Project Dissertation Report on

"IMPACT OF DISRUPTIVE TOOLS ON BANKING & INSURANCE SECTOR"

Submitted By:

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2K17/MBA/090

Under the Guidance of:

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CERTIFICATE FROM THE INSTITUTE

This is to certify that Siddharth Malhotra, a student of MBA from Delhi School of Management, Delhi Technological University has submitted a report on the topic **'Impact of Disruptive Tools on Banking & Insurance Sector'.**

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

I wish him all the success in his career and life.

Project Guide **HOD**

(Asstt. Prof Chandan Sharma) (Dr. Rajan Yadav)

Place:

Date:

DECLARATION

I hereby declare that the report submitted by me entitled **'Impact of Disruptive Tools on Banking & Insurance 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 Asstt. Prof. Chandan Sharma.

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:

Asstt. Prof. Chandan Sharma

Submitted By:

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ACKNOWLEDGEMENT

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EXECUTIVE SUMMARY

During the course of this project, we aim to understand how certain tools that causes disruptions in various other industries impact the financial sector with special focus on Banking and Insurance. We try to understand the current processes being followed in these industries and how adopting these disruptive tools may increase efficiency and productivity of this industry.

Financial Services refer to the services provided by the finance market, and also used to describe organizations that deal with the management of money. Today's financial services institutions are under increasing pressure. Growing consumer confidence, regulatory change and the rise of fresh-faced FinTech startups means competition in the space is stiffer than ever before. As a result, businesses have to work harder and smarter to attract and retain clients. The project aims to understand the impact of Disruptive Tools on the Banking and Insurance Sector. 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. This study identifies the level of inefficiency in the Banking & Insurance Industry, the current levels of adoption of these tools, and how adopting these tools will lead to increase in efficiency.

Keeping these things in mind, the project was undertaken and careful analysis was done to measure the benefits and impact of the changes.

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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
IRDAI	Insurance Regulatory & Development Authority of India
PMFBY	Pradhan Mantri Fasal Bima Yojna
OCR	Optical Character Recognition
ATM	Automated Teller Machines
RPA	Robotic Process Automation
KYC	Know your Customer
AML	Anti Money Laundering
IoT	Internet of Things
SMILe	Smoke Indication & Lifestyle Estimation

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. Growing consumer confidence, regulatory change and the rise of fresh-faced FinTech startups means

competition in the space is stiffer than ever before. As a result, businesses have to work harder and smarter to attract and retain clients. 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 concerned with a service or technology that creates a new market and value network and as a result disrupts the existing market and value ecosystem, thereby displacing the already established market players, products and alliances. The term was given 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 life line 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 welah 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 Taurn). With both the government and private sector actively pushing, India is undoubtedly the most vibrant capital market in the world.

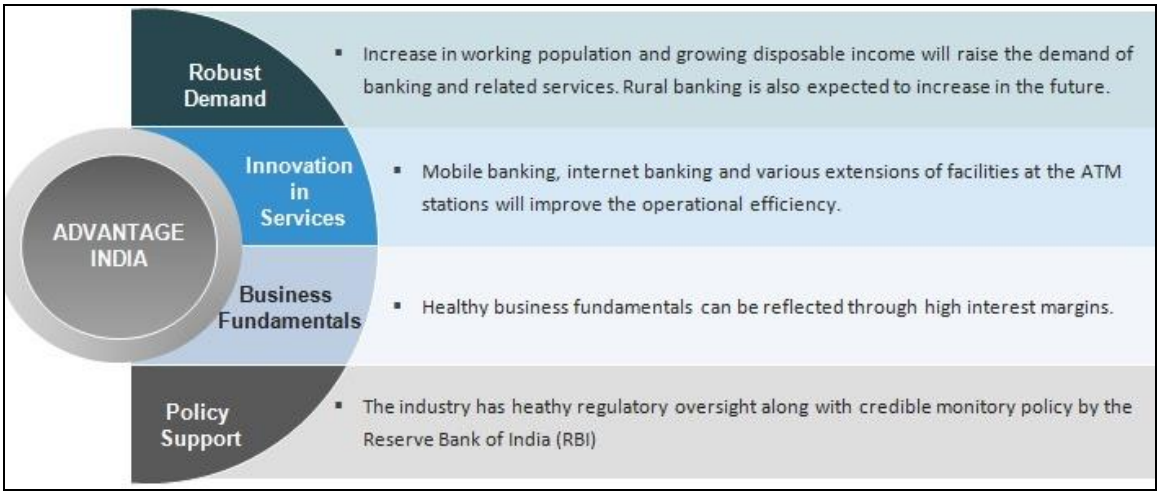


Figure 1: Advantages to the Banking Sector from Indian Perspective

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 27 PSBs, 21 Private Banks, 49 Foreign Banks, 56 Regional Banks, 1,562 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:

- The Government of India recently launched India Post Payments Bank (IPPB) and has opened branches in more than 600 districts to achieve the aim of financial inclusion till September 2018.
- The biggest merger deal of FY18 was that of Bank of Baroda, Dena Bank and Vijaya Bank.

Government Initiatives

- The Pradhan Mantri Jan Dhan Yojana (PMJDY) and Mudra Yojna are two schemes actively being promoted by the government.
- The Indian Government plans to inject Rs 42,000 Cr in the PSBs by March 2019.

Achievements

The achievements of the Indian Government in the year 2017-18 are as follows:

- 204,000 Point of Sale (PoS) terminals have been sanctioned from the Financial Inclusion Fund by NABARD to improve village infrastructure.
- A major drive was undertaken in the year 2017 to boost the use of digital mode of payments specifically debit cards, resulting in an increase in the number of Point of Sale (PoS) terminals to 2.77 million as on November 30, 2016.
- The number of total bank accounts opened under Pradhan Mantri Jan Dhan Yojana (PMJDY) reached 333.8 million as of November 2018.

1.3.2 Insurance Industry

The companies that help you manage your risk by selling insurance contracts are categorized under the Insurance Industry. The underlying concept of insurance is based on the fact that the insurance company will guarantee payment for an uncertain event in the future to the insured person. Meanwhile, another party, the insured person has to pay a small premium to the Insurance Company in exchange for the risk that the company is taking for the uncertain event. In simple terms, insurance is all about Risk Management. Let us understand the example of life insurance. The company aims to predict the life of its policy holders by constantly crunching data such as age/sex/smoker etc. The insurance company collects premiums from its policy holders, invests this money in low risk investments, and then reimburses this money once the person passes away or the policy matures. The age/sex/smoker/etc., all affects the premium that a policy holder must pay. The higher the chances of the policy holder having a life span shorter than average, the higher premium he has to pay. The similar process followed for every other type of insurance, including automobile, health and property. There are several major types of insurance policies. Certain companies offer insurance in all domains, while others have their specialization in specific areas:

- Life Insurance – This insurance guarantees a certain specific sum of money to the beneficiary when the insured person dies, or to the insured if he lives beyond a certain age.
- Health Insurance - Insurance that covers all the health related expenses due to illness.
- Liability Insurance - This is for the insurance of properties such as automobiles, property etc.

1.3.2.1 The Indian Insurance Sector

The Insurance Sector in India is divided into two categories, namely Life Insurance and Non-life Insurance (also called as General Insurance). The governing body for Life Insurance as well as Non Life Insurance is IRDAI (Insurance Regulatory and Development Authority of India). This government organization is basically a regulator for the Insurance Sector in India and ensures that the consumer rights are secured. Thus, it is mandatory for all the insurers to abide by the rules and regulations of the IRDAI. A total of 57 companies operate in the Indian Insurance Sector, which include 24 Life Insurance providers and 33 Non Life Insurance Providers. Life insurance companies offer coverage to the life of the individuals, whereas the non-life insurance companies offer coverage to activities like travel, health, motor, and home insurance. Non Life insurance companies also provide insurance for the equipments used in the industry, crop insurance the Indian Farmers, Insurance for our mobiles, pet insurance etc. Various advantages are shown in Fig 2.

Market Size

The insurance penetration in India has increased due to the schemes promoted by the government in the country. Gross premiums have reached record US$ 94.48 billion in FY18, with US$ 71.1 billion coming from life insurance and US$ 23.38 billion ccoming from non-life insurance. If we talk about overall penetration of insurance (premiums as % of GDP) in India, it is at 3.69% in 2017 from 2.71% in 2001. Premium from Life insurance business increased 3.91% YoY to US$ 22.04 billion, and gross direct premiums of non-life insurers reached US$ 19.28 billion showing a year-on-year growth rate of 12.65 per cent in the year 2019.

Investments and Recent Developments

Some of the major investments and developments in the Indian insurance sector are as follows:

- HDFC Ergo is in advanced talks to acquire Apollo Munich Health Insurance at around Rs 2,600 crore (US$ 370.05 million).
- Flipkart, an Indian Ecommerce Giant entered the insurance space in partnership with Bajaj Allianz to offer mobile insurance.
- Insurance companies in India raised around US$ 6.7 billion through public issues in 2017.

Government Initiatives

The Indian Government has taken numerous initiatives to boost the insurance industry. Some of them are as follows:

- National Health Protection Scheme was launched under Ayushman Bharat in 2018 to provide coverage of up to Rs 5 Lakh to more than 100 million vulnerable families. The health insurance penetration is expected to increase to 50% from 34% as a result of this scheme.
- Pradhan Mantri Fasal Bima Yojana (PMFBY) has benefitted over 47.9 Million farmers in 2017-18.

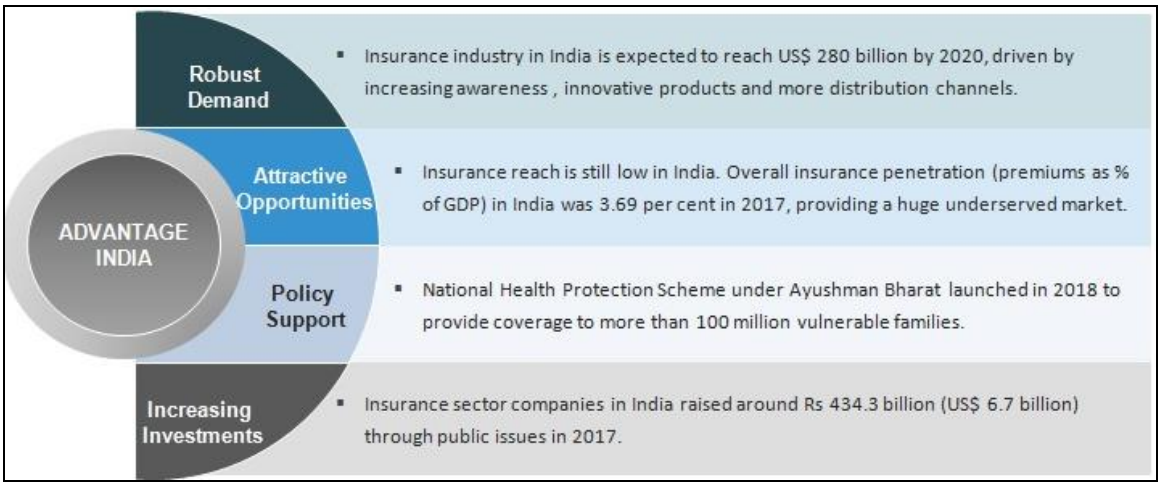


Figure 2: Advantages to the Insurance Sector from Indian Perspective

1.4 Objectives of the Study

The objective of this study is to determine the impact of Disruptive Tools on the Banking & Insurance Sector. As discussed, due to growing competition and high level of inefficiency, adopting the disruptive 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. This study identifies the level of inefficiency in the banking industry, the current levels of adoption of these tools, and how adopting these tools will lead to increase in efficiency.

CHAPTER – 2

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 that we are discussing here 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. The first thing that comes to our mind when we talk about ATMs is that how heavily it would have impacted the job of tellers. However, contrary to the belief, as ATMs expanded from 1 Lakh in 1990 to about 4 Lakh recently, **the number of tellers employed by banks did not fall**, contrary to what we would have expected.

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 of the activities AI can help the computers to do 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 3.

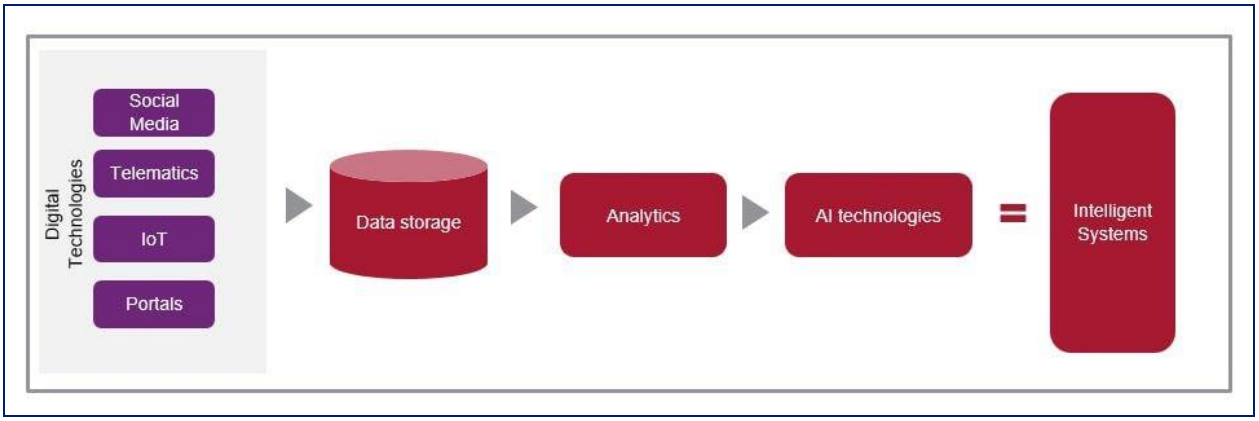


Figure 3: Use of AI in Data Analytics

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 4. 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 inter connected 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.

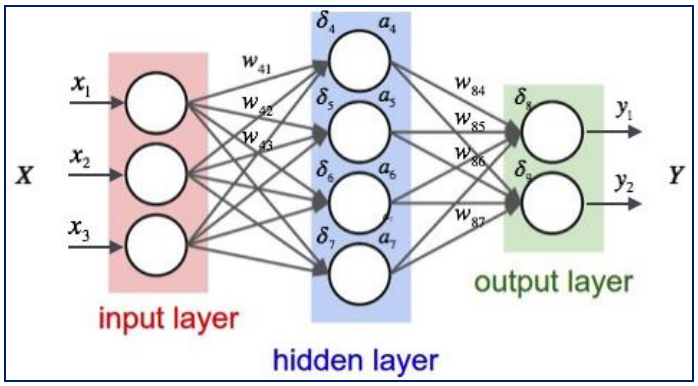


Figure 4: Structure of Neural Network

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 5.

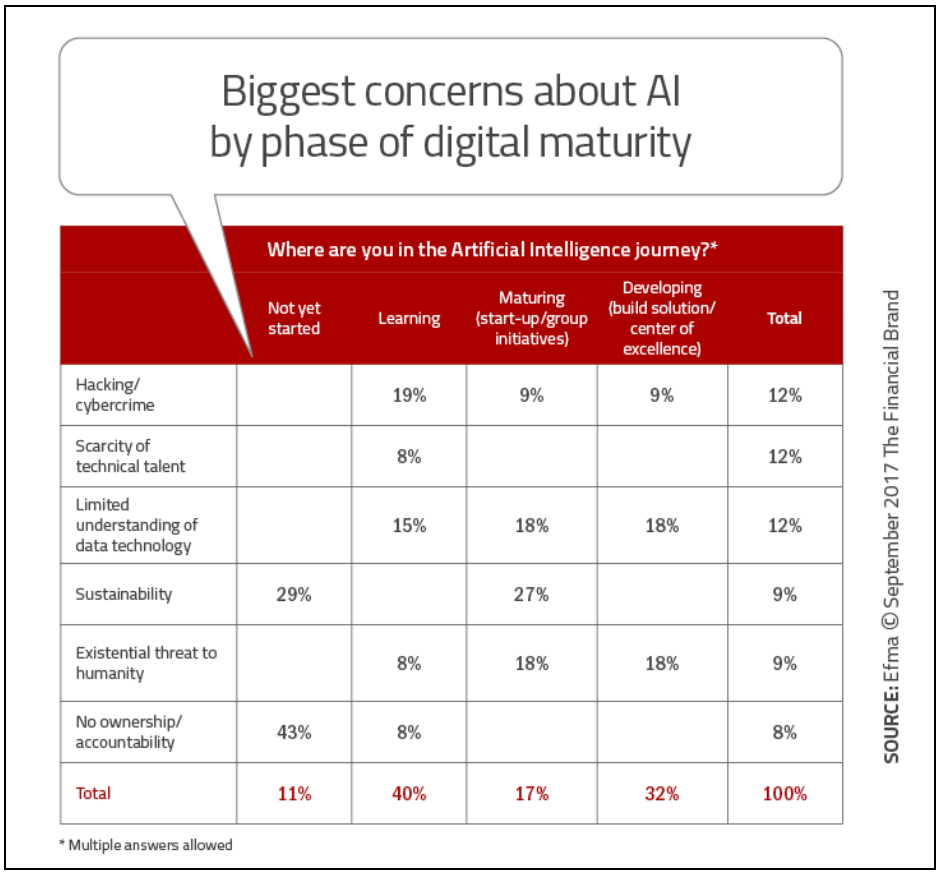


Figure 5: Strategic Challenges of AI

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 6.

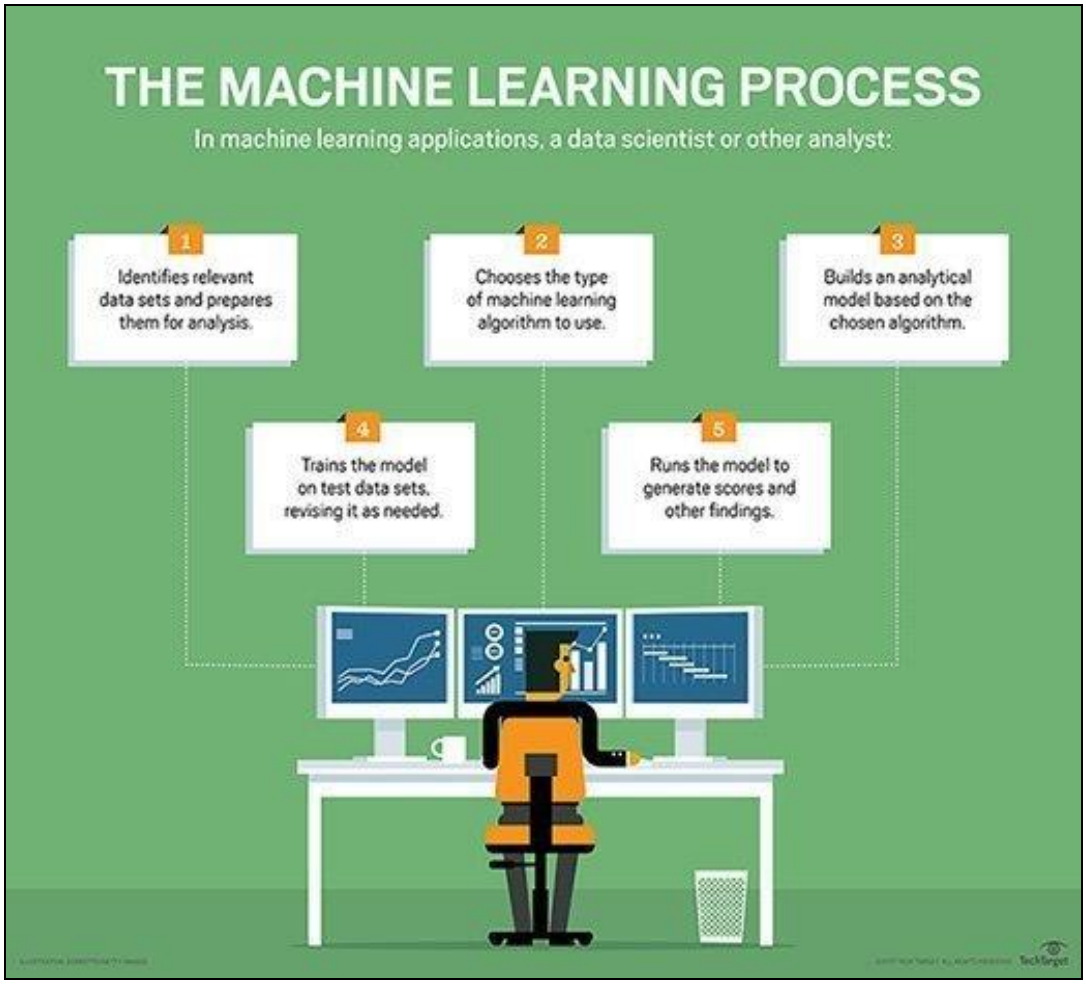


Figure 6: The Machine Learning Process

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 7.

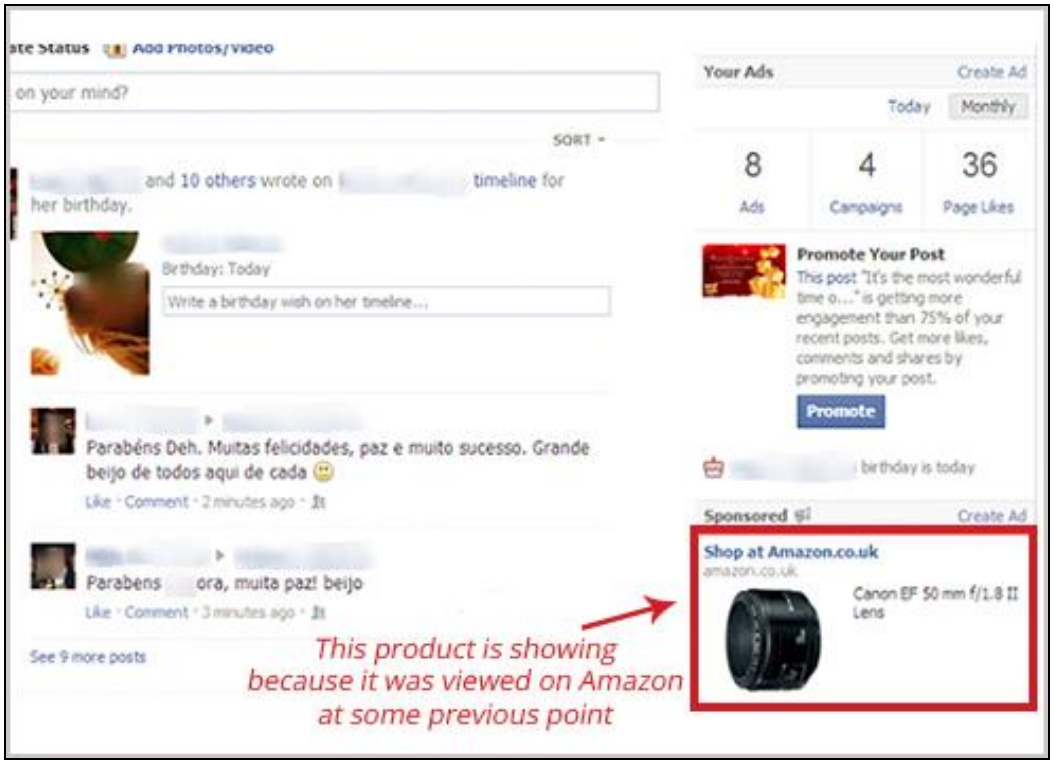


Figure 7: Advertisement shown based on search history

2.3.1 Types of Machine Learning

1. Supervised Learning: 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.

How it Works

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. Unsupervised Learning: 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 8.

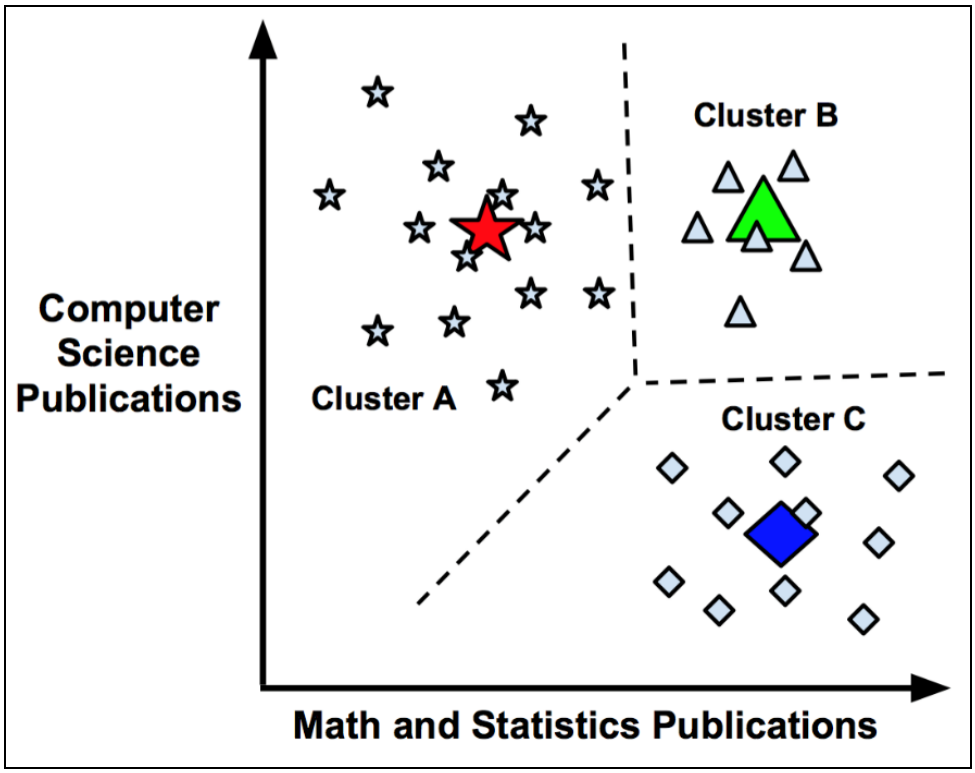


Figure 8: Example of Cluster Formation

3. Reinforcement Learning: 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 9.

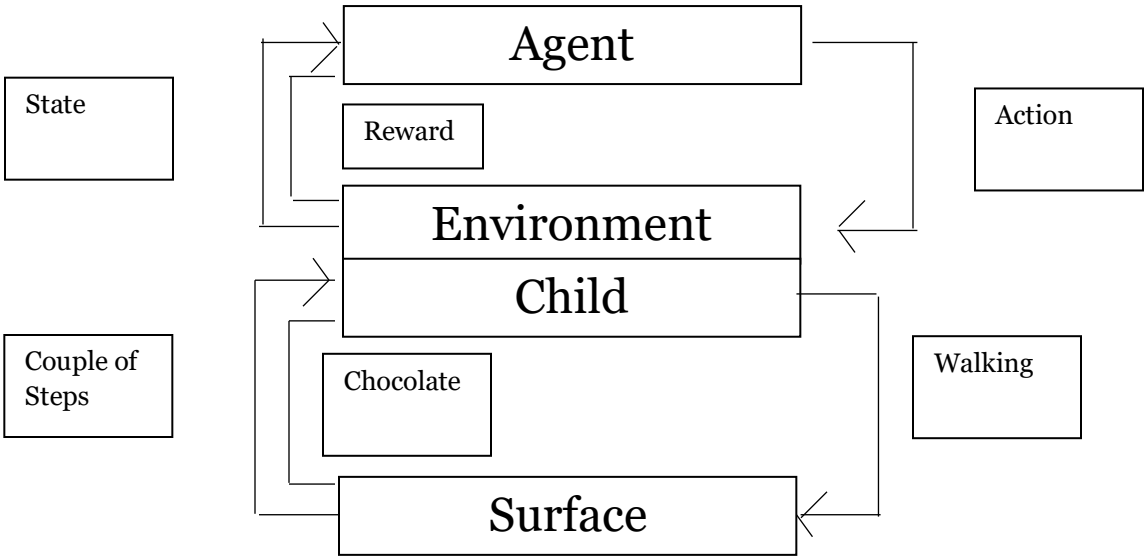


Figure 9: Reinforced Learning

CHAPTER – 3

RESEARCH METHODOLOGY

Problem definition: The study is done in order to determine the impact of Disruptive Tools on the Financial Sector particularly Banking & Insurance Sector. This study identifies the level of inefficiency in these sectors, the current levels of adoption of these tools, and how adopting these tools will lead to increase in efficiency.

Research Design: The research design is employed to satisfy the objectives in this descriptive research.

Data collection methods:

Secondary Data**:** The data was collected through various websites, KPMG Journals and other internet sources.

CHAPTER – 4

CASE STUDIES

4.1 RPA and its Impact on Banking & Insurance Sector

4.1.1 Robotic Process Automation (RPA)

Robotic Process Automation can be defined as the use of computer programs called software robots that are specialized to automate business processes which are repeated and non value adding to the organization. The tasks on which RPA can be applied could be queries, calculations or transaction records. RPA can be understood as a robot sitting in front of a computer performing the same keystrokes and running applications that a normal human 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 aim of RPA is to reduce or eliminate human intervention in processes which are repeated and highly manual intensive, thus freeing up the time for the employees and giving the organization the liberty to deploy these employees in areas where the company makes its money. Many of you might be thinking 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 10.

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.

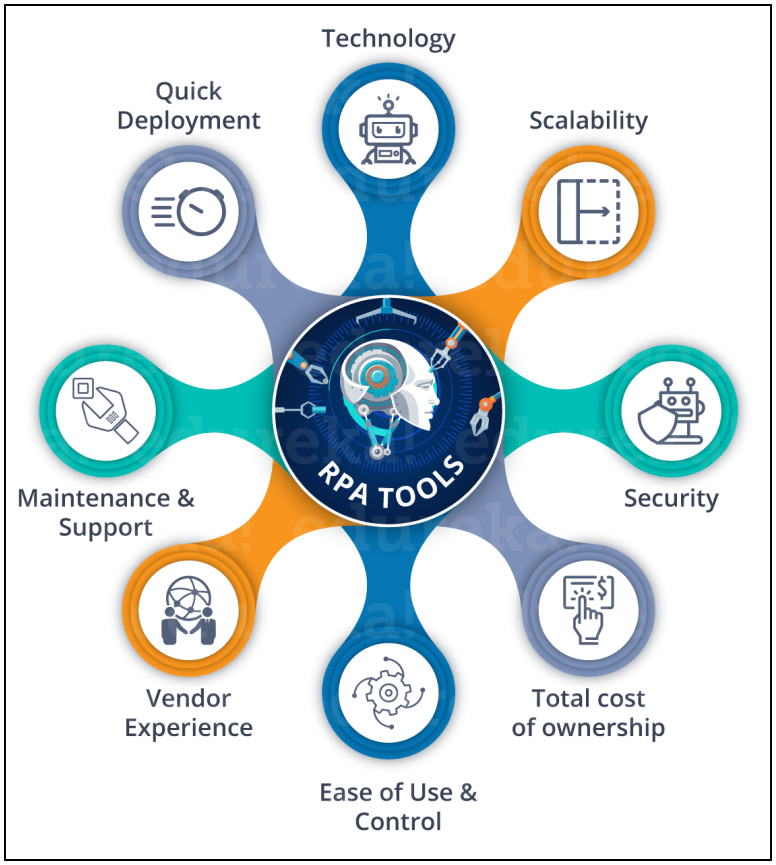


Figure 10: Various RPA Tools

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. Unattended automation**:** 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:
    - Data Input in the System: 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.
    - Bot initiated: 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.
    - Specified intervals**:** Bots can be launched as per schedule at specific times to process the data batch wise.

3. Hybrid RPA: 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 Benefits of RPA

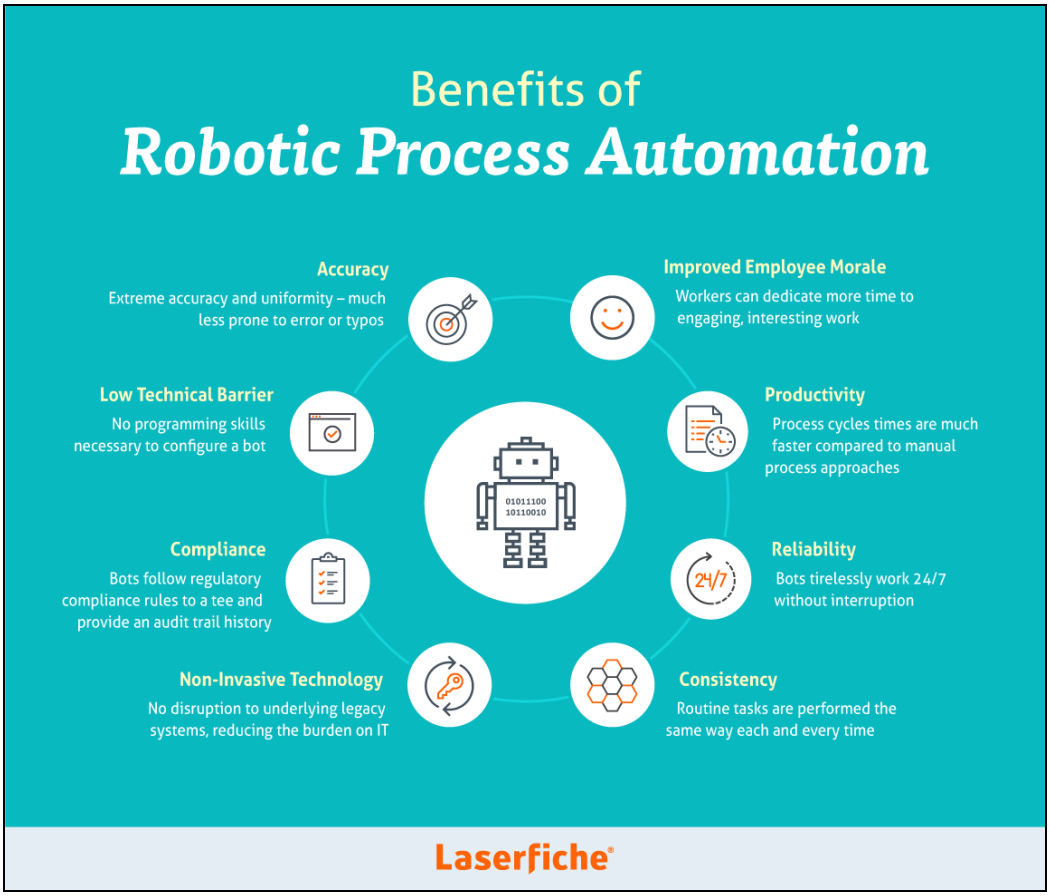


Figure 11: Benefits of RPA

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 11) are as follows:

- No Technical Skills required: 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.
- Higher accuracy: 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, if we talk about the cost of running KYC and CDD then it is in the range of US $52 Million to US $384 Million. Talking about certain activities in KYC that are manual and consumes lot of time and are a good candidate for RPA are gathering information about the customer from various sources, entering the data into the system, validating existing customer information, and compilation and screening of those data. By implementing these 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 paper work, 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.
- Faster and error-free P&L reporting and analysis, on-time management of accounts payable, account receivable, efficient treasury management are more areas where RPA is being deployed by the banks.

4.1.5 RPA in Insurance

Insurance industries is one of the least innovative industries for the customers as the customers normally are disappointed and dissatisfied or have wait for longer periods, do a

lot of paper work to get the claim which is their right. The industry also is not progressive in adopting new technology even though it is at the receiving end of major technological changes like the driver less cars for example. However, the industry has now reached an inflection point where the current market conditions, growth of emerging technologies, and the rise of a tech savvy consumer. They are in particular facing the following issues:

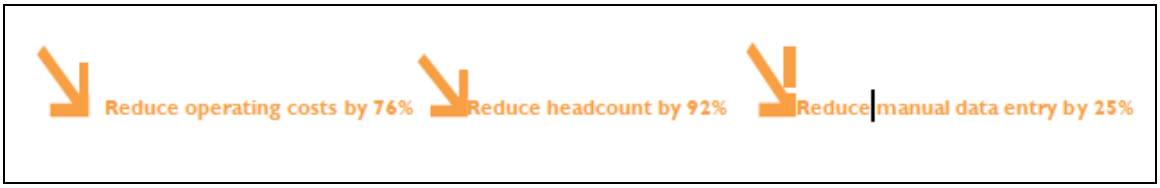
- Legacy systems that run on outdated technologies and an infrastructure that is complex with regards to data, systems and architecture.
- Business models which are complex particularly in areas like claims and underwriting, where there are multiple variations of similar processes, which are modified to support unique lines of business.
- Disruption across the Marketplace including new competitors as well as shift to new age emerging technologies

In order to address the above stated issues, organizations, business leaders, insurance brokers and agents are turning to RPA to tackle these issues. Let us have a look at the following case study to better understand this.

4.1.6 Case Study of Assicuraziani Generali S.p.A (An Italian Insurance Company)

Let us have a look at the case of the largest Italian Insurance Company **Assicuraziani Generali S.p.A**, which has its operations in more than 60 countries and providing a range of life and non-life insurance products to individuals and corporate customers. The Italian Company was facing issues wherein there was a sudden increase in new policies and the data was to be manually entered into the system. Since majority of the work was manual, it resulted in heavy back logs and the underwriting team was gasping for breath. The existing process required input of over 300 fields into two systems to bring the reinsurance policy to life. The company tried to automate the process on their own but saw no success. Hence, they consulted Sutherland to help them automate this process. Sutherland is a company based out of USA which specializes in Digital Transformations and rebuilds processes for the digital age. Since data keying was highly prone to errors and probably one of the most complex processes in reinsurance, the organization had no way to streamline work and reduce the errors. Sutherland was given the task to implement RPA to centralize processing and automate the data input across various client locations. The firm implemented the RPA in the insurance company and was able to

automate almost all of the tasks. This not only resulted in decrease in the processing time but also drastically reduced the cost. The Italian Company was delighted to see tackle the huge volumes of data and effortlessly processing it at unmatched pace. RPA not just automated the process once, but also generates regular reports regarding the performance of the process and highlighting any key issues. Thus the client was able to monitor activity – a feature not available when they handled the data manually. The results of the initiative can be summarized below wherein costs were reduced by 76%, headcount to do this task was reduced by 92% and manual data entry was reduced by 25%.



4.2 AI and its Impact on Banking & Insurance 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 achieves incredible accuracy: Again speaking about the accuracy, deep neural networks helps the system better understand the user, his thought process, and his buying patterns which was previously impossible. 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 Artificial Intelligence in Banking

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. JPMorgan Chase**:** JPMorgan Chase has invested a lot of money in development of new and emerging technology and has introduced what they term COiN which stands for **Contract 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. The initial goal will be 1.2 Lakh service tickets with future expansion to efficiently address more of the 1.7 million employee requests the company receives every year.

2. Wells Fargo: 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. Bank of America: 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. Citibank: 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.

4.2.3 Artificial Intelligence in Insurance

If we talk about the Insurance industry, it is one of the industries that is least innovative for customer experience, which effectively means customers are mostly disappointed and dissatisfied when they interact with this industry. Hence, they normally say that interacting with insurance companies is a pain for many. The insurance industry also isn't known for being very proactive in adoptive new and emerging technologies. The reason is that usually when a big technology comes into the picture, it usually shifts the society, how the business functions and impacts the way people live and interact. For example the newest technology in town that is the driver less cars will have a major impact on the insurance sector, as insurance does not cover machine driving a car and hence they have to alter their offering, the premium they charge and the claim amount accordingly.

A recent Accenture report on the use of Artificial Intelligence based on survey done on 550 insurance executives in insurance companies suggest that AI will either significantly change or completely transform the overall insurance industry in the next three years.

Let us have a closer look at three major insurance trends utilizing AI, examining at the current state of the technology, the changes underway, and the potential resulting shifts in the industry:

1. Behavioral Premium Pricing: Internet of Things (IoT) Sensors will be used to personalize insurance pricing in the following ways:
    - Pay What You Risk: Wearable gadgets like Fitbit and other sensors can be used to collect data and enable lower insurance premiums for behavior which is less risky, which could be driving less or walking more.

- Bundle Policy and Loss Prevention Hardware**:** Companies that operate in the Smart Home Space will offer discounts to users who have adopted sensor based loss prevention technology and the risk of loss will be considerably reduced.
- Verify and Settle Claims: Since IoT sensors will be sharing data in real time which will be analyzed and processes in real time, claims can be settled quickly without delays and costly audits.

Let us consider this example of usage based or pay per mile payment for car insurance. Sensors can be used to track the car in real time which includes its speed, miles driven, driving pattern and how frequently is the car being used, and in response to these data existing premiums can be recalibrated and new policies can be introduced in the market as per the patterns observed. This basically means that people who drive safer than average pay less premiums for the policies, while those who drive dangerously pay more. Policyholders aren't part of a risk pool any more — **they are paying what they risk**. More examples can be seen in Fig 12.

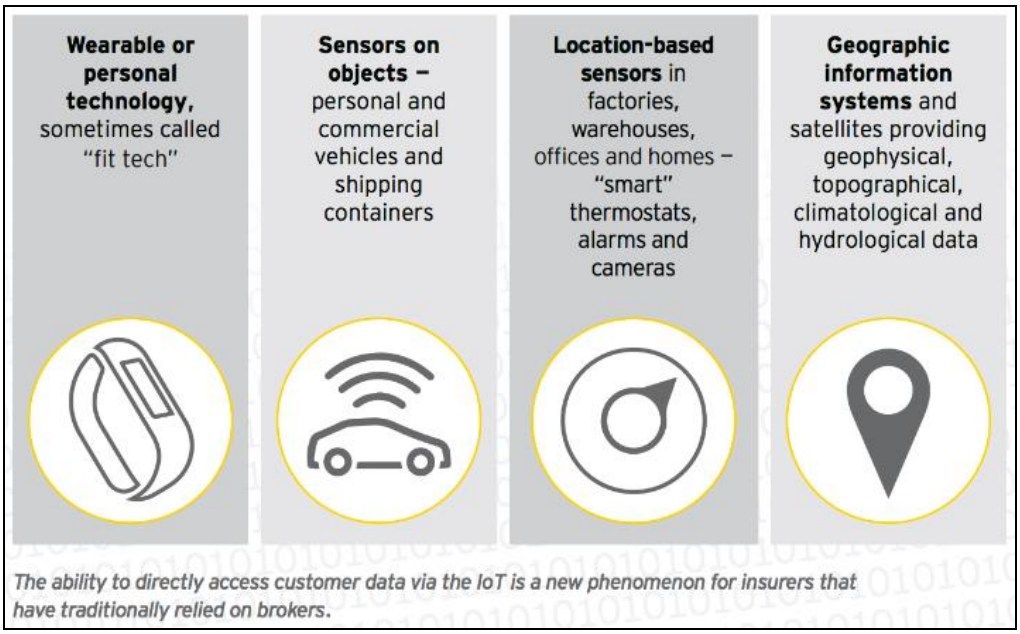


Figure 12: Behavioral Premium Pricing using IoT

2. Customer Experience & Coverage Personalization**:** AI also helps in better on boarding and offer excellent customer experience. Some of the key instances are as follows:

- Chatbots Will Recognize You: Latest generation technology like facial recognition and social media data can be used to recognize the customer and offer personalized sales experience
- Platforms Will Verify Your Identity: The software will automatically verify your identity by matching it with the data stored in the system
- Carriers Can Customize Your Coverage: Machine learning can be used to offer excellent app-based shopping experience

One of the most excellent examples of how this technology is impacting the insurance sector can be seen in the following example. A Life Insurance Start up **Lapetus** allows its users to buy insurance policies by **using a selfie**. The question that will come to our mind will be how a selfie will be able to calculate the life of a person and hence calculate the premium that needs to be paid to avail this policy. Habits such as smoking cigarettes can be considered a strong predictor of how long a person will live. **Lapetus can use facial analysis to rapidly assign risk scores without a lengthy or onerous medical examination**. The SMILe (smoker indication and lifestyle estimation) approach is explained in Fig 13:

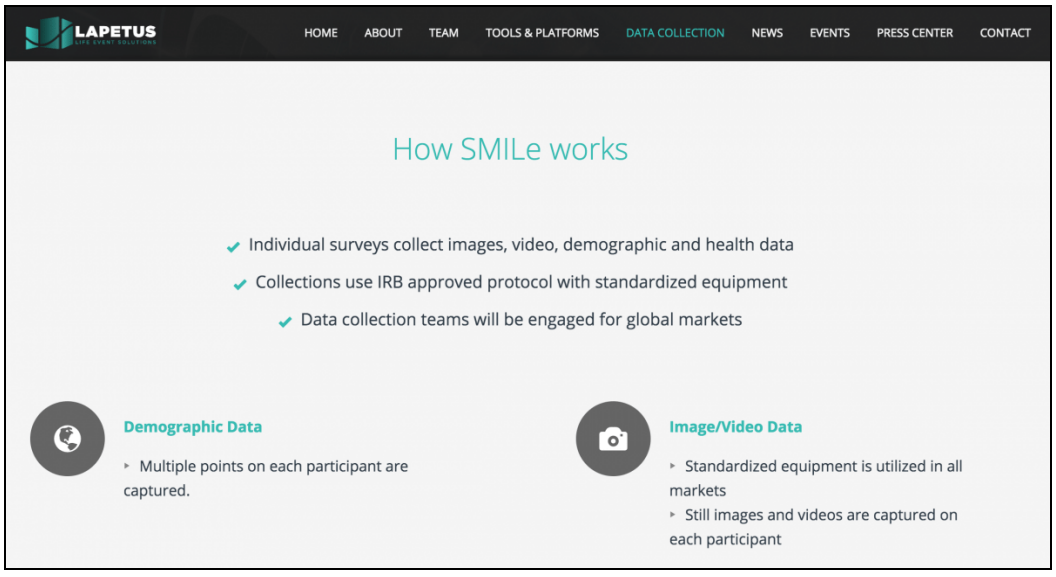


Figure 13: How SMILe works

3. Faster, Customized Claims Settlement**:** AI can also be used to settle claims faster while at the same time reducing the chances of fraud. **Speed and success** in

settling claims is a critical factor for insurance business efficiencies. Two ways in which AI can help improve the customer satisfaction are as follows:

- Speed in Settling Claims**:** Since the data is collected and processed in real time, hence no sudden calculation is required at the time of settling claims leading to quick claim settlements.
- Decrease Likelihood of Fraud**:** Since the entire process is automated with minimum to no human intervention hence chances of fraud are automatically reduced.

One of the most excellent examples of how AI can help speed up claim settlement can be seen in the following example. **Lemonade's AI Jim** was in the news in 2017 as it reportedly **settled a claim in less than 3 seconds** which is even better than the No1 ranked insurer which takes 11 days to settle a claim. That means the best in the industry took **316,800 times** longer to settle a claim than Lemonade's AI Jim. Again, time-to-settle is consistently the metric that customers most care about.

4.3. Machine Learning in Banking & Insurance

4.3.1 Machine Learning in Banking

- Portfolio Management**:** 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.

- Fraud Detection: 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.

- Security 2.0: 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.

- Sentiment Analysis: 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.

4.3.2 Machine Learning in Insurance

- Insurance Underwriting: Underwriting is a perfect job fit for Machine Learning application in finance. The algorithms can be trained using millions of consumer data and financial lending and insurance results. The algorithm then identifies the

patterns and trends in the data and can also determine the trends that might influence insurance in the future.

- Customer Service: Chat bots can be used to answer customer queries, solve issues like determining how much the customer spent in the last month by integrating natural language processing and Machine learning. Instead of customer turning up at the bank branches to solve queries, if they are directed to these bots and the issue is resolved then and there, then this will lead not just reduction in number of people turning up at the branch but also less manpower required to deal with these queries. Hence, this not only boosts efficiency and productivity and in turn save costs but also improves the image of the insurance company in the eyes of the public as a company with quick response to customer queries and issues. This kind of chat experience is not the norm today in banking or finance, but may be a viable option for millions in the coming five years. This application goes beyond machine learning in finance, and is likely to manifest itself as specialized chat bots in a variety of fields and industries.

4.4 Conclusion

A scenario where people will completely disappear with financial service organizations is not likely, but computers and software applications will become even more important. Automation should not be intimidating for financial service companies, as the opportunity for greater efficiency and regulatory compliance is vast. Improvement can start quickly by identifying repetitive tasks and utilizing tools that are readily available and very cost effective. The biggest opportunity for many organizations is to use their own creativity to leverage automation to solve their problems. Data will act as an intellectual property as all major emerging technologies like AI and ML work on data. So, the company having access to quality data will be able to have a competitive advantage over other players in the industry, and as a result lead to long term profitability and sustainability.

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