Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 4 Issue 3 (2024)

The Impact of Perceived Usefulness, Ease of Use, and Facilitating Conditions on Consumer Adoption of UPI Platform - A Structural Equation Model Approach

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Abstract
Objective:

In India, UPI is a means of payment that allows users to transfer money in real time between bank accounts via mobile devices. The study investigates factors influencing users' intention to adopt the Unified Payment Interface (UPI) in India and the relationship between customer preferences for UPI payment systems

Research Methodology:

A comprehensively designed questionnaire was employed to collect data from 239 participants for the study. The SEM & CFA Model was employed to analyse the relationship between variables such as ease of use, facilitating conditions, and perceived usefulness with consumers' intentions and actual usage of UPI payment platforms.

Results:
Consumers demonstrated a positive intention towards using UPI as a payment channel. The study highlights the rapid growth of UPI adoption in India, evidenced by the rise in both transaction volume and the number of participating banks, which grew from 21 banks in the 2016 launch year to 605 banks in July 2024.

Originality:
The research provides fresh insights into how technological advancements have transformed digital payments, particularly in the Indian context and can be followed internationally to develop payment platforms.

Practical Implications:

The findings underscore UPI's potential to drive cashless transactions by providing a user-friendly, real-time payment platform. It highlights the importance of raising awareness, especially in rural areas, to expand the adoption of UPI, which could benefit small businesses and traders by facilitating seamless online payments.

Keywords- Unified Payment Interface, Digital Payment, Cashless Economy, E-payment, International Payments

Introduction

With the advancement in technology, India's banking sector is witnessing major changes by making banking services seamless for consumers. (Karsen et al., 2019) Smartphones' built-in mobile payment systems are now significant socioeconomic development drivers that are boosting regional and national economic growth. Technology advancements have caused a shift in merchant and trader practices towards digital payments since consumers are more likely to make payments online due to increased smartphone adoption and improved internet access. Fintech, a technology that is rapidly developing, is used by banks to provide an extensive variety of services in today's world. (Fahad & Shahid, 2022) Modern and innovative methods to obtain financial services are currently provided by Indian banks to their clientele. For a customer to obtain any banking service, they are required to visit their branch before such digital innovation physically.

(Liébana-Cabanillas et al., 2014) Due to the rapid advancement of internet devices and the rising demand for mobile phones,, creative businesses now have a lot of opportunity to develop novel payment method. In this context (Baliyan et al., 2023) The motive behind the development of UPI is to promote the cashless system in the country, as UPI is developed as a platform which allows customers to pay from their bank account easily by scanning a QR Code or through the Virtual UPI address of the receiver. The transactions done via UPI are settled in real-time without any delay and the bank charges no amount for using this service.(T. T. T. Pham & Ho, 2015) These days, banks and e-commerce sites collaborate to offer cutting-edge payment choices. The recent advancement of UPI has enabled the emergence of mobile payment services. (Ming-Yen Teoh & Lin, 2013) The primary goals of e-payments are to reduce transaction costs and increase user convenience.

Even while cash is still widely accepted and is embedded in our behaviours, (Kirmani et al., 2022) UPI Payments are quicker and easier because they save time and effort. With the development of technology and people's increased adoption of smartphones, the banking and payment sectors of the global economy are undergoing several transformations. (Iman, 2018) Mobile phones have created such a huge prospect for financial growth, and it is predicted that they will increasingly be used as a tool for conducting different financial activities.

Around the world, there have many new mobile payment services launched. According to (Capgemini World's Payment Report, 2023) Digital wallets, electronic fund transfer, digital money, and QR payments projected by 2027 would account for about 30% of total volume. (Pham & Ho, 2015) Mobile payment services as adopted by the consumers more rapidly as the consumers are accomplished by its quick payment services.

(Jünger & Mietzner, 2020) The rise of mobile payments has ushered in a period of digital change. (Potrich et al., 2018) There is a considerable association between the gender of consumers and financial awareness as with a higher proportion of men among individuals digital adaption is more. (Bongomin et al., 2018) The way that the underprivileged use and access payment systems like electronic payments, e-banking, and mobile banking is significantly impacted by financial literacy and inclusion.

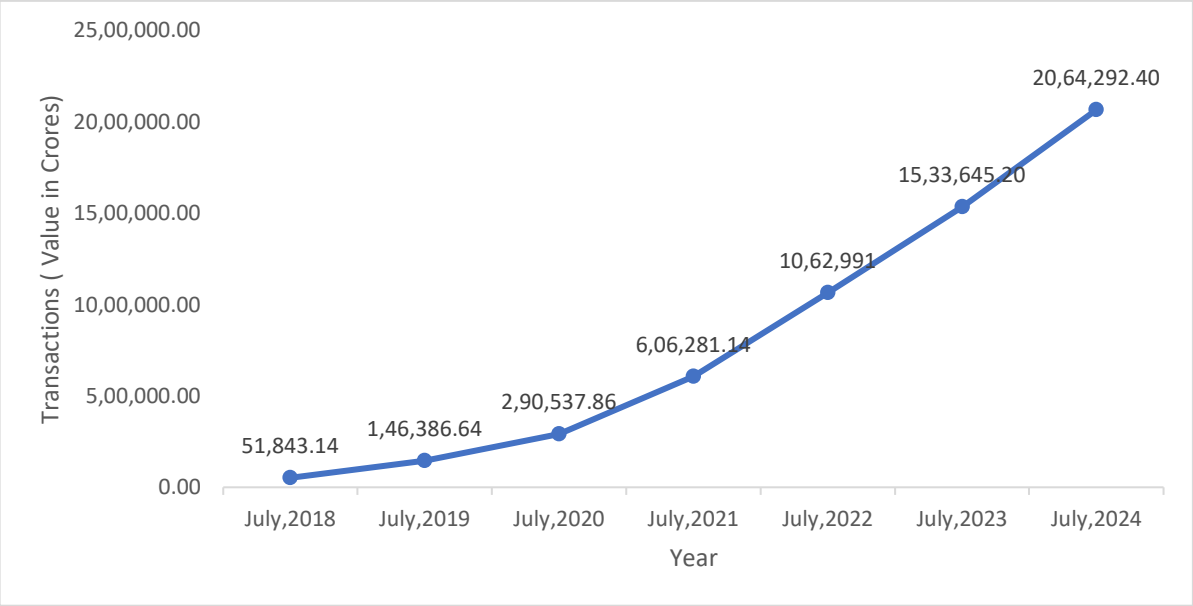
UPI has accomplished numerous achievements since its introduction, as per data released by NPCI (UPI Product Statistics, 2023) Since UPI has expanded quickly, its success may be seen in the sheer volume of its users. In September 2022, there were over 6.7 billion transactions worth over ₹11.16 trillion value which has been increased to over 10.55 billion transactions worth over ₹15.79 trillion value in September 2023. This figure is rising with time as it has reached as people in India adapt to UPI more rapidly. (Liébana-Cabanillas et al., 2014) The latest technological advancements (Internet, social networks, mobile phones, etc.) have changed the payment methods utilised in commercial operations within the past several years. Through a virtual payment address or simply the recipient's mobile number, UPI is a seamless platform that enables real-time fund transfers without any delay or fees.

UPI platform serves as a simple and unique platform to accept payments as it does not require the receiver's personal information such as Account number, Bank details and IFSC code. Payment via UPI can made through a virtual address, QR code or mobile number of the recipient and the payments are settled without any delay to the receiver account.

Customers using UPI platforms can conduct transactions from numerous bank accounts using a single UPI application, and they can also access multiple bank accounts from such app. Additionally, UPI platforms make payments simple by granting a VPA so users of e-commerce apps and websites never have to divulge their card or account information.

Growth of UPI

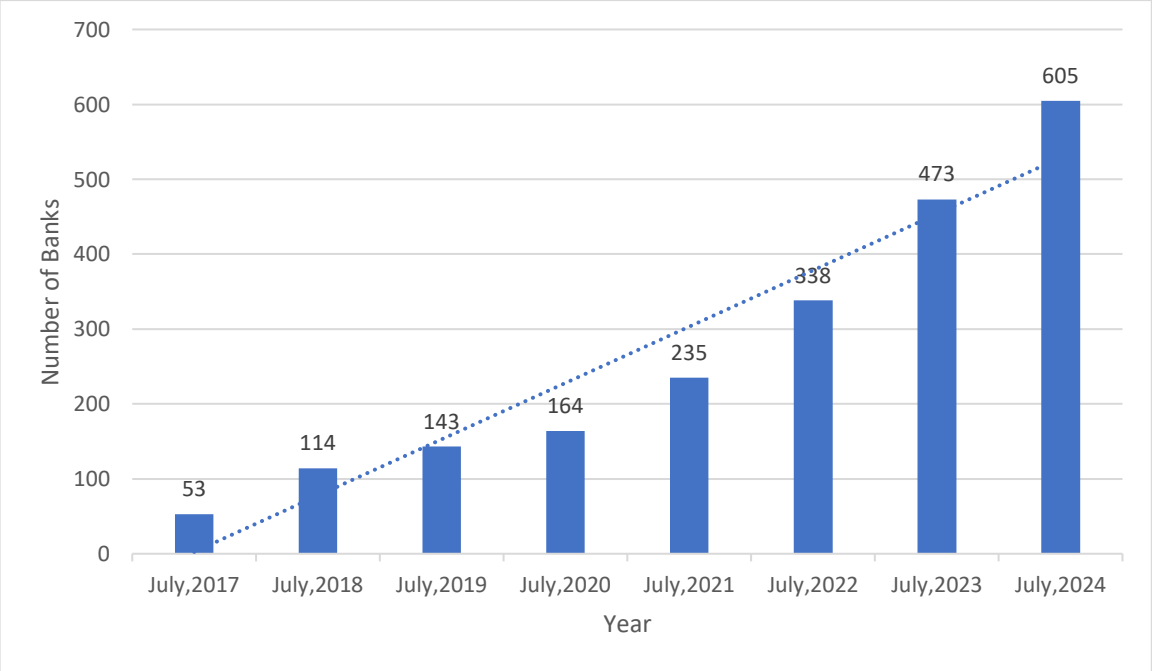
Figure 1 – Transactions Performed on UPI (Value in Crores)



Source: NPCI

Figure 1 shows transactions performed via UPI throughout various years. As per the results, UPI usage shows an upward trend as transaction volume has increased yearly. From Rs. 51483.14 Crores in July 2016 to Rs. 20,64,292.40 Crores in July 2024. As UPI is developed by keeping today's generation's requirement of instant payment and settlement it is witnessing an upsurge. As user can easily pay via UPI by scanning a QR Code or by mobile number.

Figure 2 – Number of Banks registered on the UPI Platform



Source: NPCI

The number of financial institutions registered on the NPCI, UPI platform is gradually increasing from 21 banks in 2016 in the introduction year the number of banks offering UPI services reached 605 banks and financial institutions in 2024 showing a high upsurge. UPI in India is rapidly expanding as compared to other payment platforms as it offers seamless payments in one tap through a QR code or mobile number of the recipient.

Numerous payment platforms, like Paytm, PhonePe, and Google Pay, are crucial to the widespread growth of UPI service in India. In India, merchants have a favourable perception towards the UPI as it provides merchants with a simple platform to accept payment from customers just through a QR Code and the payment received is instantly settled into their bank accounts.

Review Of Literature & Hypothesis Formation

Perceived Usefulness

(Davis, 1989) Customers' inclination to use mobile payments was found to be positively influenced by perceived utility. (Hunafa et al., 2018) consumers' intentions towards the usage of a particular product are derived from its usefulness. (Latef et al., n.d.) A person's intention to use electronic banking services is largely determined by their perception of its utility. Research on digital payments and mobile banking demonstrates that intention to utilize these services is positively correlated with their perceived usefulness. Hence the following hypothesis has been framed.

H1: Perceived usefulness positively associated with intention to use UPI service.

H2: Perceived usefulness positively associated with actual usage of UPI service.

Facilitating Conditions

(Chawla & Joshi, 2021) "Facilitating conditions" are those that aid in the acceptance of emerging technologies and include technical supplies' accessibility, affordability, and usefulness. Zasuwa & Wesołowski, 2023) A wide range of complicated elements, such as infrastructure and access-related issues, industry-specific Internet banking aspects, and the adoption of mobile payment services is influenced by several socioeconomic factors. These can include factors like the cost of mobile, laptop or PC and data tariff rates, speed of internet services, information, and familiarity with technology etc. (Kirmani et al., 2022) It makes sense to believe that having favorable FC will increase one's propensity to use mobile banking services. services. Hence the following hypothesis has been framed

H3: Facilitating conditions are positively associated with intention to use UPI service.

H4: Facilitating conditions are positively associated with actual usage of UPI service.

Ease of Use

An easy payment platform is very helpful in making payments and UPI is developed in the same manner by providing seamless payment through a QR code or mobile number. (Davis, 1989) claim that the perceived utility and ease of use of a technology have a significant impact on its usage. (Latef et al., n.d.) According to their study, convenience of use positively and favourably influences consumers' intentions to utilise online banking. Hence the following Hypothesis has been framed. UPI offers a seamless platform to pay via VPA, QR code or the mobile number of the recipient, and the platform is simple to make payments with two-factor authentication.

H5: Ease of use is positively associated with intention to use UPI service.

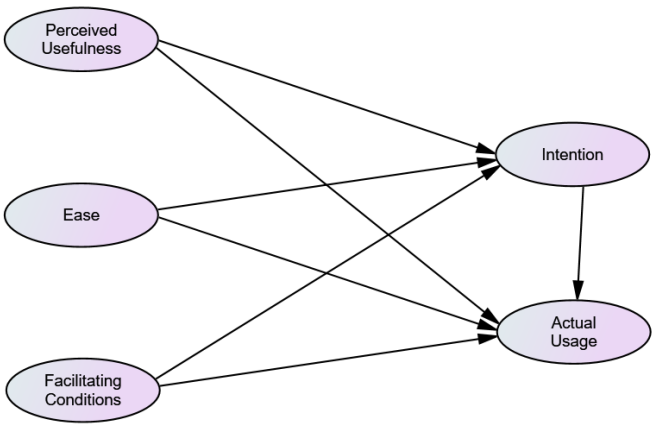
H6: Ease of use is positively associated with actual usage of UPI service.

Actual Usage

(T. T. T. Pham & Ho, 2015) Mobile-based technology is duly adopted with the advancement in technology**.** As with the increasing digital adaption and increase in smartphone usage consumers have more favourable behaviour towards e-banking and online payments. (Karsen et al., 2019) found that consumers' intentions and actual usage are part of the most of studies. Hence the following hypothesis has been framed.

H7: Intention to use the UPI service is positively associated with the actual usage of the UPI service.

Figure 3: Proposed Conceptual Model



Research Methodology

For this study, data was gathered using a well-structured questionnaire designed to capture relevant information from participants. The respondents were selected using a convenience sampling method, which involved choo sing individuals who were readily available and willing to participate. The questionnaire was distributed to around 400 respondents and it received 254 responses from which 239 were deemed usable. Based on a review of the literature on UPI, internet banking, and mobile wallets, this study proposes a conceptual framework that considers Perceived Usefulness, facilitating conditions, Ease of Use, and their association with intention to use UPI and actual usage of UPI as a payment platform It also examines the results of consumers intention to use UPI platform with their actual usage of UPI. For the study, the questionnaire is derived from scales of:

Table 1: List of Model variables:

1.	Perceived Usefulness (PU) (Bhattacherjee & Premkumar, 2004; Di Pietro et al., 2015)
2.	Ease of Use (EU) (Teoh et al., 2013; Venkatesh & Bala, 2008; Karahanna et al. 1999,)
3.	Facilitating Conditions (FC) (Latef et al. 2019)
4.	Intention to use (IU) (Di Pietro et al., 2015; Venkatesh & Bala, 2008)
5.	Actual Use (AU) (Latef et al. 2019)

Data Analysis & Interpretation

Table 2: Demographic Profile of Respondents

		Frequency	**%**
Gender	Male Respondents	104	43.51%
	Female Respondents	135	56.49%

Age-group	Below 18 years	34	14.22%
	18-24 years	59	24.69%
	25-30 years	73	30.54%
	30-36 years	46	19.25%
	Above 36 years	27	11.30%
Level of Education	Intermediate	21	8.79%
	Graduate	67	28.03%
	Post Graduate	105	43.93%
	M.Phil & Ph.D	46	19.25%

To facilitate the investigation, a meticulously designed questionnaire was distributed to a sample of 400 participants. The survey generated 254 responses in total, with 239 deemed appropriate for inclusion in the current study. Out of a total of 239 responses, 104 were provided by male respondents, while the remaining 135 were contributed by female respondents.

Concerning the age distribution, it is seen that 30.54% of the participants fall within the 25-30 years age bracket, followed by 24.69% in the 18-24 years category, and 19.25% in the 30-36 years age range. The majority of respondents, comprising 43.93%, possessed a post-graduate level of education, while 28.03% had completed their graduation.

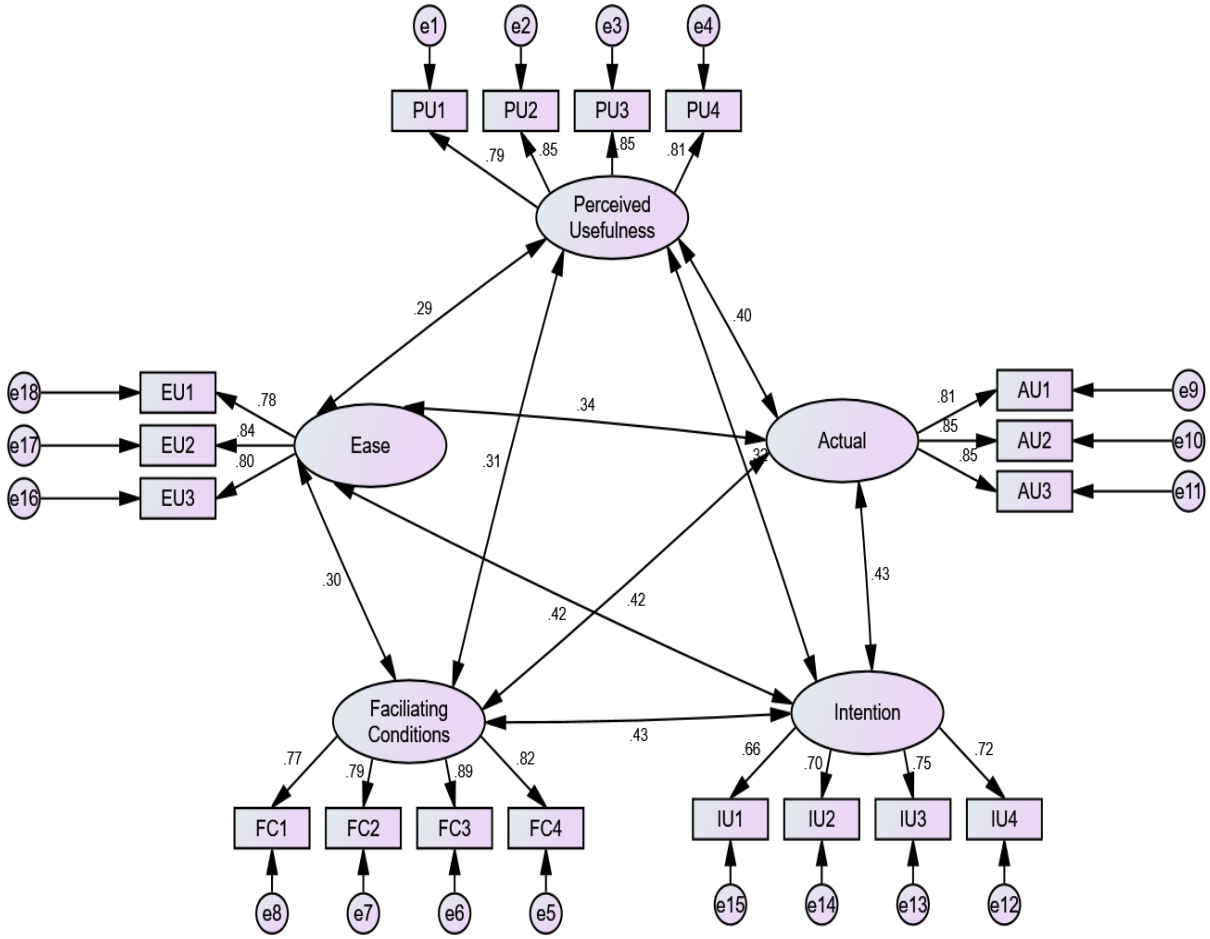
Table 3: Summary of Confirmatory Factor Analysis

Variable		Factor Loading	Cronbach's Alpha	CR	AVE
Perceived Usefulness	PU1	.855	.892	0.925	.799
	PU2	.878			
	PU3	.837			
	PU4	.806			
Ease of Use	EU1	.833	.845	0.907	.764
	EU2	.852			
	EU3	.850			
Facilitating Conditions	FC1	.821	.889	0.923	.751
	FC2	.818			
	FC3	.865			
	FC4	.835			
Intention to Use	IU1	.706	.798	0.868	.622
	IU2	.737			
	IU3	.838			
	IU4	.733			
Actual Usage	AU1	.830	.875	0.923	.799
	AU2	.881			
	AU3	.819			

Source: Author's own Calculation

(Hossain et al., 2020) KMO measurements is used to establish the sampling efficiency that was used to assess if the responses acquired from the sample were sufficient or not. According to (Cerny & Kaiser, 1977) values higher than 0.8 are regarded as favourable, meaning that component or factor analysis will be beneficial for these variables. The value of KMO for the above variables calculated is 0.860 which shows data is favourable for further study. Strong convergent validity is confirmed by AVE being more than the 0.5 threshold for every construct. (Ruvio et al., 2008) the loading of related measurable variables is represented by the average extracted variance, which acts as a measure of the convergent validity and (Chin, 1998) the degree of correlation of different indicators for a variable of the latent variable. (Fornell & Larcker, 1981) suggested that the Cronbach's alpha value should exceed 0.8. and it was discovered in our investigation to be greater than 0.8. The highest value is observed for Perceived Usefulness (PU) (0.892), indicating a high level of reliability for that construct.

Figure 4: Measurement Model



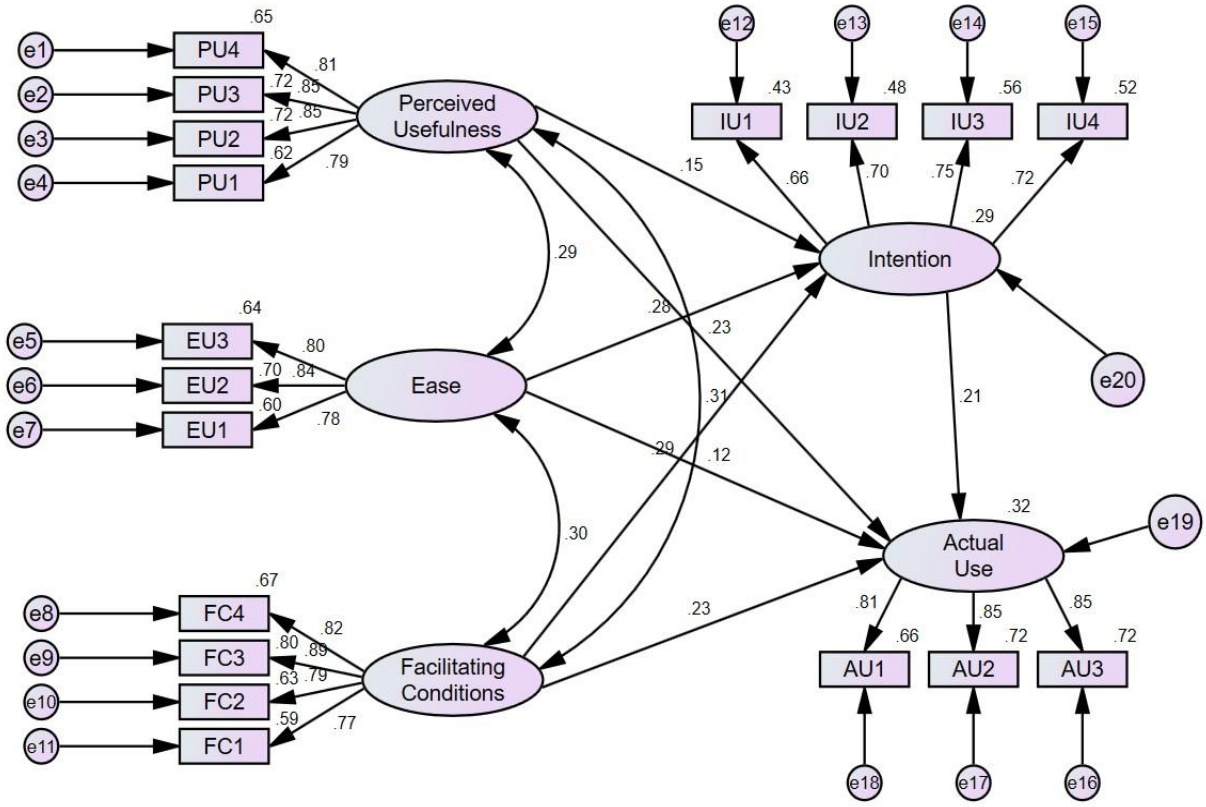
Source: Author's Own Calculation

Table 4: MODEL FIT

Model	CMIN/DF	CFI	GFI	AGFI	TLI	RMSEA	RMR
CFA	1.066	.996	.944	.924	.995	.017	.035

The model fit data, evaluated using SPSS AMOS, is presented in Table 4. According to the study conducted by Hair, Black, Babin, and Anderson (2010). A fitting model is considered satisfactory when the CMIN/DF value is less than 5, as indicated by the goodness-of-fit indices proposed by (Tucker & Lewis, 1973) where the Tucker and Lewis (TLI) index should exceed 0.90, and by (McDonald & Ho, 2002) where the Confirmatory Fit Index (CFI) should exceed 0.95. (Klem, 2000) In addition, a filling model is considered appropriate if the standardized root mean square residual (RMR) computed value is less than 0.05 and the root mean square error approximation (RMSEA) in AMOS is 0.35 which is less than 0.05 suggesting a good fit. Table 4 presents the fit indices of the structural model, indicating that all values are within the acceptable range: CMIN/DF = 1.066, CFI = .996, AGFI = .924, GFI = .944, TLI = .995, RMSEA = .035 & RMR = 0.017. The values of GFI & AGFI are close to 1 indicating a good model fit and the PGFI which accounts for model parsimony is also reasonable. As all values lie in the acceptable range, the structured model represents a better fit of the data. The Chi-square is non-significant and other fit indices (Klem, 2000; McDonald & Ho, 2002; Tucker & Lewis, 1973) are above the acceptable thresholds. The model is also parsimonious which is important in model evaluation.

Figure 5: Result of Structural Equation Model



Source: Author's own Calculation

Table 5: Variance Explained (R^2)

	R-square	R-square adjusted
AU	0.244	0.234
IU	0.252	0.239

The model explains 24.4% of the variance in Actual Usage (AU) and 25.2% of the variance in Intention to Use (IU), indicating moderate explanatory power. (Hair et al., 2011) However (Raithel et al., 2012) But acceptable R2 values depend on the situation; in certain fields, a number as low as 0.10 is deemed adequate.

Path Analysis Results

The relationship of PU, EU, and FC on IU & AU towards the UPI platform was evaluated in this study. Perceived usefulness is positively associated with the actual usage of the UPI platform as per the path analysis results (b =.222, t = 3.249, P value =.001) and is also positively associated with the use of the UPI platform, according to the path analysis results (b =.106, t = 1.971, P value =.049) This suggests that users who find UPI useful are more likely to intend to use it and use it. Additionally, as shown by b =.220, t = 3.505, and P value =.***, ease of use and intention to use the UPI platform are positively associated but the ease of use is not positively associated with the actual usage of the UPI platform as per the path analysis results (b =.120, t = 1.516, P value =.129). As evidenced by b =.234, t = 3.709, and P value =***, facilitating conditions are positively associated with the intention to use UPI services and are also positively associated with the actual usage of UPI as a payment platform as b =.244, t = 3.029, and P value = 0.002 highlighting the importance of available resources and support in driving UPI adoption. The results also show that the Intention to use UPI services is positively associated with the actual usage of UPI services by respondents as b =.284 t = 2.474, and P value =0.013. As per the result of path analysis, Table 6 data confirm H1, H2 H3, H4, H5 & H7 are accepted, while H6 was rejected since its P value is more than 0.05 significance level.

Table 6: Result of Structural Equation Model

			Estimate	S.E.	C.R.	P	Results
Intention	<--	Perceived Usefulness	.106	.054	1.971	.049	H1: Supported
Intention	<--	Ease	.220	.063	3.505	***	H5: Supported
Intention	<--	Facilitating Conditions	.234	.063	3.709	***	H3: Supported
Actual Usage	<--	Intention	.284	.115	2.474	.013	H7: Supported
Actual Usage	<--	Perceived Usefulness	.222	.068	3.249	.001	H2: Supported
Actual Usage	<--	Ease	.120	.079	1.516	.129	H6: Rejected
Actual Usage	<--	Facilitating Conditions	.244	.081	3.029	.002	H4: Supported

Conclusion

The present research investigates the variables that impact the inclination of Indian consumers to utilise UPI payment systems. Our research's objective is to examine, using a structural equation model and the variables that shape it, how it is associated with consumers' intention of UPI payment services. The findings of the study indicate that customers have positive intentions toward using UPI as a payment method. The intention to utilize UPI as a payment channel is positively correlated with perceived utility, simplicity of use, and enabling conditions; however, ease of use and actual UPI payment platform utilisation are not significantly correlated. The finding shows that consumers found UPI as a seamless platform for making payments as it is quick, and easy and transactions are settled in real-time. Customers no longer pay for their purchases with cash; instead, they use digital gadgets thanks to emerging technology. Small business owners and traders are benefiting from UPI since it provides them with a user-friendly interface for accepting online payments from clients using QR codes. To expand UPI services in rural areas, there is a need to create awareness among rural banking customers. Financial inclusion is being promoted worldwide by the growing use of digital payments, especially UPI, which allows for cost-free, real-time transactions. In particular in rural areas, it promotes economic growth by empowering small companies

and enabling smooth, cashless transactions, which serve as crucial for growing digitized economies and can also be adapted in western countries to provide seamless and real-time payment platforms.

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