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**An Empirical study of Unified Payment Interface (UPI)
in Indian Digital Payment System**

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Abstract:

“Faceless, Paperless, Cashless”

A significant shift in support of digital has been seen in the financial services industry. Numerous opportunities in the area of digital financial services have arisen as a result of this change. The purpose of this paper is to provide a broad picture of the contactless payment environment, drawing insights gained and addressing challenges and possibilities for the Indian mobile payments ecosystem in order to propel this vibrant and valued sector. The primary aim of this paper is to examine the future possibilities of the Unified Payment Interface and evaluate a comparative analysis between Public and Private sector banks performance in UPI. UPI's turnaround can be linked to a variety of revolutionary headwinds, including the presence of a robust infrastructure, switching expectations of customers, foresighted government actions, and technological breakthroughs. The future may see a realignment of ecosystem participants' roles and a consolidation of market players for better Financial Literacy.

Keywords: UPI, Financial Literacy, Digital Transition, Public and Private sector Banks.

Introduction

The banking system reflects the country's financial health. The banking industry is essential to the functioning

of any civilised economy. It is one of the fundamental financial pillars of the banking system, which is crucial to the effective functioning of an Indian

economy. For a country's economic growth to be productive, its financial needs for fair trade, business, and agriculture must be met with greater enthusiasm and accountability. Therefore, the prosperity of a country and the growth of banking are strongly connected. In a modern economy, banks should be seen as economic stimulators rather than money dealers. They play an important role in mobilisation of deposit and loan distribution to various economic sectors.

Banks have played an important role in India's economic progress since the country's sovereignty. In India, the banking industry dominates, more than half of all financial assets. Indian banks have been currently experiencing an exciting period of quick transformation as an outcome of financial sector reforms that are being executed in phases.

The existing operational strategy should be considered as an opportunity to reshape Indian banking services into a sound, solid, and vibrant system capable of carrying out its responsibilities smoothly and economically without putting the government at risk. Following the economic reforms of the Indian market, the government proposed a number of policy initiatives to make the banking system more economically sustainable and productive, based on the recommendations of the Narasimhan Committee.

The banking sector in India is currently undergoing significant structural reforms, as well as an increase in the use of information and communication technology (ICT). It has significant

impact on the banking sector. It enabled rapid and safe fund transfers between financial transactions by transitioning from paper to digital mode. Furthermore, technology empower the development of a wide range of E-payment platforms, colloquially known as digital payment services, the most prominent of which is UPI (Unified Payments Interface).

Review of Literature

Raharja, Sutarjo, Muhyi and Herawaty (2020) jointly made a study on Digital Payment as an Enabler for Business Opportunities: A Go-Pay Case Study. The authors propose to exemplify how cashless platforms enable market opportunities by employing a descriptive approach method and data analytical procedures from published studies. The findings show that Go-Pay encourages economic opportunities by fulfilling its mission as a digital payment solution. Furthermore, it allows consumers and merchants to tap into a large market and gain access to a variety of products and services.

Chawala, Singhal and Bajaj (2019) jointly made a study on *A Study on Awareness and Adopting of Unified Payments Interface (UPI) for Digital Payments*. The authors tried to establish folk's level of awareness of the Unified Payment Interface and the variables that impact their preference of digital payment option. This study was carried out to determine the deployment of UPI in the funds transfer framework.

Kolte and Humbe (2019) jointly made a study on *Study of UPI/BHIM Payment System in India*. Authors study the

positive impact of UPI and BHIM app on digital payment system. It was discovered that there is a slight bump in the gender divide for basic knowledge of smart phones, and students are extremely passionate regarding real-time payments and their settlement in savings accounts.

Boke and Harkare (2018) jointly made a study on Review on Unified Payment Interface Advancement towards Digitalization and Challenges Faced. Authors analysed about the challenges faced by the customers in Digitalization era. They found that UPI is not complex to understand and yet is not used which is complimenting the variable such as digital illiteracy in India. If Indian people adopt the cashless service than transparency will increase and it will help to ease the process. Thus cashless process will help in reduce the Black money.

Gupta and Bansal (2018) jointly made a study on UPI- Redefining Digital Payments- A Critical Review. The world's most advanced, original, and financially inclusive payment service, according to authors, is unquestionably UPI. The interface, which is governed by the RBI, operates by carrying out a mobile platform-based quick transfer of money between two bank accounts.

Buckley and Mas (2015) jointly made a study on The Coming of Age of Digital Payments as a Field of Expertise. Authors explains the essential contrasts between a banking perspective and a payments mind-set, as well as the historical backdrop in which both areas evolved. It starts a conversation on

whether it's appropriate to think of the digital payments area as an emerging profession separate from banking, and if so, what the essential elements of its identity may be, and how a sense of a profession might arise. Finally, it examines the major vision, knowledge, and human capacity limitations that are currently slowing the speed of progress in the digital payments field.

Objectives of the study

1. To examine UPI's place in the digital payment ecosystem.
2. To analyse the Internationalization aspect of UPI
3. Comparative analysis between Public and Private sector banks performance in UPI

Research Hypothesis

H01: Total volume of UPI transactions of public banks equal that of the private banks.

H02: For the top ten remitter and beneficiary banks, there is no significant difference in business decline prior to and after the onset of Covid-19.

H03: For the top ten remitter and beneficiary banks, there is no significant difference in Technical decline prior to and after the onset of Covid-19.

H04: For the top ten remitter and beneficiary banks, there is no significant difference in Debit reversal success rate prior to and after the onset of Covid-19.

H05: For the top ten remitter and beneficiary banks, there is no significant difference in Deemed Approved rate prior to and after the onset of Covid-19.

Research Methodology

This paper utilizes an exploratory research strategy to gather the necessary information from secondary sources such as published research works, RBI reports, NPCI website, and so on. Total of Ten Public and Private sector banks has been taken for data collection as per top Market Capitalization among BSE 100. Based on the secondary data gathered, T-Test- Levene's Test for Equality of Variances has been used for comparative analysis between Public and Private sector banks performance in UPI.

Research Gap

Research has revealed that the revolutionary impacts of using UPI in daily life are related to authenticity, awareness, nostalgia, and consumer satisfaction. Therefore, these elements might be connected. Nevertheless, there aren't many academic studies that have compared the performance of public and private sector banks on UPI-based digital platforms.

Globalization facet of UPI

E-commerce business has accelerated in India post Covid-19 pandemic. In 2021, around 180–190 million shoppers bought products via online platform. As per a study conducted by the management consulting firm Bain & Company, India's e-retail market is projected to reach \$50 billion in 2022. This makes India the world's third-largest online shopper base after US and China. Moreover, Block chain technology and Bitcoin are yet to deliver on their promise of becoming

the next big thing in global e-commerce. This had made it important for the Indian policy makers to take UPI to the global stage and facilitate payments across countries in various currencies in real time.

Strategy followed to expand UPI footprint in Europe:

- To make the payments hassle-free, NPCI International Payments Limited (NIPL) has entered into an agreement with PPRO Financial (UK based fintech firm). As per this memorandum of understanding (MoU), both companies will collaborate to expand UPI into foreign markets with focus on India and Europe.
- In January 2022, Transact365 (UK based fintech start-up) has helped UPI system with a platform for enabling real time currency conversion facility. This will help global merchants to seamlessly carry out business in India without having to source local partners. Faster payment in real time in local currency is the key focus for Transact365 platform.
- Last month (October 2022), NIPL (NPCI International Payments Limited) has entered into an agreement with Word line (French company dealing with multinational payment services) to enable UPI system in Belgium, Netherlands, Luxembourg and Switzerland.
- Indian diplomats are in discussion with their counterparts in France to enable UPI usage across French business houses.

Strategy followed in Asia and Commonwealth countries:

- Government of India is forging partnerships with countries such as UAE, Malaysia, Singapore, Nepal and Bhutan to expand the network of India's digital payment system.
- Nepal became the first country outside India to adopt UPI payment system. Bhutan has installed UPI-based QR codes at many outlets. Cross-border payment system using UPI became operational in Singapore in July 2022.
- India has agreed to share UPI technology with the Commonwealth countries in a bid to go global. India's efforts have been praised by the Commonwealth Secretary General Ms. Patricia Scotland.

Meanwhile, the NPCI along with support from the RBI are trying their best to popularise the adoption of UPI. NPCI has given a mandate to all banks, third party application providers and payment service providers to enable international acceptance via UPI by September 30, 2022.

Challenges:

Following are some of the major challenges being faced by India's UPI system as it strives to go global.

- UPI implementation has come to a standstill due to geopolitical concerns in few countries. Countries such as Canada are hesitant to accept UPI due to push back from North American local tech companies. Ministry of External Affairs

(MEA) is striving hard to enter into negotiations with the government and central banks of such countries in a bid to go global.

- Brazil has recently implemented PIX payment system. This instant payment system has gained popularity in many Latin American countries. It relies on a centralized repository of user database as compared to the decentralized model that UPI uses.

Instant payment system in the United States is at a nascent stage as compared to the UPI system. The prevalent mode of payment in the US is cards – credit and debit cards. The popularity of card ecosystem to some extent is responsible for hampering the growth and development of instant payment systems in the US. The government is in discussion to popularise payment system for the benefit of the end consumers – in order to save high transaction fees being charged by the credit and debit card companies.

Data Analysis & Results

A study was conducted to compare the performance of UPI transactions with public sector banks and private sector banks. In our opinion, there is no discernible difference in their performance levels. The total volume of UPI transactions by the respective banks as of March 2022 was chosen as the performance criterion. Ten public and private banks were chosen from the top market capitalization in the BSE 100.

In this problem, we want to assess whether the performance of the banks in the two sectors is comparable. The null hypothesis in this case would be that

there is no difference in the performance of public and private sector banks in UPI transactions.

H01: Total volume of UPI transactions of public banks equals that of the private banks.

Table 1: Total UPI Volume Transactions as on March 2022 (in millions)

	Name of the Bank	Total Volume	Total Volume	Name of the Bank	
Public Sector Banks	State Bank Of India	1533187	439591	HDFC Bank Ltd	Private Sector Banks
	Bank of Baroda	379776	275879	ICICI Bank	
	Union Bank of India	159226	254012	Axis Bank Ltd	
	Punjab National Bank	302754	219200	Kotak Mahindra Bank	
	Canara Bank	234103	75655	Federal Bank	
	Bank of India	175519	27887	Yes Bank Ltd	
	Indian Bank	133612	40957	IDBI Bank Limited	
	Central Bank Of India	101216	41727	IndusInd Bank	
	Indian Overseas Bank	59554	6357	RBL Bank	
	Bank of Maharashtra	44390	27997	IDFC FIRST Bank	

Source: RBI & NPCI website

Table 2: T-Test- Levene’s Test for Equality of Variances (using Statistical Package for Social Science)

T-Test										
[DataSet0]										
Group Statistics										
	public	N	Mean	Std. Deviation	Std. Error Mean					
output1	1	10	312333.70	441664.380	139666.540					
	2	10	140926.20	146841.749	46435.438					
Independent Samples Test										
		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
output1	Equal variances assumed	1.402	.252	1.165	18	.259	171407.500	147183.533	-137813.628	480628.628
	Equal variances not assumed			1.165	10.966	.269	171407.500	147183.533	-152665.021	495480.021

The outcomes of the T-Test: Levene’s Test for Equality of Variances and the t-test for Equality of Means from SPSS are summarized in the two tables above.

The table contains two sets of analysis, one with homogeneity of variance in the two categories and the other with uneven variances. The t-test result

shows t statistic of 1.165 with 10.966 degree of freedom. The corresponding two-tailed p-value is 0.269, which is greater than 0.05. As a result, at a 5% level of significance, we can accept the null hypothesis, which means that

the volume of UPI transactions of public and private sector banks are not significantly different from each other, i.e., both sectors' UPI volume transactions performed similarly.

List of Public & Private Banks	Business Decline %		Technical Decline %		Debit Reversal Success %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Airtel Payments Bank	6.57	12.26	1.54	1.37	48.84	72.44
Bank of India	7.93	5.05	0.8	0.5	38.88	68.83
Bank of Maharashtra	8.89	5.15	0.74	0.75	37.87	75.53
Canara Bank	11.61	7.73	2.62	1.57	27.45	61.67
Central Bank Of India	8.87	6.67	0.39	2.26	47.5	66.8
Citibank	3.84	6.12	1.75	0.29	26.76	86.47
Federal Bank	6.04	5.69	1.42	0.1	47.27	97.47
IDBI Bank Limited	7.07	4.4	0.3	0.98	47.29	77.56
Indian Overseas Bank	12.04	5.68	1.34	1.21	46.72	76.53
IndusInd Bank	7.62	8.27	2.4	1.41	24.87	78.85

Source: RBI & NPCI website

**Remitter Banks: The account holder's bank is the one sending the money.*

**Business Decline (BD %): Transactions decline due to a client entering an inaccurate passcode, using the erroneous beneficiary account, or for other monetary reasons such as exceeding the per transaction limit, surpassing the allowed number of payments per day, outpacing the daily amount cap, and so on.*

**Technical Decline (TD %): Transactions are declining owing to technological*

factors such as software outages and connectivity problems on the bank's or NPCI's end.

**Debit Reversal Success %: It means the reversal process was successful, and the money were successfully restored to the account holder's account. It indicates that the reversal request was processed and that the debit transaction was effectively cancelled. This ensures that the account holder's money is restored and that they are not held liable for the debit.*

	Business Decline		Technical Decline		Debit Reversal Success	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Mean	8.048	6.702	1.33	1.044	39.345	76.215
Standard Deviation	2.474	2.291	0.790	0.656	9.711	10.194
Coefficient of Variation	30.741	34.189	59.368	62.805	24.682	13.375

	Two-Tailed (<i>p-value</i>)	t-value (Tabulated value)	Significant/ Insignificant
Business Decline	0.22296665	0.05	Insignificant
Technical Decline	0.38982628	0.05	Insignificant
Debit Reversal Success	0.00000015	0.05	Significant

The paired t-test was used to test the hypothesis, and the degree of freedom (d.f.) was found to be $(n-1) = (10-1) = 9$. After entering the data into the Statistical Package for the Social Sciences (SPSS), we obtained the calculated value shown in the table above.

Since, only in case of Debit Reversal Success % the calculated value is smaller than the tabulated value at 5% level of significance, it is significant

and the null hypothesis is rejected. In rest two cases i.e. Business Decline % & Technical Decline % the calculated value is greater than the tabulated value at 5% level of significance, it is Insignificant and the null hypothesis is accepted.

The study concludes that the impact of Covid-19 has adversely effected Remitter Banks in terms of Debit Reversal Success%.

List of Public & Private Banks	Business Decline %		Technical Decline %		Deemed Approved %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Airtel Payments Bank	0.96	0.48	0.3	0.79	0.02	0.2
Bank of India	1.09	0.32	0.72	0.18	0.43	0.14
Bank of Maharashtra	0.62	0.28	0.8	0.43	0.38	0.19
Canara Bank	1.01	0.69	0.29	0.73	1.59	0.52
Central Bank Of India	1.53	0.64	0.29	0.58	0.3	0.9
Federal Bank	0.54	0.24	0.09	0.02	0.11	0
IDBI Bank Limited	3.3	0.53	0.05	0.08	0.14	0.11

Indian Overseas Bank	0.9	0.37	0.14	0.62	4.79	0.26
Karnataka Bank	1.74	0.92	0.14	0.38	0.05	0.29
Karur Vysya Bank	1.81	0.44	0.37	0.3	0.46	0.18

Source: RBI & NPCI website

**Beneficiary Banks: The bank from which the account holder is receiving funds.*

**Deemed Approved %: The Deemed Approved percentage refers to the percentage of cases where credit authorizations are not received online*

from the beneficiary banks for the credit. If the beneficiary account is not credited online, the beneficiary bank will carry out the payment individually in adherence to the current RBI guidelines.

	Business Decline		Technical Decline		Deemed Approved %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Mean	1.35	0.491	0.319	0.411	0.827	0.279
Standard Deviation	0.811	0.211	0.255	0.268	1.464	0.257
Coefficient of Variation	60.104	43.016	79.969	65.241	177.066	92.072

	Two-Tailed (<i>p-value</i>)	t-value (Tabulated value)	Significant/ Insignificant
Business Decline	0.00454633	0.05	Significant
Technical Decline	0.44204717	0.05	Insignificant
Deemed Approved	0.25897965	0.05	Insignificant

Since, only in case of Business Decline % the calculated value is smaller than the tabulated value at 5% level of significance, it is significant and the null hypothesis is rejected. In rest two cases i.e. Technical Decline % & Deemed Approved % the calculated value is greater than the tabulated value at 5% level of significance, it is Insignificant and the null hypothesis is accepted.

The study conclude that the impact of Covid-19 has been affected to the Beneficiary Banks with respect to Business Decline %.

Conclusion

With UPI, the NPCI has built a strong payment infrastructure that enables cashless and hassle-free financial transaction. It is simple to learn and use, due to the numerous payment

applications and simple procedures for registering and starting transactions. It is a system that integrates multiple banking services, seamless fund tracking, and merchant payments into a standard android browser (of any participating bank). UPI is an electronic payment gateway that enables money to be transferred between two bank accounts mostly through mobile phone. Consumers could use UPI to make payments directly from their bank accounts to a variety of retailers, both online and offline, without entering credit/debit card numbers, IFSC codes,

or net banking/wallet passcodes. It aims to improve flawless integration & customer satisfaction by standardizing and offering a single interface for all NPCI systems. The goal of the UPI is to make funds transfer as simple and quick as conceivable. The prevalent use of android/IOS phones, the affordability of an online credible authenticity, global banking availability & the inclusion of fingerprint in phones would actively promote the utilization of electronic payment systems in India, resulting in a cashless society.

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