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TKM INSTITUTE OF MANAGEMENT

The Legacy of TKM College Trust

The TKM College Trust was founded by Janab A.Thangal Kunju Musaliar, a successful industrialist, philanthropist and businessman. Born in a middle class family on 12th January 1897 at his ancestral home in Kollam. Janab Thangal Kunju Musaliar built up a vast business empire which dominated the cashew export trade in the 1940s and 50s. As a man of extra ordinary vision, he foresaw the tremendous importance of education and this led to the establishment of the TKM College Trust in the year 1956. T.K.M. College of Engineering, the first private Engineering College in Kerala, was set up by the Trust in 1958 followed by the T.K.M. College of Arts and Science in the year 1965. Janab Musaliar passed away on 19th February 1966 after an illustrious career that paved the way for advancement of professional education in Kerala.

True to the vision of its founder, the TKM College Trust has, over the years, added several other educational institutions to its fold - The TKM Institute of Management in 1995, The T.K.M. School of Communication & Information Technology in 1996, the T.K.M. Centenary Public School in 1997, the T.K.M. High School and T.K.M. Higher Secondary School in 2000, the T.K.M. Institute of Technology in 2002 and the T.K.M. School of Architecture in 2014.

Today, the dream of the late Janab A. Thangal Kunju Muslaiar of uplifting society through education has to a large extent been fulfilled. His life exemplifies greatness in its true sense. Several of his initiatives, innovations and achievements are standing monuments in the changing national and global scenario. No wonder that the Government of India has thought it fit to issue a commemorative stamp in recognition of the services of this great man in 2001.

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Special Issue: FinTech & Digital Banking **ISSN: 2455-684X**
Volume 3| Issue1| 2018

CONTENTS

EDITORIAL

DIGITALIZING FINANCIAL THROUGHPUT

Jb.T.K.Shahal Hassan Musaliar

The convergence of the digital and the financial realms is a megatrend that affects contemporary business and management. Digital finance is seizing space at an accelerated pace and is shortening the distance for the customer to the financial world. These are the times of 'smart contracts' that can self-execute, self-enforce, self-verify, and self-constrain performance. These are times of e-aggregators who provide internet-based venues for retail customers to compare the prices and features of a range of financial (and non-financial) products across institutions.

According to the Reserve Bank of India, around 400 Fintech companies are operational in India and their investments are anticipated to grow by 170% by 2020. As per NASSCOM, the Indian Fintech software market is projected to touch USD 2.4 billion by 2020 from a current USD 1.2 billion. The business value for the Indian Fintech sector is estimated to be approximately USD 33 billion in 2016 and is estimated to reach USD 73 billion in 2020. The penetration of internet and mobile telephones, high-speed computing, cryptography, and innovations in machine learning and data analytics are some of the elements behind the latest fintech wave. While technology-driven change is inevitable, it brings with it an enormous potential for disruption in both structure and tools. The final balance will depend on, among other factors, how the education sector reskills both at the domestic level and at the global level.

We at TIM believe that the technological transformation in the financial landscape underlies the need for a new learning curve for management studies. To stay relevant, management education has to be adaptive to technological transformation. As suppliers of skill to the financial industry, the management institutions have to be ahead of the curve. The impact of changing technology on management education is profound. Fintech changes call for big data analytical abilities, predictive abilities, culling out insights from information, interpreting data patterns abilities, simulative capabilities and optimal solution suggestion givers.

We at TIM would endeavour to focus on four essentials in this forceful change process:

First, to keep our participants up to date on the dynamics of technological innovations in their application to finance;

Second, to contribute capacity-building needed to meet the challenges of the financial sector;

Third, to broaden our contents as 'fit and proper' as possible for fintech sector, financial firms, as well as non-financial firms such as tech companies and network operators;

Finally, to assimilate global trends while maintaining the national aspiration of financial inclusion.

FINTECH AND DIGITAL BANKING: AN INTRODUCTION

[1]R.Gandhi

[1]Former Deputy Governor, Reserve Bank of India

Recent years have seen enormous growth of FinTech companies worldwide. An added flavor is that they are typically startups. This has attracted wide spread attention from different quarters including the investment community, the media, the financial regulators and the government.

I. What is FinTech

FinTech is the short form for Financial Technology and FinTech companies are those entities which apply technology in innovative ways for providing financial products and services. Today, 'Technology' for financial sector encompasses computer science, information technology, communication technology, internet technology, data science technology, artificial intelligence and blockchain/ distributed ledger technology; further within the communication technology arena, telephony, wireless, mobile, radio frequency, vsat technologies and the like are contributing immensely.

II. Evolution of FinTech

For many long years, the financial sector entities have been operating under very broad umbrellas of a bank, a non-bank finance entity, securities and broking firm, a fund/trust entity or an insurance firm. Each of these types carries out a distinct bouquet of financial services and products as defined or grouped under respective statutory and regulatory frameworks. It had been the received wisdom that such respective bouquets of products and services needed to be grouped and served together for optimal efficiency, and to take advantage of scale.

Application of modern technological developments has effectively been questioning this received wisdom and the emergence of FinTech has forcefully negated this wisdom. The situation was slowly evolving from 1950s and has gathered such a momentum in recent years that it is now revolutionalising the financial sector.

It all started when computing technology made its headway post World Wars into civilian arena. One of the early adopters of technology was banking, as it was eminently suited to make good use of technology. Banking has a natural fit for application of computing technology as banking operations really means handling and dealing with high frequency and large volume of data with greatest accuracy and speed; large of records needed to be maintained; customers needed to be services in whichever way, time and place; and these are the attributes which are offered by computing technology. This banking and finance on the one hand and the computing technology on the other hand became made for each other pair.

Based on such cozy relationship, the banking and financial sector started demanding of the technology solutions for bringing in greater efficiency in their operations in terms

of cost, time and resources. The technology sector rose to the occasion by applying technological developments in innovative ways for market share increase, customer retention, enhancing customer delight and even for regulatory compliance.

The technology companies who were initially just software developing entities grew to become integrated solution providers. Later, they turned into business process outsourcing performers for carrying out routine, mundane and repetitive operations of banks and financial institutions with the help of technology. In due course, with the emergence of sophisticated technological aids for performing qualitative, research based knowledge offerings, the technology companies became Knowledge Process Outsourcing partners and started performing certain core functions of financial sector like the credit scoring, risk modeling and stress testing.

III. FinTech Revolution

In parallel moves, , there were developments which resulted in 'chunking' of banking and financial services became the norm; and for undertaking each of these chunks, there are some specialist entities who perform only those chunks.

The chunking away of banking from the banks have given enormous business and growth for these non-banks. With their specialization and focused service rendering, they are able to offer that chosen service at greater efficiency, speed and at very affordable cost. Though initially they were offering these services to the banks and financial institutions, slowly they started offering the services directly to the ultimate consumers. It is these specialized entities, which make innovative use of ICT as their business model, which tend to be called the FinTech companies.

Payment service providers, P2P services, P2B services, SME financing, consumer retail financing, disintermediation, crowd funding, open ended mutual funds, money market mutual funds, deposit alternatives, trade financing, invoice financing, bill discounters, bill collectors, credit referrals, account aggregators, interest free products, syndicators, investment bankers, MFIs, co-ops, HFCs and credit raters are some of the entities who chipped away chunk after chunk of banking. Is there an element of banking or finance that remains the exclusive privilege of banks or financial institutions?

When you add the aggregators, special apps, P2P lending platforms, angel financing, algo trades, Robo advisers, internet banks, branchless banks to the chunking providers, one can understand the magnitude of FinTech Revolution that is playing out these days.

IV. Implications of FinTech Revolution

The FinTech Revolution has implications for very many financial sector players, regulators and as it has turned out, even for governments. First, the FinTech companies are providing serious competition to the mainstream financial service providers like banks and the financial institutions. The competition has been not just from the perspective of emergence of additional and alternative financial sector intermediaries; in fact, the FinTech companies are actually dis-intermediating, i.e. linking the borrowers and lenders directly, the investors and invested directly, the givers and receivers directly, thus eliminating the need for financial intermediation itself. This has led to eminent thinkers/ innovators like Bill Gates to say that in future "while banking may be necessary, banks are not". A recent survey among CTOs/ CIOs bring out that 88% of them believe that

FinTech will eat away one fourth of banking business in five years.

V. Regulation of FinTechs

If the banks and other financial sector participants are worried about the competition that the FinTechs pose to them, the financial sector regulators are also a worried lot. The FinTechs are changing the way funds are raised, used, lent and borrowed, and remitted. It is impacting not just entrepreneurs and businesses, but also ordinary bank and financial customers. Therefore, the regulators across the world are sitting up and closely monitoring the developments with great interest. Standard setting bodies like the Financial Stability Board, the Basle Committee on Banking Supervision and others have formed special teams, working groups to examine the developments.

The debate has been whether the FinTechs should be regulated or not; and should regulation be needed, should it be light touch or intrusive. There is also a proposition that it is the FinTechs who want to be regulated, even though the regulators do not want the FinTechs to be regulated.

The arguments for financial regulation have been built on the premise that financial sector entities are dealing with public money and therefore they should be worthy of public trust; they should be financially sound and prudentially managed; they should be of good conduct - all these considerations, along with consumer protection and competition concerns, need for systemic risks management etc. have led to prudential, conduct, systemic and competition regulations.

The FinTech groups maintain that technological innovations bring in jobs, productivity enhancement and customer delight; innovations should not be fettered. Regulation typically hampers innovation; ergo regulation should not be there. Further, FinTechs do not offer the standard spectrum of financial services, and therefore they should not be subject to costly and constraining regulations.

A middle ground, balancing these arguments, has been reached. Since the FinTechs offer financial service, but only a particular aspect of financial service, not the standard spectrum of financial services, they may be differentially regulated. Differential regulation is meant to be offering FinTech certain exemptions from standard full set of regulations, easy entry norms, relaxed standards, allowing trial and error i.e. providing a Sandbox etc.

While the debate on whether the FinTechs should be regulated or not has been settled the way explained above, quite a few FinTechs have in fact been welcoming and canvassing for regulation. They have understood that certification in the form of a regulated entity provide them official recognition which can help them gain public confidence and trust; regulation also means assurance on standards and of good conduct; it also accords the FinTechs facilities for accessing Data and Advice from the regulators.

A specialized branch of FinTechs is being recognized of late. These groups of FinTechs apply Big Data technology, Stress Testing, Model building, Artificial Intelligence and Machine Learning in ways to help regulation itself and is being called as RegTech, short for Regulation Technology.

VI. FinTech Regulation and Facilitation

The world-wide approach of regulators to FinTech has been varied. Jurisdictions like the United Kingdom, Singapore, Hong Kong, Switzerland and the like have taken extremely

favorable position vis-à-vis FinTech regulation. They believe that FinTech disruption in the financial sector has immense potential for competition and efficiency. Hence, these jurisdictions have adopted the role of being promoters and facilitators of FinTechs. Slowly other jurisdictions like Australia, New Zealand, Canada and the like are emulating this trend. Jurisdictions like the United States of America, China and India have taken a cautious approach and initiated actions to regulate FinTechs.

VII. FinTech Regulation – India

India has a long history of facilitating innovation in financial sector by applying appropriate technology. In fact, India has coined the term Banking Technology, the precursor to FinTech way back in 1990s itself when it established a specialized research institution, the Institute for Development and Research in Banking Technology (IDRBT). India has been offering also the Sand Box, the now famous arrangement for FinTechs, all these years – the labs in IDRBT from 1996, in the National Payment Corporation of India Ltd(NPCI) from 2009 and the Reserve Bank Information Technology Pvt Ltd (ReBIT) in 2016.

While explaining the Indian approach to innovations in the financial sector, Dr. RaghuramRajan, the then Governor, Reserve Bank had said in September 2015 "There is a Chinese saying: 'Cross the river by feeling the stones.' We have tried to follow that path of experimentation and incremental liberalization. More generally, our philosophy is to allow innovation in institutions, instruments and practices so long as they do not present a clear and present danger. Once we understand them better, and they grow to a material size, we can do a deeper analysis on how they should be regulated".

Following this approach, India has while facilitating and promoting application of information and communication technology in areas like microfinance, Peer to Peer Lending platforms, e-wallets etc. in the initial years/ phases brought them under proportionate regulation in due course.

VIII. Digital Banking Impact

Banking is generally defined as accepting deposits, withdrawable on demand, from the public for the purposes of lending. Thus acceptance of deposits, purveyance of credit and effecting payment and remittances form the effective trinity of banking. Digital banking means conducting these three primary activities of banking through digital means.

Among the various types of credit (viz., Agriculture, Infrastructure & Corporate, MSME, Services, Retail & Personal and within the Retail & Personal segments the Housing, Vehicles, Education, Consumer and others), FinTechs are making serious inroads in the MSME sector, the Retail trade (e-Commerce) and personal segments. FinTechs have decisively foraying into the hitherto unwanted, unmet and underserved segments of the MSME and Micro Finance; they focus on conversion of informal credit (of money lending and daylight lending) into formal credit; they are also creating credit demand in the case of e-Commerce.

As regards deposits, will FinTechs encroach on Liabilities Business? No, FinTechs are not authorized to take deposits. Only banks can do so. Under extant regulations either FinTechs do not deal in money or they have to park their collections into bank accounts by EOD. But, what if FinTechs become banks or half-banks? Say the Payment Banks and Wallet offerers? There is a secular declining trend of demand deposits in Indian banking, whereas

the savings and term deposits are holding forth; banks' borrowing has been increasing, while their other liabilities have a declining trend. The FinTech revolution is likely to be disrupting these trends – the time liabilities of banks are likely to fly in search of direct and extra return; further the time liabilities will increasingly be short-termed, as the FinTechs offer very nimble ways of managing one's funds. CASA will increase, but will be highly volatile and will see fast turnaround. As FinTechs help e-Commerce, Wallet Escrows will increase; banks' borrowing will face huge increase, as end of day balances of E-Commerce, direct investment vehicles etc. get parked in banks.

The real revolution will be in digital payments. The challenge by FinTechs viz., E-Wallets, e-Commerce, Payment Banks, P2Ps, Account aggregators etc. is so humungous that payment banking will move away from 4x5.5x245 (ie four hours a day, five and a half a week by two hundred and forty five working days a year) to 24x7x365. While the banks will still at end of day get back all the moneys that were paid or remitted, it is the volume, frequency and revenue per transaction of the FinTechs specializing in digital payment that will make all the critical difference.

What these trends in FinTechs foretell the banks? The banks' profitability will be under serious stress. The new entrants i.e., the FinTechs will concentrate on high quality service, and will be more efficient; they will target the high NIM (Net Interest Margin) business and high volume fee business. Thus when the FinTechs remove the creamy layer, the normal banks will face the ultimate challenge.

CYBER SECURITY AT CENTRE STAGE

[1]R.Ravikumar and [2] M.Venkateswaran
[1,2]Officers of the Reserve Bank of India

I. Introduction

Financial institutions, particularly banks, are considered to be posing higher risk by the very nature of their business. Size and maturity transformation functions of such entities require that these institutions mange theirs risks well. International standard setters as well as regulators have recognized this and traditionally credit, market, liquidity and operational risks are the major risks faced by the banks and over a period of time on the back of developments in statistical techniques, technology adoption and lessons learnt from various episodes of risk materialization, techniques for risk identification, measurement, mitigation and monitoring have evolved to an acceptable level.

As banks adopted technology in a major way in the past few decades, the risks posed by the technology also was reckoned as part of the operational risk, which is defined as risk emanating from failed people, processes and technology. Developments in network and mobile technologies on the one hand and growing demand for ease of delivery of banking services on the other ensured that more and more services of the banks are offered electronically, in so much so leading to setting up of 'digital only' banks.

Financial industry has always attracted the attention of fraudsters on account of the lure for the money and with networked systems offering services to customers through their devices, the risk of abusing technology for wrongful gains has increased materially. Financial institutions, being the core of the economy, are also prime targets for various groups like nation states, crime syndicates, hacktivists etc. so as to convey their messages. Hence attacks on the systems of banks facing the public, in other words cyber space of banks, have increased manifold both in numbers as well as in its impact. The sophistication of such attacks have grown significantly in the recent times.

Cyber-attacks are a threat to the entire financial system, a fact that is underscored by recent reports of significant and successful attacks both within and outside the financial sector. The 2016 attack on the Bangladesh Bank resulted in atheft of $81 million, the WannaCry ransomware attack infected more than 250,000 computer systems in 150countries, and the recent Equifax hack is estimated to have resulted in the compromise of personal information of up to 143 million individuals. The changing nature of cyber risk to financial institutions is driven by several factors, including evolving technology, which can lead to new or increased vulnerabilities; interconnections among financial institutions and between financial institutions and external parties, e.g. through cloud computing and FinTech providers who may be outside the regulatory perimeter; determined efforts by cyber criminals to find new methods to attack and compromise IT systems; and the continuing attractiveness of financial institutions as targets

for cyber criminals seeking illicit financial gain, irrespective of the method.

According to the IMF Working Paper titled 'Cyber Risk, Market Failures, and FinancialStability', the key characteristics of Cyber Risks are given as

- Ø Cyber-attacks occur with increasing frequency amid ever-decreasing costs of technology.
- Ø Virtually everybody is exposed to cyber risk in some form.
- Ø Cyber-attacks evolve quickly and are highly dynamic by nature, which complicates risk assessment.
- Ø The internet is largely anonymous, which complicates the identification and attribution of cyber threats.
- Ø There are structural difficulties in estimating the cost and likelihood of cyber events.

II. Global Developments

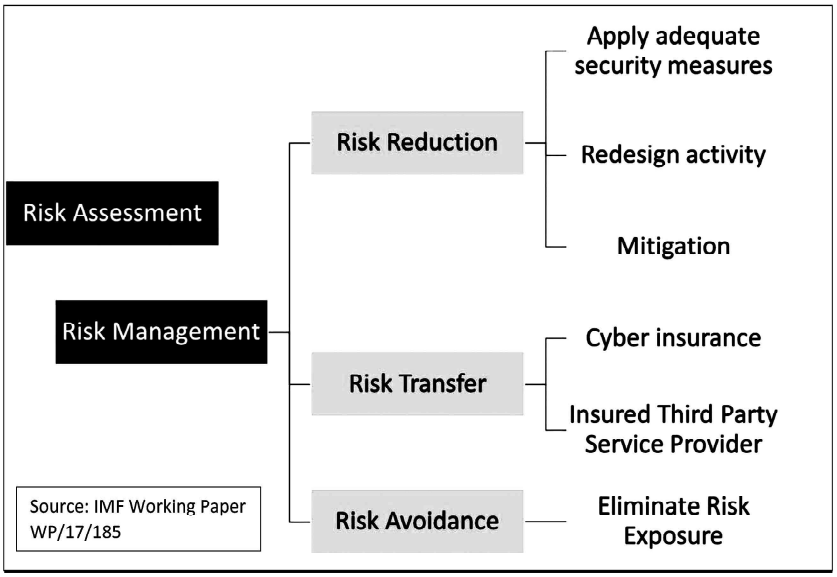
Recognising the threat from cyber risks and the critical nature of enhancing financial institutions' resilience to those risks, authorities across the globe have taken regulatory and supervisory initiatives designed to facilitate both the mitigation of cyber risk by financial institutions, and their effective response to, and recovery from, cyber-attacks.

In June 2016, the Committee on Payments and Market Infrastructures (CPMI) and the Board of the International Organization of Securities Commissions (IOSCO) released the Guidance on Cyber Resilience for Financial Market Infrastructures ("Cyber Guidance").This Cyber Guidance is the first internationally agreed guidance on cyber security for the financial industry. It has been developed against the backdrop of a rising number of cyber- attacks against the financial sector and in a context where attacks are becoming increasingly sophisticated. Ahead of its summit in Davos 2016, the World Economic Forum published its Global Risks Report 2016, in which it warned that most of the world's economies are underestimating the potential effect of cyber-attacks on businesses – and their economies. G7 CEG (Cyber Expert Group) published the G7 Fundamental Elements for CyberSecurity (G7 Fundamental Elements) in 2016. This guidance applies to both firms and supervisory and regulatory authorities throughout the financial sector, including FMIs, trading venues, banks, insurance companies, broker-dealers, asset managers and pension funds. The elements included as part of the G7 fundamental elements are Cybersecurity Strategy and Framework, Governance, Risk and Control Assessment, Monitoring, Response, Recovery, Information Sharing and Continuous Learning. Subsequently, an assessment framework has also been developed for these elements. Financial Stability Board (FSB) published the stock-take on cyber security regulations, guidance and supervisory practices on 13 October 2017. The report includes information concerning jurisdictions' self-reported existing publicly released regulations, guidance and supervisory practices; future plans; and views regarding effective regulatory and supervisory practices. Needless to add that all major regulators have recognized the impact of cyber risk on their regulated entities and have strategized their oversight in a nuanced manner in the recent past. Cyber-Lexicon is being developed by the FSB to support the work of the FSB, standard-setting bodies, authorities and private sector participants, e.g. financial institutions and international standards organisations, to address cyber security and cyber resilience in the financial sector.

III. Cyber Risk Management

As per the above referred IMF paper, firms, including financial services institutions, have long viewed cyber risk mainly as an internal, IT security problem. Over time, this perspective has evolved to also include operational risks linked to the firm's immediate business partners—including counterparties and third parties to which certain cyber-security activities, like threat monitoring or data storing, have been outsourced. According to the IMF Working Paper titled 'Cyber Risk, Market Failures, and Financial Stability', the risks identified, analyzed, and evaluated as part of a threat identification process need to be actively managed using largely common, risk management techniques. Active management is crucial to ensure that cyber security-related measures are appropriate for and commensurate with the underlying risk. The basic options are risk avoidance, risk reduction, and risk transfer.

Figure 1: Cyber Risk Management



Source: IMF Working Paper: WP/17/185

Regulators, globally, require banks to recognize cyber risk as one of the risks faced by the institutions and managed as per the best risk management practices adopted while managing other major risks faced by them. However, the knowledge and skills that are required to manage cyber risks are seldom available within risk management vertical and as such institutions have to make conscious efforts to build the expertise in this arena. All major regulators have issued specific guidelines to their regulated entities on cyber risk in the recent times and are monitoring the developments closely

IV. Cyber Security Regulations - Indian Scenario

If the evolution and adoption of Information Technology by banks in India is traced, Rangarajan Committee on Mechanisation in Banks (1984) could be considered as the harbinger of adoption of technology for Indian banks. Thereafter, various committees / working groups have recommended gradual adoption of technology and need for associated safeguards in the

sector. The journey basically commenced with the advent of Ledger Posting Machines, moved to Total Branch Automation and then to Core Banking Solution (CBS). In the 1990s, the new generation private sector banks were mandated to commence their operations in fully computerised environment. As Gordon Moore's prediction of doubling of overall processing power of the computers every two years kept coming true, more and more applications in the banking space got pushed to the computerised environment.

Reserve Bank of India also played a very pivotal role in developing the payment market infrastructure and facilitating use of technology in the banking sector by setting up institutions like the IDRBT, NPCI, CCIL etc. Currently, these institutions provide the platform for running mission-critical and secured payment system applications like RTGS, Secured Financial Messaging System, and Negotiated Dealing Settlement System etc.

Information Technology Act enacted in the year 2000 gave a further fillip to conducting of transactions in a computerised environment by providing a legal underpinning. Internet penetration gradually increased which led to increasing use of internet as a channel for delivery of banking products and services. The exponential growth of mobile phone users in the country also fast-tracked their usages as a delivery channel. The latest in the long line of innovations in the banking technology space is Unified Payment Interface (UPI), which has pushed the boundaries on remittances.

According to the BCG-Google report titled Digital Payments 2020- The making of a $500 Billion Ecosystem in India, the growth of Indian digital payments is expected to be driven by the following trends;

- India going digital
- Favorable regulatory environment
- Emergence of NextGen Payment service providers
- Enhanced customer experience.

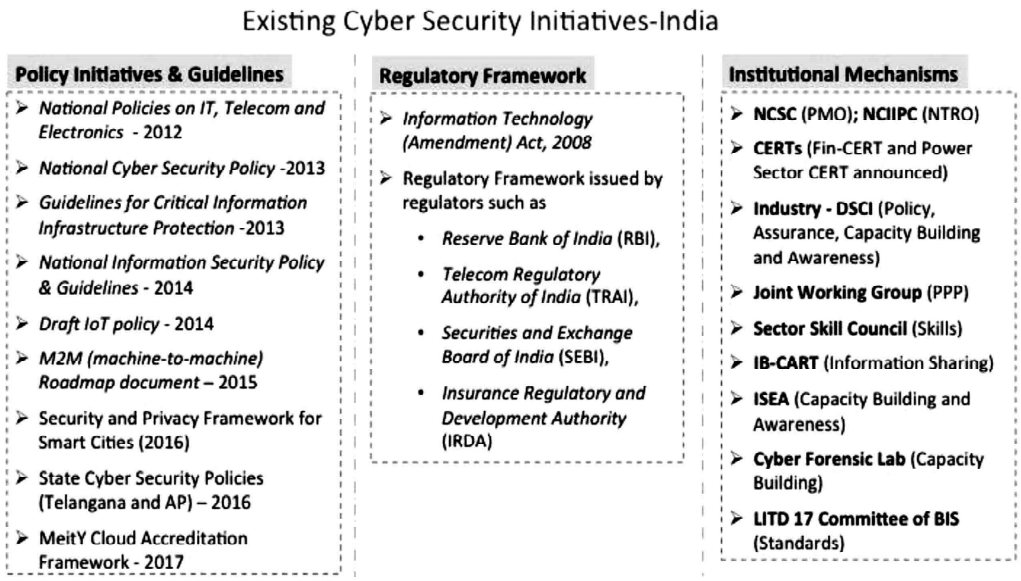
India is rapidly evolving into a digital behemoth. Rising smart-phone penetration and internet access have ensured that Indian consumers stay constantly connected. Also, the Indian government has embarked on a programme to turn the country into a digital economy. It has unveiled a series of initiatives—from introducing Digital Locker, which eliminates the need for people to carry hard copies of documents issued by the government and by providing various incentives to use digital medium for putting through transactions.

However, the development also poses a big challenge, that of cyber security. With the move towards a digital economy, increasing amount of consumer and citizen data will be stored digitally and a large number of transactions will be carried out online, by companies, individuals as well as government departments. That makes India a huge digital market on the one hand and a target for cyber-criminals and hackers on the other.

v. Existing Cyber security Structure in India

Government of India has taken several steps to tackle the menace of cyber-attacks and important institutional arrangements have been made. Indian Computer Emergency Response Team (CERT-In) and National Critical Information Infrastructure Protection Centre (NCIIPC) are the national agencies with latter taking all measures including associated research and development for protected systems of Critical Information Infrastructures in India. Indian Computer Emergence Response Team (CERT-In) monitors Indian cyberspace and coordinates

alerts and warning of imminent attacks and detection of malicious attacks among public and private cyber users and organisations in the country. Banks / Financial Institutions have been identified as critical infrastructure for the purpose. National Critical Information Infrastructure Protection Centre ("NCIIPC") is an organisation under the administrative control of National Technical Research, Organisation ("NTRO") and is designated as the National Nodal Agency in respect of Critical Information Infrastructure Protection ("CIIP").



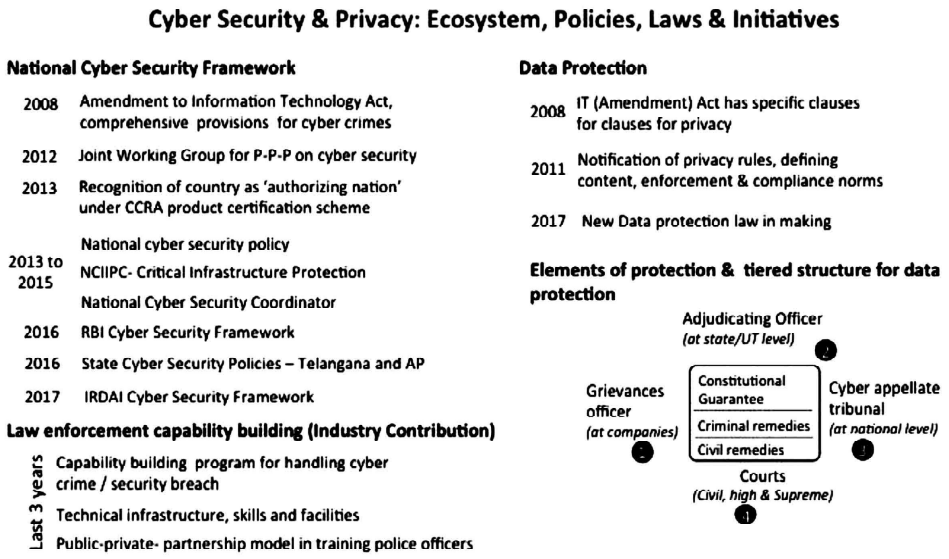


Figure 2

Cyber Swachhta Kendra (Botnet Cleaning and Malware Analysis Centre) has been launched by CERT-In on February 21, 2017 for detection of compromised systems in India and to notify, enable cleaning and securing systems of end users to prevent further malware infections. The Centre is working in close coordination and collaboration with Internet Service Providers, Academia and Industry. The Centre is providing detection of malicious programs and free tools to remove the same for common users. A National Cyber Coordination Centre has also been established. The Government of India has proposed to establish a Computer Emergency Response Team for the financial sector (CERT-Fin), to work in close coordination with all financial sector regulators and other stakeholders.

India has three schemes of regulations/ guidance that address cyber security for the financial sector. The first, issued by the Reserve Bank of India (RBI), covers banks. It is targeted to cyber security and/or IT risk. The second scheme, issued by the Securities and Exchange Board of India (SEBI), covers FMIs and trading venues. The third scheme, issued by the Insurance Regulatory and Development Authority of India (IRDAI), covers insurance companies.

Figure 3: Cyber security Framework in India

Governance and Oversight	**Baseline Controls**
CYBER SECURITY FRAMEWORK – INDIA issued by RBI	
Incident Reporting	**Education and Awareness**

RBI has issued instructions on cyber security framework in banks in June, 2016. Among others, the framework expects banks to put in place a board approved cyber- security policy, to prepare a cyber-crisis management plan, to make arrangement for continuous surveillance, to reckon the security aspects while procuring / connecting / implementing hardware, software, network devices etc., to ensure protection of consumer information, to share unusual cyber security incidents with RBI, to assess the gaps in cyber security preparedness on the basis of baseline requirements articulated in the circular and to set up a Cyber Security Operations Centre. The Reserve Bank also had set up an Expert Panel on IT Examination and Cyber Security drawing representatives from the industry as members. The Panel was providing assistance in IT examination/cyber security initiatives of banks, review examination reports and suggest actionable items. Subsequently, in February 2017, the Reserve Bank of India has set up an Inter-disciplinary Standing Committee on Cyber Security to, inter alia, review the threats inherent in the existing/emerging technology; study adoption of various security standards/protocols; interface with stakeholders; and suggest appropriate policy interventions to strengthen cyber security and resilience. RBI also established its IT subsidiary (the Reserve Bank Information Technology (ReBIT) Pvt Ltd. The mandate for ReBIT, among others, is to focus on issues around IT systems and cyber security

(including related research) of the financial sector and to also assist in the audit and assessment of the entities regulated by the Reserve Bank. IDRBT (Institute for Development & Research in Banking Technology), a subsidiary of RBI, has released a comprehensive check-list on cyber security prepared by a panel of experts drawn from industry and academia in July 2016. The checklist covers wide-ranging aspects of cyber security like enterprise control, IT infrastructure security, Endpoint security, Security monitoring as also outsourcing security.

In August 2016, SEBI constituted a High Powered Steering Committee on Cyber Security (HPSCCS) to, among other things, oversee and provide overall guidance on cyber security initiatives for SEBI and for the entire capital market, advise SEBI in developing and maintaining cyber security and cyber resilience requirements aligned with global best practices and industry standards and identify measures to improve cyber resilience and related business continuity and disaster recovery processes in the Indian securities market.

In order to strengthen the existing cyber security framework and to put in place a more comprehensive framework, IRDAI has recently constituted two working groups for life and general (including Health) insurance sectors involving Chief Information Officers (CIO) of all insurers to deliberate and decide on various issues related to cyber security. The working groups of CIOs met and decided on the approach methodology for drafting of proposed framework. The Guidelines on Information and Cyber Security for insurers was issued by IRDAI on 7th April 2017 under Sub-section (1) of Section 14 of IRDA Act 1999 with strict timelines for implementation of various aspects of the guideline document.

VI. Challenges and Way Forward

Technology adoption is seen at an increased pace in the recent times and with various fintech companies jumping into provide financial services, the pace is likely to increase. This brings in additional security considerations to be addressed. Security is as good as its weakest link and ensuring that all the stakeholders are carrying out their business in a cyber-safe manner is a challenge. Tone at the top in the regulated entities has to change significantly to recognise the potential of cyber threats to impact financial stability. Recent incidents across various countries are just a tip of the iceberg. Information sharing among stakeholders has to become more voluntary. Collaboration among stakeholders to address this issue needs to become stronger. Information exchange among regulators on such matters needs to be elevated to desired level. There are incidents where multiple countries are involved in unwinding an unauthorized message sent through SWIFT or other payment channels. There is a need to have an SOP among central banks to respond quickly to such requests so as to frustrate the perpetrators. Skill gap is an area where collaboration could help in a significant manner. Joint workshops on cyber security related aspects could help each other to learn from the best practices. Regular communication between central banks on major developments in this important area would be useful. Setting up an emergency response SOP for requests emanating from each other would help in addressing any future incident in a befitting manner.

Cyber-literacy is at its infancy now in India and some institutions are still not following adequate cyber-hygiene. Cyber hygiene is a reference to the practices and steps that users

of computers and other devices take to maintain system health and improve online security. These practices are often part of a routine to ensure the safety of identity and other details that could be stolen or corrupted. Much like physical hygiene, cyber hygiene is regularly conducted to ward off natural deterioration and common threats. Therefore, the stakeholders need to proactively embrace cyber-hygiene on the one hand and a formal and professional approach to prevent, monitor, detect, respond and recover from cyber-incidents, apart from having a state of the art cyber security infrastructure, in financial institutions, on the other.

Commercial organisations including financial sector institutions are primarily responsible to put in place a cyber-secure eco system in offering their services to various stakeholders. Governance and oversight plays an important role in managing cyber risk. The security controls must be robust and to be reviewed periodically to recognize the developments. It is important to share incidents among the peers so as to learn from each other. At a macro level, coordination among various stakeholders is the key. Government– through various ministries, sectoral regulators, law enforcement agencies, academia and technical organisations need to work in coordinated manner to identity, protect, detect, respond and recover from cyber incidents. As India emerges as a major digital marketplace, the security needs to be strengthened on a continuous basis to ensure that the stakeholders are able to transact safely.

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FINTECH & DIGITAL – THE DISRUPTIVE COMBINATION

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1. Introduction

Banking across the world is in a hyperbolic transformation phase. The adoption of modern technology has revolutionised the way the banking products and services are delivered to customers. In the long run up to modern technology, technological start-ups challenging traditional banking and other financial players, and offers several easy to operate financial products and services, from crowd funding and P2P lending platforms, mobile solutions, international money transfers, bloc chain and distributed technology, crypto-currencies, to on-line portfolio management services, aggregators, etc. In this context, the financial institutions are partnering with and/or investing in the FinTech companies to retain their unique position in the financial sector. These companies are now capable of offering directly financial intermediation and on-line services, which may be disruptive to the exclusive domain of the traditional players. Competition between banks and FinTech give way to direct collaboration across the FinTech ecosystem. Potential opportunities range between product design and development by the FinTech to the intermediation architecture of banks.

II. Era of Disruption

We live in a world where old business models become irrelevant overnight. Those entities who fail to look beyond their immediate competitor have been wiped out, irrespective of their size, long existence, leadership positions. (e.g. Blackberry, Motorola, Nokia, Kodak, Blockbuster etc.). They failed to identify trends in other industries which had the potential to make their own revenue streams stop abruptly forcing them into oblivion.

III. Technology is the catalyst

It is true that even in the past, there have been businesses which were taken over by better competitors. However, the real reason why disruption is happening so rapidly is the fact that today's technology is leapfrogging at a furious pace due to the power of computing multiplying exponentially. On the communication infrastructure, rapid changes have already taken place with a very high data transmission pipeline, which is only expected to multiply in the years to come. This is then leveraged using the humungous networking capabilities available on the social media.

iv. Fintech have pushed the door open

From being a simple portmanteau definition in the last few decades, FinTech has become a force to reckon with. Financial technologies have catapulted themselves to hitherto unimaginable levels by combining great customer centric ideas backed by technology. They have found active interest from Angel investors, Venture Capitalists and in some cases from Crowd funding. Budding entrepreneurs with bright idea are changing human lives in dramatic ways.

V. Paranoid about customer experience

FinTech have ushered in a new culture where customer experience is the fulcrum on which the entire business model is created. All

the other aspects, such as cash flow, revenue stream are often seen as afterthoughts. No stone is left unturned when it comes to creating beautiful UI (User interface) culminating in great UX (User experience). The new generation of consumers, viz. the millennial, is known for its impatience and short attention span. Any service provider has to realize this truth while designing new offerings. An extra click here or a small waiting period is all it takes to lose a mobile app customer.

VI. Low entry barriers

Unlike the past, where significant capital was required to set up a brick and mortar based business mode, the strength of utility computing, made possible by subscribing to the on the go infrastructure (virtualized Hardware, Software, Network available as a cloud model) has empowered young entrepreneurs to convert their dream idea or project into reality within no time. As the solutions are running on cloud infrastructure, any sudden increase in customer base is easily catered to, by on the tap capacity augmentation.

VII. Aggregation is the new mantra

Various industries have seen FinTech led disruptions, most of which have been based on a technology backed aggregation model. The FinTech have been quick to identify the customer pain points; their demands and then match it with unutilized supply at the providers end. As this is beneficial to the supply side players, they pass on some of their profit margins back to the aggregator. In the end, customer gets the double benefit of best offering at best price, which is further sweetened by the added loyalty point rewards, discount coupons and cashbacks.

- Commerce – e-com revolution (e.g. Amazon, Flipkart)
- Food/Restaurant – Rendering of food at our doorstep through Zomato
- Taxi Services– Uber, Ola
- Hospitality – AirBnb, OYO
- Travel – MakeMyTrip, ClearTrip

The most amazing fact is that most of these leaders do not hold even a single piece of inventory themselves.

VIII. Digital Revolution

Globally, companies are moving to embrace digital strategies and capabilities. In India too, we have witnessed dramatic enhancements happening in digital space, especially when it comes to authentication and payments. The India stack, which essentially is a platform that started with Aadhaar authentication in 2010, followed by Aadhaar based payment bridge (APB) which is the backbone of Direct Benefit Fund Transfer to bank accounts. This was immediately followed by AEPS (Aadhaar Enabled Payment System), which paved the way for withdrawals from Bank account using Aadhaar authentication. Aadhaar based e-KYC experiments started in 2012. In 2013, the much talked about JanDhan account, Aadhaar and Mobility factors were taken as top priority by the Government and called it as JAM. 2015 saw the digilocker platform being opened for all customers. The final push came in the form of UPI (Unified Payment Interface) which is a globally unique concept and platform, which combines Push & Pull payments in one go. It allows customers to instantly create Virtual Payment Addresses of his bank account, and then send money to another VPA. The key aspect is that it also supports Collect Request, which opens up a whole lot of opportunities for FinTech, banks and businesses to come with exciting new payment models. South Indian Bank, is on-boarded on all these platforms. We were the first bank to go live on UPI in India, after complying with all NPCI mandates.

The latest entrant in this endeavour is QR (Quick Response) based payments wherein customers can scan a QR code displayed at a merchant outlet. The QR can be even dynamically generated in an app or the billing system of the merchant, which will include all specific details for each payment including billing amount. India is planning to emulate the China model, wherein lion's share of payment is done using the QR mode. South Indian Bank has this feature integrated in the mobile app, Mirror+. We are also rolling out this solution for our merchant establishments along with BHIM Aadhaar. We are also offering customers the common bill payment platform called Bharat Bill Payments system or BBPS. As a bank, we also offer our customers RFID powered FASTAG which allows for seamless driving through Toll booths across the country. The customer is definitely spoiled for choice while making payments as the traditional mode of debit and credit cards will get slowly replaced by these advanced modes.

ix. Other emerging technologies

The FinTech led digital revolution is banking on exciting technology revolutions that are happening around us.

a. Blockchain : Also known as Distributed Ledger Technology or DLT, Blockchain has been widely touted as the next big technology which could remove the role of intermediation and ledger keeping, which used to be the classic stronghold of organizations such as banks. This concept of tamper proof transparency in a no trust environment is finding takers in various industries including banking. We as a bank, were one of the first to pilot a cross border transaction on Blockchain platform in partnership with a leading exchange house in UAE and a FinTech in India. We are also working on building a Blockchain based trade finance platform with a consortium of 11 bankers and a technology company.

b. Analytics: We have extensively used technology to assist us in decision making using data processing and reporting. However, the crucial ability of decision making using native intelligence derived from patterns in data hitherto unknown even to a trained eye, is now being made possible using Analytics and Machine Learning. The data models which were till now being developed by data scientists are now offered as a service on cloud platforms on a subscription model. Banks are investing an analytics in various domains such as Credit scoring, Risk modelling, Cross selling and fraud detection to mention a few. All these initiatives are aimed towards increasing business, revenue on the one hand while preventing losses

X. Artificial Intelligence and Robotics

Human being has leveraged the potential of technology to ease their day to day life using automation aides and devices. However, various nuances of human communication and the myriad complexities that are a part of human interactions have posed a big bottleneck for introducing automation through robots or robotics. Times have changed, and today AI tools such as NLP (Natural Language Processing) and NLG (Natural Language Generation) have ensured that human beings can not only hold meaningful conversation with software based chatbots or full scale humanoids which combine the capacity of chatbots with mechanics of robots. We, at our bank have introduced a chatbot, named SONA (SIB's Online Assistant) which promptly answers all general queries that a person has on our bank's products and services. We are also working on transactional features using chatbots.

Another interesting area of bot based automation is Robotic Process Automation (RPA). Bots, take over the role of human beings both in back office and front office automation. We have deployed RPA for data centre process automation and STP (Straight Through Processing) in the first phase. From next fiscal, we are planning to introduce front office RPA, which is expected to take over structured process oriented works. We are also working on algorithm based advisory for mutual fund investments. In all these engagements we have partnered with FinTech.

XI. Virtual Reality & Augmented Reality

Our capability for imagination took a leap forward with the advent of Virtual Reality, wherein technology allowed us to be completely transported to a new world. This has now been further enhanced by concepts of Augmented Reality and Mixed Reality, wherein the virtual world is seamlessly blended with the actual reality around us. There are numerous use cases being prototyped in diverse sectors such as healthcare, aviation, modelling, etc. However, we believed that this new experience could become a crowd puller, if we were capable of creating an immersive marketing experience to promote our brand as a Next Generation Bank. We created a unique 360 degree video of the traditional snake boat race fully shot in a real life competition mode. This was then subject to AR/VR tools which created opportunities for introducing a virtual and augmented reality for the viewers. This was showcased in major malls in Kerala, where it became a huge crowd-puller, enhancing our brand recall and acting as a good lead acquiring tool.

XII. Open API

On 13th January 2018, United Kingdom has started managed roll out of a yet another revolutionary concept in banking, viz. Open Banking. In the next few months, all of UK's largest banks and financial service will be forced to open up their accounts to new competition, which is expected to be from FinTech and other innovators. Open Banking will run on a concept of API or Application Program Interfaces, which creates standards for accessing a bank's customer data in a secure manner on a real time basis. Some banks in India have started testing API banking, which once set up will enable any legitimate entity authorized by banks or regulator to plug in to bank data for business purposes. It can be a win-win situation, if banks proactively see this as a FinTech-bank partnership, with both parties benefiting from revenue generation and extending customer service beyond their traditional domains. A classic example in this case, would be the way in which the new FinTech payment companies such as e-com players, mobile top up firms, etc. are now getting on the banking domain using the new digital platforms. However, banks have not taken a backseat. Instead, they are foraying into the domain of FinTech, by going beyond the domain of being financial supermarkets. South Indian Bank has started such an initiative named "Sibermart" which is an online compare and shop portal, where customers accessing our bank's website can search for a product of their choice. We then plug in to all the major e-com players to get the list of products that the customer has requested, the result of which is shown on a single interface to our customers. More importantly, we are able to share additional cashbacks to customers who use our portal. Thus he gets the best price and additional rewards.

XIII. Challenges for FinTech

As has been proved beyond doubt, all entrepreneurial ventures do not end up being success stories. In fact, out of the large number

of FinTech companies only a few have been able to make their presence felt or end up with Unicorn status of valuations. The unrealistic expectation in valuation drives the companies to scale up too quickly without having wherewithal to service the customers. More importantly, lot of seed capital is being spent on customer acquisitions using financial incentives, thus drying up the cash coffers rapidly. There are challenges on regulatory front, as many of the FinTech operate at the edge of new businesses which is soon bound to catch the attention of regulators and government. Thus some of them might be forced to wind up and others may have to cough up large investments as cost of compliance. Lastly, the most important elements of cyber security, privacy protection, denial of service etc. can create nightmares for the newcomers.

XIV. Conclusion

India is on the verge of a huge digital transformation which is evidenced by these facts,

a. Total mobile customer base is around 988 million as of Jan 2018.

b. Total number of Aadhaar cards issued is 1200.45 million.

c. Total number of Aadhaar authentication happening daily is approximately. 5 Crore.

d. Total Internet users in India is expected to reach 50 Crore by June 2018.

e. The average age of an Indian is expected to be 29 by 2020.

All these data point to the fact that there is a huge digital disruption opportunity in our country. Yes, there are challenges for banks and for FinTech entities. The most successful models are the ones where the FinTech is partnered by banks leveraging on digital capabilities at both ends. Banks are able to lend a sense of stability and domain knowledge whereas FinTech gives banks the nimble footedness and fresh business opportunities. Any bank that fails to hop on this new opportunity is soon bound to end up at the wrong end of the bell curve. South Indian Bank has been very quick in identifying this opportunity and has created an exclusive vertical for digital banking. We have fostered various FinTech initiatives on one to one basis. We have also revived the FinTech environment in Kerala, by hosting monthly events through the platform titled “Kitchen”. This has helped us to work with enterprising FinTech. We have also been able to bring in mentors and leaders who have given invaluable inputs to all the budding young minds who aspire to change the world. We eagerly look forward to continue embarking on all the new digital opportunities in the immediate future on our own and by partnering with more FinTech in the days to come.

A TECHNOLOGICAL OUTLOOK ON FINTECH & DIGITAL BANKING

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Banking and financial services being highly information driven, information technology(IT) has been transforming the sector during the last few decades. Infusion of IT in the early stages in the banking and finance sector has been focusing on automation of the transactions processing, back office and generation of necessary MIS reports required for the management. This has greatly helped the financial organizations internally to achieve much higher speed, accuracy, productivity and profitability levels. With the emergence of the Internet, customer service could be brought to the next level of convenience by providing banking services anywhere, anytime through various online digital channels such as Mobile Banking, SMS Banking, Phone Banking, ATMs and Net Banking. Also, the new online payment channels boosted the e-commerce business and an array of online services such as ticket reservation, electronic bill payment etc.

I. Emergence of Fintech

Innovative use of technology in the financial services sector brought in new digital services by the Fintech ventures. As per the BIS, "FinTech is technologically enabled financial innovation that could result in new business models, applications, processes, or products with an associated material effect on financial markets and institutions and the provision of financial services". The new forms of banking offered by these players are totally different to the old form. The Fintech players are basically technology companies having speed, reduced cost and are highly customer centric. In addition, they have the advantage of agility and innovative minds who can design totally new digital products & services to achieve competitive edge over the incumbent banks.

FinTech service firms are currently redefining the way companies and consumers conduct transactions on a daily basis. The global FinTech software and services sector is estimated at USD 45 billion opportunity by 2020, growing at a compounded annual growth rate of 7.1% as per NASSCOM. In India too, Fintech innovations, products and technology is growing fast, leveraging on the large market base, innovation-driven startup culture and supportive government and regulatory policies. The Fintech software market in India is estimated to touch USD 2.4 billion by 2020. Fintech may have the potential to bring in disruption in the banking and financial services sector with far reaching impact. With a collaborative approach from all the stakeholders, viz., regulators, market players and investors, the Indian banking and financial services sector could be transformed dramatically.

Indian Fintech players started with the payments segment initially introducing the mobile wallets. Later innovations such as the

Unified Payment Interface (UPI) platform and proliferation of smart-phones and mobile Internet exponentially increased the convenient mobile payments. Similarly, consumers opted for insurance and bank aggregator sites for comparison shopping. Peer-to-peer (P2P) platforms for high return investments sites are also becoming increasingly popular.

Borrowing is also being transformed with the new digital lenders offering consumers with a simpler, less–paper borrowing experience while leveraging alternate data to appraise creditworthiness of non-traditional borrowers. Crowd funding is a way of raising debt or equity from multiple investors via an online platform. The Fintechplatform matches borrowers / issuers with savers/investors. It also offer a range of information about the potential borrowers/issuers, such as credit ratings to lenders

II. Digital Disruption, Competition & Collaboration for Incumbents

Fintech firms are characterized by their customer focus, providing innovative and cost effective solutions to meet their needs in the most convenient way possible. Latest technology solutions and IT infrastructure form the backbone of Fintech companies. They identify appropriate segments to suit their products & services such as Millennial, SME, unbanked etc. The new digital experience brought out to customers such as online calculators, real-time alerts, knowledge portals, live chats, tracking application status, etc., are features that helped increase awareness and convenience for customers, thereby resulting in greater customer satisfaction. Innovations driven by technology helped the financial system to be more efficient and attractive with their convenient user interfaces. Also, the increased competition led to greater choice of providers and products cost-effectively to customers.

However, banks are often unable to live up to the increasing expectations of the demanding customers who are aware of the Fintech products & services. Millennial and younger segment of customers have almost abandoned visiting branches. They are looking for fully automated, simple to use, digital products and services - an area where banks are found lacking - especially when compared to the digital offerings of the new Fintech players. In this environment, the incumbent banks and NBFCs should collaborate with FinTech firms rather than reinventing the wheel so as to improve their customer experience and achieve operational excellence.

On the other hand, Fintech firms have the challenge of to scale up their customer base to match the existing financial service providers. While these companies can innovate quickly and create better customer experiences, by far they lack a bank's data insights and broad-based knowledge of complex global financial markets, regulation, and high-security networks. Meanwhile, banks have access to a goldmine of customer data. By analyzing and acting on their data, they can get a better understanding of what types of services & products their customers really need and prefer. Banks have the advantage of large existing customer-baseready for offering their apps, and reach out with digital solutions that can meet customer needs. Needless to say, banks and Fintech players both need the synergy to succeed.

Some incumbents in banking have gone for developing a whole new ecosystem of digital banking products and services built upon their existing infrastructure. To retain their customers, they have realized development of

innovative products and services through a focus on digital innovation are essential. Faced with increasing disruption from FinTech, some banks are making efforts to compete by investing in internal Fintech or partnering with FinTech startups. Some others find it easier to collaborate with Fintech players and opt to serve as platforms, by unbundling the production and distribution of banking products and services. While they own the customer's primary account, extend access to their banking platform through open APIs, allowing the agile startups to access customers' financial accounts information / transactions and offer value-added products and services.

III. Data is the New Gold for Collateral

Lack or inadequacy of reliable data, especially on the credit history of the customers has been a major impediment in extending credit to the large unbanked/under banked masses in India. This segment may be caught in a vicious cycle - one cannot get credit without a score, and cannot build one's score without credit history. Hardly 20 per cent of the Indian population reportedly has a valid credit score, preventing them a loan from an NBFC or a bank. Fintech lenders have innovated and identified many alternate sources of data such as data points obtained from social sites, device data, digital footprints, social media accounts, bank account statements etc. to enrich or replace traditional sources. These non-traditional sources of data, coupled with advanced analytics and artificial intelligence (AI), can be effectively used to assess the creditworthiness of the large and unbanked customer segments. The underwriting decision here is taken by an algorithm-based decision engine.

Developments in Big Data and Artificial Intelligence (AI) and Machine Learning etc. tools areeffectively used by Fintech players for personalization and customization at a micro level meeting individual needs by tailored products. Big data layered with behaviour-based predictive analysis can generate targeted advice at the point of need. This can enable a Fintech provider to be more integrated with the customer's decision making and purchase history and preference.

Increasingly, FinTech firms are tying up with merchants and service providers to offer affordable financing options at the point of sale. Unique financial products are being developed in collaboration with these merchants, utilizing customers' transactions history and other available data points to evaluate their credit worthiness. Also tie-ups for offering flexible repayment options to customers are made available across aggregator websites, retail chains, e-commerce players and travel portals, targeting especially to customers without credit cards. SME is yet another segment who face challenges in getting access to capital for a variety of reasons, including their informal nature of business, poor infrastructure and limited assets. Fintechs have developed innovative business models to cater to this market by capturing relevant data from alternate sources. These include partnering with e-commerce platforms such as Amazon, Snapdeal and Flipkart and leveraging their data on sellers including trading history, returns ratio, customer ratings et, to assess credit worthiness and offer suitable loans.

It has to be noted that the sources of data should be used based on its reliability for ensuring predictability. Such data should be able to provide futuristic insights into customer behaviour, say in relation to likelihood of

repayment. Mobile and psychometric data have also demonstrated greater predictability when compared with other sources such as Internet data owing to the more personal nature of mobile phones.

Lenders have to keep in mind that alternate sources of data form only one part of the credit scoring process and must assess the compatibility of various such data sources with their existing credit underwriting mechanisms. This will help them get a more comprehensive picture of their customers' creditworthiness, thus reducing the default rate. NBFCs and banks can enter into partnerships with multiple agencies both within and across industry sectors for more robust data capturing.

With the digital revolution steadily progressing in the country through Internet and Mobile penetration along with Aadhar-based authentication and Digital India policies, the wide data gaps will be bridged in a reasonable span of time. Perhaps it may be a matter of time when even the traditional lenders who take gold as collateral for lending can rely on data instead. This transformation of customer data into a goldmine can enable extending credit to the unbanked millions at much reduced interest rates as the operational overheads can come down drastically on digitalization coupled with innovation.

IV.Immense Scope for Fintech in India

Financial inclusion to provide at least basic banking services to the millions in the rural areas of the country has seen limited success due to the associated infrastructural constraints and high operational overheads. However, the new digital technology driven products and channels coupled with the appropriate regulatory framework during the past decade has finally come to the rescue of the large financially excluded segment with access to basic financial services. It is reported that India is presently next only to China in the adoption of FinTech services across an array of industry segments. It is expected that India will ascend to the top of the global FinTech league in the future.

The challenge still remains is how these poor families can actively use financial services to improve their standard of living. The key here is cost reduction and improved data and process hygiene. This is where the trinity of JAM(Jan Dhan accounts, the Aadhaar IDs and Mobiles) with over a billion in each has the potential to bring in unprecedented opportunities. Already the billion member Aadhar database is enabling the customer onboarding process through e-KYC which is much faster and secure. Indian consumers are waiting for new, simple and personalized digital experiences. The Big Data generated by the Jan Dhan accounts transactions and the linked mobiles on customer behaviour and preferences can be used by Fintech to design innovative business models that offer highly efficient, scalable and intelligent processes for customer acquisition, servicing, cross-selling and up-selling. The rapidly falling prices of smart phones and connectivity charges will trigger exponential usage mobile Apps designed for simplicity targeting the millions so far not connected digitally.

In the Indian context, Fintech companies can be a boon in addressing its perennial problems such as reaching the masses with simple, hassle-free banking products & services with free or near-zero costs to them, leveraging the new digital technology tools and platforms which can be highly scalable. It may be interesting to note that consequent to the emergence of Internet banking two decades ago, it was expected that the new e-banks

would beat the incumbent banks based on their much lower operational costs and passing on the benefits through attractive interest rates to both depositors and borrowers. However, what turned out was that the incumbent banks, driven by competition adapted new e-channels and products and faced the challenge effectively. The positive role played by the regulators in this transformation In India has been remarkable. Globally also the new digital avatar banks could not grow significantly as the vital customer trust factor in banking was favoring the incumbents. Thus the IT1.0 round was won by the banks hands down. In the IT 2.0, the game has changed and it has to be seen who will be the ultimate winner. In any case, ultimately it will be the customers who will benefit.

V. Regulatory Policy Framework and Support

The developments in Fintech and digital banking pause many regulatory and supervisory challenges. For instance, financial technology is increasing the channels for provision of finance through banks and non-banks. Also technological innovations can impact the existing bank business models, its business strategies and growth plans. Again, the rise of Fintech may lead to fundamentally different risk profiles. The central bank has to proactively adopt best practices and principles for the management and supervision of risks arising from Fintech and digital banking.

It is heartening to observe that the Indian Government and financial sector regulators such as RBI, IRDAI, SEBIetc. have been encouraging the new Fintech and digital banking innovations as it is in tune with the larger financial inclusion objective. The regulators have been encouraging the use of digital modes of transaction for payments. Digital initiatives such as UPI, Unstructured Supplementary Service Data (USSD), Bharat Interface for Money (BHIM), Bharat QR, Aadhaar Enabled Payments System (AEPS),were brought through The National Payments Corporation of India (NPCI) which was set up jointly by the RBI and the Indian Banks Association (IBA).

RBI has liberalized the KYC requirements for low-value wallets and customer authorization mechanism for retail payments to make the process simple for users. Also in the recent past the RBI issued licenses to players from diverse areas such as wallets / pre-paid instruments, telecom players as well as India Post, to democratize payments for mass adoption. These new banks are expected to integrate a large network of financial services providers where Fintech could potentially play a large role. The much needed P2P guidelines have been issued by RBI in October 2017.

To ensure that regulations keep pace with the developments in technology impacting the payment space, the global developments in technology such as distributed ledgers, block chain, etc. will be monitored, and suitable regulatory framework will be put in place by RBI. Through the Institute for Development and Research in Banking Technology (IDRBT), RBI has taken many initiatives for adoption of the emerging technologies and digital advancements so as to recommend the most appropriate ones for the Indian environment.

VI.Information Security & Privacy Concerns

Fintech and digital banking are driven by data and sharing of data with multiple players is the norm to take its advantages. The shift in customer preferences driven by social media, mobile computing, analytics/ big data, cloud computing, etc. have brought in new challenges in terms of their utility/efficiency, complexity of products, deployment architecture, interoperability of systems, etc.

along with increasing concerns over data protection through the digital channels. Interfaces and APIs that facilitate seamless interoperability with multiple applications may be more vulnerable to cyber-attacks and other threats.

The propensity to adopt the latest tools and technologies may not be commensurate with the growth in understanding/awareness of their risks, by both customers and banks alike. To catch up with the Fintech players and to provide innovative products and services through digital channels and reducing cost of transactions/services/processes, banks are increasingly resorting to outsourcing, quicker development and deployment cycle of products/ services/processes without due emphasis/rigor in security design and testing. This is an area of concern as much vulnerability might be left for attackers to exploit. To ensure adequate data security and privacy, suitable systems and processes across the data/information lifecycle need to be put in place by the FinTechs.

VII. Conclusion

Fintech is driving innovation in finance and digital banking to reduce cost of operations and provide best customer experience, using latest technology tools & platforms to the hilt. India is blessed to have a large pool of talents in both finance and IT domains. This synergy has the potential to address some of the long pending structural issues afflicting the financial sector such as high intermediation cost, lack of credit availability for the poor and SME segment and low adoption of the digital channels in payment systems.

Some of the emerging technologies such as Block Chain, Artificial Intelligence and Internet of Things (IoT) can profoundly transform the Fintech and digital banking across its operations, leading to an order of magnitude enhancement in efficiency, security, risk management, and underwriting algorithm, even on a real-time basis. Emerging technologies such as Block Chain has the potential to disrupt the very need for a trusted third party like bank for conducting financial and other transactions securely. Two decades back Bill Gates made a controversial statement that 'banking is necessary, banks are not' in the context of digital revolution. However, banks could embrace technology and retained the dominant position overcoming the pure digital players so far. In the new IT2.0 era with fierce completion and disruptive technologies around, banks have to reinvent themselves taking cue from the Fintech players, embrace technology, reduce their operational overheads drastically, to be competitive in the market so as to sustain its growth, if not survive.

FINTECH REDEFINING THE INDIAN FINANCIAL SERVICES SECTOR: AN INSIGHT INTO THE MODELS OF PEER-TO-PEER LENDING AND CROSS BORDER PAYMENTS

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i. Executive Summary

Technology innovations are transforming the Banking and Financial services industry. It is evident that the two major technology innovation use cases in India; Peer-to-Peer lending and Cross-Border Payments, given proper regulatory and policy support, can drive performance and become pioneers in credit provisioning.

In the last decade there has been exponential progress particularly in areas of on-demand computing infrastructure (cloud computing), Big Data, Artificial Intelligence, mobile and Block chain technologies. Advancement in technology brought cost-effective opportunities for start-ups to come up with highly innovative industry solutions, particularly in the financial industry that gave rise to opportunities for Fintech start-ups. The transformative potential of new entrants and innovative business models as a result of recent technological advancements have brought an array of applications in financial services known as Fintechs.

Figure: 1: The Fintech Landscape

Payment services are at the epicenter of Fintech innovations. PwC reports that over 70 per cent of businesses in this area are concerned about losing their market share to the emerging models. The non-bank players are taking parts of of the banking industry and transforming it to a whole new level of customer satisfaction and involvement. The digital technology is enabling new platforms to let customers interact directly to send/receive money. With this the concept of Peer-to-Peer lending emerged, connecting lenders directly to borrowers to provide loans.

Inefficiencies of sending remittances have remained unaddressed for a long time. There have hardly been any technological changes at the back end to enhance the whole experience of money transfers across countries. The distributed ledger (Blockchain) technology has huge potential that can drive cross-border payments. The report discusses the changing

dynamics of personal finance particularly the in lending business and payments across countries in light of the prospects and risks they pose to the financial services sector.

II. Motivation

The report explores capabilities of Fintechs in the Indian Financial sector space. Amongst all sectors, the banking sector has been going through the most prominent transformation as a result of technology disruptions. In India alone, consumer banking sector is to transform by 80 per cent, fund transfers and payments by 60 per cent (PwC report, 2017). By opening up the banking market to the non-bank players, regulators are creating a collaborative environment between banks and the new entrants to provide financial services. While the banking and securities regulators around the world are encouraging financial innovations and trying to protect the investors and consumers, traditional banks are trying best to cope with changing scenario. There is a constant attempt to dominate the consumer banking and lending market between the online start-ups and the incumbent banks, to best assist the consumers and take banking to a whole new level.

The report focuses on two most significant Fintech use-cases, the Peer-to-Peer lending and Cross Border Payments leveraging the Blockchain technology, in the Indian Financial sector space. The models of both have been explained in detail and have been compared with traditional models. The report concludes with implications and prospects of such transformation in the Indian payments landscape.

III. Fintech Trends

The world is fast embracing the concept of Internet of Things[1] to create Internet of Value[2]. Availability of information became swift and extremely cheap with the increasing internet connectivity. This directly addresses the need for financial inclusion as more and more people are able to access sources to transact in ways that are simpler and cost-effective.

Fintech is a dynamic segment at the intersection of the financial services and technology where technology-focused start-ups and new market entrants innovate the products and services currently provided by the traditional financial services industry.[3] The year 2017 records third-highest annual total of the decade for Venture Capitalist investments in Fintech innovations. During Q4'17, fintech funding globally remained steady, with $8.7 billion invested across 307 deals.[4]

UK Fintech investment reached a record high of £1.34 billion in VC funding in 2017. UK's Peer-to-Peer lending business saw the highest growth as it emerged as international leader in this segment. Market opportunities with huge consumer market ready for innovations, and government support, with the new Payments and Services Directive (PSD2)[5] and the General Data Protection Regulation (GDPR)[6] to come into effect in early 2018 all over European Union, have created massive scope for new developments in the Fintech ecosystem.

In the US, investments were in an all-time high until Q4'17 when it declined. The US continued to account for the vast majority of fintech start-ups in the fourth quarter of 2017. Singapore emerged as a leader in Southeast Asia after the slump in China's Fintech segment. Investment in Singapore reached over USD 7 billion followed by Indonesia with USD 4.6 billion. The Regulatory Sandbox[7] introduced in the UK is widely being adopted in the Southeast Asia. It is also being approached by

the Indian government. China led the Peer-to-Peer industry in Asia until 2016. However, cases of shadow banking increased with over 2000 P2P platforms giving unsecured loans that turned out to be fraudulent schemes. China attracted heavy investment of USD 4.5 billion until 2016. In India, the Fintech industry grew by 282 per cent in 2013-2014, and reached USD 450 million in 2015 and in 2017, Fintech investments have crossed $5 billion in India.[8]

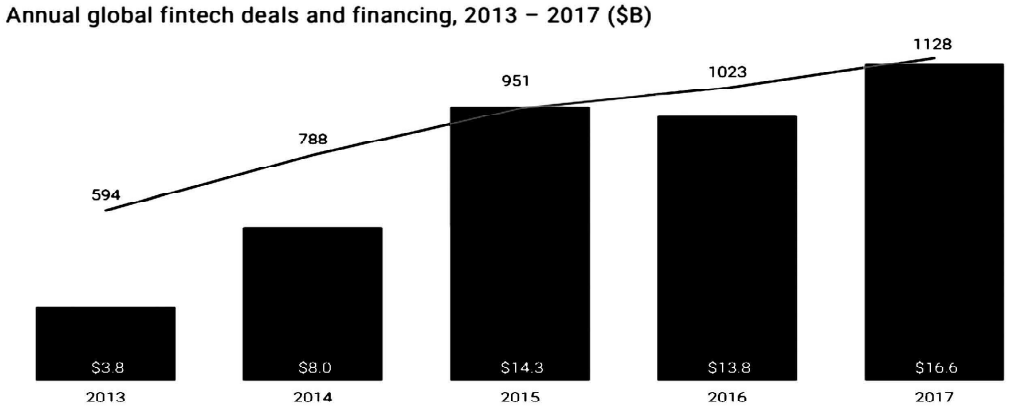


Figure 2: Fintech Funding in billion USD

Reference Note:

1 Internet of Things (IoT) is connecting device to device through internet. IoT is being increasingly used in industries like manufacturing, transportation, smart city projects, retail and healthcare. IBM's Watson IoT and Microsoft Azure are some of the industry examples. The analyst firm Gartner reported that by 2020 there will be over 26 billion connected devices.

2 Internet of Value is essentially leveraging internet to source and transact value in form of assets (money, digital assets, bonds, property rights etc.)

3 PwC Global Fintech Report, 2016

4 KPMG, Pulse of Fintech, Q4 2017. https://assets.kpmg.com/content/dam/ kpmg/xx/pdf/2018/02/pulse_of_fintech_q4_2017.pdf

5 PSD2 requires banks to open customer account and transaction data to third parties via open APIs, to create open banking system all over Europe and the UK. (PwC report)

6 GDPR defines "personal data", and therefore protects, as any information relating to an identified or identifiable natural person, who can be identified, directly or indirectly, including by reference to an identifier such as a name, an identification number, location data, an online identifier or other factors including the economic identity of that natural person, Deloitte report, https://www2.deloitte.com/lu/en/pages/banking-and-securities/articles/psd2-gdpr-friends-or-foes.html

7 Live or virtual testing of new products or services, in a (controlled) testing environment, with or without any 'regulatory relief' is termed a 'sandbox', RBI Working Group on Fintech and Digital Banking, 2018.

8 India emerging a hub for FinTech start-ups, Business Standard website, http://www.businessstandard.com/article/companies/indiaemerging-a-hub-for-FinTech-start-ups-116051700397_1.html

IV. Role of Fintech in reshaping the Indian banking system.

Iv.a. Current Scenario

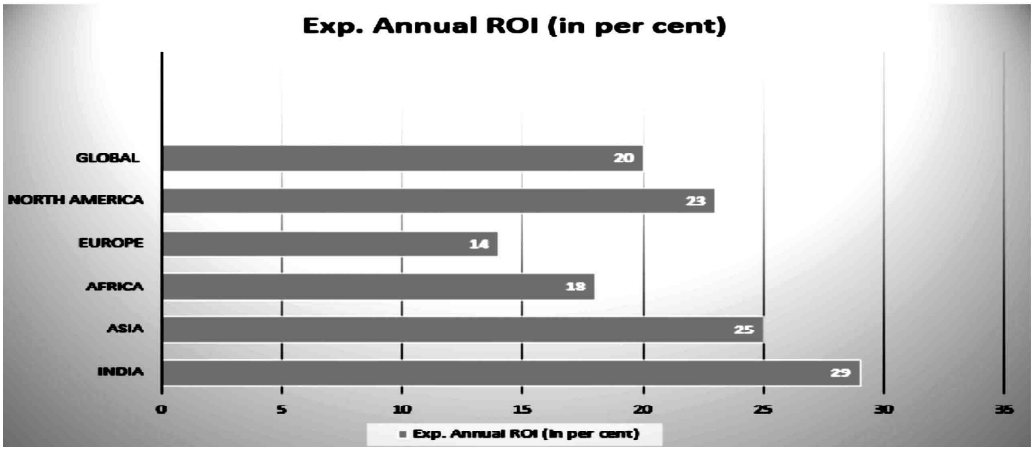
The Fintech market in India has grown rapidly since the last three years and has brought an array of products and services with new business models while challenging the traditional financial services sector in India. Support from the government and regulators, capital investments flowing into the start-ups of the country and entrepreneurial initiatives driven by cutting edge technology has catalyzed further development of these new business models. The areas of Big Data, Artificial Intelligence, Blockchain technology, and cyber-security are being constantly explored in the country. For example, Big Data analytics can help to understand customer's spending behavior and depending on that, banks can suggest suitable products and services. Artificial Intelligence can help banks to automate internal processes and reduce costs, for example mortgage and wealth advice, loan processing, Know Your Customer (KYC), etc. Blockchain is widely being proposed for areas like trade finance, syndicated loans, cross border payments. Recent advances in cyber-security has made it nearly impossible for hackers to penetrate through the financial systems.

A number of Fintech start-ups have emerged in India since 2010 which have the potential to transform into billion dollar industries in five years. NASSCOM reports that by 2020, the Indian Fintech software market is expected to grow up to $ 2.4billion.

Fintech investments is booming in India and cross $5billion across over 400 deals as of 2017 end[9]. Even the banks are encouraging financial technology changes by partnering with the new start-ups or investing in them and then directly bringing those products into the Bank's use cases. Few examples are those of the Yes Bank's Innovation Programs on Fintech and DCB Bank's Hachathon. Six start-ups joined hands and secured pilot with State Bank of India, RBL Bank and ICICI Bank. The BankChain community of 33 member banks at present are exploring opportunities by implementing the Blockchain technology on a number of projects on cross-border payments, corporate KYC, stressed assets, etc.[10]

Payments and lending sector has been one of the segments undergoing a huge transformation in terms of process and technology. There is inherent demand in the Indian market that creates scope for P2P platforms in the Indian Fintech space.On the supply side, government's push to support fast digitization, growing internet penetration[11], and investments in Fintech initiatives are all favoring the growth of Fintech ventures. Indian start-ups promise the highest expected returns on investment (ROI) on Fintech projects. Whereas, the global average is 20 per cent, it stands at 29 per cent in case of India.

Figure 3: The Expected Annual Returns on Investment on Fintech Start-ups



IV.B. Support from the government for the Fintech innovations and financial inclusion

The government of India introduced policy measures to support digital transformation and create favorable environment for financial technology innovations in the banking and finance sector. The government has provided boost to support these innovations and also launched certain projects. Initiatives by the government

a. Unified Payments Interface was launched in 2016 by the National Payments Corporation of India to promote a cashless India.[12] It provides one mobile application solution to keep information of multiple bank accounts. At present with 30 banks as the partners, easy integration process and no charges to the banks, except for a minimal fee to the customers, it provides quick and seamless fund transfer, up to a limit of INR 1 lac per transaction. The Bharat Interface for Money (BHIM), one more platform, enables cashless transfer of money through mobile phones.

b. India Stack is a government endeavor to support digital transformation in India. It provides a digital platform to the governments, start-ups and businesses where-in Application Processing Interface is already provided and companies can leverage this infrastructure to develop products to suit India's requirements in different sectors like finance, healthcare, education and services. It has four sub-stacks that offer four functionalities[13]. The Start-up India and India Stack collectively brought investments worth $ 1.5 million to support start-ups in India.

c. The Pradhan Mantri Jan Dhan **Yojana** (PMJDY) was launched by the Indian Prime Minister on 28th of August, 2014. It has been a major drive to promote financial inclusion of the under banked and unbanked masses in India and as a result more than 200 million people across the country had opened their first bank accounts.

d. AADHAAR implementation: Unique Identification Authority of India (UIDAI) launched the Aadhaar system that is a unique 12 digit identification number registered to every India citizen that provides a single quickly verifiable source of KYC anywhere. The real Aadhar System can authenticate 100 M transactions per day in real time and there have been 1 billion registrations in 5 and half years.

Reference Note:

9. Moneycontrol.com
10 http://www.bankchaintech.com/index.php
11 Internet penetration was about 10% in 2017 in India, making it the second largest online market with 460 million internet users, after China.[11]PwC-Fintech Trends Report 2017

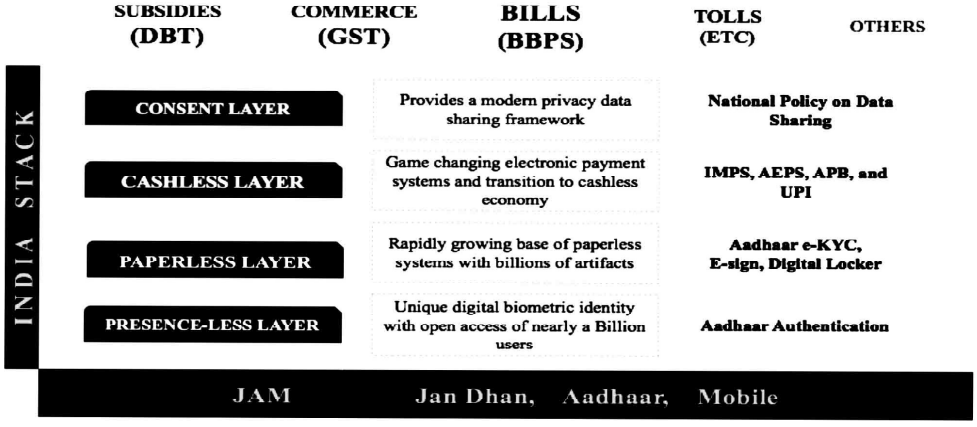


Figure 4: the JAM initiative by the Indian Government

All these initiatives together established the base for the fintech companies. Increasing number of people now had access to mobile banking and internet banking, had a unique identification number and could transfer money without going to the branch physically. Larger number of people now has access to credit in a way that is efficient and secure.

Reference Note:

12 Unified Payments Interface (UPI) is a system that powers multiple bank accounts into a single mobile application (of any participating bank), merging several banking features, seamless fund routing & merchant payments into one hood. (http://cashlessindia.gov.in/upi.html)

13 What is India Stack and how is it set to change India? https://razorpay.com/blog/what-is-indiastack-and-how-is-it-set-to-change-india-2/

V. An analysis of the two major Fintech innovations in India

V.A. 1. Peer to Peer (P2P) lending marketplace.

A direct realization of lending and borrowing activities between two unrelated parties through online platform, without a financial intermediary, where the platform acts to establish trust between participants through credit risk assessments and borrower's solvency, is known as Peer-to-Peer (P2P) lending. (Petrushenko, 2014).

Peer-to-Peer lending marketplace is formed by a group of P2P platforms that provide an online facility for the borrowers to seek loans and investors to invest funds. The availability of quick funds, affordability of the platform's fees, and ease of getting loans at attractive interest rates have attracted many borrowers to such platforms. P2P platforms have gained a lot of investors' confidence as interest rate returns are high compared to returns from other financial instruments. The loan durations are normally short, starting from three months and can go up to thirty-six months. The investor can independently choose the loans he wants to fund and the amount of risk he wants to take, depending on the model of the platform.

The platform is the sole intermediary that charges a commission on providing risk assessments, matching borrowers to lenders and carrying out the whole process from loan approval to repayment. Most of the loans are unsecured and funded to individual borrowers or SMEs. The platforms do not assume any risk of loss of credit as they act as a facilitator and not guarantor. However, some platforms maintain a fund that is like an insurance, to protect a part of the investment.

The rapid growth of such platforms and lack of regulatory oversight for a long time urged that these models are analyzed and their potential be explored. Over the period of time, some of the countries have accepted the model of P2P lending and these are now being regulated across the countries like the UK, USA, China, South Korea and India.

Peer to Peer lending market has been growing fast over the past few years. In India, the market is expected to grow into a $5 billion industry by 2023 (PwC report). With i-Lend (launched in 2012) as the first P2P lending company of India, today there are about 30 platforms in the country that specialize in providing unsecured loans. The market has favored growth of P2P lending platforms in India, driven by some key elements:

a. Technology enabling trust between strangers: After the 2007-2008 global crisis there arose a need for alternative finance models. The phase of declining growth required innovative use of technologies, etc. The trust building mechanism took off as we moved more and more towards a digitized world. With digital connectivity, people started relying increasingly on reviews from completely unrelated people to make their own personal choices. Some industry examples like e-Bay, Airbnb, TripAdvisor, Uber, Zip Car, Experian, social media platforms like Facebook, reviews on Amazon, created a new sources of data. The data was now easily available and it was trustworthy. This movement towards being data rich at low cost and in no time started gaining confidence and slowly this trust factor enabled movement of finance between peers. There has been a rise of new players in the market acting as alternatives to bank's lending business. Peer-to-Peer lending is one such alternative that has opened up new avenues for individuals and small businesses to acquire loans. Peer-to-Peer finance has its roots in Peer-to-Peer sharing of information that took off with the internet and its increasing availability. The whole concept of Peer-to-Peer lending is built on the trust mechanism between strangers, underpinned by technology- the key driver behind these platforms.

b. New data sources enabling better credit assessment : Credit reporting is one of the most essential requirements for improving inefficiency of financial sector, increasing private sector lending and reducing the risk of financial crises.[14] And as the traditional banker-customer relationships became more formal and system-driven, and the products became more complex and technology-based, it called for improved infrastructure for assessing quality of information with the changing environment in banking[15]. Traditionally banks relied heavily on 'soft' data[16]. Credit bureaus were set up in Asia after the Asian crisis of 1997. Credit Information Bureau in India' was set up in 1999 in India.[17] In 2014, few new bureaus joined at a global level to like Experian Credit Information Co. of India Pvt. Ltd and Equifax Credit Information Services. These methods were formulated so as to protect the lenders more than to facilitate the borrowers. As for the CIBIL score, the benchmark is set at 750 points but most Indians have a CIBIL score between 640 and 690. People with less history of transactions and borrowing did not have enough information and hence, did not get the desired loan. Access to information about a borrower should ideally be available irrespective of the absence or a low credit score. But there were hardly any other sources of data that could instill confidence in the investors and lenders. The bank's underwriting processes and credit bureaus made it very difficult for small businesses and individuals with a bad or no credit history to access funds. Mills and McCarthy commented in their paper that relying only on the credit score of an individual to fund his/her business has proven to be a poor predictor of the borrower's repayment performance.[18]

Reference Note:

14 https://www.transunion.com/docs/interstitial/TransUnion_WhitePaper_CreditScoring.pdf , The Importance of Credit Scoring for Economic Growth, TransUnion Whitepaper, 2007.

15 https://rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=763#11 RBI publication, 2014

16 Peterson, Mitchell A. and Raghuram G. Rajan. "The Effect of Credit Market Competition on Lending Relationships." Working Paper No. 4921. Cambridge, MA: National Bureau of Economic Research. 1994.)

17 https://rbi.org.in/scripts/PublicationReportDetails.aspx?UrlPage=&ID=763#11. The Credit Information Bureau (India) Ltd. (CIBIL) was incorporated in August 2000. CIBIL launched its credit bureau operations in April 2004 and its commercial bureau operations in May 2006.

18 Mills K, McCarthy B. The State of Small Business Lending: Credit Access during the Recovery and How Technology May Change the Game. Harvard Business School General Management Unit Working Paper; 2014

Credit gap and access to credit remains a major problem in most of the countries today and there has been a huge credit supply gap in the medium and small scale enterprises in India, about INR 833,000 crores[19]. This has to be addressed with the growing demands and changing requirements of the people.

c. Operational advantages of P2P platforms over banks: These platforms are unique with their operational advantages that bring significant cost reduction and time efficiencies. Operating cost is the most important factor explaining interest margins in banking and banks pass on their operating costs to their depositors and lenders.[20] Models of P2P platforms have been able to address this through an online frictionless platform with faster online KYC. This has been the third most significant drivers of P2P lending. One of the major attributes of P2P lending platforms is their scalability. Through digital contacts and online KYC, there is low investment costs incurred by the platforms (hardly any infrastructure except computer system)[21]. Banks on the other hand have huge costs of operations which are passed down to the customers.

d. Lender and borrower benefits: Every process in a P2P lending platform is carried out online, without direct physical interaction between investors and borrowers. This means less manual and fixed costs like infrastructural costs or payment to the employees. Because of which they can offer high interest returns to the investors. and competitive interest rates to the borrowers. Attractive rates have made investments in these platforms very famous over the rest available investment options like shares, bonds and securities. At present, it can be said that investments in P2P companies are increasing. Equity mutual funds' investments yield an average returns of 10-12 per cent and the minimum time of investment to yield good returns is at least three years. Whereas P2P lenders can earn gross returns of about 18-28 per cent per annum and the loan period can be as short as three to six months and goes up to five years.[22]

There is also an ease of investment in P2P platforms. Both, P2P platform and equity mutual fund investments are fairly risky. Equity investments require knowledge of the market and the stock prices of companies are highly volatile and the concept of P2P lending is new and requires careful judgment before making any investment decisions. P2P investments are not volatile and do not suffer from market fluctuations. Returns in such platforms are much higher than bank fixed deposits. For instance, in India FD rates are at 4-6 per cent and P2P returns are much more.

Reference Note:

19 Deloitte report, July 2017

20 Maudos J, De Guevara JF,2004

21 With cloud computing, and facilities like Amazon cloud, it is extremely cheap to buy a subscription and work on that sitting at your homes. This has drastically brought down infrastructural costs.

22 https://economictimes.indiatimes.com/small-biz/sme-sector/how-ltcg-stung-investors-can-still-earn-high-returns-and-play-a-bigger-role/articleshow/62832430.cms

V.A.2. Business Model of P2P lending

Peer-to-Peer finance models originated with a need to directly connect the borrowers to the lenders and strike a personalized trade deal between the two, without any intermediary. This whole process is possible today with the emergence of the internet that connects person to person and everything is online through an automated process. The business models vary from platform to platform and from country to country. Each platform unique is in their ways of credit risk assessments and setting the interest rates, but they all follow the model of pure matching.

V.A.3. The Model of Pure Matching

The traditional model is based on the concept of simple matching of a borrower or a number of borrowers to a lender. Both borrower and lender are registered on a common platform. The borrower provides all information related to his loan requirements and credit information. The P2P platform carries out a credit risk analysis. Similarly, lender provides his intent of investment and the kind of risk he can take. On the basis of which, a borrower is assigned to that particular lender. Loan is passed between the two parties and funds are provided. The borrower repays at the agreed interest rate and time period that is mutually decided between the two. This is known as the Pure Matching model.

The methods of credit risk assessment are not very clear as these platforms have their own in-house risk assessment models and they do not disclose that. The platforms use data from various sources to arrive at a conclusion on the risk appetite of the lender and the credit rating of a borrower. Online e-commerce websites provide huge amount of data to such platforms. For instance, LendBox, an Indian P2P platform, leverages social media networks, past spending of the borrower on online stores and such similar non-traditional data sources.

In most cases, the investors' funds are allocated between numbers of borrowers to manage exposure. There are a number of ways in which the platforms operate to diversify the portfolio of lenders and minimize risk by increasing the spread. For instance, in the model of Funding circle (a UK based P2P platform that specializes in providing loans to small businesses), at one time an investor carries only 0.5 per cent risk of default from a single business. Their platform is built in such a way that on a minimum investment of GBP 2000, the money lent is diversified into at least 100 different businesses.

Loans are personalized and there is Investor's choice. This is the most attractive part of any P2P lending platform over traditional methods of acquiring loans and making investments. There are two models which work to match borrowers with potential lenders as described by Murphy (2016). The active P2P lending model and the passive model. In the first one, the lenders choose loans that they would like to finance, not knowing the borrowers directly. The loans can vary from individual requirements, both short and long term, to small scale businesses. In the passive model, the investor looks at the risks of funding particular loans and takes a decision based on his interests and returns expectations. In both models, the investor can also decide on the maturity and repayment period. The P2P platform acts as a facilitator between all these processes. The platform itself is not exposed to any credit risk. The platform carries all credit risk assessment, creating a list of loans or a portfolio of loans with assigned risk element to it.

Setting an interest rate is the most critical part and there are two ways to decide the rate. One is that the borrower intimates the maximum interest that he can pay on a loan amount in a given time. There is an online auction form, where lenders bid till the auction closing date. If sufficient bids are available, the interest rate is fixed at the highest bid that is successful in the uniform rate auction. Whereas, if it is a mixed rate auction, different investors get different rates depending on their bid. The borrower gets one rate that is calculated as the weighted average of the rates of all its lenders. And the deal is finalized. However, if no sufficient bids are available, and there are less funds available to a loan by the bid closing date, the loan is no longer placed on the platform. The borrower has to withdraw and might decide to set another request with a different interest rate, higher than the previous rate.

Another method is that of the proprietary based risk assessment model, where each loan or borrower is assigned a grade. There are criteria to determine lowest and highest interest rates on a particular grade. The third method is a simple accept or decline of an interest rate, where depending on the prevailing rate in the market, loan amount required, time of repayment and the credit rating of the borrower, an interest rate is suggested to the borrower by the platform. The borrower can agree or disagree to the rate. Investors can choose a rate depending on the market rate for different loan amounts and time of repayment. The critical part is to analyze the rewards to risks payoff. The P2P platform then matches the appropriate investor to a list of borrowers.

While most of the loans are unsecured, some platforms have a model of providing investors a part of their lost credit in case of defaults. It can be a kind of contract to insure a part of the loaned amount or a guaranteed security like in the countries of UK (Zopa), Australia, and Korea, and a few platforms in India (LenDenClub) where platforms keep a separate fund in case of late repayment or defaults by borrowers.

V.A.4. Revenue Stream of a P2P Lending Platform

Figure 5 depicts the model of revenue generation by a P2P lending platform. It shows the various sources at each step, where the platform charges a fee in return of the service. Consider an investor, Miss X in the Figure, wants to invest in a P2P lending platform. She gets herself registered and her credit rating verified for a fee. She fills a form to show her interest of investment and gets listed in the platform's website. Now suppose a borrower, Mr. Y is in need of a loan for funding house refurbishment. He registers on the same platform and gets his credit score for a fee. Both parties opt for an insurance at a nominal charge. The lenders funds are passed down to the borrower for the agreed time period and interest rate. Both pay a settlement fee at the end of the contract. Most platforms charge a fee between 1-4 per cent. LendBox (India) charges a commission of 3-4 per cent from both the parties.

Reference Note:

22 https://economictimes.indiatimes.com/small-biz/sme-sector/how-ltcg-stung-investors-can-still-earn-high-returns-and-play-a-bigger-role/articleshow/62832430.cms

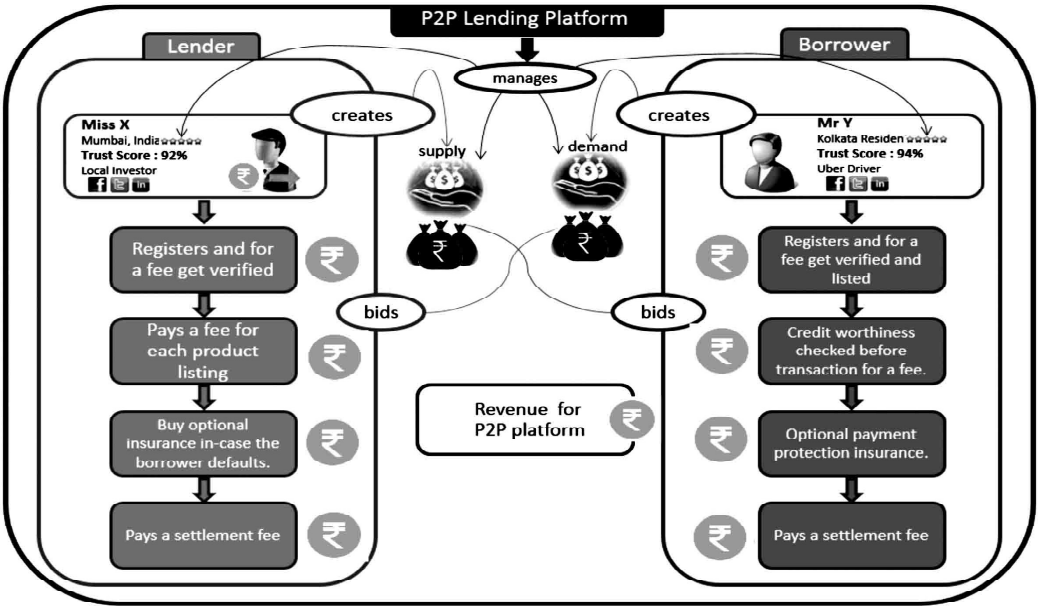


Figure 5: ***The Model of Revenue Generation by a P2P Lending Platform***

V.A.5. Implications of P2P market on the Indian banking and financial sector: Prospects and Risks

The Reserve Bank recently introduced the P2P lending market under the Non-Bank sector and set out guidelines for their operations within the country. It lays out scope of activities and the norms and regulations regarding maximum lending and borrowing limits, loan duration, fund transfers through an escrow account, to protect the interests of the investors and borrowers. The formalization of P2P lending market in India brought more transparency and higher confidence amongst people and more platforms are expected to enter the market, with currently over 50 operational in the country. Faircent being the first one, LenDenClub, Lendbox, i2iFunding, Monexo, Rupaiyaa Exchange, OMLP2P are few of the leading platforms in India.

Fintech lenders are taking away share of lending business around the world. In India, informal lenders play a large role in SME lending. Several Indian players have emerged in the alternative finance sector to fund the SME sector like Faircent, Loanzen, Rupaiyaa Exchange. Their volumes of lending is increasing but cost of customer acquisition remains high.[23] Informal lending for personal loans has been growing since 2015 as the market is developing and with the RBI guidelines released last October, more people are now confident to engage in these channels. This shift is significantly changing the way people borrow and lend money. This might be attractive in ways but also raises concerns.

V.A.6.Social Benefits and a Step towards Financial Inclusion Some of the most advantageous factors in terms of cost effectiveness of alternative lenders, according to PwC report, 2017 are:

- Saves up to 60 per cent in loan origination and underwriting costs
- Savings of almost 50 per cent in loan servicing costs
- Overall 30 per cent savings in collection costs
- Reduced settlement costs as everything is online
- Providing credit to the under-banked segment
- Vast geographical reach

Financial inclusion's current state in any country is critical to identify the areas of focus. Throughout the country, job creation through SMEs has been a key focus of the policy makers. The SMEs are known to generate most of the new jobs but they face growth impediments and lack of funding. Asia has the highest percentage of unbanked population in the world and 47 per cent is in India. Financial institutions have not historically focused on small businesses leaving a funding gap in the market.[24] There is an estimated credit gap of INR 833,000 crores.[25]

In a speech delivered by Shri S. S. Mundra, Deputy Governor, RBI (2016), he mentioned 'Access and Availability' of credit as the main component of financing MSMEs As of then, there were 3000 public sector bank branches, still it was not reaching the tier 3 and tier 4, that is, village and taluka levels for personal and business loans. And the largest barrier to loan provisioning is insufficient data on credit history and documents to verify it.[26] Peer-to-Peer lending has subsequently been able to address these pain points through their innovative use of data to generate credit history, cost efficient means of underwriting and servicing and greater reach with online platforms that is accessible to people with internet connectivity. The model of matching borrowers and lenders have successfully financed many individuals and SMEs with approximately 30 per cent of total lending to the SMEs and rest on personal loans.[27]

Reference Note:

23 http://mapegroup.com/pdf/fintech-india-changing-landscape-sme-lending.pdf

24 https://www.pwc.com/sg/en/publications/assets/fintech-startupbootcamp-state-of-fintech-2017.pdf

25 Fintech in India Ready for breakout, Deloitte report, July 2017.

26 https://www.rbi.org.in/SCRIPTS/BS_SpeechesView.aspx?Id=1018

27 The average share of SME lending of few of the leading P2P companies like LenDenClub, OMLP2P, Faircent, i2ifunding is between 20-45 per cent. Major share is to personal loans

Figure 6: Credit Gap in India's SME Sector

Revenue Segment (INR)	No. of Units (Mn)	Credit Demand (INR 000 crore)	Bank Credit Supply (INR 000 crore)	Credit Gap (INR 000 crore)
<15 Lakh	41.4	414	92	322
15 - 30 Lakh	5.6	168	62	106
30 lakh - 1.5 Crore	4.5	477	203	274
1.5 Crore - 3 Crore	1.3	234	103	131
3 Crore - 18 Crore	1.8	720	357	363
Total	**54.6**	**2013**	**817**	**1196**

Note: Credit demand is calculated on the basis of revenue using appropriate multipliers.

Source: Deloitte report, July 2017

V.A.7. Risks associated with P2P lending

Peer-to-Peer lending market shares a very small proportion of the total unsecured lending market at present. In the UK, P2P lending is about only 0.53 per cent of the total unsecured lending with 0.45 per cent to the SME lending (Milne and Parboteeah, 2016). In India the market is at a nascent stage. Transaction value in this segment is $55million as of January 2018. [28] However, this segment has huge growth potential and many new entrants are anticipated after the guidelines from the Reserve Bank were released in October, 2017.[29] But there remains certain concerns that need to be addressed by the regulators and policy makers.

a. Information asymmetry: P2P lending promises high and quick returns. But investors might not have the adequate knowledge before investing in to one of the platforms. And hence, it is difficult to analyse the risk to rewards trade-off in such cases. Most lenders in P2P lending are not skilled in evaluating investment risks and thus face difficulty in judging the quality of a loan application.[30]

Investors typically are urged to have complete information while making investment decisions. However, in this new asset class where the history of its performance is highly limited and varies widely across countries and platforms, investors and borrowers might face problem of asymmetry of information. This in economic sense results into moral hazards and adverse selection.

i) Operational Risks and Data Protection: Regulatory authorities have taken serious consideration of private data shared to third parties and have issued guidelines for data protection and cyber-security.The European Union's General Data Protection Regulation (GDPR) to be in effect from May 2018 has laid out guidelines for companies participating in any form of data collection to protect EU citizens against data breaches.

Under RBI's guidelines on information security, electronic banking, technology risk management and cyber frauds in section 43A of the Information Technology Act, 2000, P2P platforms are required to have a privacy policy to protect sensitive personal data. It includes details such as bank account, credit/debit cards, financial information of an individual.

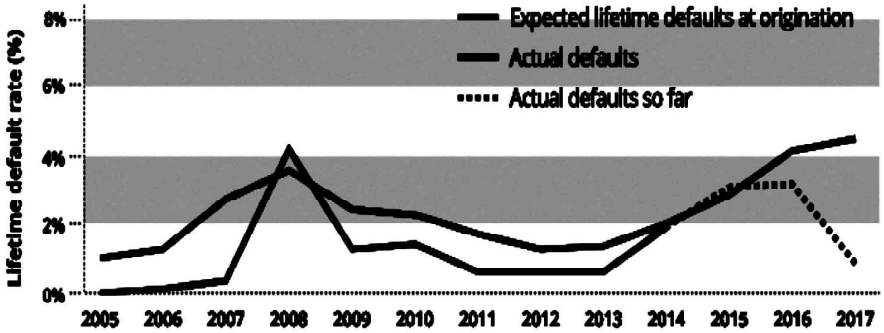
ii) *Performance of Credit Risk Assessment:* The business model of a P2P platform is pivotal to its overall functioning. This includes the process of assessing credit risk of the

borrowers and setting an accurate interest rate. In the investor side, it is important to understand the risk-reward factors while fixing the rate of returns. This varies across models.P2P platforms make use of a greater amount of data, that is more recent and carry specialized analytics. P2P platforms leverage borrower's social behavior, past spending activities on online retail shops and finance management for credit rating and these are given more consideration. Yet there is no robust evidence that these methods of credit scoring are better than the traditional methods.

b. Risks Related to Financial Stability:

i) Market Risks and Macroeconomic Factors: There are chances that a lot of investment flows in to the platforms waiting to be lent. This might result into blockage of funds. The investors will seek high returns but there might be temporary shortage of borrowers. This might significantly reduce interest rate returns for the investors, causing market fluctuations. In times of economic recession, there might be under employment. This can result into higher default rates. Taking example from the 2007-08 recession, the default rate of Zopa (UK) increased by 4.61 per cent.[31]

Figure 7: Zopa's Actual Default over the Expected Default Rates 12 years period



Source: www.zopa.com

Reference Note:

28 https://www.statista.com/outlook/332/119/p2p-money-transfers/india#

29 In the RBI guidelines, P2P platforms have been categorized under Non-Bank Financial Corporations. Certain terms and conditions have been set for platforms to qualify as P2P lending companies, to operate in India.

30 M. Klafft, "Online peer-to-peer lending: A lenders' perspective," in: proceedings of the International Conference on E-Learning, EBusiness, Enterprise Information Systems, and E-Government, IEEE, pp. 371-375, 2008.

31 In 2007, Zopa reported 0.49% default rate, which increased up to 5% by the end of year 2008. https://www.zopa.com/lending/risk-performance

Increasing competition resulting into volatile interest rates: With many new entrants in this space and increased competition, there can be a decline in the interest rates offered to the investors. However, it is unlikely to affect the lending rates offered by the banks. Lending rates of P2P market is absolutely governed by the demand and supply of loans.

ii) Borrower's insolvency: The performance of borrowers is not guaranteed after the loans are passed. Again, there remains risks and uncertainties in the part of the borrower, who may default. To prevent this, investors are mostly made to invest in a number of loans and diversify across various borrowers. For example, Funding circle (a UK

based P2P platform that specializes in providing loans to small businesses), at one time an investor carries only 0.5 per cent risk of default from a single business.

On an average, the default rates of global P2P platforms have been between 2 to 6 per cent (excluding those in China). Zopa (UK based) operates at 2-3 per cent (not considering 2007-08. Recession period) and Lending Club (US based) operates on 3-4 per cent average annual default rates.

iii) Liquidity Risks: When an investor enters a contract, he is obliged to provide the promised amount for the time period decided mutually between the platform, investor and in some cases the borrower. Transfer of this commitment is not possible and hence this remains illiquid. But, with the growing market, there can be a rise of secondary market, where the investors can sell their contract to another investor and come out of the deal. Investors wishing to sell loans have no superior information to potential purchasers can increase the adverse selection problem that can otherwise impede market development.[32]

Maintaining investor confidence is very crucial to these business models. Attracting and retaining lenders is more difficult than that of borrowers.[33] But investors can be lost due to reasons like:

- Increasing default rate of the borrowers
- Operational risks like fraud or cyber-threats and attacks
- Misuse of data of investors in the platform
- Better options available in other platforms
- Lack of borrowers and funds sitting idle in the platform for a long time.

iv) Credit Risks: The platforms are not directly exposed to loan loss or the performance of the loans. The role of facilitating direct lending from investors to individuals or SMEs makes the platform more directly responsible for servicing loans and not repayment guarantee. Whereas, banks are specialised to take risks for which they gather knowledge to extend loans to individuals of MSMEs, they conduct screening and loan performance checks and have secured as well as unsecured loans to manage exposure.

Reference Note:

32 Peer-to-Peer Lending: Structures, Risks and Regulation. Kevin Davis & Jacob Murphy. June 2016

33 Milne and Parboteeah (2016)

V.B. Changing dynamics of Cross Border Payments

Amongst the financial technology innovations over the last decade, the model of Distributed Ledger (Blockchain) Technology has been one of the revolutionary breakthroughs. This technology is being widely experimented and adopted. And one of the most successful use cases until now is its integration into the current model of cross border payments.

While cross-border payments account for less than 20 per cent of total payments volumes, they comprise about 40 per cent of global payments transactional revenues (i.e. the transaction related fees and float income). Consumer-to-consumer remittances generate a global cross-border revenue of 8 per cent and business-to-business payments brought in $240 billion revenue on $135 trillion in flows, roughly 80 per cent of cross-border payments revenues.[34] Banks hold about 90 per cent share of revenues that comes from the global remittance market.

But this market did not go through any cost reductions in the ways of their functioning. The operational cost per transaction for international

payments remained at an average of $20, though varying a lot between countries and corridors. There is a growing need to improve correspondent banking with changing customer expectations and newer technologies challenging the cost of sending remittances worldwide.

Today's customers demand a smooth and transparent user experience. Real-time is what they look for in any digital transformation. But there hasn't been much of a change in the way people or businesses send money across countries, for years. If domestic transfers can be so cost effective and efficient, money crossing international borders also should be quick and less costly. The limitations of today's infrastructure in cross border payments are high processing costs and lengthy settlement times. These inefficiencies result in an enormous cost. The global average cost of sending remittances worldwide remains at 7.21 per cent in Q3 of 2017 and banks remain the most expensive means to send money across countries with an average cost of 11 per cent compared to approximately 6 per cent of the Money Transfer Operators.[35]

V.B.1.Traditional model of international money transfer

In the traditional model, multiple hops are involved to send money. Each party involved needs to validate the transaction. The validation process is done through book transfers, which is different for different systems. It includes manual processes and takes a lot of time and incurs costs. The chances of error are high with error rates more than 12.7 per cent.[36] Figure 8 depicts the present model of sending payments across countries and the costs associated at each step, while making a payment. At present, international transfers take settlement time up to 3 to 5 days.

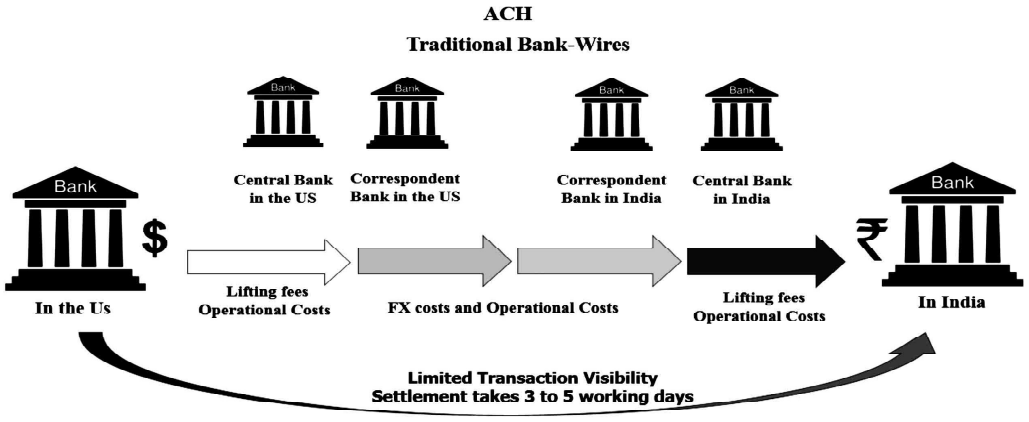
Reference Note:

34 McKinsey Global Payments Report, 2016

35 World Bank's Remittance Prices Worldwide report of 2017.

36 Experian, Does Valid Bank Account Data Matter?

Figure 8: Traditional Method of International Money Transfer



V.B.2. The Blockchain Technology

In order to understand the changing dynamics of cross border payments, it is first essential to understand how the Blockchain technology works.

The Blockchain technology has been one of the revolutionary breakthroughs that enables peer-to-peer transfer of digital assets seamlessly through its secured network protocol without the need for central intermediaries. Blockchain maintains a cryptographically-secured multi-asset shared ledger. Using this ledger, participants can transfer any proof of value in real time with no transactional intermediary. Each participant in the business network holds a copy of the ledger and independently validates each update. This makes it a decentralized platform, without an overlooking intermediary. The technology uses Smart Contracts, which are computer protocols that work on logic assigned, in order to verify and validate a transaction. Without the agreement of all the participants in the network or without verification from the smart contract, no transaction can take place. This makes it as a single source of proof for every transaction. Every participant receives a real-time update of the transaction. And these transactions once occurred, cannot be altered. The following are the major attributes of blockchain technology

- Acts as a store of digital assets
- Enables exchange and tracking of digital assets and its ownership in real-time
- It is a distributed ledger where everyone in the network has a copy of the ledger
- It has a consensus mechanism where every transaction is validated through consensus in the network
- Immutable transaction records are cut into a block and chained to previous block enabling audit trails and establishing provenance.

Blockchain maintains a continuously growing list of records into blocks which are secured from tampering. Each block contains a timestamp and a link to the previous block.

Figure 9: International Money Transfer leveraging Distributed Ledger (Blockchain) technology.

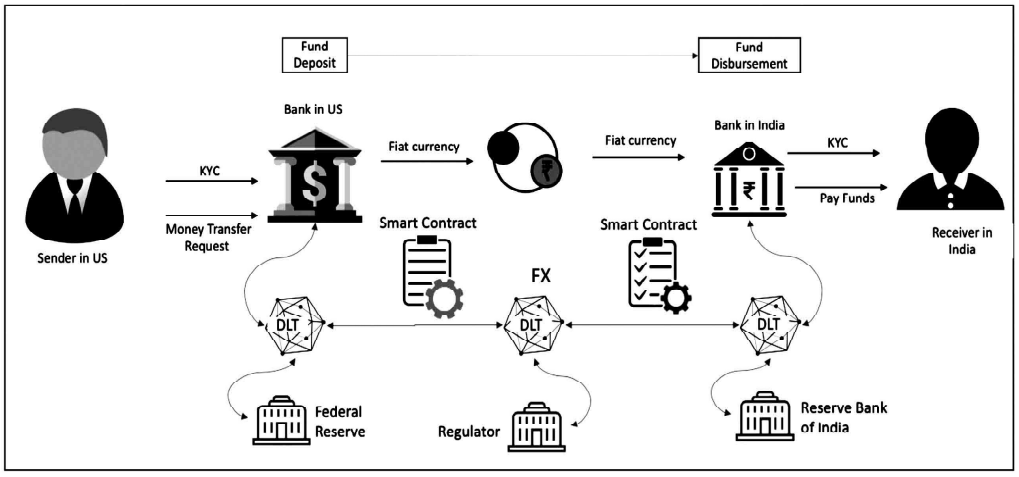


Figure 9 is a basic model of international money transfer leveraging the Distributed Ledger (Blockchain) Technology. All financial institutions have got their own proprietary technology and processes to process payments. They are independent of each other.

In a traditional model, the request from a bank is converted into a gateway and sent to a correspondent bank. That bank has a different process of validating and taking the transaction forward. It might also include manual processes. So, there are a number of steps of validation that any request has to go through before the transaction is passed. Here there is a loss of time and huge service costs.

Whereas, if a Blockchain solution is implemented in the above system, all banks involved in a particular transaction will hold a distributed ledger which is a part of the Blockchain network. And when a payment is initiated, all the ledgers can be updated instantaneously. This will drastically reduce the time of processing payments and operational costs.

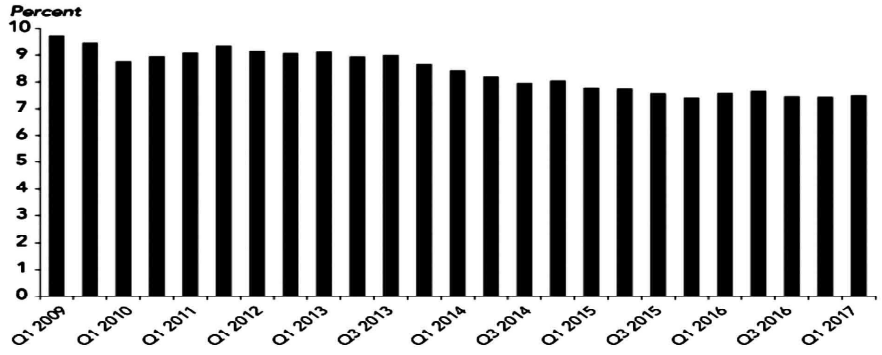
Consider a money transfer from a sender in the US to a receiver in India. Unlike traditional model where there were a number of hops to get the transaction verified and approved, a messenger system is used that is encrypted at both the ends. Both sender and receiver banks use this messenger system that is built of smart contracts and secured in the blockchain based ledger. The request is triggered by the sender bank, which instantaneously reaches the correspondent banks and when approved, it is updated in the receiver bank's ledger. The actual money transfer takes place just the way it was done originally.

So, the technology provides a messaging and verification gateway that is common to all the parties involved. It is automated and self verifies any requested transaction with the prevailing FX rates, customer KYC, transaction fee, etc. Once it is approved, the transaction update is visible to every participant in real-time.

The technology self verifies a request that works on logic based in the smart contracts. And this works as a single source of proof, guaranteeing the receiver bank that funds will be transferred in that bank's account once it has been approved in the messenger system. Because of which the receiver bank can instantly update the account of receiver sitting in India and later, through the original process, funds are transferred to receiver bank. This has reduced time of settlements from 3 to 5 days to just 3 to 5 seconds, reduced service charges by more than 30 per cent and it prevents defaults and fraud invariably with its built-in authentication mechanism.

The table below shows a simple comparison of few of the services of wireless transfers and Automated Clearing House (ACH) system in India. For every 1000 USD sent to India at a prevalent market FX rate of 1 USD equals 65 INR, the service charges, time taken to receive payments and the total money received is shown below. It clearly depicts the time inefficiencies, and amount lost in transaction. For instance, for every 100 GBP sent to India, Western Union charges a 2.99 GBP fee. Also, their FX rate is always 0.5 to 0.8 GBP lower than the market rate.

Figure 10: The global average cost of sending $200 has remained nearly flat at 7 per cent.



Source: Remittance Prices Worldwide, World Bank, April 2017.

Figure 11: Comparison of five widely used systems to send money from the US to India (1000 USD at FX rate of 65 INR per USD)

Service	USD 1000 to INR	Time taken	Transfer fee $
remit2India	64360	4 days	0
Transfast	64500	3 days	0
TransferWise	64132	2 days	8.92
Worldremit	64520	2 days	0
Western Union	64428	1 day	2.99

Source: Compiled taking data from individual websites of the systems mentioned

India is one of the major remittance receiving countries. Many Indians stationed in global locations lose out heavy amounts of money as cost to transfer. Ripple – a-Blockchain based enterprise, has partnered with Axis bank in India to receive remittances from the RakBank of UAE and Standard Figureered of Singapore. This partnership has been able to scale up transactions with processing rates as high as 1000 transactions per second. Operational costs reduced by about 33 per cent.[37]

V.B.3.Concerns and Mitigation Strategy

a. Financial management and traceability: The Blockchain network takes care of security, traceability, immutability and transparency.All the banks involved in a transaction (sender, receiver and correspondent banks) are provided with a dedicated ledger with 24/7 access with real-time updating of all transactions.

b. Network System and Security: The Blockchain inherently secure with cryptographic technology. Every communication is encrypted and transactions records can't be altered, instead a new record is inserted for every update.

VI. Concluding Remarks

The Fintech market has been growing exponentially year-on-year in India favored by foreign investments and government support. The financial sector holds huge scope for the new innovative models to upscale operations and increase convenience to the customers. The report is an attempt to highlight the models of P2P lending and cross-border payments to understand their functionalities, scope and risks. Indian banks can gain by implementing strategy for effective collaboration and utilize elements of the new models of lending and cross border payments to enhance the overall customer experience. The regulators and policy makers need to identify potential and associated risks to provide the required support for the sustained growth of the new players so they co-exist with the traditional models and contribute to the financial inclusion endeavor.

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