Shaping the Future of Financial inclusivity: A critical analysis of the recent innovations of the Unified Payments Interface (UPI)

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Abstract-
0.1 Purpose
After demonetization, the COVID induced lockdown and persistent initiatives, government and otherwise, digital payments in India have gained widespread momentum. A consistent forerunner of the digital payments revolution in India is the Unified Payments Interface (UPI), an initiative of the National Payments Corporation of India (NPCI). The body has also undertaken innovative new measures to greater the reach and impact of the UPI as the payment processor for not just India, but the world. Many inclusions made in the UPI in the recent past have vast inherent potential for social impact, while many flaws in the ground-up structure of the payments interface platform weigh it down. This analysis is done to assess these two contrasting fronts of the UPI in the hopes of a globally integrated and inclusive digital Indian economy.
0.2 Design/Methodology/Approach
This paper aims at assessing the growth strategies of the UPI and its progression in the Indian digital retail space and the sustainability of these initial unique-selling-points while also pointing out spaces of potential for vast social impact to further both financial inclusivity and well-being. This paper was compiled after exploring secondary sources and by applying strengths, weaknesses, opportunities, and threats (SWOT) approach. SWOT (Strengths, Weakness, Opportunities and threats) analysis is the primary framework utilized in the analysis of the positioning of the inclusion of credit-lines as a feature of the Unified Payment Service in the Indian credit segment keeping in mind Internal and external factors as well as present and future propositions for developments, as divided into Strengths, Opportunities alongside Weakness and Threats regarding credit lines and their inclusion in the package of the Unified Payments Interface, using primarily secondary data sources and logical inferences that can be drawn from them.

Keywords: **UPI, Digital Payment, retail payments, digital transaction, UPI**

1.0 The Elephant in the room: Introduction to the Unified Payments Interface (UPI)

Digitization is the next prerequisite for success as a sovereign nation. Digitalization is a big technological change and how the countries adopt to these changes will lay the groundwork for success in the next coming decades. Increased economic efficiency, competitiveness creating new business and products and the foundational financial inclusion milestones for nationwide and not isolated progress are all important characteristics of nationwide digitization, a must for India to reach the 1 trillion-dollar digital economy by 2026. The Indian government has long tried to increase the involvement of Information and Communication technologies (ICT) in the structural reforms it is undergoing to shift from the traditional paper to virtual mode to facilitate better banking facilities to all parts of the country in the most economical and efficient way. Demonetization, largescale cell access followed by the COVID lockdown greatly pushed the acceptance of digital financial services in rural India. Through the various ICT-enabled payment mechanisms that enable efficient, speedy, and safe transfer of funds from one bank account to another, e-payment services operated primarily through mobile phones has become wildly popular in India, among which the UPI (Unified Payments Interface), is perhaps the largest player among any other payment system, facilitating 941 crore transactions in volume and Rs 14.89 lakh crore in value in just May of 2023. For perspective, the number of monthly UPI transactions stands at five times the number of mobile connections in the country. The monthly transaction amount is equal to the number of bad loans written off in the country by Indian banks in the past 5 years. In barely six years, the UPI payment system has garnered a 16% market share of retail payments, taking away valuable market share form other forms such as the NEFT (National Electronic Fund Transfer).

The UPI is in many ways the golden child of digital payments in India and is well regarded as one of the most advanced systems in the world. The UPI is a payment architecture which aims at making India a less cash intensive society and encourage people's participation in a digital economy. The applications mobile-first model fitting if as far back as 2017, the number of Mobile phones in the country almost equaled the population, a staggering statistic lets us broadly assume that for atleast most of India, there is a smartphone in every household in India. Thus, the attempt to migrate banking services from brick-and-mortar to the screens of a smartphone is a timely push for financial inclusion assuming the deep mobile phone penetration even in rural India. The system was inaugurated in April 11, 2016 by the then governor of the Reserve Bank of India R. Rajan in Mumbai along with the BHIM (Bharat Interface for Money), the reference application for UPI. The National Payments Corporation of India (NPCI) of which the UPI is a brainchild of, is a project of the Reserve Bank of India and the Indian Banking Association as a jointly created umbrella corporation under the provision of "The Payments and Settlements act 2007" to operate retail payments and settlement systems in India's electronic payment ecosystem, like the UPI. The NPCI is owned by a conglomerate of ten major banking institutions in the country and is backed by the RBI. It is also behind other successful financial inclusion programs such as the RuPay domestic card line and the Kisan card which is now offered by 43 banks. The digital payments market in India, encompassing retail payments, B2B payments by MSMEs and government payments is expected to become a 10 trillion-dollar market by 2026 UPI, which logs upwards of 220 million transactions every day, is still the juggernaut in the market. Dilip Asbe, the MD and CEO of NPCI believes in "1 billion transactions a day" being a real possibility. Newer features such as credit card linkages, international remittance services and deeper penetration into rural geographies driving the next wave of exponential growth.

1.1 Technical overview of the functioning structure of the Unified Payments Interface

In 2009, the NPCI (national payments corporation of India) Was formed to create an integrated retail payments system for all such kind of payments in India. The NPCI finally unveiled the UPI, one of the most successful governments led deep-tech solutions in the world that was developed primarily by the NPCI under the guidance of the Reserve Bank of India. India is today the world's largest real-time payment market, and much of that could be primarily cited to the UPI and its exponential growth. When the NPCI was first assembled to develop a system like this, the country was nowhere in the online real-time payments space, with only six non cash transactions being executed by individuals a year and only 10 million retailers that accepted card-based payments. Thus, a massive chunk of the population was virtually left out of the online payment ecosystem. With the aim to increase online transactions, the UPI essentially migrated the whole banking ecosystem to a mobile phone screen. If transactions could be made quick and effortless, as the UPI has done, then more people would be motivated to use it. When it comes to financial inclusion, the UPI truly has come out as the golden boy of financial inclusion in India.

The UPI is a part of the India-stack, a set of APIs that allows governments, businesses, startups and developers to utilize the unique digital infrastructure to solve India's hard problems and move towards a cashless digital service system. The UPI is a set of common APIs (Application Programming Interface, a contractual interaction module of sorts between two separate software applications or software middlemen. The UPI enables person-to-person, person-to-merchant and merchant-to-person transactions through its set of APIs through its pay(push) and collect(pull) protocols which are enabled through Virtual Payment Addresses as the primary identifier of the source and recipient of funds. The Virtual Payments Adress (VPA) is the global identifier on which all UPI transactions are carried out on. For the most part, the UPI VPA could be a globally accepted identifier like phone number or bank name, while in some cases it is a mixture of all these. The UPI-VPA is the unique address to which money is accepted and sent during online payment. It can serve as a virtual alias in some ways for one or multiple bank accounts linked to it and thus protects the actual bank details when undergoing third party transactions.

In the carrying out a UPI transaction, there are three main parties involved, the UPI application, the Payment Service Provider (PSP) and their respective bank. As previously mentioned, the set of APIs that is the UPI is hosted by the NPCI with which the PSP and the banks interact with. As of now, only banks are allowed to interact with the UPI switch that the NPCI hosts and for this reason, banking entities play the role of PSP. The UPI APIs serve as a common set of APIs with which the banks and other applications to build a payments system. It compiles existing payments systems like the IMPS- Immediate Payment Services and AEPS-Adhar Enabled Payment Services among others to ensure the integrity of these transactions. When a UPI transaction is made, an app is chosen to carry out the transaction which acts essentially as the front-end of the transaction. These apps like PhonePe, BHIM or Google Pay are deeply linked with the PSP and embed the PSP functions within themselves. The PSP relieves the merchant from the hassle of setting up multiple payment options for the numerous payment methods which the PSP has partnered up with and thus accepts.

The main function of this PSP is to handle the authentication of the user and the connectivity with the bank and the UPI, essentially the backend of the transaction or TPAP (Third Party Application Provider). The PSP accesses and uses the Virtual Payment Addresses of the receiver and the sender and the sender which are finally transferred to the UPI interface and then to the receivers PSP. The payment system during this transfer, converts the details to the virtual address which can be used to route the money from one account to another. The UPI API has translators to convert the VPA to the bank accounts between which the transaction is carried out. The authentication of the payment is an integral step for the UPI transaction to take place, and occurs through two sets of authentications called the Two factor authentications, the first enabled by the application (PSP) itself, something simple like the screen lock passcode or application pin. The second is the NPCI mandated security device. The 2-factor authentication scheme is heavily utilized by banks and applications to regulate transactions due to their intrinsic protection with a simple procedure. This authentication service, also known as the 1-click-2-factor payment authentication involves the banking institutions asking for a M-PIN or OTP to be entered as the means of verification.

One of the most dormant mechanisms for payment identification is the use of the Aadhar number for authentication using UIDAI (Unique Identification Authority of India). The government has taken steps for the active integration of the UPI payment system with the Aadhar number, which could make the latter a universal payment ID of sorts. As far back as 2017, the government took the Initial steps of telling users of the BHIM payment system let users authenticate payments by entering the 12-digit Aadhar number. This feature would not require any prior set up nor any additional biometric to authenticate. The adoption of Aadhar as a payment option is fast growing, with many other platforms allowing the use of Aadhar, with google pay unveiling the feature in early 2023. The government has for long tried to make having a Aadhar card a mandatory requirement for every citizen and aspires to be India's version of large-scale identification. The benefits of most of the country using a national identification service as a payment key has massive upside, which are discussed later.

Once all the authentication is done, the UPI asks the bank of the payer to debit the amount due and the bank of the receiver like the merchant to credit the amount that is due. Even after both these processes are complete and the success intimation has been received, no actual money flows through the PSP. The PSP are simply software middlemen who broker the transaction between the banks and money is transferred between the underlying banks. The debit and credit that have been created in the transaction that takes place is only cleared 4 times a day when the money is transferred between the banks of the payer and receiver, thus settling the positions. The net position changes every time a UPI transaction is done and all of them are cleared at once during the net clearing, after which the positions again start to mount. This is done to prevent system overburdening, with the UPI facilitating about 556 transactions every second with the UPI network, thus real time settlement of funds is next to impossible. This system is already used in most modern credit card networks.

The UPI is at the forefront of payment systems, not only in India, but also globally. Since its launch in 2016, it has become one of the forerunners in India's move towards Open Banking. Several innovations built into the existing UPI framework make it stand out from other payment providers. Interoperability, or the commonality of the procedure used between the different stakeholders in the UPI ecosystem. It is the bid to allow users one payment ecosystem to seamlessly make payments to and from another payment ecosystem, thus brings about integration between all the different PSPs through the common interface. The same PSP could be used to virtually tap into the funds in any banks account and move them from one to another. This ease of conjecture of these various payments systems as made possible by the UPI makes its exponentially more convenient. The UPI also makes it a guideline to be able to check the bank balance of multiple bank accounts, a service not offered by mobile wallets, like how PhonePe will not let you check the balance in your Paytm account etc. The NPCI takes interoperability very seriously, as it was one of the driving factors for the development of the UPI and a crucial part of its mission statement. Further, UPI marked the first step in India moving towards an entirely open financial infrastructure system. This progress has been bolstered by the addition of key new pieces like the Data Empowerment and Protection Architecture (DEPA) and Open Credit Enablement Network (OCEN). DEPA is a joint public private initiative that aims at taking a more pragmatic approach to data protection through Private Enhancement Technologies (PET) to ensure smooth and regulated flow of data. This is done primarily through third party entities and content managers with the essential crux being to allow the user to share data on their own terms. Free flow of data can have huge potential in the unlocking social and economic values in apprehending user data. The Open Credit Enablement Network (OCEN) is a definitive step for India to move towards a democratic credit and financial infrastructure. OCEN was launched as a part of India Stack and is a set of open standards that aims at facilitating the various aspects of the credit lending ecosystem. The OCEN has been influential in disrupting the traditional credit lending scene in India. The network aims at collaborating with the account aggregator framework to increase credit access. It does this by being a common language to bridge the gap between loan service providers (LSP) and the lenders. It is a software architecture of sorts that brings together the various stakeholder of the lending ecosystem under one roof with the help of APIs and smart Integration, thereby allowing the lenders to create custom lending equipment's and tap into the 300 million untapped customers via the facilitation of a unique marketplace. This bridges one of the critical pain points of the MSME industry in India, where it is difficult to get affordable credit access for expansion and working capital.

1.2 Recent in the UPI (Unified Payments Interface) innovations under analysis

- *Direct Credit Line access on the Unified Payments Interface*

It was unveiled on the 6th of April 2023 by the Reverse Bank of India (RBI) Governor Mr. Shaktikanta Das about the availability of pre-sanctioned credit lines on the Unified Payment Interface. This new feature would involve a bank approved credit line with a borrowing limit via the UPI platform that a borrower can avail at any time, with a similar payment-interest structure as most conventional credit card. Unlike a traditional loan, a credit line is an unsecured (revolving loan) where the continuous access to certain predefined credit limits if credit lines are open. Most conventional credit lines (like credit cards) have interest rates higher than traditional loans. Different kind of pre-sanctioned credit lines under the RBI's new system is inclusive of credit cards, small credit lines, business credit lines, etc. where the bank is responsible for determining the limit for each line of credit on basis of due-diligence of income, credit score, repayment history and borrowing history of the borrowers among others. Thus, to access this credit line via the UPI, the user will have to make a formal application to the lender where, similar to the loan approval process followed conventionally, the lender will thoroughly examine the financial record of the applicant in order to determine the limit of the pre-sanctioned credit line. The user will then be allowed access to the credit-line after lender's due diligence based on their financial details for transactions to be carried out via the UPI platform.

In the past, the government had announced linking of Rupay (A Payment Service System Launched by the National Payments Corporation of India in 2014 to fulfill the RBIs vision of a Domestic, Open and Multilateral Payment System) credit cards via the UPI system, a proposition that failed to generate much traction from the Private Banking Space due to their heavy reliance on VISA and Mastercard for this segment. Bridging this divide is perhaps one of the primary motives of the government as such a feature will facilitate the inclusion of credit lines like credit card products to customers in Private sector banks who have UPI relations with the bank. The system will also make it easier for banks to offer these credit facilities seeing the lack of need for any physical credit cards. From the merchant side, no physical swipe machines like those required for physical credit-cards will be required. The previous attempt made by the government in 2018 involved the ability of a customer in getting an overdraft account on their bank (which essentially entails a short term small-volume loan based on bank-customer relation) but had to be eventually shut off because of its lack of popularity primarily because of the fees and charges involved in these transactions for the merchants.

- *International remittance services and cross-border real time payment systems*

Two years ago, NIPL (NPCI International Payments Limited) was set up as a whole subsidiary of the NPCI to roll out the Indian domestic card scheme (RuPay) and mobile payment solution (UPI) outside the country in global markets. NPIL wants to expand the payment ecosystem that already exists in India to foreign regions including the P2P, P2M and Cross-border payment systems. Bhutan became the first nation to adopt the UPI as the standard for QR deployment. A MoU was also signed with the UK payment system provider PayXpert to integrate the UPI QR standard into the PayXpert Android POS device for in-store payments. UPI has integrated with the UAE's Mashreq bank to give Indian travelers and tourists access to the ten-thousand merchants and store in the NeoPay via the UPI payment system itself. Five South East Asian Nations, including Malaysia, Singapore, Indonesia, Thailand, and Philippines will integrate UPI with merchant payments via the QR codes of the UPI and integrating the transaction infrastructure. The NIPL has effectively migrated the UPI payment systems as the global gold standard for international payments, challenging the domination of the SWIFT payment system with the indigenous version. Strategic ties have been made with countries with significant Indian diaspora and Indian trade. In the long run this can emerge as a primary source of financial soft power for India while in the present making remittance and other cross border transactions very convenient for Indians abroad. The aim is perhaps to become to standard of adoption of globally when there is universal need for a cost-effective, real-time payment system.

- *UPILite, UPI123 and other rural first innovations.*

UPILite and UPI123 are among some recent innovations by the NPCI and RBI to further rural penetration of the UPI in India. The aim is to get the UPI to the end mile user in India. UPIlite Specifically targets low value transactions and is a kind of wallet stored in your UPI BHIM app and this removes the need for active internet connection to make transactions. It targets the small value transactions below Rupees 2000, the goal is to try to take these transactions off the active servers this preventing overwhelming of the backend infrastructure of the payment ecosystem. Because a significant percentage of the UPI traffic comes from tier 2 and tier 3 India, more than 50% of all the transactions recorded on the platform are under Rs 1000. One adopted this would greatly relieve the backend systems and thus need for heavy investments in the CBS while also taking UPI services to regions with poor internet infrastructure. The UPI123 pay is a bid to provide UPI access to the huge segment of the Indian consumers who lack continuous access to smartphone or other handheld smart devices. It allows UPI transactions to be done simply by using a feature phone by IVR (Interactive Voice Response) methodology as the mode of transaction, selecting the nature of payment to be made and then carry out the payment. The user has the option to choose from payment using missed calls, payments using proximity sound-based payment and calling an interactive Voice response system. This is a huge segment of the 30-35% of the Indian population who still use feature phones. Simply by choosing the method and entering the mobile number of the recipient, the transaction is complete. Innovations like this can make UPI a force in all segments of India.

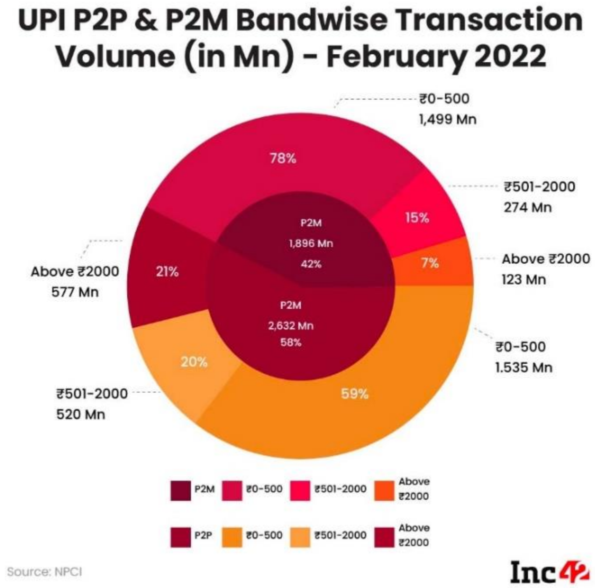
2.0 Primary SWOT (Strength Weakness Opportunities and Threats) Analysis of features

2.1 Strengths

2.11 Tailoring banking for rural unbanked India

The first step to the envisioning of the UPI was with the unveiling of a four-year vision statement by the RBI aimed at the creation of a safe and accessible financial platform without compromising on efficiency or global and domestic competitiveness. Since its establishment in 2016, the various Iterations of the UPI have made pragmatic efforts at building an interface that is suited for both urban and rural segments of India and providing affordable financial services and products to individuals and communities previously unbanked or under banked. Through its inspiring growth story, vast sections of previously unbanked India have successfully been provided with financial services that can very well be significant determinants in the escape from financial backwardness.

As a foundational goal of the UPI, digital transactions via this platform have been kept simple, allowing people with limited financial literacy or lack of access to traditional banking services to participate in a digital economy with greater ease, essentially preventing the “tech scare”. When the UPI was envisioned in 2011, only 10 million retailers accepted card-based payment methods across India. UPI made it possible for even smaller businesses to accept digital payments without the need of a POS (Point-Of-Sale terminal) machine thus being possible even in places where payment infrastructure was poor. Eliminating the need for physical infrastructure such as banks and ATMs reduced overheads and expansion costs, making financial services affordable for both consumers and providers, leading to greater adoption and expansion. Via these products, now even previously unbanked population can access basic banking services. Large parts of India were unbanked when the UPI set out, and will probably still be unbanked for a while to come, but the aggression with which initiatives like the UPI are attacking the market is drastically reducing how long the “while” will be.



To create greater penetration to the rural and backward sectors that needs financial inclusion the most, the UPIlite and UPI123pay are powerful tools. As the popularity of online transactions sky rocket after the COVID-19 pandemic, various tools like these make

UPI more accessible to even the common rural man while reducing the pressure the system bears on the Banks core banking system (CBS). Specifically targeted at low value transactions, the joint effort of the Reserve Bank of India and the National Payments Corporation of India, the UPILite is a kind of wallet stored in your UPI BHIM app and this removes the need for the consumer to go online to make a transaction. Aimed at small value transactions below Rupees 200, it aims at making these transactions offline this preventing overwhelming of the backend infrastructure that supports the UPI. The double edge for a large part of UPI transactions coming from Rural India, with more than 505 of UPI transactions coming from tier 2 and 3 cities, is the low average ticker value of these transactions. More than 50% of all the transactions recorded on the platform are under Rs 1000. This means an immense relief to the backend systems once UPI Lite is adopted. It removes the banks need for heavy investments in the CBS while mitigating the requirement for active internet connections, benefiting geographies with dubious internet access. Both from the provider and consumer standpoint, it is a win-win.
The UPI123 pay is a bid to provide UPI access to consumers without continuous access to smartphone or other handheld smart devices. It allows users to make UPI transactions simply by using a feature phone where you call an IVR (Interactive Voice Response) methodology as a means of transaction, selecting the nature of payment to be made and then carry out the payment. The user opting for UPI123 pay can choose from payment using missed calls, payments using proximity sound-based payment and calling an interactive Voice response system. The UPI123 caters to the 30-35% of the Indian population without access to a smart phone who still use feature phones. Then the user must choose the service before adding the recipient's phone number. As of now, IDFC first bank, City Union bank and NSDL payment bank have gone live on the IVR payment platform, supported by Ultra-cash and none tag. IVR work well in developing countries context by broadening mobile phone penetration and addressing barriers to literacy by using audio as the primary delivery mechanism. It promotes financial inclusion because it removes the need to have an active internet connection or a smart phone overall. With these features UPI is ready for its next growth phase. This introduction on feature phones helps one tap into a huge market with more than 400 million handsets in play. One just needs to call the IVR (Interactive Voice Response) to link the bank account with UPI, and can make payments by adding the recipients phone number. The user simply needs to enter the UPI pin and the transaction will be done. After UPI 2.0 which came with various tech-first up gradations, these two added services are truly tailored for rural India where these services are essential to be provided to. It could be the next big leap towards financial inclusion and a crucial part in the realization of the 1 trillion-dollar digital economy and carve out financial inclusion for the end mile user. Both platforms are expected to usher significant growth in India's digital payment story, and will permeate the flow of payments in tier 3 and tier 4 India, carving the mass inclusion story. It will help carry out low value secure transactions to areas will bad connectivity and low internet permeability.

2.12 Bridging credit access gaps

For small and medium sized businesses in India, the access to sustainable credit has posed to be a significant obstacle. Out of the 64 million MSMEs, only some 14% of them have access to credit. These 63 million small enterprises contribute to over 60% of the Indian GDP and provide employment for over 113 million people. This worrying for the entire Indian ecosystem at large, as rural MSMEs form a major part of the Indian supply chain, supporting the big corporations in the country. The 530-billion-dollar credit gap that is actively widening shows that India has a lot of headroom for increase in its total debt in relation to size of the economy. There is massive need for enterprise credit in India, beyond that that is met by corporate bond markets and banks. There is a severe lack of formal credit in semi urban and rural areas which forces MSMEs to be forced to lend from unorganized sources of credit which have often found to be predatory and exploitative. According to the World Bank, the Indian economy currently boasts a domestic credit to private sector at 55% of GDP as of 2020, a remarkably lower value than the world average of 148% and lowest among its Asian peers such as China at 182%, South Korea at 165% and Vietnam at 148%. The two primary sources of private debt in India, bank credit and corporate bond, are severely lacking and need more equitable distribution. As per the All-India Debt and Investment Survey (AIDIS) the share of rural unorganized moneylenders has increased from 17.5% to 29.6% between 1991 and 2002. Rural credit access through formal sources has found to be a difficult expansion for banks due to cost of opening new physical branches and has left micro-manufacturing firms increasingly credit starved. UPI credit access allows banks to lend directly in tier 3 and tier 4 India in a cost-effective manner getting direct access to the vast UPI user base of millions of consumers and merchants. UPI-credit card linkages are expected to skyrocket credit expansion. As of now, the limited numbers of high-cost POS machines were one of the primary restricting factors for the limited growth of credit cards in the country. There are millions of merchants across the country who do not have POS machines but have QR codes. Virtual credit cards are easier to issue with lower credit limit, which will help open the credit market. Visa and MasterCard are likely to link their credit cards into the UPI ecosystem at some point, like they have tried to do in the past with BharatQR code which failed to take off, and provide the wide merchant market of the UPI QR code.
This move can help reduce the cost of such offering and serve to be important growth drivers for Indian markets. In the larger picture, it may serve to integrate the formal banking sector and opening lending opportunities for banks and NBFC (Non-Banking Financial Company) to reach over 30 crore and business who are active on UPI, providing them access to a wider lending market. This makes it an important catalyst for financial inclusion and opens future innovation prospects for banks, NBFCs, PSPs and fintech's to tinker with credit products that enable embedded financing during the UPI purchase journey. Banks and PSPs who are looking to monetize UPI payment and lower the cost of credit disbursement will be incentivized to launch UPI revolving credit lines to access a wider market and benefit the consumer by serving as pre-approved working capital. The NPCI has already collaborated with various payment aggregators like BharatPe, GooglePay, etc to enable merchant transactions through the Rupay Credit cards through UPI. This linkage means that consumers no longer must carry their credit cards with them for payments.
The proposal of the Reserve Bank of India to provide direct access of pre sanctioned credit lines through the UPI can come as a boom for the lacking MSME credit infrastructure in rural India. A pre-approved credit line is essentially a pre sanctioned credit that can be drawn by the borrower at any time. The UPI has attracted 250 million unique users and five crore merchants in the past few

years, and the credit-card UPI linkage will particularly benefit merchants in semi-urban and rural areas and help bridge the large MSME credit gap that is reported to be around Rs 20-25 lakh crores by the RBI and NPCI and a crucial pain point. It is expected to massively ease the access to credit and speedup the process as there is no requirement for over documentation, KYC and other related documents for MSME. Since UPI transactions already have immense popularity in urban and semi-urban areas, predominantly among small merchants and shopkeepers, they can easily use this feature to meet their needs very conveniently for working capital, expansion capital or for stock replenishment. User's access to credit may become more affordable as banks use low-cost UPI infrastructure to offer credit products at a lower cost. Easy and fast access to credit can also serve as effective data collection points for efficient lending. A digital economy and easy access to data gives way to a more objective and comprehensive basis for credit assessment. Underwriting of such loans will require lenders to evaluate available UPI data using various transaction parameters. This allows them to make more informed credit offerings to different customers and minimize defaults and reduce Non-Performing Assets in loans to different consumers. One of the primary reasons for the poor borrowing penetration for MSMEs in Rural India the high risk involved in lending to them. This stems from them having poor of non-existent credit scores or other relevant data and hence collection and repayment becomes challenge for lenders. UPI data access, driven by interoperability, gives a base pad for lending activities of new credit customers to be based off.

2.13 Financial inclusivity of Marginalized Indians abroad

The NPCI has worked towards effective integration and migration of the UPI and its acceptance to other countries. Payment's systems like the UPI are becoming increasingly globally attractive as a measure to enable seamless cross border transactions. This in face value serves the primary purpose lowering cost of remittances and fund transfers, but has headroom for innovative cross border solutions. A variety of countries with significant Indian diaspora such as Singapore, UAE, Oman, the UK amongst others have announces partnerships with the UPI. Post the integration with the Monetary Authority of Singapore (MAS) and Paynow, there is effective cross system transaction and immediate remittance transfer services. Yet the true impact lies in the Gulf Cooperation Council where an estimated 10 million Indians live and work, mostly as construction workers and other blue-collar professionals. A huge population of untrained and untalented workers in the Gulf Cooperation Council countries bear harsh conditions and lack basic financial and social infrastructure, especially during the Indian years. The Arab Monetary fund states that almost 50% of the Middle East population remains financially excluded with other figures claiming it to be even higher. A large percentage of this unbanked population are made up for blue collar migrant laborers who lack any formal financial services thus facing severe inequality when it comes to infrastructure access.

A larger systematic problem, these workers are forced to use high free inefficient money exchanges and informal networks to receive their wages and transferring remittances back to their home countries. Physical exchange houses, which are primarily used by this diaspora have high fees, long waiting periods and very little post transfer customer support. Migrant workers are not a homogenous group, and the lower income level of construction workers etc., cannot access formal banks because of the various requirements of the regional banks. In the UAE for example, a salary certificate and a minimum salary of up to AED 5000 are required. Even in the cases where these criteria are met, it is difficult for these workers who send monthly remittances worth a large part of their income to maintain the minimum balance. Lack of access to financial services means that the user has no credit history in the home country and no way to undertake formal lending. In the case of construction workers, most of the borrowing has to be done from the employer. This is because of the lack of any formal credit history to judge credit worthiness. Migrant workers in the Middle East have faced the brutalities of financial inclusion for years, but if the UPI is successfully integrated into other payment services, it opens exciting new possibilities. For example, to tackle the problem of lack of credit history, the credit history of the migrant workers from back in their home country can be migrated by the host country and its financial platform from the UPI. This provides some basis for the banks to work off of. A migrant worker having a UPI serves a barebones financial infrastructure in the host country, and a sort of financial identity. Credit lines can be extended to these migrant workers as borrowing from the home country might serve to be cheaper and easier due to past records. Turning the tide on cruel malpractices on Indian workers abroad requires effective collaboration with private and public entities in these regions. The UPI has introduced Aadhar as a new method of onboarding and where a customer can be authenticated based on the customers Aadhar using OTP. NPCI can connect with Unique Identification Authority of India (UIDAI) based on the customer's bank to seek authentication and validation of Aadhar OTP as per UIDAI guidelines. Direct linking of payment services with an identification authority leads ways in which the payment wallet could also serve effective identification purposes, a pain point for Indian migrant workers abroad. Thus, through UPIs integration with other governments and their payment services, we can provide effective and essential financial infrastructure, credit facilities and identification services.

2.14 Boost to the remittance economy

Since the 1980s, Indians have had significant Diasporas abroad with more than 30 million Indians residing outside the country and sending back money in the form of remittances. In the early eighties and nighties, expats physically visited money transfer houses to send money back to their homes, while businesses and governments also depended on these methods of cross border payments. As the days have progressed, the story is still similar. For most blue-collar Indian workers living abroad, the norm is to navigate through the traditional method fraught with security issues, high cost, time delays etc. For many workers living abroad, these funds serve as the principal source of stable income for their families back home, and high cuts by the intermediaries and delays in payments have adverse consequences. Differences in time zones, currency conversions and compliance checks make this process tedious. Traditional money transfer houses are expensive, involve long queues and have limited post transaction support. The remittance economy is dominated by banks, Money Transfer Operators (MTO) and foreign exchange dealers. Traditional banks on the other hand are expensive and often involve third party intermediaries which makes the process even more cumbersome. The current inward remittance structure involves a "Rupee Drawing Arrangement" where the institution in India ties up with global licensed institution who hold vostro accounts on behalf in their foreign currency. The main payment rails or pipes for international payments is the SWIFT (Society of Worldwide Interbank Financial Telecommunication), the global network used to transfer money and the Money Transfer Service Schemes (MTSS) for remittance of foreign tourists inside the country. According to worldwide databases, the cost of sending 200 dollars to South Asian countries, including India is on average 4.1%. In the 2021-22 financial year, India received its highest inward remittance of 89 billion dollars in the form of transfers and gifts to Indians back home, there is clearly a huge market for streamlining this cash flow. NPCIs foreign wing NIPL has already formed partnerships with banks in countries like Bhutan, UAE, Singapore, Hong Kong etc. in order to promote a acceptance network for RuPay and UPI abroad.

The MENA region (Middle East and North Africa) is home to a significant part of the Indian working-class diaspora, with more than half of its outward remittances being sent to India. India-UAE is the world's second largest Remittance corridor with more than 20 billion dollars in transaction value. The National Payments Corporation of India (NPCI) set up the foreign wing, the NIPL to internationalize the UPI and the Rupay and enable real time account payments. The UPI has become one of the most popular parts of India Stack and provide an effective interface on which mobile and QR led transfers can be built on top of. The recent NIPL collaboration with the Mashreq bank in the UAE could usher better future for remittance flow. The availability of the UPI to NRIs in UAE and other Gulf countries through international mobile numbers can have a significant impact on the volume of foreign currency remittance to India. UPI offers mobile first, interoperable mobile payment infrastructure that allows to PSP to inculcate diverse payment systems used to undertake, clear, and settle transactions through a common interface. It provides a seamless experience that can be facilitates twenty-four seven instantaneous money transfer system that greatly reduces the risk involved. UPI uses virtual IDs for transactions, thus adding an extra safety layer to the transfer and can be leveraged to prevent money laundering, financing of terrorism etc.

With UPI being made available in GCC and other countries, with the list growing, we can expect greater remittance in the coming years along with less dependence on the traditional money transfer methods. Integration of the UPI with Singapore's Pay-now is expected to reduce the cost of remittances to drop by over 10%. It offers peer to peer fund transfers which will be available to retail customers through participating banks and Non-Banking Institutions Singapore. Deal have also been struck with Western Union, one of the world leaders in cross border payments for real time money transfer. The UPI also serves as a platform for non-institutional financial innovations, with various FinTech's jumping on the opportunity to create UPI based transaction services.M2P for example, is a UAE based service for foreign exchange operators to facilitate end to end settlement with inbuilt conversion facilities. In Such official integrations with counterparts in the GCC are needed with the NIPL providing technical assistance licensing and consultation to build effective real time remittance channels. The most challenging component of these integrations is less to do with the tech side of it and rather with the data-sharing regulations, the legal obstacles, and the cost barriers, but as already previously mentioned, effective innovation in these regards can unlock immense social value.

2.15 Competitive front-end market for the best experience for end user

It is undeniable that the UPI has revolutionized the fintech space in India. It gave way to numerous UPI based mobile applications such as PhonePe, BharatPay, Paytm etc all capitalizing on the demand for digital payment solutions. Its unique features such as low transaction cost, minimal infrastructure requirements and real time processing capabilities have made it a useful tool to build on top of. UPI is after all the world's only API driven interoperable real time money transfer platform designed for a mobile first ecosystem, thus it provides ample opportunities for developers and app-makers to carry out innovations with these underlying tools. Due to competition between different app developers, all trying to get a piece of the UPI pie, the end customer is ultimately the one that wins. These Third-Party Application Providers (TPAP) like Google Pay, PhonePe and Paytm all capitalize on the vast UPI network by enabling merchant transactions and hence locking merchants onto their ecosystem, an integral part for monetizing their userbase. This was up till now, the only way in which a merchant could integrate UPI payments systems into their app or website, by becoming a TPAP. Active competition between different such providers is something the NPCI wants. The duopoly of the two large existing players PhonePe and GooglePay which control over 80% of the UPI market is not something the NPCI wants, wanting rather more individual UPI players to emerge. Before the launch of the Whatsapp payments feature, the NPCI came ahead with a ruling against any TPAP having more than 30% market share in the UPI payments space. Since the UPI is built on interoperability, and if these values are effectively upheld, the fragmentation of the market to a reasonable extent would not a problem, rather would give the user the best end experience and other perks and benefits, as all the TPAPs would be competing to acquire customers. India is a large developing economy, with ample space for more than one player.

The open protocol of UPI means any other company can be built on the UPI creating a much larger and more network than its competitors for financial payments. It is a given that India companies have long been tinkering with the UPI to give their apps the best Unique Selling Point in the form of user end experience, but now with the UPI going abroad, companies outside India have started building on the UPI or integrating with the UPI. Lyra networks, a French company, announced its deployment of the UPI as did many other collaborators as the UPI makes a significant step in into the Eurozone. Even in the GCC with remittance technology, private companies are putting in commendable effort towards innovation in these fields. The future of the UPI holds great promise with exciting innovations across the horizon.

2.2 Weaknesses

2.21 Uncertain future of infrastructure efficiency as a zero MDR payment processor

One of the biggest reasons for faster adoption of UPI payments is the Zero Merchant Discount Rate (MDR) and cash backs offered by third party players. As of 1st of April, 2023, a fee of up to1.1% was instated for UPI transactions above Rs. 2000 when PPIs (Prepaid Payment Instruments) or wallets and cards. This fee, varying from 0.7% for education, telecom, and utilities while 0.9% on supermarkets, would invariably be levied on the merchant side. This transaction-fee after free no charge UPI since its establishment in 2016 came after the belief in the gradual instatement of fees on UPI transactions to preserve growing popularity of platform while tackling, in some measure, the excessively unsustainable form the platform is taking. Since its establishment, the UPI racked up a Rs. 2 cost to process a person-to-merchant transaction of Rs. 800. At a 0.1% transaction cost, the Rs. 84 lakh crore (in Financial Year 2021-22), a rapidly growing amount, a bill of 8400 crores had to be footed. So far, due to the governments marginal subsidy there were no charges on low value P2M transactions under the value of Rs 2000. The value of the government subsidy of just Rs. 1300 crores for the payment platform, a widening gap is emerging which gives less incentive for banks and service providers to upgrade their systems, causing system slowdown and backdating. With less incentive for the banks and service providers to upgrade their UPI related infrastructure, there has been hesitance's in banks participation in the UPI platform. In an isolated however insightful case from July 2022 where the UPI transaction decline rate stood at 7.26%, an increase from the 6.96% decline rate in June. An increase in decline rate would be a massive red flag for the stakeholders in the UPI payment ecosystem as they find themselves cash-crunched and unable to approve their transactions. During festivals, cricket matches, etc, banks witness huge transaction volumes and to maintain performance during such peak surges, it is essential to inject investment in the infrastructure. So far, funding from venture capitalists and private equity players have supported the digital payments momentum. Thus, while the zero MDR policy that is still followed by the government for most of the transactions taking place on the Unified Payments Interface is great for skyrocketing transaction number and volumes of transaction, the sustainability of the ecosystem may be in danger.

Expansion of the UPI will further demand profitability in the working model. As of now UPI is linked only with savings and current account, but as we expand to linking of credit cards, a feature the NPCI is keen on rolling out, a reasonable MDR rate becomes important because of the cost of QR code acquirer, credit card issuer and network. As of now, the MDR file is recovered form the merchant, the card network such as Visa, Mastercard etc. fixes the MDR amongst all its distributaries to cover costs involved in the process. Currently the UPI RuPay credit cards enjoy a one fifth market share with an experimental in the ballpark of the 2-3% of the POS driven non-RuPay of the transaction value.

As many industry experts, including the Boston Consulting Group (BCG) has pointed out, the commercials for UPI merchant payments have been largely immobilized even despite the revenue potential to drive adoption. It is important to incentivize financial institutions through sustainable MDR to encourage them to chase merchant acquisition, digital payments growth and engagement. Currently the UPI stakeholders such as payment aggregators, payment gateway players and banks incur costs in terms of salaries, acquisition of merchants in remote areas, printing of QR codes, support services and, IT systems, data centers, Interchange fees, refunds etc. Like any system this also costs money to maintain. While banks do get some subsidy, they end up paying much more in interchange fees, SMS costs and other technology set up costs. The demand for reasonable MDR for UPI transactions is fast gaining ground. RBI had even sought feedback from players on likely charges on UPI payments, but the government was quick to suggest the cost recovery to be done by players through other means. The government currently also provides subsidies for QR code adoption in smaller geographies which is criticized as being insufficient. This is especially worrying because as more secluded geographies are targeted the cost of merchant adoption is expected to go up dramatically. The volume of small ticket size transactions like those of Rs 200-300 are much greater in volume. Even a small transaction fee can motivate the stakeholders to create a sustainable business ecosystem. As of now the average merchant acquisition cost is roughly Rs 500-600 which would need a 0.1% - 0.2% transaction charge on an average Rs 300 ticket size at 200-220 transactions per month. Thus, even minute transaction charges can motivate sustainable business with greater investments by all the stakeholders in the ecosystem and prevent system slowdowns that may occur as pointed out.

2.22 Varied determinants for success as an impulse lender

Following the announcement of the ability of UPI-linked transactions to be to and from pre-approved limited credit lines from banks as a new service, many leaders in the banking segment have speculated on the success and impact of this push for greater credit inclusivity. Many have argued the success of this new product lying in the ability of the bank to structure these short-term credit-line as short-term loans following the market standard interest free credit for 30 days and then reward points for these transactions as primary selling factors of credit cards for consumers. The ability of banks to capitalize on the massive borrowing demand of the new segment of these 30 crore UPI users, many of whom do not lie in the spectrum of credit card users would urge many players to enter this newly created space and provide a lucrative opportunity to expand their loan book, but many of the features which makes credit cards so popular and so phycological rewarding are points, cashbacks and other benefits. These benefits, understandably, come at a cost which is equated from the transaction charges charged on most common credit card services which is charged as a fee from the merchant.

A discussion paper deliberated upon by the Reserve Bank of India (RBI) on the 3rd of October, 2022 proposed the capping of credit card charges, something that had previously been done on debit card charges. Merchant Discount Rate (MDR) – or the maximum charge that shops or merchants pay to the bank on debit card transaction was centrally capped at 0.9% with primary determinants being the size of turnover and merchant transaction size. A similar structure arises when it comes to credit cards, with a additional charge being justified by the reserve bank as a fund to cover the 30-day interest free rate on credit cards that most banks offer. The main reason for a paper of such a nature by the reserve bank was transparency issues on the deemed-to-be high charges on credit card transactions. It is to be understood however, that many of the credit card related benefits that act as a main lure for the customers as well as the 30-day interest-free credit is primarily made up from these charges. Another issue brought up by this paper, and the larger fees structure on credit related transactions is the surcharge system. A surcharge is the practice of adding 1%-4% of the transaction cost by the merchant when a payment is made using a credit card instead of cash as an extra fee, essentially transferring credit card transaction fees to the consumer. This followed a class action lawsuit instated in 2013 by businesses and merchants against two of the transaction processing giants, Visa and Mastercard which had 49% and 30% share in the payment card space in

India, rough as of 2021, against such charges and fees. Legislative action has been taken on this payment fee being capped at 4% and being prohibited in select countries and areas. One of the unique-selling-points of the UPI was the no-fee model that is followed from the beginning. RuPay credit cards exploded in popularity and volume of usage, rocketing past both Visa and Mastercard because of their no-fees model under Rs. 2000 assuming the nature of a 'Made-In-India' product. UPI transactions have always been kept free for all transactions under Rs. 2000. The high growth recorded has come with significant downside assuming the high cost the government must swallow for keeping the UPI services relatively fee-less, a zero MDR (Merchant Discount Rate) for all UPI transactions since 2020, following which the population of the platform exploded. With no definite source for funding commonly found credit card related benefits, banks might find it hard to afford such luxury attractive benefits in this segment.

2.23 Consumer vulnerability to easy credit trap

A rough 4.62% of the Indian population has access to credit cards (or similar financial instruments with pre-determined credit limits). As of November 2022, the Unified Payments Interface platform had over 300 million monthly active users. The volume of UPI transactions to total volume of digital transactions grew from 23% in 2018-19 to 55% in the 2021-22 cycle, thus the platform being poised for sustainable and exponential growth, will give financial inclusivity and banking services to millions of previously-unbanked Indians. With direct credit line access to UPI account holders, the growth of the UPI will provide easy credit access to millions more Indians. The inclusion of a direct credit line on UPI accounts is not very different from the typical borrowing features of a credit card. Even if the said consumer does not have a credit card, he or she can get a short-term loan within the pre-determined loan limit from, and as determined by the banks concerned. This is undeniably a great step of financial inclusion. As shown by the statistics, not many of the vast UPI users have a credit card, and thus would provide credit access to this segment.

Since banks do not need to issue physical credit cards to offer this kind of credit facilities to its consumers, it saves banks on significant distribution and disbursal costs. Thus, these kind of credit facilities are a better carter to the greater Indian basket. Banks can easily tap into the UPI network, which now comprises of a staggering 75% of digital retail payments in India, and create even small credit lines of Rs 10000 to Rs 20000. Compared to long-term loans of fixed amounts, short-term loans in the form of credit lines have higher interest rates. Thus, while credit lines are easier to access as compared to traditional loans, they come at the downside of higher interest rates. At a monthly interest rate of 2.5%-3.5% for standard credit cards, to be competitive in terms of facilities, benefits it provides if any, etc. the ballpark interest rate of credit lines will have to be similar. It is for good reason that Credit cards have been blamed for consumer over-spending and growth in household debt. Credit-cards, and thus credit-access in general, eases the pain of making a payment and thus encourages unhealthy spending, with links to the strong activation to the stratum which is directly correlated to the credit card cue onset and not with the product price. With the ubiquitous grip that UPI has in Indian online payment, it might lead to excessive borrowing and the vicious cycle of lending, which ultimately spills over to offline unorganized money lenders (sahukars) with inhumane interest rates and concerning provide most of the credit requirements to much of the rural segment which is targeting in the inclusion of this feature for greater credit and banking penetration.

2.25 Slowdown in the growth and spread of the UPI

Even with incredible urbanization in the recent years, India remains a largely rural country with more than 70% of the population residing in rural and semi-rural areas. Though mobile phones and digital penetration have reached even the most remote regions in India, digital payments do not boast nearly the same penetration extent. A recent field study by 1Bridge shows that a mere 3-7% of the rural population use UPI on a regular basis. As per this 2022 survey, approximately 40% of the rural people surveyed had no idea what the UPI and had limited knowledge about digital payments. As per the same survey, there still exists a widespread hesitation to adopt online payments, with 20% expressing a preference for cash-based transactions and 10% citing low bank balance or inactive accounts, which seconds cash transactional preference. There is still a general distrust in the system and an immemorially old trust in the cash payment system. Most people do not know how to use it, or are scared they will lose their hard-earned money. From the same survey, the average value of a UPI transaction was INR 1450, thus pointing to how the platform is still largely an urban and semi urban phenomenon. The chief share of digital payments in rural areas is the payment for goods and services in stores, with some shopkeepers even using it to return change. Thus, the need of the hour is to build adequate infrastructure and awareness about UPI and digital payments in rural India, for while greatly catalyzed by the pandemic, there remains much work to be done to spread the benefits of online payments to end of the mile settlements.

2.3 Opportunities

2.31 Integral in the development of Super-app like capabilities

Ever since the concept of super-app was first introduced to the world by Blackberry founder Mike Lazaridis, the dubious concept has not left tech circles and government alike. A super-app is an all-encompassing application (Mobile or web) that provides services and applications above and beyond its principal ones. With the aim of being a Swiss army knife of apps, the goal is to provide functions like chatting, online payment, digital commerce etc. all under one roof. The term super-app was first used to describe the Chinese giant WeChat which was wildly successful in China and led the way for many companies trying to emulate it outside China. A successfully provided super-app creates an ecosystem for user that other companies find hard to break into, and a chance to garner a large user base, simply processes and improve consumer engagement in a profitable and monetizable way.

The rise of super-apps has a large level playing field in the world of technology given how in many South East Asian countries they have become an essential part of life after the Pandemic. Besides providing ample client engagement and improved user convenience, the prospect of upselling and cross-selling by the corporations make these models particularly lucrative. The super-app ecosystem is heavily data driven gathering tons of user data and behavioral patterns that gives firms valuable insight and knowledge about their customers. It allows them to make calculated decisions and improve their strategies better to target appropriate audiences. Data collected by these companies can be used to push similar content, items, or anything else to the same audience that have a demonstrated interest to that type of product. Thus, it is without a doubt that data forms the backbone of super-apps, the creation of a super-app is wholly based on the amount of data the creator has with him. Any Indian super-app will probably have to, or find it wildly convenient to build on top of the UPI interface. The foundational structure of the UPI is built such that it stands perfect for multifunction data collection systems. The UPI already comes built with tools for financial transfer, payment of bills, remittances, now credit lines amongst others. But whats more is basis of the UPI in the Data Empowerment and Protection Architecture (DEPA) and the Open Credit Enablement Network (OCEN) along with the larger emphasis on interoperability which is not taken very lightly. DEPA is a techno-legal solution that lets users control over their data allowing them to seamlessly share them, this inducing competition and enabling new services. By directly adopting the UPI and other components of India Stack, super-app makers will perhaps not have to worry about writing the data regulations all over by themselves, and there will be no one to blame them by simply following the evolvable and agile good data governance norms already in place. Above all this, given the fact that the UPI has UIDAI and other government databases, it provides effective room for innovation when it comes to identification and government schemes and programs direct rollout.

WhatsApp Pay was Facebooks latest attempt to capture the Indian market by attempting to mix UPI based payments with digital chatting. This faced strict rebuttal from Indian Payment providers, such as Paytm as a violation of the rules of interoperability that the UPI (and India Stack) is built on. The India Stack, as a medium for promoting the financial and digital inclusion in India, has all the components to build a socially potent super-app put together in a neat bundle. With Aadhar, e-KYC, Digital Lockers, Digital Sign-in and of course the UPI, it provides all the components for create a digital identity of a nation. Over that, it is not limited to India and can be applied to other countries as well, with various nations already having signed MOUs with India for sharing of the India Stack. Other Asian countries also boast of wildly popular super-apps, such as Grab and Gojek. There is no lack of super-apps in India, but the market is still widely fragmented with public and private players. Beyond this, there is no clear winner in the super-app market in India yet, but this gives no excuse for effective analysis. When it comes to super-apps, the big Indian names would include Paytm, the MyJio app, TataNeu and government apps like Arogya Setu. None of these paints the complete picture, but all show an attempt to capture the Indian market.

2.32 Blockchain Integration

Blockchain is the favorite buzzword of the pseudo finance world. Blockchain enabled cryptocurrency has been making waves in the digital finance/fintech world and it must be wondered whether possible integration is possible between UPI-tech and the blockchain framework. The Blockchain is a decentralized and distributed lender technology that allows multiple parties to maintain a joint record of transactions without any central recordkeeping. These blocks of transactions form a joint chain that keeps these records transparent, secure, and immutable. Blockchain was an uproar in the finance world because of its benefits in the fields of security, as it uses cryptographic techniques, transparency of records decentralization and global accessibility. These two payments systems can have effective collaboration instead of competition between each other, the UPI can effectively benefit from the various advantages of the blockchain system. Real time Payments Systems (RTPS) like the UPI require banks to settle transactions multiple times a day, which can be effectively circumvented by blockchain technology and allow all the transactors to operate through the same ledger. Blockchain also fits particularly well in the global payments puzzle. The use of blockchain technology in cross border payments can reduce remittance costs greatly. It can make remittance instantaneous, quick and affordable, preventing the need for one or multiple intermediatory banks and for the dubious conversion rates which remains uncertain during transaction initiation and can thus vary the transaction costs. The rising costs of maintaining the UPI supporting framework as the payment system enjoys more popularity is of utmost importance, perhaps blockchain is an effective system to maintain low costs and structural efficiency as the platform expands. Blockchain provides immense benefits in large scale mass transfer in the realms of data persistence, traceability, reliability, and transparency.

Collaboration between the two has already been done by several informal parties, such as a blockchain and AI based UPI wallet developed by the Blockchain Community India which shows the unique advantages blockchain tech brings to UPI payment systems. The model uses advanced blockchain technology to authenticate the peers on its platforms before we start the transaction and thus avoids the need for authentication being done twice. It introduces ledger like functionality to the platform which authenticates the peer and books the transaction by double entry or debiting the account of the sender and crediting the account of the borrower like normal banks do. This brings about security and efficiency benefits by storing the transactions on the ledger system. The NPCI has already started looking for block chain specialists to integrate block chain technologies into the current-day payment system, thus official integration is not far.

The move of the international payment standard away from SWIFT payment system and ISO15022 MT standard with the ISO 20022 messaging format, underpinned by the blockchain and related network technology can bring about flexibility, interoperability etc., all which are founding principles of the UPI. India is a proven leader in domestic real time transactions and has set benchmarks for the world to follow in this regard. Effective blockchain integration coupled with the widespread adoption of the UPI can make it a leader in international cross-border payments as well.

2.4 Threats

2.41 Threat to the existing credit and debit cards market

Since its inception in 2016, the UPI has emerged as the dominant force in digital payments in India, growing in volume by close to 60 times to INR 39 billion while card payments grew only by around 1.6 times in the same period. Credit cards require CVV number, expiration period and other card details to authenticate transactions, a cumbersome process compared to the UPIs 2 factor authentication system, causing UPI to emerge as the preferred option as India moves to a completely digital savvy nation with business and other transactions completely shifting to online and digital payments. In the future there is a serious possibility that debit cards may find it difficult to maintain their relevance in the face of the preference to the UPI across India. Debit card

transactions have fallen 20% YoY according to the data from the RBI, with a big chunk of those transactions being taken by the UPI. Payments through Prepaid Payments Instruments (PPI) further hinder the market for debit cards because, in addition to being much more convenient, PPI payment keeps the bank balance away from the risk of fraud since users do not need to enter their debit pin every time, they make a transaction. UPI works based on VPA (Virtual Payment Address), commonly called a UPI ID which is a much simpler process. The UPI has been wildly more successful than debit and credit cards in recent years with the UPI adoption rate being at an all-time high. In tier 2 and tier 3 cities, UPI contributes to close to 50% of all transactions.
Where the UPI truly leaves card transactions behind however is the merchant network. Compared to the UPI, Credit and debit card have had limited success in tapping payments at merchant storefronts. Today millions of merchants use UPI payments daily for their payments. It is inconceivable to see a pani-puri vendor, barber etc without a UPI QR code. According to the last count by consulting firm BCG, some 30 million plus merchants use QR code machines with UPI enablement while there are only 6 million POS(Point-of-Sale) machines for making card payments. Merchants always looked at POS device for cards as something that ate away into their profits, but the QR code system stands out exactly there, engraved in the philosophy of lowering costs for customers and merchants. According the BCG, the next big growth in digital payments will be driven by the merchant segment as the share in merchant payments jumps from 20% to 60% by 2026. UPI is fast replacing cash in physical stores as well. In addition to this, from the merchant end, there is little compliance formality irrespective of your credit formality. Regardless of your credit score, one can transact simply by the KYC transaction and registering your mobile number. The infrastructure to accept debit and credit card payments is much more intensive than that for UPI payments. Thus, a vast network accepting UPI payments has evolved with several payment aggregators to choose form and even various methods of payment such as QR code etc. As the nation moves towards a digital savvy payment ecosystem, UPI is fast eroding the relevance of Debit and Credit Cards. Both are offerings by banks which find a conflict of interest. UPI is a low-cost lean payment service, while the debit and credit cards are more lucrative segments, allowing them to splurge on heavy customer acquisition strategies such as perks and benefits. Now as we see a complete dominance of UPI payments under the Rs 2000 transactions, there is reason to observe the response of banks and other financial institutions with foots in both segments.

2.50 Conclusion

The UPI payment system has emerged as a juggernaut in the retail payment space in India and the poster boy of India developmental innovation to the world. Before long it is challenging the global order of cross border payments and has become the pseudo standard all other countries look up to when creating their own payment services. In India the UPI has ushered a new era in digital financial inclusivity. As the NPCI has stated, the goal of the UPI is not to compete with other payment systems, but rather with cash payments on a whole. The NIPL is making great strides in created a global payment pipeline with its roots in Indian tech, the benefits of these will be reaped immediately in terms of ease of remittance and cross border payments while providing the prospect of ample financial soft power in the future.
It is however to be noted that as the payment service racks up more and more volume of daily transactions both India and abroad, it puts more pressure on the infrastructure that runs these services. Efficiency and reliability are some of primary selling points of the UPI payment service, but so is the zero cost to transactions under certain amounts. Maintaining the efficiency in infrastructure needs investments, and motivating the stakeholders in the ecosystem needs the prospect of profitability in the future. The government subsidies provided are neither sustainable nor sufficient, and effective routes to Monetization must be developed. A payment model where we take a cut of the payment made would be more efficient than a flat fee. Since we plan on hopefully challenging the dominance of cash, we must try to keep end consumer freedom in the size of the transactions. This will keep profitability same across the board, weather for tier 1, 2 or 3 and prevent burdening the cost of the infrastructure on any one segment of the market.
Lastly, the UPI, and India Stack at large, should be viewed as tools of betterment and digital financial inclusion. The components of India stack can be used to effectively bundle financial records, identity services etc. in the form of a composite package. The culmination of these services together, in a sort of reinforcing system can lead to immense social benefit due to the cross-connectivity of all these data bases as supplementing each other. This can help build national, large scale, all-encompassing digital infrastructure to remove inefficiencies and bring the ease of digital technology to every aspect of the life of a citizen, weather be in rural or urban setting. This is one of the exciting prospects to bridge the gap between India and Bharat.

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