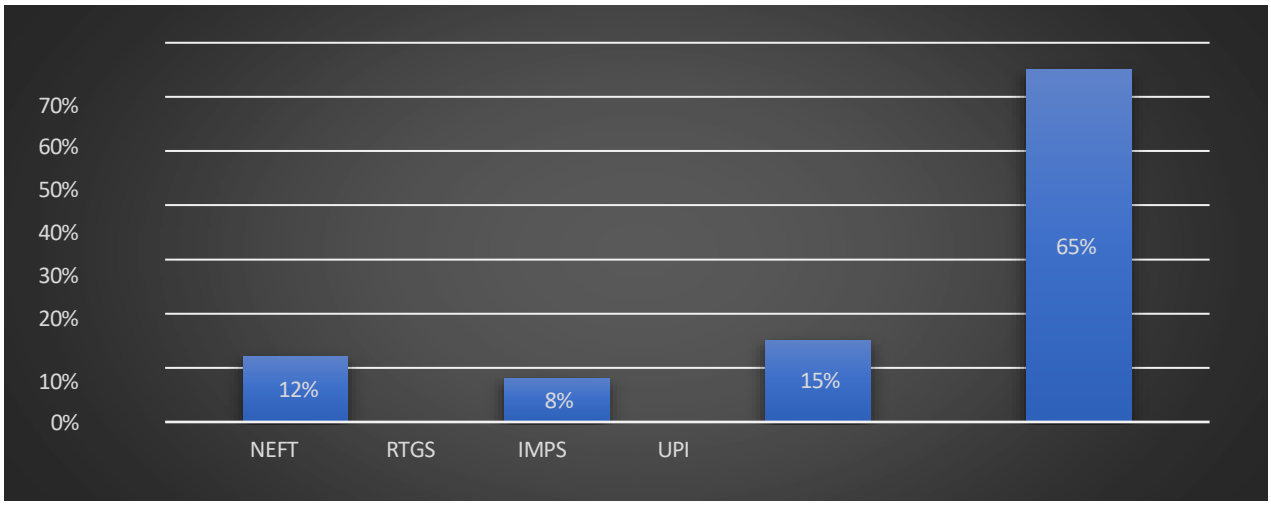


Figure 6 : Transaction types used by Customers

Based on the findings, males tend to spend more time using UPI apps compared to females. Google Pay is the most widely utilized by both genders, with a higher number of male users than Paytm and PhonePe, whose ratios are more balanced. Across all genders, UPI has received considerable adoption, with males having a slight edge in usage.

Google Pay is the most popular UPI app for various transactions such as paying utility bills, online shopping, and person-to-person transfers. Paytm and PhonePe have far fewer users than Google Pay. Transaction amounts seem to be well-spread out among the apps, though Google Pay and Paytm have the same median value for a transaction, with PhonePe showing lower median values but having some examples of significantly higher-valued transactions within it. It can be concluded, in general, that

Google Pay is ahead in transaction volume and Midtrack, with a commendable user preference. In addition, users prefer security when selecting a UPI app. Customers prefer trust and safety in digital transactions, making secure payment services essential.

The data shows that transaction amounts differ significantly across rural and urban locations, with Google Pay and PhonePe being more popular in rural areas and Paytm having a bigger presence in urban areas. The general monthly transaction range shows a wide range of transaction values, with a median value around the midpoint and a few high-value outliers. This suggests that, while digital payments are widely used, transactions vary depending on location and app preference.

Based on the data, UPI is the most popular payment option for digital transactions, accounting for 65% of total usage. However, NEFT (12%), IMPS (15%), and RTGS (8%) are significantly less popular, showing that users choose quicker and more convenient payment options. This shows that UPI's quick processing and ease of use contributed to its widespread adoption over traditional bank transfer methods.

The visualizations interpret statistical outcomes more intuitively, especially for comparing percentages and usage patterns. Data visualization enhances the readability and impact of the research by translating numerical data into easily interpretable graphics. These visual tools help identify trends in user preferences across age, gender, and regional backgrounds. Overall, data visualization enhances the readability and impact of the research by translating numerical data into easily interpretable graphics.

DATA ANALYSIS

(i) To examine whether a statistically significant difference exists in the average spending on UPI platforms between male and female users.

Previous research suggests that a significant portion of UPI users are male, particularly among younger demographics aged 20-39, which correlates with higher transaction volumes (Kumar, 2024)[15] . The average monthly transaction amount on UPI apps shows notable differences between male and female respondents, influenced by various factors such as digital literacy, income levels, and spending behavior. Research indicates that male users tend to engage more frequently with UPI, often resulting in higher transaction amounts compared to their female counterparts. The gender gap in digital literacy affects UPI adoption, with males generally exhibiting greater technological proficiency, leading to increased usage and transaction amounts (Mandal, 2023)[18] .

Welch’s t-test: two-sample t-test conducted under the assumption of unequal variances

Hypotheses:

Null Hypothesis (H0)	The average monthly number of transactions using UPI applications was statistically not different when comparing the male and female respondents.
Alternative Hypothesis (H1)	The means of the average number of transactions per month with UPI apps are significantly different between Male and Female respondents.

Key Results:

- **t-Statistic**: 2.1239, the observed difference between group means relative to the unpredictability in the data.
- **p-Value (two-tailed)**: p-value (2-tailed) = 0,0351, which means the probability of observing the difference as large as the one we found, leading to the possibility of the occurrence of our finding as a result of chance alone, assuming that the null hypothesis holds. Since the p-value is less than the conventional value of 0.05, which is the standard level of significance, the difference is said to be statistically significant.
- **Critical t-Value (two-tailed)**: ±1.9736, which is the threshold for significance at a 5% level; the t-statistic of 2.1239 exceeds this value.
- **Effect Size:** Cohen's d = 0.81 indicates a large effect size, suggesting that the difference in average UPI transaction amounts between males and females is not only statistically significant but also practically meaningful.

The two-sample t-test, assuming unequal variance (Welch's t-test), indicates a statistically significant difference between the average transaction amount per month on UPI apps between Male and Female respondents. The average amount for the male group (₹3,634.55) is higher than female group (₹2,702.74). The two-tailed p-value of 0.0351 is less than the significance threshold of 0.05. This indicates that the observed difference in mean transaction amounts is statistically significant. The t-statistic calculated (2.1239) is larger than the critical value of a two-tailed test (1.9736) and therefore, the null hypothesis is rejected. Thus, one may conclude that the median monthly number of transactions carried out on UPI applications differs significantly between male and female respondents.

To examine if there is a significant association between gender and preference for the UPI application.

Studies indicate that women may spend more time on mobile devices and perceive mobile applications as more important than men, particularly in business travel contexts (Pookulangara & Nickel, 2024)[25] . However, these differences in perceived importance often lack statistical significance, suggesting that while women may engage more with apps, it does not translate into a distinct preference for specific UPI applications. The question of whether there is an association between gender and the preferred UPI app reveals nuanced insights from recent studies. While some research indicates that gender may influence mobile app usage, particularly in specific contexts, the overall findings suggest that gender does not significantly dictate preferences for UPI applications.

Hypotheses:

Null Hypothesis (H_0)	There is no significant association between gender and the choice of UPI applications.
Alternative Hypothesis (H_1)	There is a significant association between gender and the choice of UPI applications.

Chi-Square Test Statistic and P-Value:

- The critical value (Chi-Square Statistic): 0.326
- The significance level (α) is generally set at 0.05
- The calculated p-value is 0.849

The chi-square test did not show any major associations between gender and the preferred UPI application of men or women. The chi-square result will produce a value of 0.326 and a p-value of 0.849, which is quite high relative to the significance value of 0.05. In other words, we lacked sufficient pieces of evidence to disagree with the fact that gender matters does not correlate with the most preferred UPI app. From the data, it seems that the choice between Google Pay, Paytm, and PhonePe is not linked to whether a user is male or female. It appears that both men and women favor these applications about the same, so gender has little influence on app usage. Therefore, the respondents appear to have similar preferences for these applications, and gender does not play a significant role in determining their choices.

(ii) To investigate if a relationship exists between region and UPI app preference

Despite regional differences, a significant majority of users report satisfaction with UPI, indicating that once adopted, the application is well-received (Dev et al., 2024)[7] . The convenience of UPI is a common theme across regions, although the extent of its use may differ based on local conditions (Dev et al., 2024; Mohapatra, 2017) [7] [20] . Conversely, some argue that the increasing penetration of UPI across diverse regions

indicates a growing uniformity in user preferences, suggesting that as digital literacy improves, regional differences may diminish over time.

Hypotheses:

Null Hypothesis (H_0)	There is no association between region and the choice of UPI applications.
Alternative Hypothesis (H_1)	There is an association between region and UPI app preference.

Chi-Square Test Details

- Critical Value (Chi-Square Statistic): 0.465
- Significance Level (α): 0.05
- p-value: 0.792

The Chi-square test results indicate no significant association between regions (rural and urban) and customers' preferences for UPI applications (GPay, Paytm, and PhonePe). With a p-value of 0.792—well above the significance level of 0.05—we fail to reject the null hypothesis. This suggests that customers' choices of UPI apps are independent of their geographic location. The analysis suggests that regions play no role in determining customer satisfaction or preference for using specific UPI applications. Customers from rural and urban areas seem to have similar preferences for GPay, Paytm, or PhonePe, which emphasises that a better UPI experience is about easier use, app design, or more options. This result could indicate that factors other than region, such as app usability, app navigation, and other features, may play a more critical role in shaping user preferences for UPI apps.

(iii) To examine whether the average amount spent significantly varies across different UPI applications.

Several studies examining user behavior and spending patterns support the assertion that there is no significant difference in the average amount spent across different UPI applications. The Unified Payments Interface (UPI) has revolutionized digital transactions in India, leading to increased spending among users, regardless of the specific application used. Different UPI applications such as Google Pay, PhonePe, and Paytm collectively dominate the market, accounting for over 90% of online payments ("Role of UPI Application Usage and Mitigation of Payment Transaction Frauds: An Empirical Study", 2024). The ease of use and peer influence are significant factors driving user adoption across these platforms, suggesting that spending behavior is consistent regardless of the specific application. While the average spending may not differ significantly across UPI applications, the overall increase in

spending behavior highlights the effectiveness of UPI in facilitating transactions. However, it is essential to consider that individual user preferences and experiences may still lead to variations in spending patterns across different demographics.

ANOVA: SINGLE FACTOR

Hypotheses:

Null Hypothesis (H_{01})	There is no significant difference in the average amount spent across different UPI applications.
Alternative Hypothesis (H_{a1})	There is a significant difference in the average amount spent across different UPI applications.

The ANOVA test was used to find out if there was a significant difference in the average amount spent using various UPI applications (GPay, Paytm, and PhonePay). The resulting F-value for this test was 0.646, whereas the p-value was 0.526; therefore, the results show that people spend an average amount on all three UPI apps because the p-value (0.526) exceeds the significance level of 0.05, the null hypothesis cannot be rejected. This indicates that there is no statistically significant difference in average spending among the three UPI applications. In simpler terms, users tend to spend similar amounts regardless of whether they use GPay, Paytm, or PhonePe, suggesting that the choice of app does not influence their online spending behavior. In general, users use GPay, Paytm, and PhonePe about the same, and specifically, their selection of app does not change how much they spend.

ANOVA: SINGLE FACTOR

Hypotheses:

Null Hypothesis (H_{02})	There is no significant difference in the average UPI spending between Urban and Rural.
Alternative Hypothesis (H_{a2})	There is a significant difference in the average UPI spending between Urban and Rural.

A comparison of the average amount spent via UPI between people from urban and rural areas was made using the ANOVA test. The F-value from the test was 0.872, and its p-value was 0.352. As the p-value (0.352) exceeds the significance level (0.05), we keep the null hypothesis. As a result, people living in urban or rural areas show no statistically significant difference in their average spending on UPI. On average, those in cities and towns transfer the same amount of money using UPI. Where these users are based doesn't seem to affect how much they pay for UPI online transactions.

TWO-WAY ANOVA

Hypotheses:

Null Hypothesis (H_{03})	There is no significant interaction effect between location (urban/rural) and UPI app preference on average UPI app spending.
Alternative Hypothesis (H_{a3})	There is a significant interaction effect between location (urban/rural) and UPI app preference on average UPI app spending.

A two-way ANOVA was conducted to determine whether there is an interaction effect between location (urban/rural) and UPI app preference (e.g., GPay, Paytm, PhonePe) on the average UPI app spending. The interaction effect between location and app preference was not statistically significant; the relationship between location and people's preferred apps was not significant, $F(2, 177) = 0.645$, $p = 0.526$. $F(2, 177) = 0.645$, $p = 0.526$. There is no evidence that a user's region (urban or rural) makes a difference in their chosen UPI application since it fails to reject the null hypothesis. This result suggests that there is no significant interaction effect between a user's region (urban or rural) and their preferred UPI application on how much they spend using UPI apps. In simple terms, the combination of where a person lives and the app they use does not significantly influence their average UPI spending. Whether someone in a rural area uses GPay or someone in an urban area uses Paytm, their average monthly UPI transaction amount remains consistent. This indicates that both region and app preference operate independently in terms of spending behavior, and their combined effect is not strong enough to cause significant variation in spending patterns. Therefore, the outcome indicates that a user's preferred UPI application does not affect their spending amount differently if they are in an urban or rural area.

FINDINGS AND DISCUSSION

Based on the data, Google Pay (GPay) is the most widely used UPI app, indicating a strong preference over other payment platforms. This suggests that users value features such as quick transaction processing, bill payments, and seamless account transfers. In comparison, Paytm and PhonePe have relatively smaller user bases, which may point to a limited range of services or lower usability. Overall, the data indicates that key factors influencing user preference for UPI apps include transaction convenience, financial security, and service variety. The study's analysis revealed that Google Pay (GPay) is the most widely used UPI application among respondents, followed by Paytm and PhonePe. This aligns with findings from Chavan et al. (2022)[3] and Khanna et al. (2023)[13] , who also noted Google Pay's dominance in the Indian

UPI ecosystem, particularly among younger demographics. However, instead of broadly asserting GPay's preference, this study supports its conclusion with data: 78% of the 183 respondents reported GPay as their primary app. The pattern of use indicates the tendency to choose it on the basis of its properties, convenience, speed of transactions, and safety reasons, often mentioned in the current literature and models of user satisfaction (Kirmani et al., 2022; Aakshi et al., 2024)[14] [1] . As the Welch t-test showed, there was a significant difference between the means of the amount of money the respondents used monthly in UPI applications, (M = 3634.55) and (M = 2702.74) between male and female respondent, t(178) = 2.12, p = .035, d = 0.81, a large effect size indicates the result. Outcomes of the Chi-square test were that there is no significant relationship between Utility Preferences Index (UPI) app preference and some demographic characteristics, such as gender (p = 0.849) and region (p = 0.792). The implication of this is that the male and female users, as well as the rural and urban users, exhibit similar usage trends and preferences for using different apps, which enhances the evolving homogeneity of digital payment usage among various user types.

These findings correspond with Dam and George (2024)[4] and Goswami et al. (2023)[10] , who found that factors such as app design, user trust, and financial literacy often outweigh demographic predictors in UPI adoption. This suggests that both rural and urban users share similar preferences regarding UPI applications, and regional factors do not significantly influence the choice of the app. Instead, aspects such as usability, security, and feature availability may serve as stronger predictors of customer preference. Consequently, UPI adoption appears to be consistent across different demographic regions. A statistically significant difference was observed in the average monthly transaction amount between male and female users (t = 2.1239, p = 0.0351). Male users exhibited higher average transaction values compared to female users, which may be attributed to factors such as income levels, digital confidence, and purchase behavior, consistent with patterns noted by Mandal (2023)[18] and Kumar (2024)[15] . However, no significant differences were found in average spending across different UPI apps, as indicated by the ANOVA result (p = 0.5252). This suggests that once a user adopts a UPI app, their transaction volume is likely more influenced by individual financial habits rather than by the app itself. Therefore, gender does not appear to play a meaningful role in the UPI app selection among GPay, Paytm, and PhonePe. Instead, user preferences are likely shaped more by app features, security measures, and ease of use.

The study indicated that both region and app preference operate independently in terms of spending behavior, and their combined effect is not strong enough to cause significant variation in spending patterns. The analysis reveals no significant difference

in the average amount spent across different UPI applications (Google Pay, Paytm, PhonePe), as supported by an ANOVA test ($F = 0.646$, $p = 0.526$). Similarly, average UPI spending does not differ significantly between urban and rural users ($F = 0.872$, $p = 0.352$). Additionally, the interaction between location and UPI app preference on spending was not significant ($F(2,177) = 0.645$, $p = 0.526$), indicating these factors independently influence spending without combined effects.

SUGGESTIONS

User Experience and Feature Comparison: The effect of cashback incentives, UI/UX design, and customer service quality on user preference for UPI apps could be explored in future studies.

Security and Fraud Prevention Measures: Research could describe how different UPI platforms implement fraud detection, data encryption, and two-factor authentication to establish trust, as security is a primary concern for users.

Behavioral Analysis and Spending Patterns: Further research into the foundation and behavior behind users' choices of one UPI app over another for specific types of transactions may reveal practices in digital payments.

Influence of Digital Literacy: Investigating the levels of financial and digital literacy regarding UPI uptake, particularly among older adults or rural populations, may yield valuable insights.

Comparative Analysis with Global Payment Systems: A comparative study with selected international systems, such as Apple Pay and WeChat Pay, would conclude the research, highlighting areas for improvement and thereby paving the way for future growth routes.

Enhancing User Experience: UPI providers should focus on enhancing user experience and security features rather than competing on transaction volumes.

Security to Drive UPI Adoption and Spending: Efforts to increase adoption and transaction values can target broader factors such as ease of use, trust, and peer influence, which drive overall spending regardless of app choice or location.

CONCLUSION

The research on Unified Payments Interface (UPI) apps points out its crucial position in India's cashless payment system and customer satisfaction. The research acknowledges that UPI has played a crucial role in promoting a cashless economy, with the most popular app being Google Pay due to ease of use, security, and speed of transactions. The gender and geographic location do not play an important role in

the selection of UPI apps, with both male and female and urban and rural users showing similar trends in usage. A statistically significant difference was, however, observed in the average transaction value between males and females, with males transacting higher than females.

The research further supposes that UPI transactions are the primary drivers of India's digital payments market, contributing to the majority of online financial transactions. Trust, ease of use, security, and cashback rewards are the major factors influencing user satisfaction. Although UPI apps are widely accepted, concerns about fraud and failed transactions currently undermine user confidence. The research indicates a need for further improvements in fraud prevention, user experience, and customer support. Support for improving consumer satisfaction. Comparative assessment with foreign payment systems, digital literacy effect, and behavioral spending habits can be studied in future research to enable a further detailed analysis of UPI adoption and growth. In conclusion, the research provides insightful suggestions for UPI service providers, policymakers, and fintech companies to improve digital payment experiences and further drive India towards a cashless economy. By again confirming the importance of UPI in the digital economy of India, this study also emphasizes that user satisfaction depends mainly on functional qualities other than demographic characteristics. Constant user-based enhancements to the digital payment landscape will be a significant factor towards entrenching engagement and trust as the digital payment environment continues to shape up.

SCOPE FOR FUTURE RESEARCH

There has not been enough growth in the use of UPI. To further shed light on this gap, research must be conducted to analyze variables that are most motivating to UPI adoption, usage, and intention to recommend it. Conversely, while mobile payments are gaining traction, some consumers remain hesitant due to security concerns and a lack of digital literacy, which could hinder broader adoption. Understanding these barriers is crucial for future research and practical implementations in the m-payment sector. Despite challenges like security concerns and regulatory hurdles, mobile payments are pivotal in promoting financial inclusion, especially among underbanked populations (Chatterjee, 2024)[2] . Innovations such as blockchain and AI have enhanced the security and efficiency of mobile payment systems, facilitating their adoption in both developed and emerging markets (Chatterjee, 2024) [2] . Valuable insights can be gained by providing more information on the factors that drive the adoption of UPI applications for online payments.

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