Project Dissertation Report on

"IMPACT OF EMERGING TECHNOLOGIES ON THE BANKING SECTOR"

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2K18/MBA/017

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CERTIFICATE FROM THE INSTITUTE

This is to certify that Sanchi Khurana, a student of MBA from Delhi School of Management, Delhi Technological University has submitted a report on the topic **'Impact of Emerging Technologies on the Banking Sector'.**

During the project, I found her to be very hardworking, sincere and inquisitive to explore new things. She is able to get across her points effectively and convincingly. She has the ability to withstand stressful project conditions and meet the deadlines.

I wish her all the success in her career and life.

Project Guide   **HOD**

(Dr. Archana Singh)   (Dr. Rajan Yadav)

Place:

Date:

DECLARATION

I hereby declare that the report submitted by me entitled **'Impact of Emerging Technologies on the Banking Sector'** to Delhi School of Management, Delhi Technological University, Delhi in partial fulfillment of the requirement for the award of the degree of MBA, is a record of bonafide work carried out by me under the guidance of Dr. Archana Singh.

I further declare that the matter embodied in this report is original and comprises only of my own work. Also, work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma to the best of my knowledge and belief.

Approved By: **Submitted By:**

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Sanchi Khurana

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EXECUTIVE SUMMARY

Financial Services in India has undergone rapid expansion in the past few years in terms of both the strong growth of existing firms and new entities entering the market. The sector comprises of **Commercial Banks**, **Non-banking Financial Companies** (NBFC), **Insurance firms**, **Pension Funds**, **Co-operatives** and other **smaller financial entities**. India is expected to be **fourth** largest private wealth market globally by **2028**. Technology in the banking sector has always existed and made things easier. Banks have enormously relied on technology to record transaction and process them. Technology has changed how banks used to function and introduced ways to ease the processes. With launch of ATM's, Internet Banking, Debit & Credit cards and Mobile Banking the transactions became quicker and the frequency of visiting the banks reduced. As on March 31, 2019, the number of ATM's in India increased to about 2,21,703 and are further expected to increase. The number of Debit and Credit cards issued around the same timeline were 925 million and 47 million respectively.

The financial sector has seen drastic technology-led changes over the past few years. The IT departments are flooded with requests to improve efficiency and facilitate game changing innovation; while also reducing costs and continuing to support legacy systems. Technology will not only help perform the backend tasks i.e. supporting the process of transactions, but future technologies are much more customer centric, efficient and provide more secure & intelligent solutions.

The technologies that are anticipated in the banking sector in the next five years are – **Machine Learning & AI, Hybrid Cloud, IOT, Blockchain, Robotic Process Automation (RPA)** and many more. Banking sector should adapt these technologies in key areas that help develop the customer journey including – **Enhanced Customer Service, Online Banking, Quick Transactions and Detection of Frauds**.

The project talks about the emerging technologies and the current processes being followed in the industry and to identify the level of inefficiency in the sector and how important it is for the existing firms to adapt to changes and strike a balance between technology and manual intervention.

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LIST OF ABBREVIATIONS

FinTech	Financial Technology
AI	Artificial Intelligence
ML	Machine Learning
RBI	Reserve Bank of India
MSME	Micro, Small & Medium Enterprise
PSB	Public Sector Banks
IPPB	Indian Post Payments Bank
PMJDY	Pradhan Mantri Jan Dhan Yojna
POS	Point of Sale
OCR	Optical Character Recognition
ATM	Automated Teller Machines
RPA	Robotic Process Automation
KYC	Know your Customer
AML	Anti Money Laundering
SIDBI	Small Industries Development Bank of India
CGTMSE	Credit Gurarantee fund trust for Micro and Small Enterprises

I

CHAPTER – 1

INTRODUCTION

1.1 Introduction to Financial Services

Financial services can be basically described as services provided by the finance industry, which consists of a wide range of businesses that manage money. Financial Services is a term used to refer to the services provided by the finance market, and also used to describe organizations that deal with the management of money. It broadly includes:

1. Banks (Commercial & Investment Banks)
2. Credit Card Companies
3. Insurance
4. Accountancy Companies
5. Consumer Finance Companies
6. Investment Funds/Services
7. Stock Exchanges
8. Factoring and Leasing Companies
9. Foreign Exchange
10. Asset Management Companies
11. FinTech

The Customers of Financial Services includes:

1. Retail Customers (Personal or Retail Banking)
2. Affluent Retail Customers (Private Banking)
3. Corporate Customers (Corporate Banking)

    3.1 Business from the Private Sector

    3.2 Business from the Public Sector

    3.3 Non for Profit Organizations

1.2 What are Disruptions?

Today's financial services institutions are under increasing pressure. Matching up to the growing customer needs, regulatory changes, adhering to the compliances, rise of the

emerging technologies and increase in the number of FinTech Startups has soared the competition in this space. As a result, businesses have to work harder and smarter to attract and retain the customer base. A huge part of this work is focused on technology and how financial services can expand their digital offer. The digital revolution has fundamentally changed the way businesses operate for their customers, and services are increasingly moving online due to consumer demand. If we talk about disruptions, it is a service and/or technology that help in creating a new market space (Market Development) and value network which in return disrupts the functioning in the existing market and value ecosystem, which in return displaces the established market players and make the existing products and alliances obsolete. The term was coined by American scholar Clayton M. Christensen in 1995, and has been called the most influential business idea of the early 21st century. Certain tools that have created disruptions in the modern era include Artificial Intelligence (AI), Machine Learning (ML), Block Chain etc.

1.3 Industry Profile

The main function of financial services industry is to manage the money for individuals and institutional investors. It consists of organizations such as commercial and investment banks, insurance companies, credit-card companies etc. Financial services are basically the lifeline of growth and development of the economy. They facilitate the setting up of big and small businesses and the expansion of businesses. People getting employed or starting their own business created with the help of financial services helps the people to earn money and save for future expenses. They help the poor to come out of poverty and lead a better life. To the rich people, they act as an opportunity to grow their wealth. The financial services industry is the largest-earning sector in the world. They also intervene in various industries and agriculture by providing credit and opportunities for investment.

The financial sector of India is well diversified and currently in the expansion phase, which can be seen in the strong growth of existing firms and new entities entering the market. The sector comprises commercial banks, insurance companies, non-banking financial companies, co-operatives, pension funds, mutual funds and other smaller financial entities. The Indian Regulator has allowed the creation of new entities such as payments banks, thus adding the types of participants in the industry. If we talk about the

Indian Financial Sector, it is predominantly a banking sector with commercial banks making up almost 64% of the total assets held by the system. The two focus industries for this project will be Banking and Insurance Industries. They are as follows:

1.3.1 Banking Industry

The Banking industry in its modern form can be identified as a network of institutions licensed by the government to provide banking services to the people. The major services offered are related to storage, transfer, managing risks and extending credit against wealth owned by individuals. The financial services offered at any point of time varies considerably across institutions, time, jurisdictions, evolving in step with changes in the regulation of the industry, the development of the economy, and advances in information and communications technologies.

1.3.1.1 Functions

Banks can be understood as institutions that act as financial intermediaries for transfer of funds between the party saving money and the party needing money. Banks promote and support the economic activity by taking deposits from a large number of small savers, and further use these deposits offer credit to consumers (retail banking) or to institutions (commercial banking) to finance investment in larger capital projects. It is also responsible for underwriting issues of securities (investment banking) or lending against real estate (mortgage banking). Banks are also responsible for risk assessment by monitoring borrower's performance; by diversifying across different investment projects, the bank is able to minimize risk and promote equal allocation of funds to those with the greatest economic potential.

1.3.1.2 Banking Industry in India

The Indian Government has introduced several reforms to liberalize, regulate and enhance the Banking Industry. The Government and Reserve Bank of India (RBI) have taken various steps to ensure that Micro, Small and Medium Enterprises (MSMEs) can easily access money from the Banks. One of the most prominent and important scheme is the Mudra Yojna that allows the MSME sector to access loans based on the size of their industry (Shishu, Kishore or Tarun). With both the government and private sector actively pushing, India is undoubtedly the most vibrant capital market in the world.
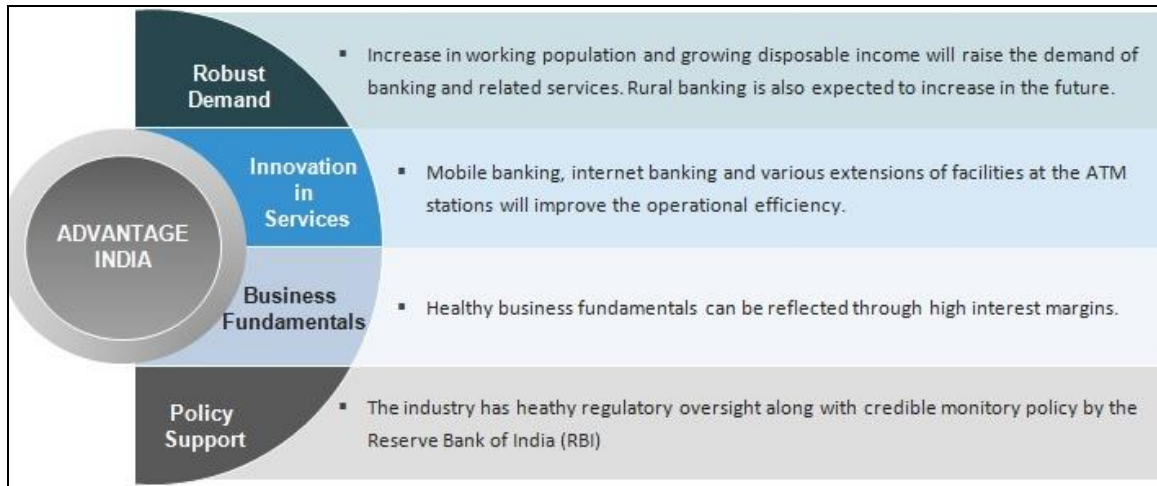
Figure 1: Advantages to the Banking Sector from Indian Perspective

According to RBI, the Banking Sector of India is well regulated and capitalised. The country's economic and financial conditions are way better than any other country in the world. Various risk analysis like Credit, market and liquidity risk show that the Indian Banks are generally resilient and are capable to handle the global downturn in the economy well. Various advantages are shown in Fig 1.

Market Size

The Banking System in India comprises of 18 PSBs, 22 Private Banks, 46 Foreign Banks, 53 Regional Banks, 1,542 urban cooperative banks and 94,384 rural cooperative banks, in addition to cooperative credit institutions. The total lending has increased at a CAGR of 10.94% from FY 07-18 and total deposits increased at a CAGR of 11.66%. If we talk about India's retail credit market, it stands at number four position in the emerging countries. It has increased to US$ 281 billion from US$ 181 billion during the period 2014 to 2017.

Investments/developments

The key developments and investments in India's banking industry include:

- In October 2019, the Department of Post launched the mobile banking facility for all post office savings account holders of the CBS (core banking solutions) post office.

- Deposits under Pradhan Mantri Jan Dhan Yojana (PMJDY) stood at Rs 1.06 lakh crore (US$ 15.17 billion

- In October 2019, Government e-Marketplace (GeM) signed a Memorandum of Understanding (MoU) with Union Bank of India to facilitate a cashless, paperless and transparent payment system for an array of services.

- Transactions through Unified Payments Interface (UPI) stood at 1.15 billion in October 2019 worth Rs 1.91 lakh crore (US$ 27.33 billion).

- In August 2019, the government announced the major mergers of public sector banks which included United Bank of India and Oriental Bank of Commerce to be merged with Punjab National Bank, Allahabad Bank will be amalgamated with Indian Bank and Andhra Bank and Corporation Bank will be consolidated with Union Bank of India.

- The NPAs (Non-Performing Assets) of commercial banks has recorded a recovery of Rs 400,000 crore (US$ 57.23 billion) in last four years including record recovery of Rs 156,746 crore (US$ 22.42 billion) in FY19.

- The board of Allahabad bank approved the merger with Indian bank for the consolidation of 10 state-run banks into the large-scale lenders.

- As of September 2018, the Government of India launched India Post Payments Bank (IPPB) and has opened branches across 650 districts to achieve the objective of financial inclusion.

- The total value of mergers and acquisition during 2017 in NBFC diversified financial services and banking was US$ 2,564 billion, US$ 103 million and US$ 79 million respectively.

- The total equity funding's of microfinance sector grew at the rate of 42 year-on-year to Rs 14,206 crore (US$ 2.03 billion) in 2018-19.

Government Initiatives

- As per Union Budget 2019-20, the government has proposed fully automated GST refund module and an electronic invoice system that will eliminate the need for a separate e-way bill.

- Under the Budget 2019-20, government has proposed Rs 70,000 crore (US$ 10.2 billion) to the public sector bank.

- Government has smoothly carried out consolidation, reducing the number of Public Sector Banks by eight.
- As of September 2018, the Government of India has made the Pradhan Mantri Jan Dhan Yojana (PMJDY) scheme an open ended scheme and has also added more incentives.
- The Government of India is planning to inject Rs 42,000 crore (US$ 5.99 billion) in the public sector banks by March 2019 and will infuse the next tranche of recapitalization by mid-December 2018.

Achievements

- As on March 31, 2019 the number of debit and credit cards issued were 925 million and 47 million, respectively.
- As per RBI, as of October 25, 2019, India recorded foreign exchange reserves of approximately US$ 442.58 billion.
- India ranks among the top seventh economies with a GDP of US$ 2,73 trillion in 2018 and economy is forecasted to grow at 7.3 per cent in 2018.
- To improve infrastructure in villages, 204,000 Point of Sale (PoS) terminals have been sanctioned from the Financial Inclusion Fund by National Bank for Agriculture & Rural Development (NABARD).
- The number of total bank accounts opened under Pradhan Mantri Jan Dhan Yojana (PMJDY) reached 333.8 million as on November 28, 2018.

1.4 Objectives of the Study

The impact of the rapidly evolving digital landscape, with more and more new technologies making their way, can be seen in almost every aspect of our lives. One of the industries that have been impacted the most by such digital disruption is banking and finance. Today, digital disruptors are transforming the way the financial sector works, like payment solutions, lending, credit settlements, and more. In response to these, banks and other financial institutions are forced to either partner with FinTech companies or develop their own solutions. Disruptive technology is an advanced innovation that develops a new market, value-oriented network by disrupting the existing market and system.

It is important for all financial organizations to adopt emerging technologies with engagement throughout the organization. The focus of every implementation must be both internal and external, as opposed to revenue, profit and cost saving.

The **objective of this project** is to understand –

- Impact of the disruptive tools on the financial sector with special focus on Banking.
- To understand the current processes being followed in these industries and identify the level of inefficiency in the Banking Industry
- To study the current levels of adoption of these tools, and how adopting these tools will lead to increase in efficiency.

To achieve the objectives of the study; detailed research is done to find out the impact on the banking industry considering the current processes that are being followed and the technologies that can be adopted to better cater the customer base, increase efficiency and match up to the competition in the industry. Today's financial services institutions are under increasing pressure. As a result, businesses have to work harder and smarter to attract and retain clients. Adopting these tools is the need of the hour to sustain in this highly competitive industry, grow profits and meet shareholders' expectations as well as ensure that the customers' demands are met with high levels of satisfaction at a minimum cost.

CHAPTER – 2

LITERATURE REVIEW

- **A study on Role of Technology in Banking Sector, Bala Nageshwara Rao, 2018**

The research paper is aimed at understanding the various new technologies currently prevalent in the banking sector and what is the level of adoption of these new technologies amongst the banking customers. It talks about the radical transformation that the banking sector has undergone in the last two decades with the emergence of newer technologies mainly implemented using IT. IT has brought in significant changes to how we do banking by easing the major functions performed by banks which are access to liquidity, risk monitoring and asset transformation. They have not only made banking much more efficient but have also resulted in the effective monitoring and control over the transactions of a customer. Aiding to this IT boom is globalization coupled with easy and cheap access to computers and smartphones which have increased the penetration of internet-based banking and customer centric solutions. The study focused on primary research by undertaking a survey to determine the levels of awareness and levels of adoption of the next generation technologies available for banking in the market. The analysis reveals that technology is majorly used in online banking which contributes around 50% to the total share followed by E – payments and financial transactions at 27% and 17% respectively. It also shows that with the advent of internet-based banking and services, majority of the customer prefer to avail these services from the comfort of their homes rather than visiting banking branches in person leading to lesser queues at the banks. Atm usage has also shown significant increase over the years with the increased spread of ATMs across the country. It finally highlights that 90% of the people surveyed prefer online modes of banking over offline and only 10% are currently reluctant to use the online mode partially due to security reasons associated with it.

- **ICT Innovation in Indian Banking Sector: Trends & Challenges, Madhura Ayachit, 2016**

With the advancement of digital technologies across the globe, Information and Communication Technology (ICT) is also gaining ground in India with the major user being the Indian Banking sector. The continuously changing and dynamic business environment of the banking sector has been further aggravated by the entry of ICT based technologies. Communication and information transmission can now be done digitally leading to enhanced customer experience and rapid growth of new customer in the sector. The paradigm shift in offerings have also led to an increase in expectations of the customer wanting better services and offerings from the various stakeholders in the Banking sector. E – Banking, Digital wallets and apps that can let you access all your bank related information on a smartphone has created a rather huge stir which has fueled the growth of the Indian Banking sector from being a Teller led framework to now a digitally led system and framework. Fin – tech services and innovation labs have led to significant growth and rise in transactions using digital means with the numbers also doubling every year for the last three years. The Government's NPCI arms that launched the Unified Payments Interface (UPI) in 2016 with more than 20 banks has been a huge success story in the Indian Banking industry having received appreciation from countries around the globe. Artificial Intelligence and robotics though at a nascent stage are also gaining ground in India with chatbots being the initial foray into this segment by the Indian Banks. All major banks including SBI, ICICI and HDFC have their own chatbots that let the customer transact, solve queries and give suggestions remotely without having to physically visit the bank branches. Biometrics, Block chain an Big Data are the next sought after technologies that the Indian Banks are trying to accustom with having seen its impact in markets abroad with the market size of analytics in India estimated around $600 Million by the end of 2017.

- **Fintech: A Messiah for the ailing Banking Industry in India, Siddhant Gurung, 2018**

The research paper talks about the buzzword prevalent in the Indian Banking industry: Fintech. Simply put it refers to the various innovations related to technology in the

financial sector that is aimed improving the quality of services and enhancing the customer experience and levels of satisfaction. With the traditional methods of banking having led to a significant accumulation of bad loans due to frauds and other illegal activities, it is imperative for the banking sector to look beyond the traditional methods of banking and focus on emerging technologies starting with Fin – Tech. With the next generation of users being tech savvy, it is critical for the banks to follow the basic principle of marketing and create products and services that are aligned with the needs and demands of these customers. It has been observed that products and services developed using innovative technologies have resulted in an increased level of adoption amongst users, a trend that can be clearly seen with E – wallets like Paytm, PhonePe, UPI etc. Investors too are not shying away from investing in these next generation technological innovations with all the Fin – Tech startups receiving significant financial assistance and funding from VC and Hedge funds. Providers of these services have almost tripled in the last five years mainly driven the next generation customer, funding and support from the government and the growing needs and wants of the customer that wishes to perform all his banking related tasks using the press of a button on a smartphone.

- **Adoption of Technology in Banks – Issues & Challenges, T.R. Srilatha, 2018**

The research paper talks about how technology has brought about a drastic and radical change in how the banks function and deliver their services to the customer. The mortar banking prevalent a decade ago is now slowly moving towards the click banking or e – banking or simply put availing banking services without having the need to physically visit the banks by making use of smartphones and computers. It also talks about how using IT services is a win – win for both the stakeholders, the banks as well as the customers. It enables the banks to minimize the cost of handling a lot of cash, enables the bank to move from branch based loyalty to bank based loyalty and allows them to provide customized and demand specific services to the customer by studying and analyzing the huge quantities of data generated in the sector. For the customer, it gives them the freedom to access banking services anytime, anywhere by a click of a button, thus saving, effort and most importantly the queues that the customer had to bear in the past. However, with the increased use of technology comes increased risks in terms of

thefts, data leakages and frauds with Hackers entering into the core banking system many a times leading to loss of money and critical personal information of the customers with Banking related frauds almost increasing fifteen times between 2010 and 2015. Even after the various challenges that these technologies pose, the future of banking lies with the usage of these technologies only. Hence, banks need to ensure that critical cyber security processes and other systems are in place to assure the customer that his money is safe, secure and at the same time providing the convenience of transactions at home.

- **Fintech – Emerging Trends in Banking Sector, Umesh Gupta, 2018**

The Indian Banking sector is a highly competitive sector with the presence of Domestic Banks, Foreign banks, Private Banks and Co – Operative societies all looking at capturing the major chunk of customers from one another. Privatization, Globalization and Liberalization in 1991 has also impacted the banking sector with the focus now shifted to Research & Development of products and services that can better serve customer needs than the traditional methods that were used earlier. The Indian economy is witnessing significant growth due to increased spending by middle class, enhanced tax reforms and government's policy of Make in India. This has resulted in boosting demand for banking related services right from increased borrowing to investments in latest instruments like mutual funds and hedge funds. In 2011 as per RBI, 96% of the transactions were done using RTGS and Cheques leading to increased work load on banks and banking staff which did not allow them to focus on critical aspects like customer satisfaction and innovation. With ECS and ATMs coming into the picture, the focus has shifted from transacting physically in the bank to using these mediums to withdraw cash and access other services. The ATM machines have grown in India at a CAGR of more than 20% between 2005 and 2015 resulting in lower handing costs for banks and increased customer satisfaction due to the feature of anytime, anywhere. The number of transaction using credit cards and debit cards have also gained traction with the number almost increasing 500% between 2014 and 2016. The future of banking lies in adoption of these instruments and providing services focused on enhancing customer experience and offering them more value.

AUTOMATION, AI & MACHINE LEARNING

2.1 Introduction to Automation

Automation as the name suggests is a process that is performed with minimal or no human assistance. Software that operates on its own or automatically functioning electronic devices are some examples of automation. The key to automation in to identify **non – value – added tasks** that are performed in a **repetitive way** that a computer program can learn to do. The concept of automation has been a point of discussion recently in the global financial service industry. The industry is working to get automation into their system at the earliest as it can help them deliver cost savings, increase productivity and improve the customer experience.

Consider the example wherein, the banking environment today has many restrictions about with whom a bank can do business. This task is a totally manual task which takes place at many institutions in which employees visit government websites, access certain files and download them to determine whether doing business with specific organizations and people is permitted as per law or not. However, there is a tool that many organizations may not be aware of which is the Power Shell application that comes with Windows OS. It can help automate these tasks that are highly manual and repetitive. Also, another application called windows scheduler can be utilized along with Power shell to download files and automatically import necessary information as per fed scheduled. The two tools stated above are totally free of cost and can save weeks of employee time each year.

Now let us consider automation from a Risk Management & Regulatory perspective. Automation can basically help us tackle several problems related to physical contracts and paper documentation. A lot of institutions still work using a lot of paper and Optical Character Recognition (OCR) software can help in this. Instead of just picking a random sample from thousands of contracts and then reviewing it, the institution can get each document scanned using the OCR and then search for specific terms and phrases that are require in that contract. Then we should pay our attention to only those documents that do not have the necessary information that is required, and hence this will help us in increasing efficiency and thereby reduces risk.

We can apply the similar process to an institution's call center by using the speech to text

technology that mines calls for certain information. How this can help here is that it can be used and effective to detect frauds when a criminal is trying to obtain an account holder's password or other bank related information. The software can raise flags when there are multiple calls or attempts to access or gather information, escalate those cases and offer a much better response to these risks.

2.1.1 The ATM Revolution

The topic under discussion is how automation can impact the financial service industry in the future. In continuation to this discussion, let us have a look at one of the most successful innovations in the financial industry—the **Automated Teller Machine** or ATMs. As the industry moved towards automation with the ATMs the question that needs to be addressed is the impact on labour i.e. job of tellers. According to the data published by the World Bank Group, ATMs expanded from about 18.308 ATMs per 100,000 adults in 2004 to about 41.639 ATMs per 100,000 adults in 2018 worldwide. With such expansion, there was a belief that the jobs of the tellers will be at risk with the advent of automation but on the contrary the **people employed were retained** as they are now utilized in the non-automated functions of the sector.

The above result can be explained by two reasons. Firstly, by employing ATMs the **cost of branch operations were reduced**, as fewer tellers were required in a single branch. This reduced cost helped the banks to expand branches rapidly, thus new branches means new teller vacancies. Secondly, ATMs freed tellers from the basic bank tasks and helped them to focus on more "**relationship-building**" efforts and complex activities. Considering the impact beyond the tellers, ATMs also introduced new jobs—armored couriers to resupply units and technology staff to monitor ATM networks. So what is the learning in this technology shift? The first will obviously be that automation helps in reducing the cost of running a business, may free up resources to invest in other areas. (In the case of ATMs, it was in new branches and new services.) Second, instead of replacing jobs entirely, automation can enable the branch staff to learn more skills and deliver better value to the clients involved in Business Banking.

2.1.2 Automation Strategies for the Financial Services

The most useful automation strategies for financial service organizations are:

1. Robotic Process Automation (RPA): RPA stands for Robotic Process Automation. It is the use of specialized computer robots to automate the processes. It can help in improving the speed and accuracy of operations by reducing manual tasks across a bank's front, middle, and back office.

2. Data Quality: Companies have to deal with loads and loads of data nowadays, and hence maintaining and aggregating data at one place called Master Data becomes a stress. Financial Service Companies can aggregate data from various sources using automatic data retrieval methods.

3. Intelligent Data: Data used for decision making should be relevant and context specific. Automation helps to achieve better results by showing data specific to the context in discussion without manual intervention.

4. Workflow Automation: Generation of documents, reports, notifications etc can be automated by analyzing the behavior, pattern from multiple sources so that tasks are done automatically as per regular timelines without causing delays in processes.

5. Social Media Data: Social media is one area that generates a lot of data, and it is important for various industries to analyse and monitor it. Automation can help analyze the data, determine spending patterns, suggest products based on user's taste etc.

2.2 What is Artificial Intelligence?

Artificial Intelligence or AI is the field of computer science that is concerned with creating intelligent machines that can work or act like humans. AI helps the machines to learn from experience, adjust to new inputs and perform tasks that can be performed by humans. In order for the machine to act and behave like humans they need to be fed loads and loads of information related to the world. Various objects, categories and relations should be fed to the AI system. Using AI, computers are trained to perform specific tasks by processing large amounts of data (big data) to determine useful patterns in the data and hence predict the output for any given set of input. Some activities that the computers can perform with the help of AI are speech recognition, planning and problem solving.

With the increasing use of digital technologies, huge amount of data is being generated for the organization which opens further areas for developments like Big Data and

Analytics. Analytical models can be used to predict outcomes based on patterns identified in the input data. This progress in Data and Analytics has led to this revolutionary concept known as Artificial Intelligence (AI) as shown in Fig 2.
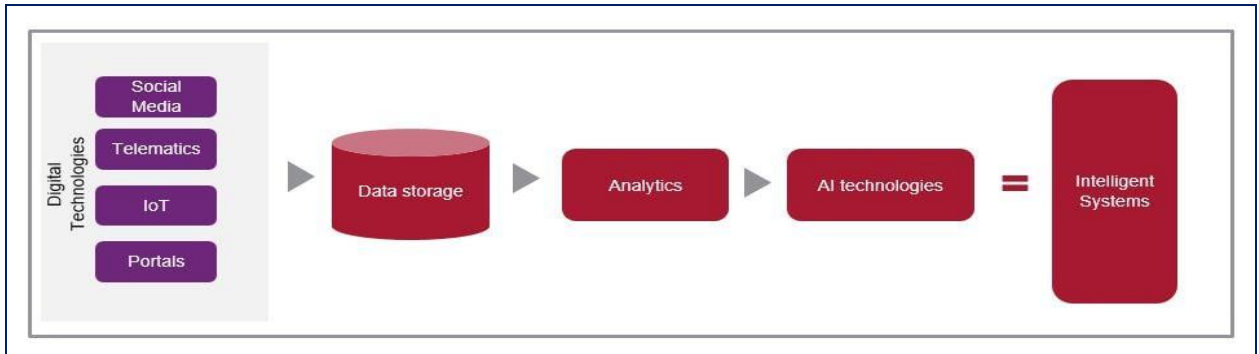

Figure 2: Use of AI in Data Analytics

2.2.1 Neural Network

Neural Network as the name suggests is typically a replica of the human nervous system in the digital domain. A human nervous system consists of neurons carrying information, passing to one another and reaching the ultimate processing unit i.e. the Brain. A neural network usually involves a large number of processing units (called Neurons) operating in parallel and arranged in tiers as shown in Fig 3. The 1st tier receives the input information in raw form – analogous to optic nerves in human nervous system. Each tier which is placed ahead in the system receives input from the tier behind it, rather than the raw input, which is similar to the neurons which are further away from the optic nerve receive signals from neurons which are closer to it. The final tier in the system produces the output. The tiers are highly interconnected which means each node in tier n will be connected to many nodes in tier (n-1) i.e. it's inputs and in tier (n+1) which provides inputs for those nodes.
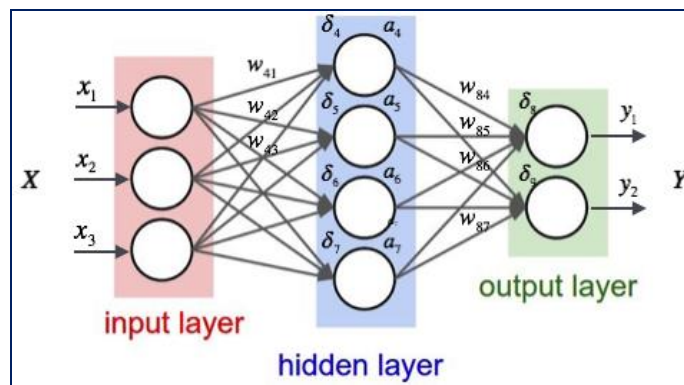

Figure 3: Structure of Neural Network

Neural networks are known to be adaptive i.e. they learn from experience. This means that the output that they will be giving during the training stage and the output that they will be giving after subsequent training and tests will be altogether different. The most basic learning model is based on assigning weights to the inputs, wherein the weight to each input depends on its importance in the system. Inputs which are responsible for getting the right answers are assigned higher weights. Typically, a neural network is initially fed a large amount of training data. The training includes providing the inputs and telling the network what the output should be. After certain trainings and tests, the system learns and understands the concept just like a human would do.

2.2.2 Strategic Challenges of AI

There are several challenges associated with the use of AI. Since most financial institutions are in their learning phase, there are concerns regarding data security, the integration of new technologies and ROI benefits. The major challenges faced in AI and their implementations are shown in Fig 4.

Biggest concerns about AI by phase of digital maturity

Where are you in the Artificial Intelligence journey?*				
	Not yet started	Learning	Maturing (start-up/group initiatives)	Developing (build solution/center of excellence)	Total
Hacking/cybercrime		19%	9%	9%	12%
Scarcity of technical talent		8%			12%
Limited understanding of data technology		15%	18%	18%	12%
Sustainability	29%		27%		9%
Existential threat to humanity		8%	18%	18%	9%
No ownership/accountability	43%	8%			8%
Total	11%	40%	17%	32%	100%

* Multiple answers allowed

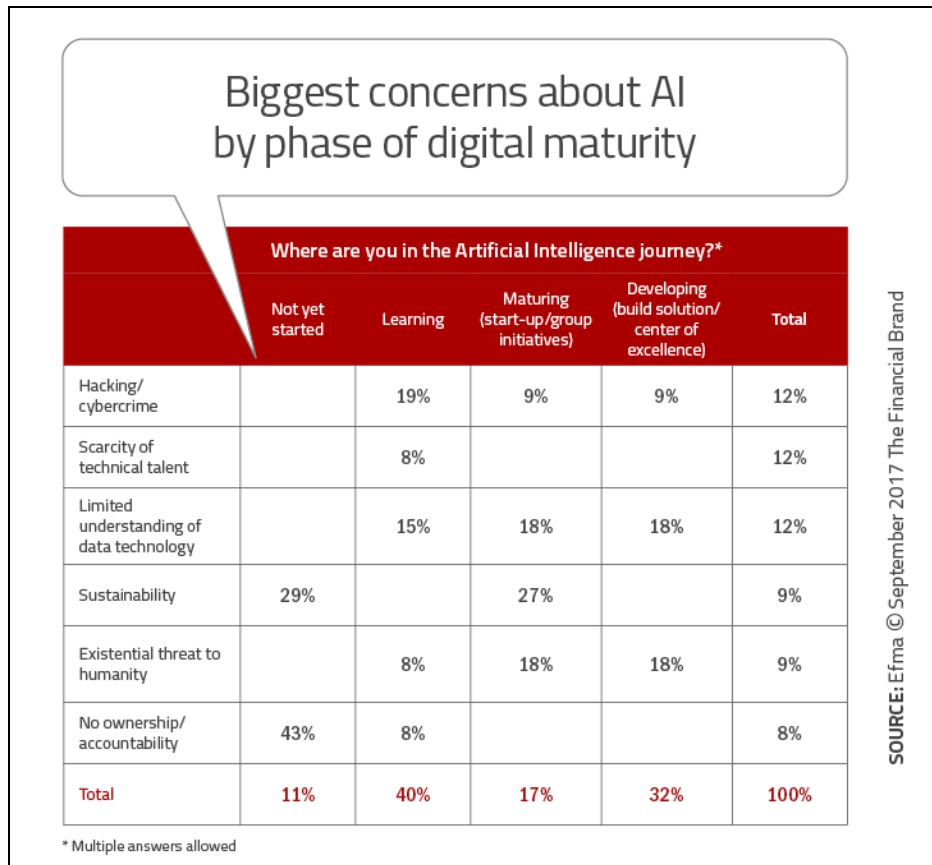SOURCE: Efma © September 2017 The Financial Brand

Figure 4: Strategic Challenges of AI

2.3 What is Machine Learning?

Machine Learning can be understood as a subset of AI that gives the systems the ability to learn and improve from experience automatically without being programmed. It focuses on development of computer programs that can access data and use it to learn for themselves. ML is basically aimed at searching through data to look for meaningful patterns and adjusting actions accordingly. The machine learning process is explained in Fig 5.
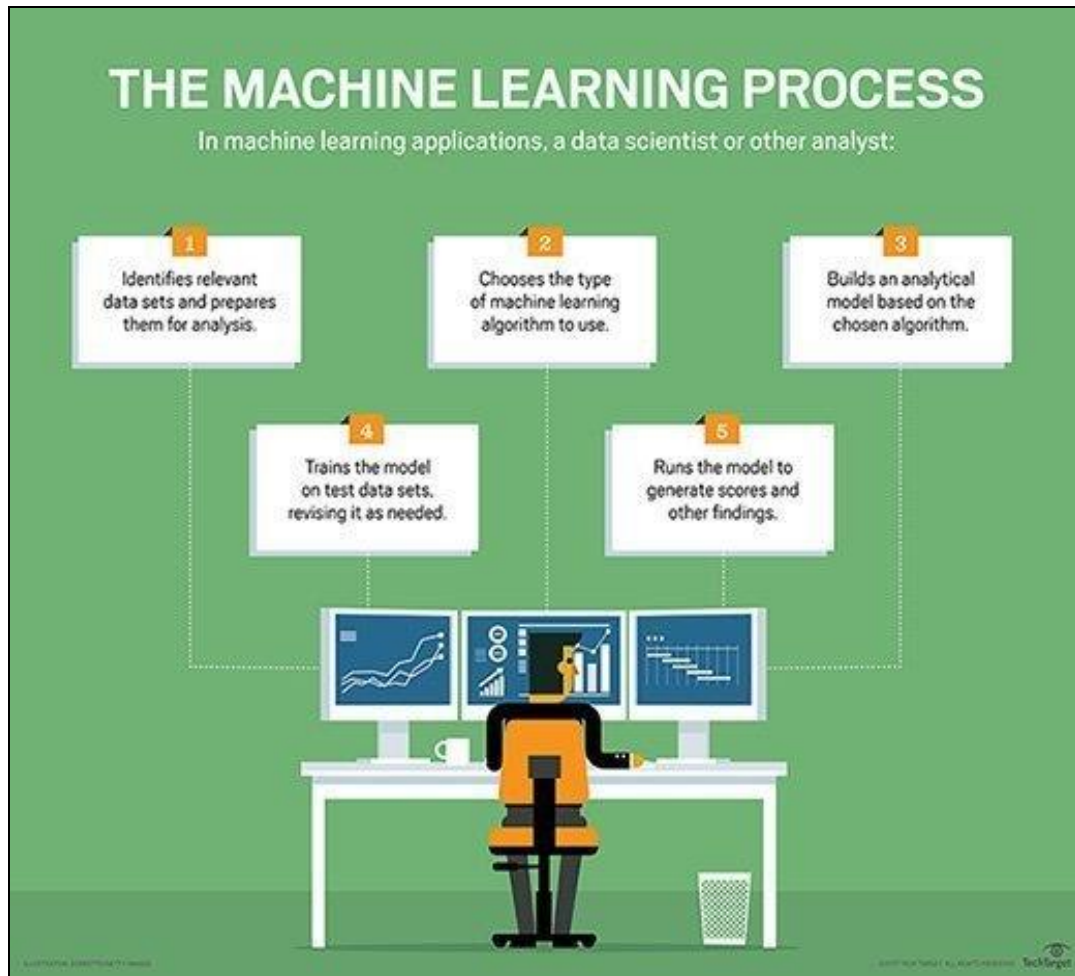

Figure 5: The Machine Learning Process

Many people are familiar with Machine Learning from shopping on the internet and being served Ads related to their purchase. This happens because recommendation engines uses machine learning to personalize online ad delivery. An example of this is shown in Fig 6.
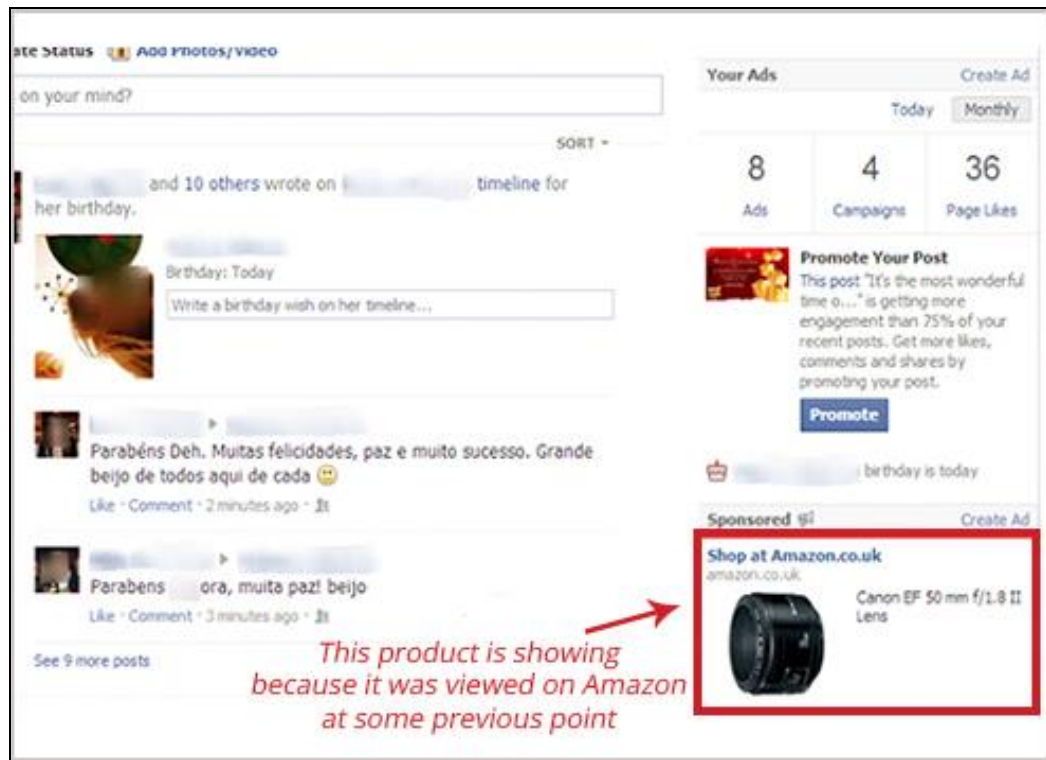
Figure 6: Advertisement shown based on search history

2.3.1 Types of Machine Learning

1. <u>Supervised Learning</u>: As the name suggests, in this type of learning, a teacher is present during the learning process. The teacher could be a data scientist or data analyst who is equipped with necessary ML skills. He is responsible for providing inputs to the systems, match the output with the desired output and initiate necessary feedback to communicate the deviation to the system. Once the training is complete, the algorithm will apply what was learned to the new data.

<u>How it Works</u>

This algorithm consists of two types of variables i.e. target variable (or dependent variable) and predictors (independent variables). Using these set of variables, we generate a function that maps inputs to the desired outputs. The training process continues until the model receives a desired level of accuracy on the training data. Examples include regression and decision tree.

2. <u>Unsupervised Learning</u>: Unsupervised algorithm as the name suggests does not require a teacher during the learning stage. The system is fed huge and huge

amount of data, which the system processes, identifies patterns and relevant relationships and automatically learns on its own without human intervention. Once trained, the algorithm can use its bank of associations to interpret new data. These algorithms are only feasible in the age of big data, as they require massive amounts of training data. Examples include virtual assistants like Siri and Alexa.

How it Works

Now let us understand this by an example of a school MCQ Test. When we used to take tests in schools, we were given questions and set of options out of which one was correct, and our grade was determined by how close our answers were to the answer key. Now, let us imagine a condition where there is no answer key and only question. How will we grade our self? Now apply this framework to Machine Learning. For unsupervised learning, the AI system is presented with data set which is unlabeled and uncategorized, and the system has to determine the relationship between the variable and how the data sets are actually related. Clusters are formed using certain technique. An example is shown in Fig 7.
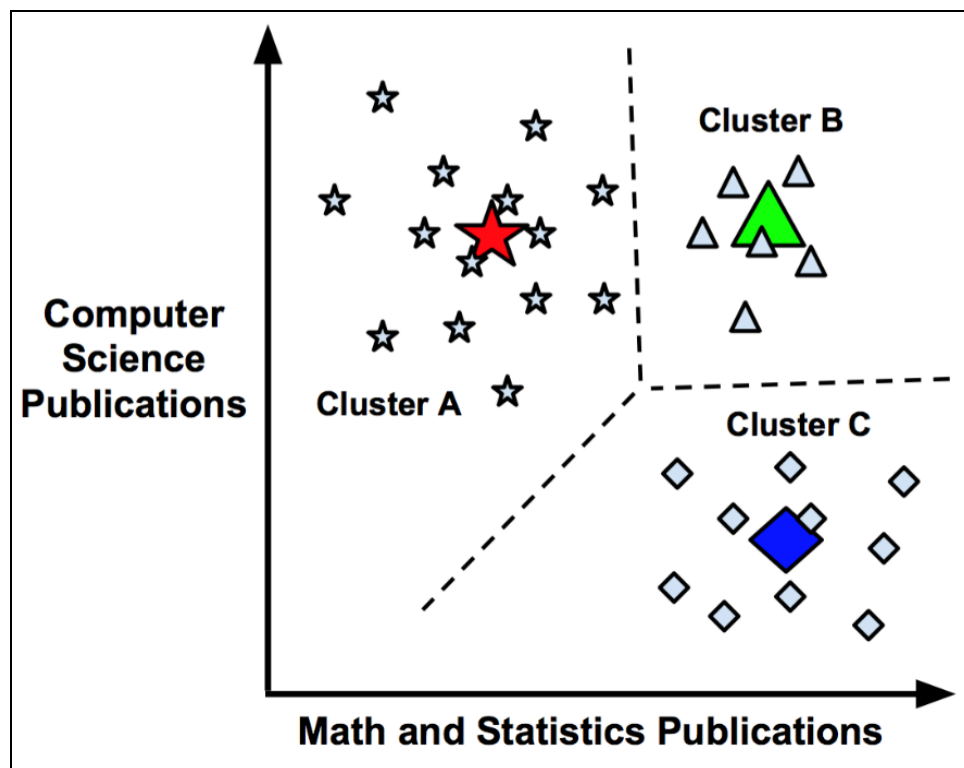

Figure 7: Example of Cluster Formation

3. <u>Reinforcement Learning</u>: Reinforcement learning is also called as reward-based learning. The learner needs to understand what actions leads to what, with the aim being maximizing the reward. An example is shown below in Fig 8.

```
                          ┌──────────────────┐
              ┌──────────►│      Agent       │──────────┐
              │           └──────────────────┘          │
  ┌────────┐  │      ┌──────────┐                   ┌────────┐
  │ State  │  │      │  Reward  │                   │ Action │
  └────────┘  │      └──────────┘                   └────────┘
              │     ┌──────────────────┐            │
              │     │   Environment    │◄───────────┘
              └─────┤   Child          │
              ┌────►│                  │──────────┐
  ┌────────┐  │     └──────────────────┘          │
  │Couple  │  │   ┌───────────┐                ┌────────┐
  │of Steps│  │   │ Chocolate │                │Walking │
  └────────┘  │   └───────────┘                └────────┘
              │     ┌──────────────────┐          │
              └─────┤    Surface       │◄─────────┘
                    └──────────────────┘
```
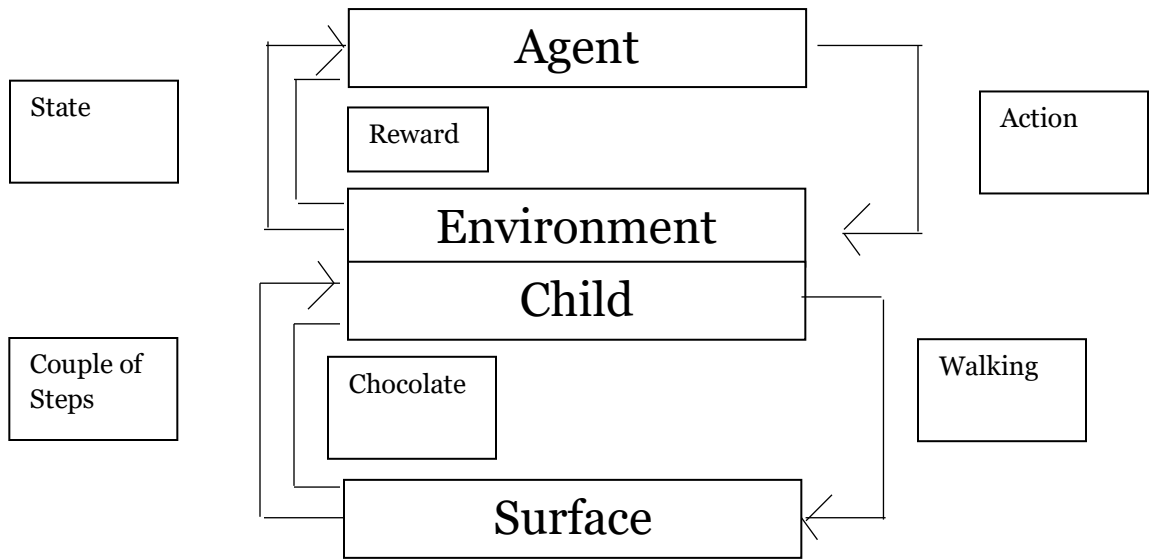
Figure 8: Reinforced Learning

CHAPTER – 3

RESEARCH METHODOLOGY

To understand the **impact of the disruptive tools on the financial sector** with special focus on **banking** and to understand the **current processes being followed in these industries and identify the level of inefficiency** the study was carried by doing an **in-depth study** about the disruptive tools and **analysis** of the **59 Minutes Loan Scheme**.

3.1 Research Methods – Qualitative & Quantitative methods

In order to **satisfy the objectives of the dissertation**, a mix of both **quantitative research** and **qualitative research** was held. The problem was to study the current processes being followed in the banking industry for which an **exploratory research** was done by going through **different papers, journals and articles**. Next objective was to identify and analyze the inefficiencies in the industry for which quantitative study was done by analyzing the data through different websites like – **The World Bank Group, RBI, PNB, SIDBI, Citi Bank, etc**. After the two objectives of the study were met, then to study the impact and current adoption levels of the emerging technologies different **journals, papers (mentioned in Literature Review) and articles** were referred and analyzed. The practices that were followed during the study are established practices.

3.2 Types of Data

Data collection plays a very crucial role in the statistical analysis. In research, there are different methods used to gather information, all of which fall into two categories, i.e. **primary data**, and **secondary data**. As the name suggests, primary data is one which is collected for the first time by the researcher while secondary data is the data already collected or produced by others.

For the **study of the objectives of the dissertation secondary sources** of data were used. To analyze the impact of the disruptive tools on the banking sector quantitative study was done and **to understand the benefits of the 59 minutes loan scheme primary data and secondary data** was used. The data was collected from various credible sources like – **SIDBI, Punjab National Bank, State Bank of India, Pwc**

reports, KPMG reports, Deloitte Reports and research papers. The data in the original reports were sourced from **primary collection of data** of the **customers, banks and other financial institutions**. The analysis was performed on the data that is used in the study to benchmark the adoption of the emerging technologies and suggest changes.

3.3 Limitations of the study

The effectiveness of qualitative research is heavily based on the skills and abilities of researchers, while the outcomes may not be perceived as reliable, because they mostly come from researcher 's personal judgments and interpretations. Because it is more appropriate for small samples, it is also risky for the results of qualitative research to be perceived as reflecting the opinions of a wider population.

CHAPTER – 4

CASE STUDIES

4.1 RPA and its Impact on Banking Sector

4.1.1 Robotic Process Automation (RPA)

Robotic Process Automation is defined as the use of computer programs called software robots or digital workers that are specialized to automate business processes which are repetitive in nature or the routine tasks that are performed by the knowledge workers; these processes are non value adding to the organization. The tasks on which RPA can be applied could be queries, calculations or transaction records. RPA is same as a digital worker performing the same activities or routine tasks that a normal knowledge worker would do. While there are no physical robots in RPA, the software robots are trained to mimic activities performed by humans by interacting with the system in the same was as a human would do. The main benefits of this technology includes reducing costs, achieve accuracy and consistency in the tasks performed, improved quality and speed with which the task is performed. RPA eliminates human intervention in the repetitive or routine tasks; which in return helps the organization to utilize the work force more efficiently and mapping them to activities which generates money. Now the question that arises here is that since technology and automating processes is involved; RPA must be a part of the organization's IT infrastructure. However, that is not the case. Instead it occupies a place at the top of it, which enables the company to implement it quickly and with more efficiency, all without doing any major changes to the existing infrastructure. The various RPA tools are shown in Fig 9.

RPA helps the organization to easily configure and set up software robots to automate tasks that are routine and repeated. These "bots" interact directly with applications' user interfaces, mimicking the tasks and actions that would normally be performed by a human such as copying and pasting data, filling out forms, opening emails etc. The most important factor that must be considered while implementing RPA is productivity. As per data from various sources, employees spend around 40% of their time on non value adding, repetitive and routine tasks with very little time left to focus on high value customer focused tasks. The best part about RPA is that you need not be technically sound in order to use and deploy

RPA i.e. even non – technical employees can configure the software robots on their own to increase productivity and efficiency.

Figure 9: Various RPA Tools

4.1.2 Types of RPA

The 3 types of RPA automation are as follows:

1. Attended automation: Attended automation basically involves bots residing on the user's machine and initiated by the user. An example of this could be the customer care of Food Delivery apps like Swiggy. When a complaint is lodged, a customer service representative will understand the customer's inquiry and need to complete a transaction in the system. Now let us assume that due to system limitations, the representative can only manage 3 screens at a time. Then, in that case RPA can be used to manage multiple queries at a time. When a complaint is lodged, it is directed to the bot which tries to solve the query using its in built programs or data fed to it or using the experience that it has gained from previous transactions. If there is any guidance required, then the query is transferred to the

customer representative, thus saving lots of time and effort and handling multiple queries at a time. Attended automation is an excellent way to boost efficiency and productivity of customer facing employees.

2. <u>Unattended automation</u>**:** Unattended automation as the name suggests involves no human assistance. They are ideal for background data processing and for reducing work of back end employees. Examples could be batch processes on the cloud. Unattended automation can be launched as follows:

   - <u>Data Input in the System</u>: Unattended bots are mostly triggered when data is fed into the system. The data could be of new transactions or employees, and processing is required in order to comply with regulatory needs or marketing needs.

   - <u>Bot initiated</u>: One bot can also be used to launch or initiate another bot. This can be useful when there are different outcomes to a situation. For example, let us consider the case of KYC Enquiry. KYC may require manual investigation or automated processing to complete the customer's registration. Based on which path to take, bot can notify the investigation team or launch another bot to complete registration.

   - <u>Specified intervals</u>**:** Bots can be launched as per schedule at specific times to process the data batch wise.

3. <u>Hybrid RPA</u>: As the name suggests, hybrid RPA is a combination of attended and unattended RPA which can be used to automate front end and back end activities allowing end-to-end automation of a process
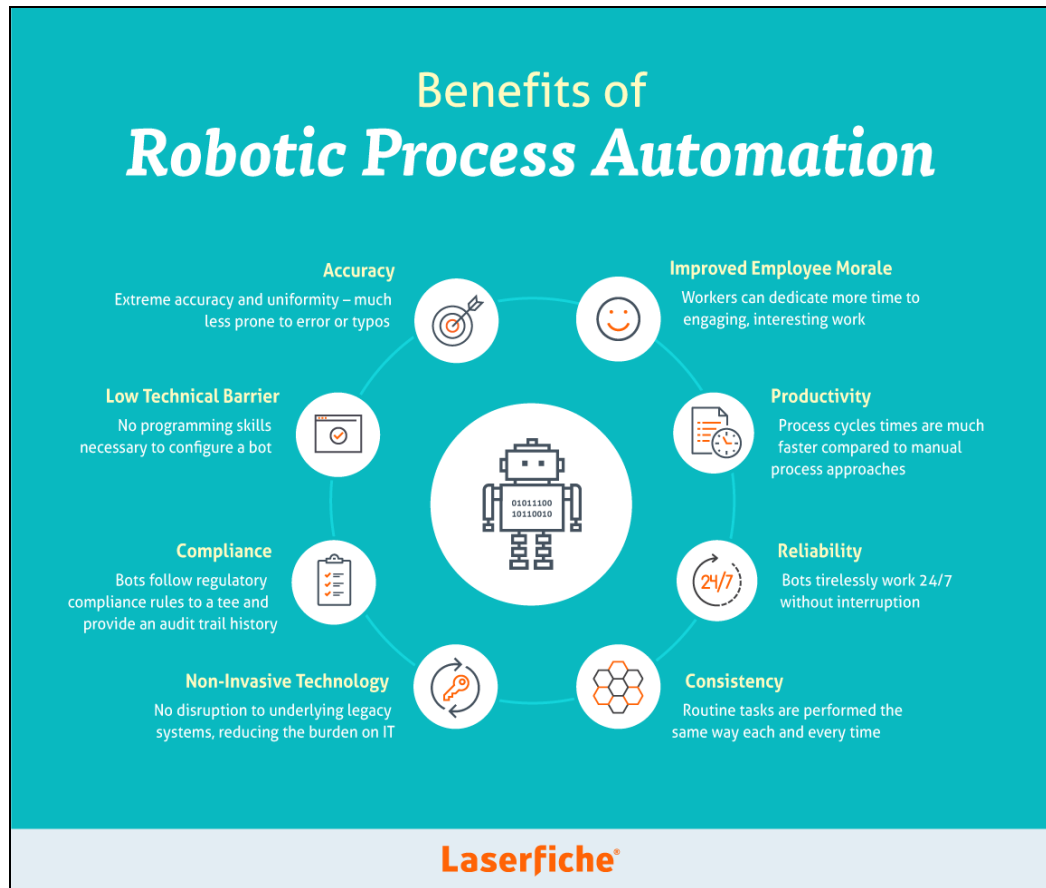
4.1.3 <u>Benefits of RPA</u>

Figure 10: Benefits of RPA

Apart from being a user-friendly and cost saving tool, RPA also provides a number of advantages that have drawn interest from organizations across various industries. The benefits of RPA (shown in Fig 10) are as follows:

- <u>No Technical Skills required</u>: As already discussed, RPA does not require any technical skills and can be easily programmed and configured by any non – technical staff. Using simple methods of drag and drop designer tool, they can record their own steps and automate the process using process recorder feature.

- <u>Higher accuracy</u>: Since robots are more accurate and consistent and are not impacted by fatigue, hence RPA delivers more accurate and consistent results than a human worker.

- Work 24/7: Operations can be run 24/7 using the software bots without needing any human assistance (apart from regular maintenance). If any human intervention is required, it will be to make a decision that a bot cannot solve or resolve an error.

- Not much changes needed in Existing systems: As already discussed, RPA lies on top of the IT Infrastructure. Hence, there are not much changes required in the IT infrastructure while implementing RPA.

- Improved employee morale and experience: Since the routine and repetitive work will be taken care of by the RPA, the employees will have more time for them to invest in their talent and engage in more interesting work.

- Increased Productivity: Computers and robots can work more efficiently than humans and so the productivity is bound to increase.

4.1.4 RPA in Banking

As more and more institutions move towards automation, the institutions are trying to identify processes which can be automated using RPA. However, most of the potential of the technology remains untapped. RPA in the banking sector should not be seen as just a onetime phenomenon that will be help to increase productivity and efficiency by reducing costs but as a method that should be continuously to boost profitability and meet the needs of the market as well as the shareholders. Most banks today use Robotic Process Automation for improving processes such as accounts management, card operations etc. Banks are looking to increase the share of automation in their system to stay relevant in the market and increase performance and productivity. As per estimates, some banks have been able to improve their productivity by **35 - 50%** as an aggregated benefit from automating thousands of transactions. Some of the uses of RPA in Banking are:

- Anti – Money Laundering (AML) Notification: As per report published by a leading house, **Anti Money Laundering analysts spend only 10% of their time on analysis**. The majority of their effort (nearly 75%) goes into collection of data and another 15% goes into data entry and organizing the data. The entire process of AML investigation is totally manual and takes around 30 to 40 minutes to process every alert based on complexity, the standard of the bank, availability of information etc. Tasks which are routine, repetitive and standard can be easily automated with

the help of RPA, which will lead to a 50% reduction in time. Moreover, detailed reports can be generated using these easy to configure, fast and convenient bots.

- Know your customer (KYC): A financial firm on average spends around US $60 Million per year on KYC, customer due diligence (CDD) and client on boarding (Source: Thomson Reuters). Moreover, the cost of the processes of KYC and CDD is about US $52 Million to somewhere around US $384 Million. The activities that are performed during the KYC of a customer are done manually and hence consume a lot of time. This qualifies the process to adopt RPA for gathering information about the customers from varied sources, compile it together and validating the same with the existing information. By implementing such processes, organization can better serve the needs of the customers by **reducing the handling time by around 80%**.

- Account Closure Processing: Account closure is one of the most hectic tasks as it involves a lot of paperwork, performing multiple tasks such as checking the bank records for certain documents, sending notification to branch manager and updating the record in the system. RPA can help in automating this exercise by automating manual and time-consuming tasks, and thus freeing up the team to focus on more productive operations.

- Report Generation: Activities that are a good fit for RPA under report generation include optimization of data extraction from various sources, standardizing how the data is to be aggregated, and developing reporting templates.

- RPA is being increasingly adopted by Banks to boost operational efficiency in areas such as customer service, IT and Mortgage Lending.

- RPA is being also being used in E2E sourcing and procurement which consists of supplier and contract management, order to cash etc.

- RPA is also being used in the accounting activities by the banks such as – Profit & Loss reporting and analysis, managing the account books with the track of payables and receivables and is also used in treasury management.

4.2 AI and its Impact on Banking Sector

4.2.1   Why is AI Important?

- AI adds intelligence: As the name suggests Artificial Intelligence (AI) adds intelligence to existing products. AI can be used to add additional capabilities to products already in use. An example of this could be Siri from Apple and Google Assistant from Google. Automation, platforms with conversational feature, bots can all be combined together with huge amount of data to improve technologies for home and workplace.

- AI adapts through learning algorithms which are progressive in nature: AI learns through iterations one after the other. It determines the structure and patterns in the data, acquire a skill set and then improves the expertise for the skill set with each successive iteration. So, just as the algorithm can teach itself how to play chess, it can teach itself what product to recommend next online.

- AI analyses deeper data: AI system must be fed huge amounts of data so that it can analyze it, determine patterns in data and then predict future actions. It does so by employing neural networks with many hidden layers. Building a fraud detection system with multiple hidden layers was just not possible some years ago, but now in the age of excellent computing power and big data things have changes. The more data you feed to the system, the more accurate and better results you get.

- AI helps achieve accuracy: Artificial Intelligence is of great help when we need to understand the customers. Deep Neural Networks help achieve the same as it helps the system to capture the buying patterns and understand the user. For example, when we interact with Alexa, they keep on getting better and accurate the more we use them.

- AI gets the most out of data: The data in case of AI is an intellectual property as the self-learning algorithms get better the more data you feed them. The patterns and answers are in the data, we just have to use AI to get them. Since the role of the data is now more important than ever before, it can create a competitive advantage for any organization. **Data is the King as they normally say it now**. If

you have the best data in a competitive industry, even if everyone is applying similar techniques, the best data will win.

4.2.2 <u>Artificial Intelligence in Banking</u>

With the emergence of new technologies, Banking Giants are racing head to head to implement these, reduce costs, and boost efficiency and increase productivity of their operations and their system. To better understand the adoption of AI in the Banking Industry, let us have a look at the top US Banks, as they are normally the early adopters of any technology. We will be having a look at major US Banks to know how they are incorporating AI into their system, what its applications are and how we can bring them to our own country. We take a look at the implementation of AI by the four leading commercial banks in the United States. The US banks below have been rank in order according to their size, with JPMorgan Chase, the largest.

1. <u>JPMorgan Chase</u>**:** JPMorgan Chase in 2018 invested lot of resources in developing a new technology and came up with the idea of **Contact Intelligence (COiN)**. The platform has been designed to "**analyze legal documents and extract important data points and clauses**." As per data from JPMG, manual review of 12,000 annual commercial credit agreements normally requires approximately 360,000 hours. From the initial run of this COiN technology, the results have been very promising. The documents which took hundreds of hours to be reviewed could be done in seconds which minimum efforts and highest levels of productivity. Another initiative by this Bank is called "**The Emerging Opportunities Engine**" which was introduced in the year 2015. It uses automated analysis to identify clients who we should follow up with for equity offerings. The technology has proved to be a huge success in the Equity Market and is currently being expanded in the Debt Market. Another shot at automation involves the virtual assistant technology first developed in 2016 with the aim of integrating a natural language interface to basically reply to employee service desk requests. After successfully testing the same, the company had an initial goal of 1,20,000 service tickets and with future expansion to efficiently and effectively address more than 1.7 million employee requests that the company receives each year.

2. <u>Wells Fargo</u>: In order to keep pace with the competition, which was heavily investing in emerging technologies, Wells Fargo announced the creation of a team called **Artificial Intelligence Enterprise Solutions team**. The head of the company's innovation group, Steve Ellis was asked to lead the new team. Soon after the formation of this team, the company began pilot testing an **AI-driven Chatbot through the Facebook Messenger platform** which was tested with several hundred employees of the organization. The basic task of this assistant was to communicate with its users to provide them with their account information and also help them reset their passwords.

3. <u>Bank of America</u>: Bank of America also announced its entry into the AI Technology segment with the debut of its intelligent virtual assistant which it named **Erica**. Erica is basically a Chabot that utilizes "**predictive analytics and cognitive messaging**" to provide financial guidance to millions of customers of the company. With majority of people now opting and using Mobile banking, Erica is designed to be accessible to customers of the Bank 24/7 and helps them to perform day to day activities in addition to suggesting recommendations based on the financial needs and the transaction history of the customer.

4. <u>Citibank:</u> Since the emerging technologies are a relatively new concept in the industry, Citibank aims gain a distinctive competency in this segment by being the first movers to adopt this technology. Through its investment and acquisitions wing, Citi Ventures, the Bank has acquired many startups and companies specializing in emerging technologies and areas like ecommerce and cybersecurity. CitiBank has made a strategic investment in **Feedzai**, a leading global data science enterprise that works to identify and eradicate fraud in real time in all avenues of commerce including online and in-person banking. **Fraudulent or questionable activity is identified** and the customer is alerted immediately. To prevent fraud and monitor potential threats to customers in commerce Feedzai utilizes "**machine-based learning**" to evaluate "big data" and potentially fraudulent activities.

4.3. Machine Learning in Banking

4.3.1 <u>Machine Learning in Banking</u>

- <u>Portfolio Management</u>**:** Creating a portfolio is one of the toughest tasks in the financial industry as it is based on not just the risk and return of the stock in the portfolio, but it should also be based on the objectives of the investor. Robots can be used to assist clients in forming portfolios of stock as per the needs, objectives and risk appetite of the investor. Investors have to simply enter their goals and objectives (for example, retiring at age 60 with $950,000.00 in savings), and other details like age, income, and current financial assets. The robo advisor then diversifies the investment across various assets and financial instruments in order to achieve the goals of the investor.

- <u>Fraud Detection</u>: Machine Learning can also be used to monitor transaction in real time with careful focus on user spending pattern and other small details. All this data is collected and processed in real time and whenever any deviation from normal or ideal behavior is detected, a flag is raised to a human operator to check whether there is a fraud or not. Hence, fraud detection can be quicker and minimize the loss to the company or to the customer on whose account the fraud is taking place. The only issue in this case will be to avoid flags on issues which are never risks in the first place. Hence, with the system undergoing multiple iterations, the system will become smart, more reliable and more efficient.

- <u>Security 2.0:</u> Accessing your account using username, password and other security questions may no longer be the norm for user security in five years. Since banking and finance involves money, hence security and access of it should be of utmost importance to any organization. We could possibly see use of ML to detect facial patterns and biometrics to access accounts and prevent unauthorized access.

- <u>Sentiment Analysis</u>: Machine Learning can also be used to conduct sentiment analysis to determine the buying and selling pattern of investors in the stock market. We should be able to determine what changes in the environment will trigger investor's action and enhance human "intuition" of financial activity by discovering new trends and telling signals.

- Sales / Recommendations of Financial Products: Instead of humans convincing and pitching financial products to the clients, selling of financial products can be totally automated and assigned to Robo – Advisors. They will be responsible for taking input of the customer needs and requirements which include the money they wish to invest, how long do they wish to invest and how much return are they expecting. Based on that a suitable financial product can be offered to the customer with higher chances of sale taking place as the product offered is as per the needs and requirements of the customer. Just as Amazon and Netflix can recommend books and movies better than any living human "expert," ongoing conversations with financial personal assistants might do the same for financial products, as we see beginning to happen in the insurance industry.

4.4 59 Minute Loan Scheme

A new transformative initiative was launched in the MSME credit space in September, 2018 under Prime Minister Narendra Modi's 12 point action plan for the MSMEs. An online portal is launched that will enable in-principle approvals for MSME loans up to Rs. 1 Crore within 59 minutes. This portal is supported by Small Industries Development Bank of India (SIDBI) and 5 Public Sector Banks (PSB).

It is a strategic initiative of SIDBI led PSB consortium incubated under the aegis of the Department of Financial Services (DFS). The portal has set new benchmarks in loan processing and it reduces the turnaround time from 20-25 days to 59 minutes. The loan will then be disbursed in 7-8 working days. This space is one of its kinds in the MSME segment which integrates advanced Fin-Tech to ensure seamless loan approvals and management.

The loans are undertaken without human intervention till sanction and or disbursement stage. The platform has been built in such a way where MSME borrower is not required to submit any physical document for in-principle approval. The solution uses sophisticated algorithms to read and analyze data points from various sources such as IT returns, GST data, bank statements, MCA21 etc. in less than an hour while capturing the applicant 's basic details using Smart analytics from available documents. The system

simplifies the decision-making process for a loan officer as the final output provides a summary of credit, valuation and verification on a user-friendly dashboard in real time. The key features of the contactless platform include:

a) Majority stake of **SIDBI** & big 5 PSBs- **SBI, Bank of Baroda, PNB, Vijaya and Indian Bank**.

b) A first for MSME borrowers-Connect with multiple banks without visiting the branch.

c) **Advanced Digital Platform** for MSME Financing with Services Driven Architecture and highest level of Information Security.

d) Only Platform in the market with a Banker Interface which covers the Branch Level integrations (with maker-checker-approver) in tune with current systems of PSBs.

e) Only Platform that enables Bankers to create Loan Products in line with the Scoring models & assessment methods within their approved credit policy.

f) Only Platform that has an integrated GST, ITR, Bank Statement Analyzer, Fraud Check and Bureau Check as well as host of other features which at present is not available with any other player in the market.

g) Only Platform that has been integrated with CGTMSE for checking the eligibility of Borrowers. MSME borrower gets loan upto Rs. 2 Crore without any collateral, which is major relief for MSME borrower.

This portal has emerged as the **largest lending platform**, according to a report by global financial firm—Credit Suisse. Figure 11 shows the number of loans sanctioned under the 59 minutes loan scheme by different PSB's.

		Online (Market Place + Bank Specfic URL), Offline & Renewal bulk upload	
		In-Principle	Sanctioned
Sr. No.	Bank	No.	No.
1	Allahabad Bank	5160	4786
2	Andhra Bank	1671	1118
3	Bank of Maharashtra	2008	927
4	Bank of Baroda	21200	18049
5	Bank of India	15275	12674
6	Canara Bank	8650	7796
7	Central Bank	8399	7585
8	Corporation Bank	2702	2237
9	IDBI	2789	2322
10	IDFC First Bank	10	0
11	Indian Bank	3256	2065
12	Indian Overseas Bank	2738	1780
13	Kotak Bank	19	0

Details of loans sanctioned by Banks under psb loans portal till 17.07.2019

14	Oriental Bank of Commerce	6793	5201
15	Punjab National Bank	10626	7810
16	Punjab & Sind Bank	2950	2438
17	State Bank of India	36353	32642
18	SIDBI	375	102
19	Syndicate bank	1109	646
20	UCO Bank	2936	2084
21	Union Bank Of India	18237	16219
22	United Bank of India	2740	2394
23	Vijaya Bank	3607	2553
	Total	1,59,583.00	1,33,448.00
*Note: The above data includes data of Private Sector Banks.			
Source : Online PSB Loans Ltd.			

Figure 11: Number of loans sanctioned under the scheme by different PSB's

The platform is unique in itself as it uses **emerging technologies** to calculate and disburse the loan amount directly into the accounts of the loan seekers. The platform uses **algorithms and techniques** to read complex Balance Sheets, Income Tax Returns and bank statements in a short span of time. This can easily capture the basic details of the applicant from the documents and **Smart Analytics** enables the solution to find discrepancies and automatically pull out information from Credit Bureaus. Moreover, the portal acts as a solution for the loan officers because the decision-making process becomes simpler as this portal provides a **summary of credit, valuation and verification**. The digital features of 59 minute loan scheme are shown in Figure 12.
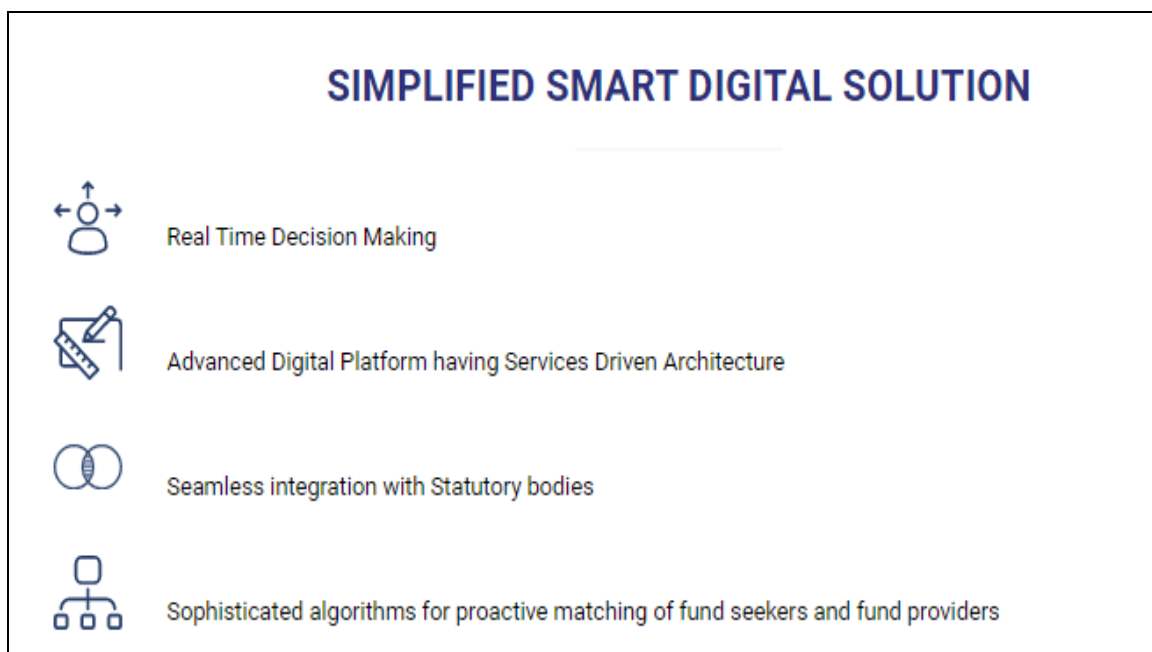
Figure 12: Digital features of 59 minute loan scheme

The scheme uses **advanced algorithms** to analyze data points from several sources such as **Balance Sheets, Income Tax Returns and Bank Statements**. Once the applicant uploads the required documents, the proprietary algorithms on the website appraise the application and determine the loan amount that can be sanctioned which then connects the applicant's request to one of the banks under the scheme. The platform maps & matches the loan seeker and the loan provider using **Artificial Intelligence, Machine Learning & Deep Learning**.

The platform is created by a Fintech Startup – **CapitaWorld**; a young company that connects borrowers and lenders. Once the borrower uploads the documents on the portal it runs algorithms to assess the risk profile. The company's ownership saw a major change when **nine PSB's including SIDBI** bought shares in CapitaWorld platform that gave the banks a **54%** stake in the company.

The platform is one of its kinds and can serve as an example for other existing institutions to be able to adapt to the changing technological environment. The process followed in 59 minute loan scheme is shown in Figure 13.

Figure 13: Process followed in 59 minute loan scheme

4.5 Conclusion

Financial Institutions have a lot to look upon – emerging technologies, new competitors, change in demographics, rising consumer expectations and changes in regulations. Technology is building its way to offer solutions that will allow institutions to reduce costs and become more efficient at what they do. Most technology is not proprietary and so has a 'limited time offer'. With the introduction of the emerging technologies, the banking industry has changed tremendously. The processes are much faster and more reliable. The relationship with the customers has not only improved but has attracted potential customers and increased the customer base with benefits like anywhere banking.

Chatbots, artificial Intelligence, Blockchain and Cloud Computing have emerged as technologies that will not just help in catering the customers efficiently but adds a security feature to the entire system. Moreover, the biggest opportunity for any organization is to use their creativity to leverage automation to solve business problems. Data in this case will act as an intellectual property; as major emerging technologies like Artificial Intelligence, Machine Learning and Deep Learning work on the fuel i.e. data. Companies having quality data will be able to have a competitive advantage over other players in the industry which will in turn help them achieve sustainable advantage.

It is important for all financial organizations to adopt emerging technologies or they will sadly lose out to the innovators in this sector. So, they should strike a balance between technology and manual intervention and how harmonizing this will further bring revolution in the industry for both businesses and customers will be an important factor to ponder and look upon.

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