



The Impact of UPI Adoption on Financial Inclusion and Consumer Spending Behaviour in India

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INTRODUCTION

During the past decade, India has experienced a robust, dynamic and persistent growth in its digital payments, with the Unified Payments Interface (UPI) technology emerging as arguably as the most adopted retail payment method within the country. UPI enables instant, secured, and bank-linked transactions through mobile applications, thereby cutting transaction costs and cash dependency significantly. The UPI payment system was initially introduced before the pandemic era, even though its large-scale adoption and rapid integration into the routine economic activities accelerated during and after the COVID-19 pandemic. The post pandemic era witnessed a fundamental shift in the way Indians make payments. The Restrictions on physical mobility, enhanced convenience, and rapid digitization at the merchant level all contributed to a significant upswing in contactless digital payments. UPI has become the preferred channel for small-value and high-frequency payments and larger transactions across households, businesses, and service providers. The rapid expansion has, hence, placed UPI at the center of not just a technological but an economic instrument which is defining the shape of financial inclusion and patterns of consumer spending. While transaction data amply chronicle the growth of UPI, its broader economic impact remains to be seriously investigated empirically. The question of how the growing adoption of UPI has enriched financial inclusion and reshaped consumer expenditure patterns in the post-pandemic period is thus an open area of scholarly inquiry.

UPI's rapid rise isn't just about making payments easier and it's changing how people handle their financial transactions. Interestingly, the bigger picture is yet to uncover. People often talk about the shift toward digital payments, but the implications for financial inclusion are not very clear. It isn't just about starting a bank account anymore rather it's about digital spending and the impact on the pattern of purchases. It is crucial to address these questions to realize the actual impact of UPI Adoption in India.

LITERATURE REVIEW

Since 2020, research on India's Unified Payments Interface (UPI) has surged, reflecting the rise in digital payments during and after the pandemic. Review the existing literature revealed four major areas of study: what encourages people to adopt UPI, how UPI influences financial inclusion, how it affects consumer spending, and the obstacles and uneven impacts of adoption. Most studies focus on the reasons for adoption of UPI. Researchers used surveys methods and behaviour related models like TAM, UTAUT and Diffusion of Innovation theory to analyze it. They consistently found the same major factors: people adopt UPI when they think it's easy to use, beneficial, secure, and when their social circles promote them. Several studies inspected among general population report that UPI's simplicity and compatibility across banks have played a big role in attracting first-time users. Among students and urban residents, convenience and speed are the top reasons for continued use. These findings suggest that adoption is strongly associated with functional efficiency rather than financial incentives alone. Some research zeroes in on older adults. They are slower in taking up of UPI compared to younger people, but if they find the apps straightforward and receive support from family, they continue using it. Concerns about security and making mistakes are significant barriers. However, once older users get past the initial hesitation toward UPI, it becomes part of their habit. Studies on rural users, especially rural women, reveal another dimension. In these groups, owning a smartphone, having basic digital skills, and trusting transaction security are crucial. When rural women start using UPI, they gain more control over daily finances. Still, challenges like device sharing and unreliable internet connection restrict their usage. Looking across Indian



states, adoption rates vary widely. The reason for the gap is mainly due to increasing digital infrastructure needs, lack of literacy, and local support. Yet, even in less developed regions, UPI use continues to grow after COVID. The research makes one thing clear: UPI has taken off in post-pandemic India, and people keep using it. But most studies however focus on users' behaviour, ignoring the bigger picture. A major part of post-2020 studies analyze the determinants and patterns of UPI adoption across different population groups in India. Most of these studies use empirical methods such as survey analysis, correlation models, and technology acceptance frameworks to explain adoption behaviour. Several studies applying the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) identifies perceived ease of use, perceived usefulness, trust, and social influence as key factors of UPI adoption (NS & Kanthimathinathan, 2025; Razi-Ur-Rahim et al., 2024; K & Vedala, 2025). These studies mainly report that UPI's simplicity to use and compatibility across banks highly reduce transaction friction, promoting their usage.

The transaction data from these studies recorded a sharp increase in UPI usage after 2020, both in terms of volume of transactions and value of transactions (Kumar, 2024; Rani, 2024) concluding that the pandemic acted as a catalyst for the growth of digital payment adoption by restricting physical mobility and increasing health concerns associated with cash handling. Several studies showed an increase in UPI usage rate even after the lockdowns are lifted, showing a structural shift in preferred payment method rather than a lockdown specific growth. Studies conducted on elderly users finds that adoption levels are relatively lesser due to security concerns and lack of digital familiarity; however, continuous usage still increased when applications are perceived as simple and social support is provided (Sharma & Chauhan, 2025). Studies that were conducted on the rural women established that having access to smartphones, basic digital literacy, and confidence in the security of the transactions highly influenced the adoption intensity (Swapna & Kanthimathinathan, 2025; Maru, 2024). Interstate and regional studies however display a particular pattern of non-consistent adoption across the various states in India, due to the differences in digital infrastructure, literacy levels, and support of ecosystem (Jaiswal & Singh, 2023). Nevertheless, most studies agree that UPI adoption has expanded rapidly across both urban and rural areas in the post-COVID period. While the adoption literature is extensive and methodologically diverse, it largely focuses on behavioural explanations and does not adequately examine the economic outcomes of UPI adoption. A growing strand of empirical literature examines the relationship between UPI adoption and financial inclusion in India. These studies move beyond behavioural adoption models and assess how digital payments influence participation in formal financial systems.

UPI Adoption and Financial Inclusion

Several case studies and survey-based enquires have found that UPI contributed to financial inclusion by accelerating the usage of existing bank accounts rather than merely expanding account ownership (Rastogi et al., 2021; Sharma et al., 2022). These findings from studies argue a point that UPI helped activate dormant accounts by enabling frequent transactions and strengthening engagement with formal financial structure. Researches focused on rural India report that UPI enabled households and small merchants to participate in digital transactions without needing on physical banking infrastructure (Haque et al., 2025). Similarly, studies conducted on female users conclude that UPI help enhance financial participation and autonomy by allowing direct access to payments via digital medium despite of certain structural barriers like device ownership and digital literacy (Maru, 2024). Studies conducted on MSMEs and micro-businesses report that UPI adoption helped small enterprises to accept digital payments, maintain a proper transaction record, and partially integrate into the formal economy (Shetty et al., 2024). Such outcomes interpret as indirect indicators of improvement in financial inclusion. However, the studies also cautions that inclusion benefits depend on sustained usage rather just a one-time adoption. Some papers mainly distinguish between access-based and usage-based financial inclusion types. Although, the access to bank accounts has improved majorly because of earlier policy related initiatives, the reviewed literature points out that UPI plays a critical role in the strengthening of this inclusion by promoting regular usage (VTK et al., 2023). Despite these positive findings from the reviewed studies, several studies highlighted a continuous inclusion gaps such as digital divide, limited access to internet connection, and concerns related to cyber security, particularly among elderly users in limited income households (Ozili, 2020).



UPI Adoption and Consumer Spending Behaviour

Several emerging set of post-pandemic studies analyzed the relationship that could exist between digital payments and consumer spending behaviour. Studies of empirical nature in this area suggest that UPI adoption does influence the consumption patterns primarily by increasing frequency of transactions and reducing the overall dependency that existed on cash transactions. These studies, analyzing consumer's payment related behaviour reported that UPI majorly facilitates low-value, high-frequency transactions by minimizing the transaction costs involved and improving convenience of transactions (Agarwal et al., 2021). These changes in behaviour are particularly evident in the daily consumption categories like retail purchases, local services, and transport. Researches focusing on micro-businesses and small merchants in particular have found that UPI adoption has contributed to higher transaction volumes and much smoother cash flows (Sawhney, 2025). Studies conducted to understand the impact of UPI on business reveal that digital payments expand their customer base and reduce the possible delays that occur in transactions, thus influencing sales turnover. Post-pandemic studies especially highlight a much broader shift in digital consumption, supported by increase in smartphone penetration and QR-code-based payment methods (Mohammed & Sanyal, 2025). These studies highlight that UPI has essentially become a part of routine consumption decisions rather than being used occasionally for larger transactions.

Significance of the Study

The literatures reviewed mainly shows an extensive research on the determinants of UPI adoption in India, with most post-pandemic studies focusing only on behavioural factors using technology acceptance frameworks such as TAM and UTAUT. While several studies also analyse the UPI adoption rate among specific groups of population, including rural area users, women, elderly individuals, and small scale merchants. However, a clear gap exists in the combined analysis of UPI adoption outcomes. Even though some studies separately address financial inclusion or consumer spending behaviour, very few of them examine the combined impact of UPI adoption on both financial inclusion and consumer spending behavior in an empirical manner using a unified analytical framework. Additionally, majority of the existing research relies only on primary survey and micro-level case studies, with very limited use of secondary, macro-level data to assess the post-pandemic structural changes. Consequently, there is insufficient empirical evidence on how sustained UPI adoption in the post-pandemic period translates into broader economic outcomes beyond behavioural intention, particularly in terms of usage-based financial inclusion and aggregate consumption patterns.

Research Methodology

The study adopts a quantitative and descriptive-analytical form of research design, supported through both primary and secondary data sources. A quantitative approach is considered apt as the objectives of the study involves measuring and analyzing relation between observable and measurable variables related to UPI usage, financial inclusion, and consumer spending behaviour. Primary data for the study was gathered through a structured questionnaire designed to particularly capture the user-level insights, while secondary data was used for the examination broader trends in UPI adoption the usage of digital payments. The trends and insights derived from the collected data are explored through quantitative techniques of analysis like descriptive statistics, comparative analysis and regression analysis. In addition the design also comprise of a demographic analysis based on age and gender of users to understand variations that may occur in UPI usage patterns across different user groups. This approach helps build a systematical analysis suitable for the time constraints of the semester.

The primary questionnaire consists of 150 valid respondents chosen through the convenience sampling technique among Delhi University Students originating from various parts of India on the basis of their willingness and availability to be part of the study. The major focus of the questionnaire was to understand various metrics related to their usage of UPI payment services. Respondent characteristics considered in the study include age gender and accessibility through which the demographic analysis were conducted. Age was grouped in different categories for the purpose of ANOVA, while gender were compared through a independent t-test samples.



Questionnaire Development

The questionnaire contained 15 questions designed to capture respondents perception, experience and behavior regarding UPI. The measurements relating to the construct was collected through a five-point Likert scale with higher scores showing strong agreement and vice versa. The principal constructs covered in the questionnaire were UPI Adoption, Financial Inclusion and Consumer Spending Behaviour from which composite scores were calculated for descriptive, correlation, and regression analysis. From the collected responses a UPI Adoption score, Financial Inclusion score and Consumer Spending scores were derived from the composite Likert scale of the question responses relevant to each metric.

The questionnaire has been constructed through appropriate evaluation of corresponding previously published empirical studies focusing on adoption of digital payments and inclusion to study consumer behaviour. The items contained in this questionnaire were adapted and modified from established peer-reviewed research papers; This was done in order for appropriate validation of results and to ensure reliability of the findings.

The selection of these questions was based on key published studies that had been identified during the literature review phase by using their corresponding serial numbers (SN) that have been assigned to each study. The finalized instrument contained only the most strongly related and statistically valid/valid items associated with the stated research aims.

Questions	Sources
<u>UPI ADOPTION</u> 1. I find UPI easy to use for making payments 2. UPI helps me complete transactions quickly. 3. UPI is convenient for my daily transactions 4. I frequently use UPI for making payments 5. UPI is my preferred mode of payment over cash.	• Razi-Ur-Rahim et al. (2024) • K & Vedala (2025) • Fahad & Shahid (2022) • Sharma & Chauhan (2024)
<u>FINANCIAL INCLUSION</u> 1. UPI has made financial transactions more accessible for me. 2. I use my bank account more actively because of UPI. 3. UPI has reduced my dependence on cash transactions. 4. UPI helps me participate more in formal financial systems. 5. UPI has increased my confidence in digital financial services	• Rastogi et al. (2021) • Vtk et al. (2023) • Mohapatra (2025) • Sharma et al. (2022)
<u>CONSUMER SPENDING BEHAVIOUR</u> 1. I make payments more frequently using UPI. 2. UPI has made spending money more convenient. 3. I use UPI for small and frequent purchases 4. UPI encourages me to spend more often 5. I prefer using UPI for everyday expenses.	• Sawhney (2025) • Dev et al. (2024) • Huggi et al. (2024) • Pawde (2025)

Reliability and Validity

The reliability of the research instruments was evaluated using the Cronbach's Alpha Values. This helped evaluate the internal consistency of the questionnaire items under the three major variables. A Cronbach alpha value of 0.893 was recorded for the the UPI Adoption Vairable. A value of 0.841 was recorded for the Financial Inclusion Variable and a value of 0.832 was recorded for the Consumer Spending Behaviour. All recorded values are above the commonly accepted threscold value of 0.5, indicating high level of internal consistency among the items measuring each construct. Hence the questionnaire was determined as reliable and suitable for further statistical analysis. The validity of the reseach instrument was evaluated using pearsons coorelation analysis. The p value was found to be 0.00, which is under the accepted p value of 0.05 of significance. The calculated pearson correlation r values were found to be greater than the corresponding critical table values. Based on this the instrument demonstrated satisfactory validity for examining the relationship between the constructs.



Objectives of the Study

The objectives of the study are given below:

1. To examine the relationship between UPI adoption and financial inclusion
2. To assess the relationship of UPI adoption on consumer spending behaviour
3. To understand the association of UPI Adoption on different demographics
4. To analyze the trend and growth pattern of UPI adoption

Scope of the Study

The current study focuses only on India and examines the possible impacts of Unified Payments Interface (UPI) adoption that can occur on the financial inclusion level and consumer spending behaviour examined through indicators during the post-pandemic period, beginning from 2020 onwards. The study adopts a macro-level empirical approach that relies extensively on secondary data collected from official and publicly available sources paired with a regional primary survey. UPI adoption is calculated using transactions based indicators such as transaction volume and transactional value, which help reflect both the extent and intensity of the digital payment usage. Financial inclusion is analyzed with the help of some usage oriented indicators collected through survey that capture engagement with formal financial services rather than indicators that merely focus on account ownership. Consumer spending behaviour is examined using the aggregate consumption expenditure indicators to understand the spending patterns in broader terms. The study however is limited to identifying empirical relationships among the selected variables and does not attempt a micro-level analysis of every region whatsoever.

Hypotheses of the Study

The studies on UPI adoption provide substantial descriptive and behavioural evidence that suggests digital payments influenced financial participation and transaction behaviour. However, as observed earlier, these relationships have never been sufficiently tested using proper macro-level secondary data. Based on these findings, the hypotheses for the present study are derived to examine these relationships in an empirical manner.

H₁: UPI adoption has a significant relation with financial inclusion during the post-pandemic period.

H₂: UPI adoption has a significant relation with consumer spending behaviour during the post-pandemic period.

H₃: There is a significant difference in UPI usage patterns across gender groups

H₄: There is a significant difference in UPI usage patterns across age groups

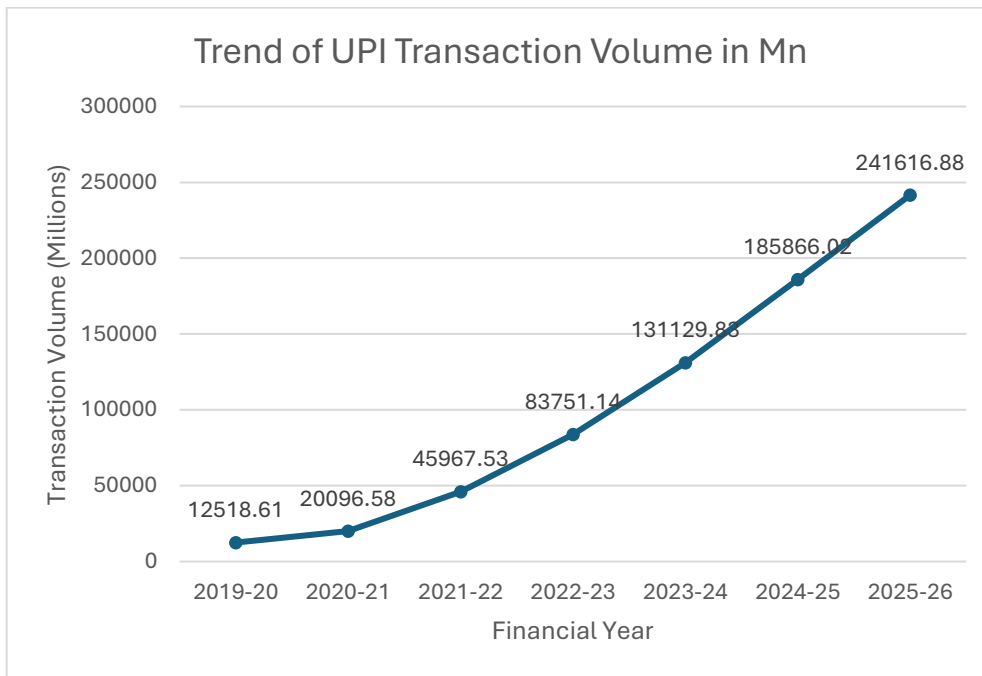
Analysis of Data

Analysis of Secondary Data

Trend of UPI Transaction Volume

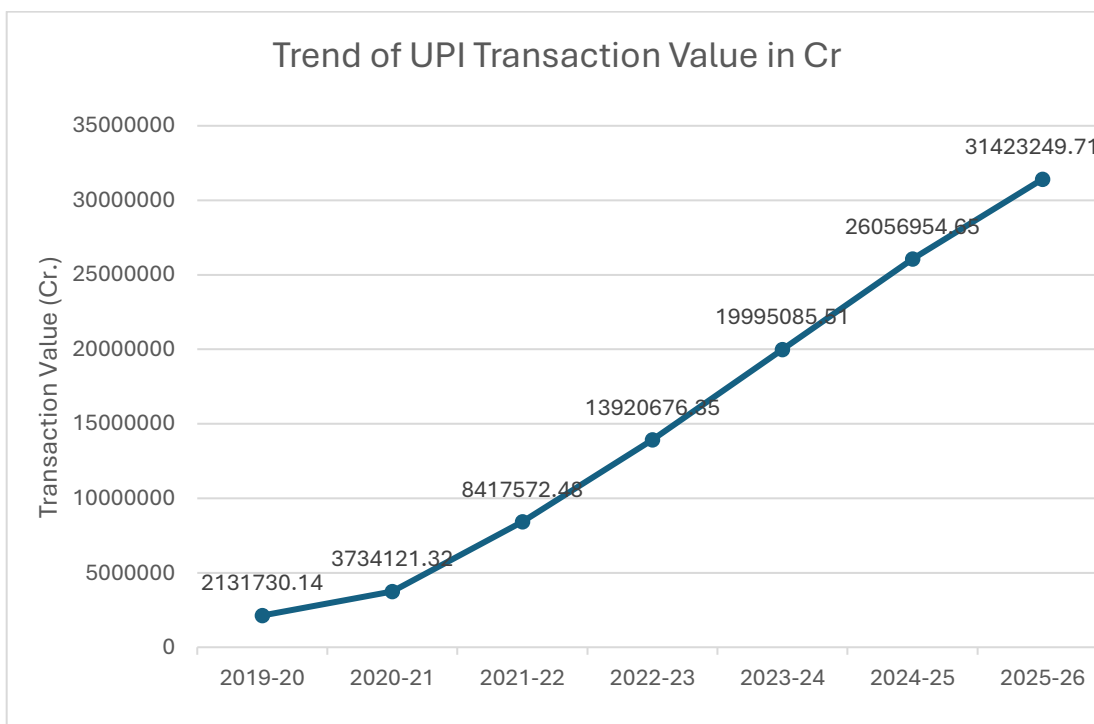
The secondary data reveals a strong upward trend in transaction volume related to the UPI adoption over the years. The overall volume progressed from 12,518.61 million in 2011–20 to 241,616.88 million in 2020–26, revealing huge expansion in the digital payment services' usage.

It can be observed that there is a gradual increase during the initial years with a significant jump in the rate of growth in the 2021–2022 period. This can be considered a transformational phase in the adoption of UPI. In the following years, despite a decrease in the rate of growth shown in the data, the volume of the transactions still rises up.



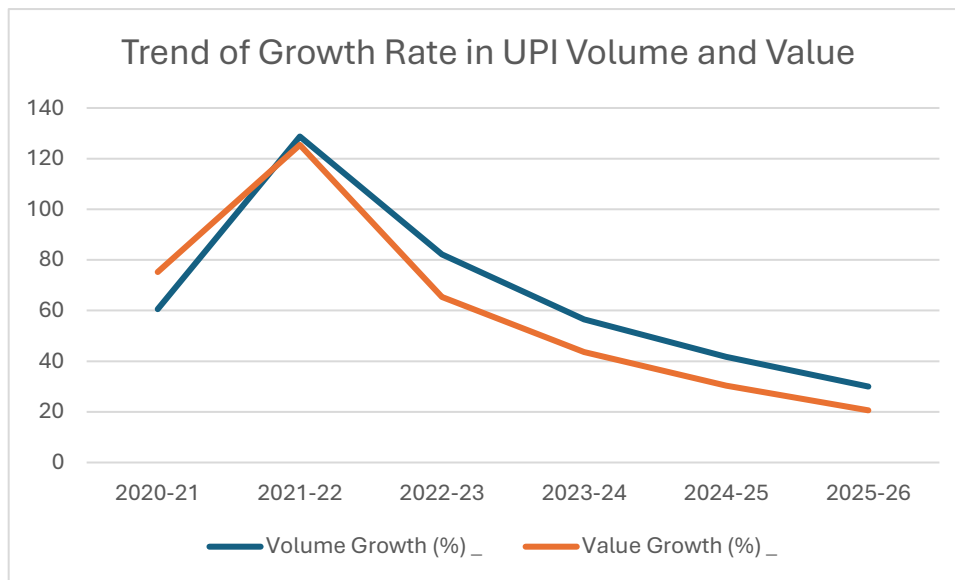
UPI Transaction Value Growth

The trend analysis of the transaction value also reveals a parallel trend. The cumulative transaction value experienced an increase from a level of around 0.72 of the growth rate of total transactions, indicating a considerable growth trajectory compared to initial years. Further, after the year 2021–22, this percentage growth rate gradually decreased. The pattern of the growth rate from 2019–20 reports an increase in the usage of UPI payment method throughout the year. In subsequent years, the share of volume (by the number of transactions) and value (by the total value of transactions) recorded increased further and significant UPI adoption of mobile app has materialized. The consistent increase in both volume and value in the growth study further suggests that there is an extensive adoption of UPI-based digital payments at individual level, thereby a potential to further increase up to 2025–26. Even after the end of the year 2022, the growth rate of volume and value of UPI transactions for the year 2023–24 continues to increase.



The Growth Rate and the Pattern of Expansion

An analysis of growth rate data indicates that volume and value experienced rapid growth during the initial period; however, the percentage of growth decreased over time. For example, volume grew more than 128% in 2021-2022 but then dropped to approximately 30% in subsequent years. This does not indicate a reduction in the rate of adoption but rather that the UPI has transitioned from a period of rapid growth to a more stable phase of growth. Generally, this is true of technological adoption; there is initial rapid expansion followed by a more stable period. Although the percentage growth has declined over time, the total number of transactions being made through the UPI continues to grow significantly.



Average Transaction Value

The average transaction value has been experiencing a downward trend since 2019-20 when it was estimated to be about ₹170 per transaction until 2025-26 when it is expected to fall to around ₹130 per transaction. There is clear evidence that UPI is being used more frequently for low-value transactions as opposed to fewer high-value transactions. This indicates that UPI is becoming an integral part of everyday life, i.e., using UPI to pay for groceries, transportation, and small services. The decline in the average transaction value demonstrates how UPI is helping to promote financial inclusion by providing access to digital payments for everyday transactions.

[OBJ]

Descriptive Analysis of Primary Data

Descriptive Statistics

Descriptive statistics give an overview of the data collected from 150 respondents. It helps in understanding the central tendency and dispersion of the variables, used in the study (UPI Adoption Score, Financial Inclusion Score and Consumer spending score).

The mean value of UPI adoption score is observed as 4.50, which that the average sample have a relatively high level of the usage. This indicates the usage of digital payment is quite good among the sample group. The value of standard deviation is around 0.64 depicting that the response is not too widely scattered. The majority of the respondents have the similar usage of UPI on an average but we can see some dissimilarities in it.

The mean of Financial inclusion score is also observed to be 4.50 which shows the sample is relatively included in financial system. This indicates the usage of financial services is active by individuals which can be the influence of digital payments like UPI. The standard deviation is moderate which depicts that the score is somewhat consistent with the response of the individuals.



SUMMARY

Statistical Measure	UPI Adoption Score	Financial Inclusion Score	Consumer Spending Score
Mean	4.504	4.321	4.276
Standard Error	0.0523	0.0538	0.0574
Median	4.8	4.4	4.4
Mode	5	5	5
Standard Deviation	0.6408	0.6586	0.7031
Sample Variance	0.4106	0.4338	0.4943
Kurtosis	3.4748	3.5145	2.6464
Skewness	-1.6210	-1.3183	-1.2351
Range	3.6	4.0	4.0
Minimum	1.4	1.0	1.0
Maximum	5.0	5.0	5.0
Sum	675.6	648.2	641.4
Count	150	150	150
Largest (1)	5.0	5.0	5.0
Smallest (1)	1.4	1.0	1.0
Confidence Level (95.0%)	0.1034	0.1063	0.1134

The mean value of consumer spending score is 4.32 which indicate that the usage of UPI is high but the influence of usage on Consumer spending various from across individuals. The standard deviation score of 0.65 shows moderate difference between response. Some individuals might spend more time on using UPI while others do not. The skewness values indicate slight negative skewness for some variables, which means that the responses are slightly concentrated towards the higher values. The analysis thus indicates positive values of usage of UPI, financial inclusion and consumer spending among the respondents. But there are small differences among and it is important for further analysis.

SUMMARY

Correlation Analysis

From the correlation matrix provided, the relationship between UPI adoption and Financial inclusion is found as 0.7822 which indicates a strong positive relationship between UPI adoption and Financial inclusion. The correlation between UPI adoption and consumer spending is found to be 0.7260 which again shows strong positive relationship between UPI adoption and consumer spending.

Further, the correlation between financial inclusion and consumer spending is found around 0.7488. thus indicating a strong positive relationship between financial inclusion and consumer spending.

	UPI Adoption Score	Financial Inclusion Score	Consumer Spending Score
UPI Adoption Score	1		
Financial Inclusion Score	0.782227323	1	
Consumer Spending Score	0.726009688	0.745800867	1



Regression Analysis (H1: Relation of UPI Adoption on Financial Inclusion)

To analyze the relation of UPI adoption on financial inclusion, simple linear regression analysis was performed. In this model, we considered UPI Adoption Score as an independent variable and Financial Inclusion Score as a dependent variable. R value of 0.7822 indicates a strong positive relationship between UPI adoption and financial inclusion. The R square value is 0.619 which tells us that there is around 61.19% of variation in the financial inclusion is a result of UPI adoption. This depicts that UPI plays an important role in influencing financial inclusion.

The ANOVA result tells us that the F-statistic is 233.325 with the probability (significance) value of $p < .001$ which is a very small value. Since the p-value is much less than 0.05, the regression model is statistically significant. This means that the model as a whole is valid and reliable.

Now looking at the coefficients, the intercept value is around 0.7001 and the coefficient of UPI adoption is found to be the value of 0.8040 which means that for a one unit increase in the UPI adoption score, the financial inclusion scores increases by approximately 0.80 units.

The p-value associated with the UPI Adoption coefficient is found to be $p < .001$ which is again a very small value and much less than 0.05. Thus it clearly tells us that the UPI adoption has a statistically significant association with financial inclusion. So based on this, null hypothesis is rejected and the alternative hypothesis is accepted. It can be said that the UPI adoption has a significant positive relation on financial inclusion. However, another significant aspect is that even though the association is strong, the R-square is not 100% which tells us that financial inclusion, is influenced by other various factors also like income, education, awareness etc, which are not part of this study.

Overall, the regression results clearly show that increased use of UPI contributes to better financial inclusion among respondents, though the effect may vary slightly across individuals.

SUMMARY OUTPUT		
<i>Regression Statistics</i>		
Multiple R	0.782227323	
R Square	0.611879584	
Adjusted R Square	0.609257149	
Standard Error	0.411694711	
Observations	150	

ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	39.54684	39.54684	233.325	$P < .001E-32$			
Residual	148	25.0849	0.169493					
Total	149	64.63173						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.70008718	0.239442	2.923831	0.004002	0.226921	1.173253	0.226921	1.173253
UPI Adoption Score	0.8040067	0.052636	15.27498	$P < .001$	0.699992	0.908021	0.699992	0.908021



Regression Analysis (H2: Relation of UPI Adoption on Consumer Spending Behaviour)

In order to analyse the impact of UPI adoption on consumer spending behaviour, another regression model was applied. In this, we considered UPI adoption score as an independent variable and consumer spending score as dependent variable.

From the regression output, we get the value of Multiple R to be 0.7260 which suggests that there is a strong positive relationship between UPI adoption and consumer spending behaviour. This means that as the UPI usage increases, the consumer spending also tends to increase though the relationship is slightly weak as compared to the financial inclusion.

The value of R square is 0.5270 which tells us that around 52.7% of the variation in consumer spending behaviour is a result of UPI adoption. It is a decent value but is smaller than last model. It suggests that while UPI adoption clearly has an effect on consumer spending behaviour, UPI has a significant effect on consumer spending, a number of other factors are potentially involved, such as income level, personal habits, tastes, and opinions.

The value of adjusted R-square is around 0.523 which is very close to R-square, again indicating that the model is reasonably well fitted and is not overestimated.

Looking at the Anova table, we find the F-value to be 164.956 and significance value $p < .001$. Since the p-value is a lot less than 0.05, the regression model is statistically significant. This confirms that UPI adoption has a significant influence on consumer spending behaviour.

The coefficient of UPI adoption is found to be 0.7966. This means, a one unit increase in UPI adoption score results into an approximate of 0.79 unit increase in consumer spending score. This suggests a strong positive influence. The p-value associated to the coefficient value is found to be around $p < .001$ which is a very small value and definitely at a lower value than the significance level of 0.05. This tells us that there is a statistically significant and the relationship is not because of random chance.

The t-statistic value is around 12.84 which is also a not such a small value. This tells us, again that the relationship is strong.

Based on these results, the null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, it can be said that UPI adoption has a significant positive association on consumer spending behaviour.

However, compared to financial inclusion, the explanatory power (R^2) is a little lower which shows that consumer spending is influenced by various factors rather than influence owing to the usage of digital payment.

Overall, the findings indicate that increased usage of UPI encourages higher usage/ frequency or convenience of spending but the extent of the impact may vary depending on the individuals behavior and external conditions.

SUMMARY OUTPUT		
<i>Regression Statistics</i>		
Multiple R	0.72601	
R Square	0.52709	
Adjusted R Square	0.523895	
Standard Error	0.485127	
Observations	150	

ANOVA								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	1	38.82208	38.82208	164.956	$p < .001$			



Residual	148	34.83152	0.235348					
Total	149	73.6536						
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0.68809	0.28215	2.438738	0.015922	0.130527	1.245653	0.130527	1.245653
UPI Adoption Score	0.796605	0.062024	12.84352	p < .001	0.674038	0.919172	0.674038	0.919172

Gender-Based Analysis (T-Test)

In order to test whether there is any significant difference in the UPI adoption between the two genders male & females, the test of the model on independent samples t-test assuming the presence of unequal variances was carried out.

As observed from the results, we find that the mean value for the male respondents to be 4.5771 whereas for the female respondents is approximately 4.3333, which indicates that the usage is slightly higher among the male respondents as compared to the female respondents, though there is no much deviation.

The calculated t-statistic value is around 1.8640 and the p-value (two tail) is 0.0670. Since the p-value is greater than the significance level of 0.05, the found result is not statistically significant at 5% significance level.

However, the one-tail p-value is around 0.0335 which is less than 0.05. This causes a slight bit of confusion, but generally in such studies two-tailed test is considered more appropriate unless the direction is predefined.

The critical t value for the two-tail is around 1.9989, which is comparatively more than the calculated t value. Since the calculated value is less than the critical value, the null hypothesis cannot be rejected.

Therefore it can be concluded that there is no significant difference in UPI use between the male & female respondents at the significance level of 5%.

Though the mean usage of male is slightly higher with p-value of 0.0335, it is a small difference to be considered significant.

Thus it may be concluded that the degree of UPI use across different genders is more or less uniform, suggesting good level of inclusiveness of the digital payment systems.

t-Test: Two-Sample Assuming Unequal Variances		
	<i>male</i>	<i>female</i>
Mean	4.577142857	4.333333333
Variance	0.298703297	0.641818182
Hypothesized Mean Difference	0	
Df	62	
t Stat	1.864053672	
P(T<=t) one-tail	0.033525224	
t Critical one-tail	1.669804163	
P(T<=t) two-tail	0.067050448	
t Critical two-tail	1.998971517	



Age-Based Analysis (ANOVA – Single Factor)

In order to test whether the UPI is differentially adopted by various age groups, the single factor (one way) Anova test was conducted. It helps in comparing the mean values of more than two groups. It helps in determining whether the differences between various groups in terms of mean values are statistically significant or not.

The results of ANOVA show that the computed F value is less than the critical F value ($F = 0.501$ approximately, $F_{crit} = 2.43$) and the significance value or p-value ($p\text{-value} = 0.734$) is higher than the defined standard significance value ($p = 0.05$). Thus, the null hypothesis is accepted and the alternate hypothesis is rejected.

This implies that there is no statistically significant difference in UPI adoption across different age groups. There are slight differences noted in mean scores when compared between different age groups in the ANOVA. But these are not significant enough to claim that age is a greater factor in the adoption of UPI.

The result indicates that the UPI has been widely adopted by the users across all the age categories, a note to the wide accessibility and convenient features of UPI. From this the null hypothesis (no difference among age groups) is accepted and the alternative hypothesis can be rejected. Thus it can be said that there is no significant difference in the use of UPI among various age groups.

This indicates that age does affect UPI adoption though the variation across groups is not very high.

Anova Single Factor

Summary

Groups	Sum	Average	Variance			
18-25	543.2	4.52667	0.374409			
25-30	85.4	4.49474	0.414971			
30-40	17.4	4.35	1.69			
40-50	21.6	4.32	0.312			
50+	8	4	2			
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.835459649	4	0.20886	0.501895	0.73438	2.434065
Within Groups	60.34214035	145	0.41615			
Total	61.1776	149				

Combined Interpretation of Results

After examining all the statistical outputs involving regression, t-test and Anova, it becomes easier to catch the whole picture of the study. Each of these tests explain a different part of the research problem and combining them makes the picture more clear.

First, from the regression analysis, it is established that the UPI adoption has a strong and statistically significant relationship with both financial inclusion & Spending. While the variables are more interrelated with financial inclusion, as it is slightly higher than the correlation factor when compared to spending. This suggests that the digital payment systems are affecting financial inclusion more than to the consumption habits, though positive.

Along with regression analysis, the correlation analysis is also giving similar results showing a strong positive relationship among all the variables. So overall the relationship between UPI adoption, financial inclusion and Spending is consistent with all the methods.

Coming to the demography analysis, the result is mixed. The t-test conducted between the genders, suggested that there is no statistically significant difference between different genders. Even though the males usage are



slightly higher, the difference was at a border level to be considered statistically significant. This indicates that the UPI adoption is quite evenly distributed across the genders.

On the other hand, the Anova suggested a statistically significant difference but again at a marginal level. The p-value is just lower than significance level and the F value is close to the critical value which suggests that the age does not have a significant effect on the UPI usage.

So, in overall, the demographic factors, are not so much influencing than the UPI adoption. The main driver of financial inclusion & spending is the usage of digital payment rather than the identity of the user.

Another thing, one can notice is that a different factor, which is that the explanatory power in the case of regression, is not complete (R^2 is not equal to 1). This indicates that the other factors such as income and education etc, can also influence the results, but it is not considered here.

Overall, the results are quite consistent. They support the main objective of this study. It is ascertained that the UPI adoption has positive effects, though the demographic difference is there but not so high.

FINDINGS AND CONCLUSION

The secondary data analysis shows notable trend with significant growth in UPI transaction volumes over the years. The total count increased considerably from 12518.61 million in 2019–20 to 241616.68 million in the year 2025–26. This signifies the tremendous rise in digitized payment system adoption.

In the similar vein, the total transaction value also have marked growth, which escalated from 21,31,730 crores to 3,14,23,249 crores, during the same duration. This represents UPI not only seeing extensive usage, but also the confidence with the banking system for various transaction size. Another particular finding derived with the growth rate of UPI, which signifies that the growth rate is particularly remarkable in the early phase, especially during the year 2021–22, after which it started to follow declining trend. However, the fall into percentage a growth is not a reduction in the usage but stabilization of the system with rapid expansion. The analysis of average value of transaction show a declining trend, signifying the day by day, UPI is used for lesser routine transactions. Which indicates the deeper penetration of digital payments into daily economic activities..

The primary data analysis depicts the information of user behavior, perception and the influence of UPI at individual level. The outcomes reveal that the adoption of UPI between respondents is relatively high, which signifies the extensive usage and acceptance of UPI.

The financial inclusion score denote that respondent feel more associated towards the financial services with the availability and ease of using digital payment platform. This informs about the positive influence in improving the financial accessibility is produced by the UPI. The consumer spending behaviour of respondents also reveals positive influence of using UPI. Respondents mentioned about ease in transacting amount, which can promote more transactions or spending by respondents.

The correlation analysis is conducted to estimate the relationship of adopting UPI, financial inclusion and consumer spending behaviour. The correlation results attest that there is a positive correlation between adopting UPI and financial inclusion. This shows that the increase in the use of UPI create the positive result in the financial inclusion.

In the same way, the positive correlation is noticed between adopting UPI and consumer spending. This indicates the consistent UPI using population which are likely to engage more in financial transactions. The ease and comfort in transacting through digital payments systems promotes the transaction frequency. Moreover, the financial inclusion also shows positive correlation with consumer spending. This signifies the greater engagement of population with financial system boost their participation in economic activities.

The coefficient value of adopting UPI are positive which shows the increase of adopting UPI caused the positive change in financial inclusion score. The improved proportion of financial inclusion score is explained by model. It shows the model have good fit with considerable explanation.

The significance value (p-value) show the relationship is not a result of a chance. So we can conclude that the adoption of UPI play an important role in improving financial inclusion. The findings thus support the claim that the digital payment platform contributes to the improvement of financial accessibility and participation in financial services.

The independent sample t-test analysis is carried out to check whether there is a considerable difference in adoption of UPI between the male and female respondents. Results show that there is no considerable difference between male and female in adopting UPI. The difference between male and female in mean value with small difference is found, however it is not statistically significant. Findings reveal that UPI adoption is not associated with gender and have the same acceptance rate between male and female. The ease and accessibility in using UPI might lead to greater adoption of UPI regardless of the gender.

The one-way ANOVA test is conducted to understand the difference in adoption of UPI between different age group. The age group that is considered in this study is younger, middle age and older age group. Results reveal that there is no meaningful statistical difference in adopting UPI among the respective age group. Findings reveal that age has no significant relation on the adoption of UPI.

Hypothesis Testing Results

Based on the statistical analysis conducted in the study, the hypotheses have been tested and the results are summarized below:

- **H₁: UPI adoption has a significant relation with financial inclusion**
→ *Accepted*, as the regression analysis shows a significant positive relationship.
- **H₂: UPI adoption has a significant relation with consumer spending behaviour**
→ *Accepted*, as correlation results indicate a positive association.
- **H₃: There is a significant difference in UPI adoption based on gender**
→ *Rejected*, as t-test results show no significant difference.
- **H₄: There is a significant difference in UPI adoption across age groups**
→ *Rejected*, as ANOVA results are not statistically significant..

Limitations of the Study

Despite the empirical nature of the study, this study is also not exempt from certain limitations and are subjected to them that should be considered while interpreting the findings. Firstly, the study relies entirely on the population of Delhi University students NCR region, which restricts the analysis based to the availability, accuracy, and consistency of the population and no further point beyond. Secondly, as the analysis is carried on a comprehensive approach of secondary and primary data, it does not attempt to capture every region specific individual, household level perspective in the UPI usage and spending behaviour that could occur. Thirdly, the study only reviewed literatures that are openly available. Hence, the finding of the study conducted may not fully depict any long-term structural trends or patterns that could exist in other literatures. Finally, even though the study analyzes the relationships between UPI adoption, financial inclusion, and consumer spending behaviour in an empirical manner, it does not establish a definitive causality in any way, and the findings derived from the study should only be interpreted as indicative rather than conclusive.

Conclusion of the Study

Based on the evaluation of both secondary and primary data, it is possible to conclude that UPI has become an extremely effective system of digital payments in India. The steady rise in the volume and value of transactions clearly points out that UPI has found extensive appeal with the users.



The outcome of the secondary data analysis underscored that UPI has witnessed rapid growth, predominantly in the earlier years, subsequent by a phase of more stable expansion. This trend makes sense of typical lifecycle of adoption of technology, where there is a spurt in growth initially, thereby followed by gradual stabilization. Perhaps it is a big fact that there occur a drop with the variable growth rate but the cumulative rise in the transaction volume and the value is quite high. The findings further indicated that the UPI is finding increasing use for low value transactions as evidenced by the decreasing average transaction value. It conveys that the digital payments are more common than being restricted to such transactions where a large financial deal are getting done it certainly has become a daily happenings for it. The main data analysis too supported to reinforce an inferences that come using the secondary data The study results showed that the UPI adoption it affects to the extent of an important factor on financial inclusion in an important extent since the ease of having the UPI there are opportunities for individuals to play more active role in the financial system. The other crucial factor UPI is also coming up the consumer spending behaviour as the transaction when it made easy it is accessible The facility of making it easy to make payment may put people to involve in more financial activities frequent.

Another crucial point to say about the work is the demographics variable like gender and the age are not making any appreciable difference on the adoption of UPI. This carries out the meaning that UPI is a universally accepted payment system every available to a wide variety of the users in their various demographic characteristics.

Overall, the study concluded that UPI has a key role in fostering financial inclusion and also it is changing the consumer behaviour in the digital economy.

RECOMMENDATIONS

Being with the result of the research study some recommendations can be suggested for further effectiveness and reach, concerning of the use of UPI.

One of the essential recommendations would be to augment the awareness and digital literacy regarding to the population which are not still so much abled to be comfortable in using the digital payment systems. The adoption of use of UPI is quite high but though UPI as a payment system is still not being effectively used by some sections of the population. The awareness programs and educational efforts would help to remove this gap.

An important other recommendation would be to work upon improving the digital infrastructure, particularly, in the rural and semi urban areas. The reliable internet connection and the availability of smartphones in these areas are necessary to use the UPI effectively. The enhancement of infrastructure will give assurance to more people to take the benefits of the digital payment systems.

It is also recommended to augment the security measures and the user trust in the transactions. Despite the availability of UPI, people are not so comfortable in using it. The concerns related to frauds and data storage are still present among the people. The strengthening of the security features and also improving the awareness of the people regarding the safe digital practices will be a good boost of enhancing the trust.

Further efforts are needed to increase merchant adoption especially in the small businesses and local vendors. Some incentives or easy onboarding process can help in augmenting the number of merchants who accept the UPI payments.

Also, financial institution and policymakers should be concentrated on integrating the UPI with the other financial service, like micro credit and insurance etc. It will further increase the financial inclusion and will provide more wide range of financial solutions for the users.

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