A Study on Evolution of UPI towards a Voice Driven Payment System – From Taps to Talks

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ABSTRACT:
Indian payments environment can witness tremendous growth due to consumer's preference for using Unified Payments Interface (UPI). "Hello, UPI" is being kick started by the NPCI (National Payment Corporation of India) in August 2023 offers voice commands as a medium to users such as account balance checking and money transferring functionalities. Voice biometric may include relative level of security by nature compared to usual PINs or password.

The process of verification that only authorized users can gain access to the system would be based on each person's unique voice characteristics, therefore reducing the likelihood of phishing and fraud. Voice interfaces can be a great solution for enhancing the virtual accessibility which appeals to people who suffer from the visual impairments or simply have low technological literacy, resulting in financial inclusion improvement. While daily activities like paying bills, buying gifts, and shopping can be risky due to a combination of high volume transactions and the potential for excessive spending. This is the end age of this thorough process. Users can now deal with their own finances easily as everything is effortless and self-effective. The regional languages will unite both the concepts and will make it possible for other groups who are living beyond cities to join the digital tribe.

India is not 100%, yet voice based UPI transactions are still not entirely common, but they still hold great promise when it comes to their adoption in the future. The benefit of saying "Hello UPI" via the voice commands is anticipated by the purchasers, meaning it is going to help immensely when they have a lot of things to manage at once. Transactions become until they have lightened the burden.

This Study explores into the emerging potential of integrating voice interfaces with UPI, paving the way for a future of "conversational commerce." The study also looks into the issue of how widely known, perceived by customers and the potential of voice enabled UPI transactions in India. Technically, the research goals are to study user attitude to voice enable UPI and highlight where voice payment may create a new currency mode of financial transaction in the future.
Keywords: *Voice Enabled Payments, UPI, Digital Wallets, User Adoption and User Experience.*

INTRODUCTION:
The widespread adoption of Unified Payment Interface (UPI) is driving a significant transformation of India's financial sector. The Digital payments has indeed taken the financial management to the new level of comfort and security, compared to the old cash based transactions. Acknowledging that UPI holds the promise to be the future, NPCI introduces "Hello, UPI" to the market in August 2023. This initiative applies voice commands giving customers a chance to use functions such as balance checks and money transfers by just pronouncing spoken commands. Such a switch towards voice enabled UPI transactions will opens a lot of opportunities which are equally exciting. However, voice biometrics with its unique security advantages compared to other physical passwords (PINs or passwords) are ready to be adopted. Verification of an individual only by means of his own voice signature highly reduces the chance of impersonation and fraudulent activities,

which is the case while phishing. This means that not only is overall security of the system improved but also users develop more trust and confidence in the system.

To begin with, voice interfaces enable for a financial inclusion enhancement in the future. People with visual impairments and those who are not technologically literate will now be able to be part of the digital economy and will be in a better position to compete. It is voice activated transaction that gives them the ability to run their finances on their own, which in turn leading to a more inclusive financial ecosystem. The digital finance revolution is not only individual owned but also importantly it gives room to other categories of the society to participate in the digital financial management. In spite of that, mastering the online world demands taking on digital hazards. As a result, everyday tasks like payment of bills, shopping, and gifting needs are often exposed to financial challenges such as reckless spending when dealing with a high volume of transactions or the possibility of being impulsive. The risks should be minimized through adequate knowledge of the patterns of user's behaviour and creating a system that has reliable protection mechanisms.

Authenticity of voice-based UPI transactions in India now being at its dawn, it is very likely that in the nearest future these transactions will be in high demand among the population. Imagine a situation where "Hello, UPI" just takes care of all financial matters in a way that a user must not even bother as there are too many other things to do. Speech based transactions gently blend into our lives hence addressing problems like manual processing which can be solved by this more intuitive and effortless way to do financial transactions.

This study talks to a number of reasons. For example, user behaviour is gradually trending towards devices and technologies that are easy to use and require no confirmation from the consumer. The voice interfaces could be the perfect tool which is not only better complementing the existing methods of payments, but also getting rid of the conventional interfaces which are not suitable for some people who have difficulties with traditional methods. Voice biometrics might give an added layer of security compared to the traditional PINs or passwords which might be the case in cases of reducing fraudulent transactions. On the surface, user perception can further reveal the biggest hurdles the users go through, such as data breach or internet connection instability. This approach will enable avoiding some critical problems and so building the system that will be more user-friendly and evidence-based. In the long run, the user experience as well as their needs have to be the focus in creating a digital payment system of the future which will prove to be easy and reachable and also secure and inclusive for all the Indians.

This study indeed concentrates on the emerging interconnections which can be brought about by combining voice interface with the existing UPI platform. One of the main objective is to investigate the potential of a world where commerce is conducted through chatting (conversations commerce), which implicitly connects our financial activities with day-to-day communications.

NEED OF THE STUDY:
This study is centred on an innovative method of using UPI in combination with voice commands as an optional yet convenient input method. It is significant because people are changing their preferences so as to shift more towards the easier and hands free modes of payment but voice payment could help with the speed of the transactions. It can facilitate people with disabilities to be part of the digital economy without any limitations. On the security front, the voice recognition also might be even more secure than PINs or passwords. From user considerations to user needs and concerns, the research findings can be used to build a system of voice payments that is secure, user friendly and widely accepted. This will work in favour of those who are connected to the system–banks, fintech companies, and policy makers as well as the citizens of India who can now perform financial transactions more conveniently, securely and readily.

SCOPE OF THE STUDY:
The objective of the study involves investigating the extent to which individuals in India do recognize and probably grab voice enabled UPI payments. In order to attain this, the study will be addressing a large number of participants from age, geographical location and occupation to gather a wide variety of responses from the respondents. I have used a survey method with a series of closed-ended questions and multiple-choice options to maximize data collection that can be easily analysed statistically. The survey would mainly be guided by several key issues. It will do the first step which is know the people how well they know voice-enabled UPI. This study aims to examine how people perceive and assess voice-enabled

UPI technology. While not fall in the details of the technology, as it should be created by specialists. In addition, even with the most comprehensive of studies, undertaking a study which captures each and every preference from each of the sections and demographics in India would be a big challenge. This can mean that all the variations in user opinions could go unnoticed at the scale of respondents.

OBJECTIVES OF THE STUDY:
1. To assess user awareness and perception regarding voice enabled UPI transactions.
2. To identify user preferences for payment methods (traditional vs. voice-enabled) and to analyse factors influencing user willingness to adopt voice enabled UPI.
3. To examine user concerns related to security and privacy in voice activated transactions.
4. To evaluate the potential impact of voice based payments on user experience and accessibility.

REVIEW OF LITERATURE:
A kumar, RK Choudhary, SK Mishra, R Bansal (2022) in their research article titled **" The Growth Trajectory of UPI-Based Mobile Payments In India: Enablers And Inhibitor"** mentioned that full extent of the UPI payments development impulses illustrating the challenges that slow down their current global potential. The study also lays significant emphasis on the technicalities, regulatory frameworks, and economic forces vital in shaping the success and failure of UPI payments mechanisms. They analyze the essence of these policies by example of demonetization that shut down the most of the currency in circulation and Digital India campaign which set up the right platform for digital payments and finally the UPI for its growth. In addition, there is an emphasis on the role of smartphone numbers, internet connectivity and the emergence of fintech companies as significant driver of mobile UPI payments adoption.

The article entitled **"Voice Payments in Local Language bridge an edivide"** being published in **Economic Times**, showcases the new phenomenon of voice enabled payments and its effectiveness in narrowing digital divide especially in rural areas by enabling people transact in their vernacular. The Economic Times, which is one of the major Indian newspapers focusing on finance and business, writes about voice based payments systems which are reinventing the way people carry out their activities with digital financial services in particular for those people who may have limited education or skills in technology. The article featured might be centred on the contribution of strategic partnerships among technology enterprises, banks, and government stimulus programs in facilitating the popularity of voice based payment solutions to bring forward the concept of financial inclusion and healthy financial transactions in any language and place in India. It could also review the hindrances as well as prospects that are accompanied by the shift towards voice payments, such as security problems, good user experience and regulations. The entire article enlighten the revolutionary power of voice-enabled payments through the process of enhancing digital literacy, making financial transactions convenient accessible and uplift of economic status in India.

Dr. Shweta Shah, Dr. Vandana Ahuja (2022) in their article titled **"A Comparative Research on Respective Adaptation of UPI and mobile wallets from the Perspective of Indian Customers"** provides a precise empirical review on how the UPI and mobile money (mobile wallet) adoption has been various among Indian consumers. The authors seek to explore the key determinants of consumer's choices and preferences in the use of digital payments versus these two well-known payment choices that are re-shaping digital finance landscape in India. The findings of the study inform the country's authorities about the links or barriers to the adoption of the digital payments and this in turn gives valuable insights to the policymakers, financial institutions, and businesses for the purpose to enhance the rates of adoption and financial inclusion in the country.

Mohammad Shahid and Fahad (2022) in their article titled **"Exploring the Determinants of Adoption of Unified Payment Interface (UPI) in India: A Study Based on Diffusion of Innovation Theory"** uses the diffusion of innovations theory to identify how those factors in charge of directing UPI adoption in India are, the theory which exposes the factors. They also focuses on the empirical research and analysis to determine the factors influencing the adoption of UPI in India. The study uses a theoretical perspective where innovation diffusion serves as a basis to explore the agent and hindrances of UPI adoption.

Ritika Bhat and Shivank Singh Chauhan (2023) in their article titled **"Analysis of the UPI's (Unified Payments Interface) adoption criteria and trust Variables: Insights from Retailers and Consumers across Low and Middle income communities"** scrutinize the issues related to the analysis of the adoption of the UPI and the importance of trust. The report puts forth the different elements that bring about UPI acceptance and adoption; cause of which are mainly needed usefulness, ease of use and trust in UPI. Through the identified factors of adoption and the complexity of their interplay with trust, the authors offer us with the complicated dynamics that intimately affect the adoption of digital payment schemes such as the Unified Payments Interface (UPI). This research further explains the core principles which guide the adoption of UPI and reveals the role of trust that plays an import role in user's acceptance of the service in the process.

Nagavali Patelkhana, Gowri Sankar Komma in their article titled **"perception of the students towards unified payment interface services"** focus on the role and outlook of UPI service in the Indian e-transaction arena. The research discusses different sides of UPI in such as the app's functionality, reasons for its popularity, and challenges it might face in the era of card payments. The paper, deals with the impact UPI makes and how it should be regarded with respect to financial inclusion and racial prosperity in India.

The article titled **"How Does AI-Driven Voice Payments for UPI Process Allow India's Digital Payments",** published on **IndiaAI.gov.in (2023)** talks about the impacts of payments on the UPI transactions in India. It examines the upward revolution of the payment system, where voice enabled payments will completely change the landscape of digital payments system of the country. Through the adoption of AI technologies such as NLP (Natural Language Processing) and ML, voice payments are set to improve not even accessibility, convenience, and security capable to let users while conducting UPI transactions. The article focuses on the advantages, drawbacks, and future trends relating to the integration of voice enabled payments and the role of such payment technology in increasing financial literacy as well as creating digital money in India.

Gaurav Tyagi, Hrishikesh Jagadale, and Nilesh Anute (2022) in their article titled **"A Study on Digital Payment Applications in India"** Digital payment applications are fast becoming a major part of our financial system. The authors investigate all the important and relevant aspects of digital payment platforms, such usage patterns, adoption, technological advancements, challenges and opportunities that are linked to Indian context. This study has the immense value in the consideration of the evolving digital payments system, and the factors that influence the introduction and adoption of the users, enabling the understanding of their attitudes and preferences, as well as of the general effect of digital payments to the country's economy.

RESEARCH METHODOLOGY:

DATA COLLECTION: The study adopts a systematic approach and relies on primary data collection through structured questionnaires distributed to a sample of 435 respondents. Random Sampling method was used for the purpose of data collection. The data collected reflects a blend of responses based on the age, gender, educational qualification, etc.

PRIMARY DATA: The study involved 435 participants from diverse sectors, who were surveyed via an online platform. The survey questions are framed based on awareness and perception regarding voice enabled UPI transactions and to Identify user preferences for payment methods (traditional vs. voice-enabled) and to analyse factors influencing user willingness to adopt voice enabled UPI.

SECONDARY DATA: Data for this study has been gathered from a range of sources, including academic journals, websites, and relevant books in the field.

SAMPLE SIZE: The sample size is 435

SAMPLE TECHNIQUE: Sample random technique is implemented.

ANALYTICAL TOOL: The collected data has been applied Correlation & Chi-square test, Multiple Regression Analysis.

ANALYSIS:

H₀: There is no significant relationship between Gender and comfort level with using voice commands to authorise financial transactions.

H₁: There is a significant relationship between Gender and comfort level with using voice commands to authorise financial transactions.

Symmetric Measures		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Interval by Interval	Pearson's R	.022	.048	.459	.647[c]
Ordinal by Ordinal	Spearman Correlation	.022	.048	.459	.647[c]
N of Valid Cases		435			

TABLE: 1

Interpretation: Based on the data presented in Table-1, the correlation test yielded a Pearson's correlation coefficient (r) was 0.022 with a significance level (p-value) of 0.647. since the p-value is greater than significance level of 0.05($\alpha = 0.05$), we fail to reject the null hypothesis. This proves that gender has nothing to do with how having same or higher comfort with voice commands to make financial transactions. However, no matter that respondents are male or female, they all tend to have a positive attitude to adapt to the voice enabled UPI transactions.

H₀: There is no significant association between age group and likelihood of adopting voice enabled UPI for future transactions.

H₁: There is a significant association between age group and likelihood of adopting voice enabled UPI for future transactions.

Chi-Square Tests	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	375.223[a]	2	.000
Likelihood Ratio	420.221	2	.000
Linear-by-Linear Association	42.298	1	.000
N of Valid Cases	435		

TABLE: 2

Interpretation: Based on the data presented in Table-2, the chi square test yielded a Pearson chi square statistic of 372.223 with a significance level (p-value) of 0.000. Since the p-value is greater than the significance level of 0.05 ($\alpha = 0.05$), we fail to reject the null hypothesis since all p-values are less than the significance level of 0.05, we reject the null hypothesis and conclude that there is a significant association between age group and the likelihood of adopting voice enabled UPI for future transactions. This implies that different age groups are varying to adopt voice-enabled UPI, suggesting the importance of considering age-related factors in strategies aimed at promoting the adoption of this technology.

H₀: There is no significant difference in the preferred method of digital payments across different education levels.

H₁: There is a significant difference in the preferred method of digital payments across different education levels.

ANOVA				
	Sum of Squares	df	Mean Square	F	Sig.

Between Groups	61.135	1	61.135	250.185	.000
Within Groups	105.808	433	.244		
Total	166.943	434			

TABLE: 3

ITERPRETATION: From the above table: 3 F value 250.185 indicates, there is a significant difference between group means. The p- value 0.000 is less than 0.05, suggesting that the result is statistically significant. Hence, we reject null hypothesis. Thus, respondent's educational levels have a significant impact on preferred method of digital payments.

PROBLEM 1: The study seeks to investigate the user concerns related to security and privacy in voice activated transactions and the potential impact of voice based payments on user experience and accessibility.

H_1: There is a significantly positive impact on user concerns related to security and privacy in voice activated transactions. A6

H_2: There is a significantly positive impact of voice based payments on user experience and accessibility. A7

H_3: There is a significant positive impact on factors influencing user willingness to adopt voice enabled UPI. A8

The dependent variable (likelihood of adopting voice-enabled UPI) was regressed on predicting variables of familiarity, perceived security and confidence in voice recognition technology. The independent variable significantly predict familiarity of voice enabled UPI transactions, $F_{(3,431)} = 12544.950$, $p<0.001$, which indicates that the three factors under study have a significant impact on adoption of voice enabled UPI. Moreover, the $R^2 = 0.897$ depicts that the model explains 89% of the variance in voice enabled UPI transactions.

Additionally, coefficients were further assessed to ascertain the influence of each factors on the dependent variable (adoption of voice enabled UPI transactions). H_1 evaluates whether there is a significantly positive impact on user concerns related to security and privacy in voice activated transactions. The results revealed that there is a positive impact user concerns related to security and privacy in voice activated transactions. ($B = 0.468$, $t = 23.903$, $p= 0.000$). Hence H_1 was supported. H_2 evaluates that there is a significantly positive impact of voice based payments on user experience and accessibility. The results revealed that there is a positive impact on adoption of voice enabled UPI ($B = 0.227$, $t = 10.279$, $p = 0.000$). Hence H_2 was supported). H_3 evaluates that there is a significant positive impact on factors influencing user willingness to adopt voice enabled UPI. The results revealed that there is a positive impact on willingness to adopt voice enabled UPI. ($B = 0.265$, $t = 10.966$, $p = 0.000$). Hence H_3 was supported. The results are presented in Table- 4.

Table-4

Hypothesis Results

Hypothesis	Regression weights			B	t	p- value	Results
H1	AVE UPI	→	S&P	0.468	23.903	0.000	Supported
H2	AVE UPI	→	UE&A	0.227	10.279	0.000	Supported
H3	AVE UPI	→	WA	0.265	10.966	0.000	Supported

Note: *$p<0.05$. AVE: Adopting voice enabled UPI, S&P: Security & Privacy, UE&E: User Experience and Accessibility, WA: Willingness to adopt.

Overall, the study indicates that user concerns related to security and privacy, user experience and accessibility, and factors highly influencing user willingness to adopt have significant positive impacts on the adoption of voice enabled UPI transactions.

PROBLEM 2: To assess user awareness and perception regarding voice enabled UPI transactions.

H_1: There is a significant relationship between awareness and perception regarding voice enabled UPI transactions.

Correlations		V5	V6
V5	Pearson Correlation	1	.736**
	Sig. (2-tailed)		.000
	N	435	435
V6	Pearson Correlation	.736**	1
	Sig. (2-tailed)	.000	
	N	435	435
**. Correlation is significant at the 0.01 level (2-tailed).			

TABLE: 5

Interpretation: From the above table: 5 Pearson correlation of awareness and perception was found to be moderately positive and statistically significant (r=0.736, p=<0.01). Hence H_1 was supported. This shows that an increase in awareness would lead to positive perception among the users.

FINDINGS:

- On the regression analysis, three variables were seen to be major predictors of voice-enabled UPI transaction adoption like, familiarity with voice recognition, perceived security, and confidence in voice recognition technology and together they accounted for 89% of the variance in adoption behaviour.

- Results showed the assumption of the relationship between the consumers' concerns about security and privacy (S&P) to the possibility of adopting voice enabled transactions, voice-based payments were good for UE&A, a factor contributing to user adoption and willingness factors influencing user willingness to adopt.

- Correlation between the awareness and perception indicated a moderate positive statistical significant relationship (r=0.736, P<0.01), showing that the increased awareness was positively related to the more positive perceptions among users.

- The study has underlined the security and privacy aspect of users, the need to make the system user friendly and flexible and the necessity to create the market awareness when it comes to voice enabled UPI transactions.

- The finding of the study emphasizes the need to have different parameters, as ease of accessing, acceptance to use, knowledge, and perception considered when designing and implementing voice automation systems in the UPI.

- User awareness and perception of voice-enabled UPI transactions have a direct link. Rise in awareness results in more favourable user opinion.

- Three main factors influence user adoption of voice-enabled UPI, like voice recognition technology, perceived security, and trust in the technology.

- The available voice-controlled UPI can improve user experience and accessibility especially to people with disabilities or those who have problems with traditional mode of paying.

- The study has underlines technical restrictions, such as speech recognition errors and language problems, can interfere with the smoothness of the service.

- Correlation between Awareness and Perception was found to be positive and to some extent, associated with user awareness and the perception regarding voice-enabled UPI transactions. People became highly conscious and also formed positive opinions about voice-enabled UPI transactions.

CONCLUSION:

The main goal of "Hello! UPI" from NPCI is to turn UPI users into a crowd that objectively accept the benefit of voice assistant in UPI transactions. By this, people will find it easy & enjoyable to use voice assistant for UPI transactions. Besides, the banking apps might have their own voice assistants which will allow consumers without having to increase all the functions on their apps. For this reason, the app or the website platform doesn't require the user to make any changes in the process. Through analysis of user references and opinion, stakeholders can design voice assisted remittances that are safe, simple to use, and widely accepted facilitating the enabling and diversifying digital payments ecosystem in India. While the research reveals the benefits of voice based UPI services, it also highlights some significant barriers that need to

be considered in embracing and ensuring widespread success of the service. The issue of security and privacy that is always seen as a major warning factor to the adoption of voice enabled payment systems should be addressed first. Although voice biometrics personalizes the authentication process, however, some people have concerns about the vulnerability to imposter identification and fraud. The realization of these concerns can be done in a suitable way with the introduction of effective authentication methods and continuous auditing of security protocols so as to develop trust amongst users. Moreover, technical issues being speech recognition errors or language barriers pose a cutting edge problem in the smooth functioning of voice enabled transactions. The condition of having to have internet connection and compatible devices as a requirement will further restrict the availability and convenience of the voice enabled payments through UPI in remote areas. Narrowing this digital gap by constantly working to close it is a crucial step toward developing voice enabled payment platforms. Although some detrimental aspects, like security issues, and reliability doubts, are uncovered, the trend is clear, the future of voice driven interfaces holds big promise as a payment method. User preferences that tend to move towards more effortless voice conversations, and in the process, using minimal screen cues, are besides the incremental step, proof of users growing acceptance and usage of voice-based payment systems. The results have some practical implications for everything including policymakers, financial institutions and even technology developers who are key in designing and implementation of the voice-enabled UPI system. As the voice-enabled UPI transactions continue to adapt, it casts an optimistic scenario of playing a crucial role in financial inclusion and progressively empowering the users, which may turn out a disruption in digital economy in the country of India.

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