**STUDY ON IMPACT OF ARTIFICIAL INTELLIGENCE IN**

 **INDIAN BANKING SECTOR**

PROJECT REPORT

Submitted to

**MAHATMA GANDHI UNIVERSITY, KOTTAYAM**

In partial fulfilment of the requirements for the award of the degree of

**BACHELOR OF COMMERCE**

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**2017-2020**

**DECLARATION**

 We, **ABHAYA K A (Reg. No. 170021063410), ADHIRA ROY (Reg. No. 170021063411), AHAMMED FAYAZ (Reg. No. 170021063413)** hereby declare that the project report entitled **“A STUDY ON THE IMPACT OF ARTIFICIAL INTELLIGENCE ON INDIAN BANKING SECTOR”** is a bonafide work done by me under the guidance and supervision of Prof. Gibin Jacob ,Assistant professor, Department of Commerce, St. Paul’s College, Kalamassery.

 We also declare that this work has not been submitted by me fully or partially for the award of any other degree, fellowship, associate ship or other similar title of any other university or board.

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 I have great pleasure in submitting this record in my deep sense of gratitude to our **principal VALENTINE D’CRUZE** I express my hearty thanks to **Mrs. THERESA STEPHAN, Head of Department, ST.PAUL’S COLLEGE KALAMASSERY** For his valuable suggestions and continuous encouragement. I also express my thanks to all teachers in the commerce department for their discerning suggestion and assistance during the course of our work. I express my sincere thanks to Librarian and my friends and family members who have directly or indirectly helped me in the successful completion of the project.

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**INDEX**

|  |  |  |
| --- | --- | --- |
| **CHAPTERS** | **CONTENTS** | **PAGE NO:** |
| 1 | INTRODUCTION | 2-6 |
| 2 | REVIEW OF LITERATURE | 8-10 |
| 3 | THEORETICAL FRAMEWORK | 12-24 |
| 4 | DATA ANALYSIS AND INTERPRETATION | 26-46 |
| 5 | FINDINGS, SUGGESTIONS AND CONCLUSION | 48-50 |
| 6 | BIBLIOGRAPHY | 52 |
| 7 | APPENDIX | 54-56 |

 **LIST OF TABLES**

|  |  |  |
| --- | --- | --- |
| **TABLE NO:** | **TITLE** | **PAGE NO:** |
| 4.1 | GENDER PROFILE | 26 |
| 4.2 | AGE PROFILE | 27 |
| 4.3 | PROFESSION | 28 |
| 4.4 | RELATION BETWEEN BANK AND USER | 29 |
| 4.5 | BANKS USED BY ACCOUNT HOLDERS | 30 |
| 4.6 | NUMBER OF YEARS USING BANKING SERVICES | 31 |
| 4.7 | TECHNOLOGIES USED | 32 |
| 4.8 | DIFFICULTIES IN USING TECHNOLOGIES | 33 |
| 4.9 | RESPONDENTS AWARNESS ABOUT AI IN BANKING SECTOR | 34 |
| 4.10 | KNOWLEDGE ABOUT AI APPLICATIONS | 35 |
| 4.11 | KNOWLEGE ABOUT CHATBOTS/OTHER DIGITAL PERSONAL ASSISTANTS | 36 |
| 4.12 | CHABOTS FAMILIAR TO USERS | 37 |
| 4.13 | IMPACT OF AI IN CUSTOMER RELATIONSHIPS | 38 |
| 4.14 | USERS RESPONSE ABOUT TIME EFFECTIVENESS | 39 |
| 4.15 | USERS RESPONSE ABOUT COST EFFECTIVENESS | 40 |
| 4.16 | BETTER PERFORMANCE ON JOB BETWEEN AI AND HUMANS | 41 |
| 4.17 | REACTION TO AI EMPLOYMENT ISSUE IN BANKING SECTOR | 42 |
| 4.18 | SECURITY ASSURED BY AI IN BANKING | 43 |
| 4.19 | RELATIONSHIP AI TOWARDS GREEN ECONOMY | 44 |
| 4.20 | FUTURE OF AI IN BANKING SECTOR | 45 |
| 4.21 | FUTURE OF AI IN BANKING FUNCTIONS | 46 |

**LIST OF FIGURES**

|  |  |  |
| --- | --- | --- |
| **TABLE NO:** | **TITLE** | **PAGE NO:** |
| 4.1 | GENDER PROFILE | 26 |
| 4.2 | AGE | 27 |
| 4.3 | PROFESSION | 28 |
| 4.4 | USERS | 29 |
| 4.5 | BANKS | 30 |
| 4.6 | NUMBERS OF YEARS IN USING BANKING SERVICES | 31 |
| 4.7 | TECHNOLOGIES USED | 32 |
| 4.8 | DIFFICULTIES FACED | 33 |
| 4.9 | FREQUENCY OF AWARENESS | 34 |
| 4.10 | KNOWLEDGE ABOUT AI APPS | 35 |
| 4.11 | KNOWLEDGE ABOUT DIGITAL PERSONAL ASSISTANTS | 36 |
| 4.12 | CHATBOTS | 37 |
| 4.13 | AI IMPACT | 38 |
| 4.14 | SUITABILITY IN TIME SAVING | 39 |
| 4.15 | SUITABILITY IN COST SAVING | 40 |
| 4.16 | BETTER PEFORMANCE ON JOBS  | 41 |
| 4.17 | REACTION TO AI EMPLOYMENT ISSUE | 42 |
| 4.18 | SECURITY ASSURED BY AI TECHNOLOGIES | 43 |
| 4.19 | AI AND GREEN ECONOMY | 44 |
| 4.20 | FUTURE OF AI IN BANKING | 45 |
| 4.21 | FUTURE AI IN DIFFERENT FUNCTIONS OF BANK | 46 |

# CHAPTER I

# INTRODUCTION

**1.1 INTRODUCTION**

Artificial Intelligence (AI) is fast evolving as the go-to technology for companies across the world to personalize experience for individuals. The technology itself is getting better and smarter day by day, allowing more and newer industries to adopt the AI for various applications. Banking sector is becoming one of the first adopters of AI. And just like other segments, banks are exploring and implementing the technology in various ways. The applications AI include bring smarter chat-bots for customer service, personalizing services for individuals, and even placing an AI robot for self-service at banks. Beyond these basic applications, banks can implement the technology for bringing in more efficiency to their back-office and even reduce fraud and security risks.

 As volumes and amount of banking transactions are increasing rapidly and banks need to serve existing customer and also plan and improve their infrastructure for the increasing customer base, which will increase the cost of the products or reduce the revenue for the banks. So for all of these problems digitalisation and automation will provide a better solution. Still many of the day to day repetitive tasks are done by human force in banks. The need for AI in banking sector is inevitable to catch up the increasing expectations of the world. It indeed reduced human errors and increased convenience.

Banking requires a differentiated digital strategy that will give banks a sustainable competitive advantage. We are now at a digital tipping point, where all aspects of banking can be conducted online. Banks are analysing various customer data points such as payment history, products held, and credit history to determine the credit worthiness of a customer and digitally embed it in various channels to offer pre-approved loans and instant disbursements. By tracking the spending patterns of customers, many banks also understand their value potential and make targeted offers on credit cards in real time.

 In addition, analytics and Artificial Intelligence (AI) are being integrated with digital channels to provide instant recommendations on products that will best suit the customer. For example, a college graduate can be offered an education loan while a married couple with young children can be offered child investment plans and life insurance policies along with relevant loan products .While banks are still trying to achieve this effectively, many organizations have already taken the lead and set awe-inspiring benchmarks—a case in point being recommendations provided by Netflix and Amazon based on the customer’s viewing and purchase/browsing history.

**1.2. SCOPE OF THE STUDY**

Today, the use of AI in banks has widened the gamut of financial services and products they have to offer their clients. Apart from this, they use for organized operations, maintain bookkeeping, provide excellent customer service and experience, offer customized financial solutions, financial trading, and prevent fraud. The research work was conducted with the objective to find out whether the selected Indian Banks are using Artificial Intelligence based technological application or not and also to find that if the banks are using AI based applications, then what are different the purposes for which they using them. The scope of our study is to identify the impact of AI in Indian Banking sector and the challenges faced by banks in customer satisfaction. The study covers the technological developments in Indian banking sector only.

**1.3. STATEMENT OF THE PROBLEM**

AI – specifically the machine learning and deep learning techniques which show the most promise require a huge number of calculations to be made very quickly. This means they use a lot of processing power. AI has been around in theory for a long time, but had been in this kind of because everyone had good ideas but they were all theory and there wasn’t enough compute power to implement them, so who cares?

Cloud compute and massively-parallel processing systems are what have provided the answer in the short term. But as data volumes continue to grow, and deep learning drives the automated creation of increasingly complex algorithms, the bottleneck will continue to slow progress. In reality, we are at least five, more likely 10, years from that, We have to figure out the programming models, because the programming models for quantum are completely different from those we use now – there’s got to be a reinvention and that’s going to take time.

Lack of people power is a major problem for the implementation of AI in banking sector. Until very recently, AI has been something talked about by science fiction writers and worked on in the depths of university IT research labs. In other words, without mass market use cases there has not been a great deal of money in it .This means there have been comparatively few organizations willing to put money into development of these skills, and the subject was not well-represented in industry-focused education and training curricula.

Another problem is that AI is a black box – people don’t feel comfortable when they don’t understand how the decision was made. For example algorithms used by banks are mainly linear maths and it’s pretty easy to explain the path from the input to the output – ‘I denied your mortgage application because, you don’t have a job, or whatever…’ With multi-layer neural networks, the average human doesn’t understand, so now we’re making predictions based on things that people don’t understand and that’s going to make people uncomfortable. Although this revolt is more likely to take the form of social media campaigning and boycotts, than smashing machines and burning down assembly plants, it’s a hurdle which could derail attempts to drive progress .The solution here is letting people see that this technology works.

**1.4. SIGNIFICANCE OF THE STUDY**

Artificial intelligence has many benefits to offer for the banking sector. Artificial intelligence is changing business processes and customer-facing services in the banking sector in India. It is also being used to meet regulatory compliance, detect fraud, and assess individual creditworthiness. The application of AI has the potential to create more efficient business processes, offer personalized services, and assist in larger goals such as financial inclusion. There is no doubt that the recent push towards digitalization is rapidly influencing the traditional banking models. However, it has also exposed the institutions for increasing cyber security threats and vulnerabilities. The banks are increasingly looking at emerging technologies such as block chain and analytics in creating an active defence mechanism against cybercrimes. The importance of the study is to analyse the benefits of Artificial intelligence in banking and customer knowledge towards it.

**1.5 OBJECTIVES OF THE STUDY**

* To Identify AI applications which are being used by customers and employees at leading Indian banks
* The benefits of these AI applications in terms of reduction in cost, time and efforts.
* To research the future holds for AI in Indian banking sector.
* To study the customer knowledge and satisfaction towards AI in banks.

**1.6 RESEARCH METHODOLOGY**

**Source of data**

The study is based on both primary and secondary data

**Primary data**: The primary data was collected through questionnaire to collect information relating to the customers perception towards the application of artificial intelligence in Indian banking sector. For the study purpose we have collected the data from customers and bank employees.

**Secondary data:** The data are collected from various books, reports, journals, news articles, various bank portals and internet sources etc.

**Population of study** : Account holders, bank related users.

**Sample size:**A sample of 102 Account holders and other bank related users was chosen.The sample chosen was fully based on the convenience of the researcher.

 Questionnaires are prepared for collecting primary data and enough time was given to respondents. It was prepared in simple language in order to reduce risk of ambiguity.

**TOOLS USED FOR STUDY**

Questionnaires were used for interviewing the respondents, to acquire data. Percentage, frequencies, Charts and tables, diagrams, images etc are used to analyse data. Pie chart, bar diagrams and various graphs were used to represent data graphically.

**1.7 LIMITATIONS OF THE STUDY**

* Time is the major limitation. The study was only for a period of four months.
* The respondent’s answers may be biased as the questionnaire were given to them and they did the filling.
* The study is based on the perceptions of customers and the views of bakers based on current scenario, which might change in the future.
* The study is focused only to few banks in India.
* Hence, it is difficult to generalize.

**CHAPTER II**

**LITERATURE REVIEW**

**2 .1 LITERATURE REVIEW**

 Banks are considered as the life blood of an economy as it handles cash, credit and financial transactions. ‘It is mind boggling to know that the entire banking system is so well connected that each and every transaction can be tracked and any exchange of information can be done from any part of the world just by connecting to these networks. This smooth operation of the banking world that is done through computers and networks is possible only because banks use Artificial intelligence’. Moreover, there is also a rapid growth of e-commerce in the country and due to this there is a constant increase in the use of credit cards for online purchasing. But on the other hand it is also causing credit card fraud activities.

* **Raj & Portia** (2011) analyzed that artificial intelligence is one of the various techniques to be used for detecting credit card fraud explosions. Along with detecting credit card fraud explosions, artificial intelligence is also been used to operate effectively. To cut down the operating expenses and to improve the efficiency, banking sector is adopting updated technologies like AI, cloud and block-chain. Moreover, AI technique along with operational research was also used to evaluate the performance of banks **Fethi, M.D. &Pasiouras.**
* AI is also been used in the banking sector in other forms like application of AI in auditing impacts in internal control effectiveness as well as it is cost effective **Omoteso K. (**2012). **Artificial Intelligence:** According to a research paper by **John McCarthy** of Sandford University, one of the founders of AI, it is the science and engineering of making intelligent machines especially intelligent computer programmes. Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Various computer languages are used to write Artificial Intelligence Programmes. The most common of them are Prolog, C/C++, recently Java, and even more recently, Python. AI is a technology of making machines over time learn from actions and take decisions on your behalf. The machine is able to do the job of a human without any manual intervention. Artificial intelligence includes programming computers for certain qualities such as information processing, giving logic, solving problems, studying behavioral patterns, self-learning, strategizing etc.
* **Matthew Sainsbury**, FST Media [2012]8 Artificial Intelligence (AI) has been identified as the next technological frontier for banks as they look to leverage their investment in mobile to drive greater customer engagement. Banks including Standard Chartered and Citi are developing AI solutions to assist with staff attrition and training, and reduce human error at all points in the engagement and transaction process. Banking executives see potential in AI programs to fulfill the role of a virtual personal assistant, following the success of Apple’s Siri platform.
* **Sabharwal, Munish.** (2014). “The use of Artificial Intelligence (AI) based technological applications by Indian Banks " .International Journal of Artificial Intelligence and Agent Technology. His research clearly suggests that none of the banks selected by the researcher in his research except the new private sector banks use artificial intelligence based technological applications. The new private sector banks also use artificial intelligence mainly for petty purposes like automatic cheque book re-order facility.
* **Mrs. MadhuraAyachit**(2017) “ ICT Innovation in Indian Banking Sector: Trends and Challenges ” IOSR Journal of Business and Management (IOSR-JBM) PP 21-27 Mrs. Madhura has enlisted very important Indian banking sector is heavily investing in automation via Robotics and Artificial Intelligence (AI). Intelligent machines are being deployed to cater to every need of today’s modern tech savvy customer. Various banks like SBI, HDFC, ICICI, DIGIBANK has implemented AI at various levels in their operations e.g. chat bots to increase the quality of customer interaction and various automated software’s to minimize the error and processing time.
* **Vedapradha and Hariharan** (2018) “Despite of increasing adoption of AI in banking sector the technology is still at the stage of infancy. This is because there are few threats in front of banking sector like infrastructure, increased technical complexity, attrition of manpower and similar”. Regardless of the threats, innovative techniques like chatbots and artificial intelligence have been adopted by banking industry for improving customer satisfaction As there are many challenges while adopting AI, approximately only 10 percent of organizations are using AI to compete in the market **Frankel** (2018). Moreover, digitalization is also rapidly growing and influencing banks to adopt new technologies for better customer service. Even technological changes are been adopted by the banks to control cybercrimes **Jewandah** (2018).
* **Vijai** (2019) claimed AI is also helping banking industry by detecting fraud, assess individual creditworthiness and offer personalized services. But one of the biggest challenges in front of banks is cyber security threats and vulnerabilities.

 From the above literature it has been observed that as artificial intelligence is at its early stage, banking sector is taking initiative to implement the innovative technology. Few studies have examined about the benefits, challenges and threats of AI in banking industry, the use of artificial intelligence8 in fraud detecting activities and evaluating performance of banks as well. The literature studied by the researcher also found that there are very few studies which have been conducted on artificial intelligence with reference to banking industry. Majority of the studies and reports has been conducted and published internationally and very few studies have been conducted in Indian context. Therefore, the current study has focused on the application of artificial intelligence in banking sector and how AI can improve the business results of banking sector. The study also focused on the implementation of AI and the impact of AI in the banking industry.

**CHAPTER III**

**THEORETICAL KNOWLEDGE**

**3.1 ARTIFICIAL INTEGLLIGENCE**

Artificial Intelligence may be defined as the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.

**3.2 STAGES OF ARTIFICIAL INTELLIGENCE**

Stage **1** – Machine Learning

It is a set of algorithms used by intelligent systems to learn from experience.

Stage **2** – Machine Intelligence

These are the advanced set of algorithms used by machines to learn from experience. Eg – Deep Neural Networks. Artificial Intelligence technology is currently at this stage.

Stage **3** – Machine Consciousness

It is self-learning from experience without the need of external data.

**3.3 TYPES OF ARTIFICIAL INTELLIGENCE**

**ANI** – Artificial Narrow Intelligence

It comprises of basic/role tasks such as those performed by chatbot’s, personal assistants like SIRI by Apple and Alexa by Amazon.

**AGI** – Artificial General Intelligence

Artificial General Intelligence comprises of human-level tasks such as performed by self-driving cars by Uber, Autopilot by Tesla. It involves continual learning by the machines.

**ASI** – Artificial Super Intelligence

Artificial Super Intelligence refers to intelligence way smarter than humans.

**Advantages of AI :**

• AI would have a low error rate compared to humans, if coded properly. They would have incredible precision, accuracy, and speed.

• They won't be affected by hostile environments, thus able to complete dangerous tasks, explore in space, and endure problems that would injure or kill us.

• This can even mean mining and digging fuels that would otherwise be hostile for humans.

• Replace humans in repetitive, tedious tasks and in many laborious places of work.

• Predict what a user will type, ask, search, and do. They can easily act as assistants and can recommend or direct various actions. An example of this can be found in the smartphone.

• Can detect fraud in card-based systems, and possibly other systems in the future.

• Organized and manages records.

• Interact with humans for entertainment or a task as avatars or robots.

• An example of this is AI for playing many videogames.

• Robotic pets can interact with humans. Can help us with depression and inactivity.

• Can fulfill sexual pleasure.

• They can think logically without emotions, making rational decisions with less or no mistakes.

• Can assess people.

• This can be for medical purposes, such as health risks and emotional state. Can simulate medical procedures and give info on side effects.

• Robotic radio surgery, and other types of surgery in the future, can achieve precision that humans can't.

• They don't need to sleep, rest, take breaks, or get entertained, as they don't get bored or tired.

**Disadvantages of AI :**

• Can cost a lot of money and time to build, rebuild, and repair. Robotic repair can occur to reduce time and humans needing to fix it, but that'll cost more money and resources.

• It's questionable: is it ethically and morally correct to have androids, human-like robots, or recreate intelligence, a gift of nature that shouldn't be recreated? This is a discussion about AI that's popular in the days.

• Storage is expansive, but access and retrieval may not lead to connections in memory as well as humans could.

• They can learn and get better with tasks if coded to, but it's questionable as to if this can ever become as good as humans can do such.

• They cannot work outside of what they were programmed for.

• They could never, or, at least, seemingly never with our technological perceptions, receive creativity that humans have.

• This can prevent sympathizing with emotions for human contact, such as in being nurses. This can also reduce wisdom can understanding.

• This can prevent common sense occurring. Even if coded with common sense and to learn, it seems hard for them to get as much common sense that humans could.

• Robots, with them replacing jobs, can lead to severe unemployment, unless if humans can fix the unemployment with jobs AI can't do or severely change the government to communism.

• As seen partially with smartphones and other technology already, humans can become too dependent on AI and lose their mental capacities.

• Machines can easily lead to destruction, if put in the wrong hands. That is, at least a fear of many humans.

• AI as robots can supersede humans, enslaving us.

**3.4 HISTORY**

The term artificial intelligence was coined in 1956, but AI has become more popular today thanks to increased data volumes, advanced algorithms, and improvements in computing power and storage. Early AI research in the 1950s explored topics like problem solving and symbolic methods. In the 1960s, the US Department of Defense took interest in this type of work and began training computers to mimic basic human reasoning. For example, the Defense Advanced Research Projects Agency (DARPA) completed street mapping projects in the 1970s. And DARPA produced intelligent personal assistants in 2003, long before Siri, Alexa or Cortana were household names.

This early work paved the way for the automation and formal reasoning that we see in computers today, including decision support systems and smart search systems that can be designed to complement and augment human abilities.

While Hollywood movies and science fiction novels depict AI as human-like robots that take over the world, the current evolution of AI technologies isn‘t that scary – or quite that smart. Instead, AI has evolved to provide many specific benefits in every industry.

**3.5 APPLICATION OF AI**

AI is important because it can help solve immensely difficult issues in various industries, such as entertainment, education, health, commerce, transport, and utilities. AI applications can be grouped into five categories-

**• Reasoning:** The ability to solve problems through logical deduction. e.g. financial asset management, legal assessment, financial application processing, autonomous weapons systems, games

**• Knowledge:** The ability to present knowledge about the world. e.g. financial market trading, purchase prediction, fraud prevention, drug creation, medical diagnosis, media recommendation

**• Planning:** The ability to set and achieve goals. e.g. inventory management, demand forecasting, predictive maintenance, physical and digital network optimization, navigation, scheduling, logistics

**• Communication:** The ability to understand spoken and written language. e.g. real-time translation of spoken and written languages, real-time transcription, intelligent assistants, voice control.

**• Perception:** The ability to infer things about the world via sounds, images, and other sensory inputs. e.g. medical diagnosis, autonomous vehicles, surveillance.

**3.6 ARTIFICIAL INTELLIGENCE IN BANKING.**

Artificial Intelligence (AI) is fast evolving as the go-to technology for companies across the world to personalize experience for individuals. The technology itself is getting better and smarter day by day, allowing more and newer industries to adopt the AI for various applications. Banking sector is becoming one of the first adopters of AI. And just like other segments, banks are exploring and implementing the technology in various ways.

The rudimentary applications AI include bring smarter chat-bots for customer service, personalizing services for individuals, and even placing an AI robot for self-service at banks. Beyond these basic applications, banks can implement the technology for bringing in more efficiency to their back-office and even reduce fraud and security risks.

Unsurprisingly, research firms are bullish on the potential of AI in banking. According to Fintech India report by PwC in 2017, the global spending in AI applications touched $5.1 billion, up from $4 billion in 2015. There is a keen interest in the Indian banking sector as well.As the name suggests, Artificial Intelligence is the ability to copy from something that is natural, in terms of acquiring and applying knowledge and skills. Now this ability of copying is done by a machine or a computer. So, when a machine mimics a human mind by thinking for itself, it is known as Artificial Intelligence. The computers are designed in such a way that they can perform many activities. Some of these activities are – Learning, Speech recognition, Perception, Planning, Reasoning, Problem solving and also the ability to operate and move objects around. Hence, AI focuses attention on creating intelligent machines that operate and react like human beings.

**3.7 APPLICATION OF AI IN THE BANKING SECTOR**

1. **Data Analytics**

Now a days, data analytics are been used to predict the future outcomes and trends. Data analytics is of great assistance to the banks, as, pattern of customer behavior can be observed by quick processing of data and banks can predict the future outcomes. Hence, banks can contact the customer at the right time with the right product. For example, when the customer did last visited the bank, when the customer performed its transactions and what websites a customer is surfing. All this information collectively could help banks in creating unique relationship with the customer. Therefore, with the data analytics the future trend can be observed and it would help banks to up-sell and cross-sell successfully.

1. **Chatbot’s**

 **“**A chatbot is a technology service powered by algorithms that interacts with a customer in a natural (human-like) manner, either by voice or text”. In other words it’s a system that replicates human chats without any human interventions. For example, if a customer is texting, the chatbot would identify the context and emotions of the customer and would reply with the most appropriate answer. This indicates that technology is analyzing the behavior and habits of the user. Therefore, chatbot helps in understanding the customer and responding in a correct manner. Few banks have already implemented this technology as it help banks to save time, cost and in improving efficiency. This results in customer relationship management.

1. **Robotic Process Automation (RPA)**

“Robotic Process Automation uses a number of techniques to mimic routine human activities automatically, repeatedly, faster, and more accurately”. RPA is being accepted in banking industry and it is growing at a high pace. There is an emerging trend of RPA. Know a day’s RPA is acting as a tool for the banking industry. Due to high competition in the industry, every bank needs to maintain their position by maximizing their efficiency along with minimum costs. On the other hand maintaining the security level is also a challenge with the banks. Hence, for all the questions the only answer is RPA. Few examples of the banks those who have implemented RPA are: ICICI bank was the first bank in India to implement RPA on a large scale. In the year 2016 bank deployed 200 software robotics programs which have increased to 750 software robots handling 20 lakhs transactions daily (Published on official website of **ICICI Bank on 8 September 2016.)**

**3.8 HOW AI IMPROVES THE BUSINESS RESULTS**

Artificial Intelligence is of the great importance to banking sector. AI helps banks to work in an efficient and effective manner. By adopting new technology in analytics, bots, RPA and report generation, banks can reduce their cost and can allay risk and moreover can increase their revenue generation. By implementing artificial intelligence various benefits can be enjoyed by banking sector like it helps in increasing the revenue, helps in mitigating risk, brings customer satisfaction and many more. Few of the points are explained below:

* **Reduce Cost**

Artificial Intelligence is helping the banking industry in reducing the cost. As AI is helping

Customers in performing their own activities, speed-up response time, handling the data with accuracy, keep humans apprised of latest changes and many more. All such activities help the banks to reduce cost.

* **Mitigate Risk**

Risk is fatal if not given proper attention. With digitalization there is an increasing percentage of Cybercrimes which is a huge risk for both the company and the customers. After the PNB(Punjab National Bank) scam was exposed, banking sector faced huge risk and shook. Therefore, in such cases AI can play an important role. AI can monitor such threats and can help banks to install fraud detection systems. Moreover, AI can also be used to maintain cyber security, safeguarding personal data and detecting insider trading that could lead to market violence. Many banks are using AI to protect themselves and their customers from such kind of risks.

* **Increase Revenue**

With the implementation of Artificial Intelligence, banking sector can earn more revenue .Revenues can be increased by employee’s effectiveness. With the use of AI in banks, employees can work generate results faster and the process would speed-up with the help of RPA. This would result in higher productivity.

* **Customer Satisfaction**

Artificial Intelligence in banking sector also enhances customer experiences. “Banks deal with multiple queries everyday ranging from account information to application status to balance information. It becomes difficult for banks to respond to queries with low turnaround time. RPA can automate such rule based process. With the help of AI, Robotic Process Automation can resolve queries which needs decision making. Chatbot can understand the natural language to chat with customer and respond like human.”

* **Fraud Detection**

Everyday thousands of transactions takes place, few pay their bills online, transfer money, pay cheques, stock trading etc. Therefore, there is a huge requirement of artificial intelligence need to be adopted in banking sector to detect fraud activities. Cyber security is a necessity for every financial institution as well as for any bank. Many banks have already implemented AI for fraud detection.

**3.9 ARTIFICIAL INTELLIGENCE IN INDIAN BANKING SECTOR**

Technological development is ruling the world and artificial intelligence is one of the fastest evolving technologies across the globe. Industries are adopting artificial intelligence for various applications and banking sector is one among them. Artificial intelligence is the future of banking as it brings the power of complex data analytics to combat fraudulent transactions and improve compliance. AI will not replace the humans but it will help to enhance their work by making them more efficient and would help people to solve calculations in much quick and easy form that would be difficult to perform manually.

Artificial Intelligence also helps the banking sector to alleviate risk and increases the revenue by improving the customer satisfaction. Now days, it is crucial for all the banks to adopt artificial intelligence into their strategy as there is high competition and innovation accelerates in the banking sector as well. Therefore, in this paper researcher has analyzed the application of artificial intelligence in the banking

sector, how Artificial Intelligence is improving business results, implementation of AI in the banking sector and the impact of AI on Indian Banks. The methodology of this paper involves usage of primary and secondary data. An interview of 50 bank experts has been conducted by the researcher to know the impact of AI in Indian Banks. The present study is descriptive in nature and considered the first of its kind conducted on artificial intelligence with special reference to banking sector focusing Indian banks and foreign banks.

**3.10 IMPLEMENTATION OF AI IN INDIAN BANKS**

In India, implementation of AI is taking at large pace but still it has to go far beyond the current scenario. AI is been implemented at back office and front office places for better services. Few banks in India which have already implemented AI are as follows:

1. **State Bank of India**

SBI, which is India’s largest public-sector bank with 420 million customers, is embarking on its AI journey from the point of view of both employees and customers. To fuel its AI mission, in 2019, SBI launched Code for Bank, for developers, startups and students to come up with innovative ideas and solutions for the banking sector, focusing on technologies such as predictive analytics, fintech/blockchain, digital payments, IoT, AI, machine learning, BOTS and robotic process automation.” SBI is currently using an AI-based solution developed by Chapdex. From a customer chatbot perspective, SBI has launched **SIA**, an AI-powered chat assistant that addresses customer enquiries instantly and helps them with everyday banking tasks just like a bank representative. SIA is setup to handle nearly 10,000 enquiries per second or 864 million in a day. That is nearly 25% of the queries processed by Google every day. Deployment of this size is arguably the first of its kind in India and even across the world. SBI claims that SIA continuously learns with each interaction and gets better over time. Currently, SIA can address enquiries on banking products and services. It is trained with a large set of past customer questions and is said to aptly handle frequently asked questions.”(Article published in **livemint on 25 September 2017**)

1. **HDFC Bank**

“HDFC Bank has developed an AI-based chatbot, **EVA**. Since its launch, Eva (which stands Electronic Virtual Assistant) has addressed over 2.7 million customer queries, interacted with over 530,000 unique users, and held 1.2 million conversations. Eva can assimilate knowledge from thousands of sources and provide simple answers in less than 0.4 seconds, the bank said. Within the first few days of its launch, Eva has answered more than 100,000 queries from thousands of customers from 17 countries across the globe. With the launch of Eva, the bank’s customers can get information on its products and services instantaneously. It removes the need to search, browse or call. Eva also becomes smarter as it learns through its customer interactions. Going forward, Eva would be able to handle real banking transactions as well, which would enable HDFC Bank to offer the true power of conversational banking to its customers.”

(Article published in **Financial Express on 6 September 2017**)

1. **ICICI Bank**

ICICI bank, the second largest private sector bank in India has implemented software robotics. The technology adopted by the bank ‘emulates human actions to automate and perform repetitive, high-volume and time-consuming tasks’. More than 1 million transactions per day take place in ICICI bank with the help of AI. According to a report by **Baruah, A. 2019**, “At ICICI bank, software robots have reduced the response time to customers by up to 60% and increased accuracy to 100% which resulted in improving bank’s productivity and efficiency. It also enabled the bank’s employees to focus on value-added and customer-related functions”. The software robots are configured to interpret information from systems, recognize the patterns and run business process across multiple applications to execute activities. Moreover, in February 2019, ICICI bank has launched AI based chatbot named ***iPal*.** The services offered by iPal are

of three categories i.e. it involves FAQs, financial transactions and helping people in discovering new features. Since it is been launched, the chatbot has interacted with 3.1 million customers with 90% accuracy rate.

1. **Axis Bank**

Axis Bank has launched an AI and NLP enabled app in 2019. This app is introduced to help customers with financial and non-financial transactions, answer FAQs and get in touch with bank for loan and other products. (News published on **Fintech News 5 September 2018**)

1. **Canara Bank**

Humanoid robot named **Mitra**and **Candi** were introduced in Canara Bank in 2017. Mitra was programmed to navigate customer’s at large premises. Basically, it is performing the function of a receptionist. **(**News published in **Hindustan Times 22 September 2017)**

**3.11 IMPACT OF AI ON INDIAN BANKS**

Artificial Intelligence is leading in the banking industry. Every bank in India is chasing for AI and implementing the same. Therefore, to study the impact of AI on banking sector, an interview was conducted by the researcher with 50 different bankers. According to Vipin Chopra, AGM, State Bank of India, Artificial Intelligence is helping the banking industry by reducing the big queues in the branches. Before reaching the branches, customers are having voice assistance with the AI but there is also a big threat to the employees of banking sector. There could be job loss in the banking sector as AI will replace human beings. In this context, **(Crosman 2018)** analyzed that in banking, 485,000 tellers, 219,000 customer service representatives and 174,000 loan interviewers will be replaced by Chatbots, voice assistants and automated authentication and biometric technology.

* 1. **THREATS POSED BY ARTIFICIAL INTELLIGENCE**
* **Job Loss: “**Banks face the risk of backlash from their employees due to the potential automation of tasks, which can lead to job loss and job reassignments. AI, in the garb of increasing enterprise productivity, will reshape the way the employees perform their jobs. This could lead to possible dissatisfaction among employees, resulting in resignations or employees being fired due to inefficiency. AI can replace a teller, customer service executive, loan processing officer, compliance officer, and even finance managers.”
* **Reduction in customer Loyalty:** As the direct interaction between the customer and the bank representative reduces, this sometimes leads to reduction in customer loyalty. In India, banks have a special emotional value with their customers as they help in fulfilling the dreams of buying a house or a car. So due to the loss of human touch and high implementation of AI in the banking sector, loyalty of customer towards their particular bank can reduce
* **Leakage and Misuse of Data:** Cyber, physical and political threats arise with growth in AI. As complete transparency while venturing into new AI projects could lead to leakage of data and misuse of the information.
	1. **UNDERSTANDING AI’S IMPACT ON INDIAN JOBS**

One unintended consequence of AlphaGo’s victory over Lee Sedol is the fear taking root within the popular discourse over job losses to technology. Reported numbers in early 2016 from the Indian information technology industry hint as to how AI-influenced automation is beginning to make an impact on Indian jobs: a recent interview with Tata Consultancy Services’ CEO on the projected decline in hiring by major Indian IT companies attributes much of this anticipated downturn to automation, with software replacing employees even as enterprises see greater use of bots and robots.

The IT services sector is not the first to see a deleterious impact from AI on jobs. Manufacturing was arguably the first to bear the consequences of what has been dubbed the second machine age or fourth industrial revolution. While India dreams of its own manufacturing revolution through Modi’s Make in India program, it is important for policymakers to closely examine how the advent of industrial robots and their impact on manufacturing transformed companies in other developing nations. The case of Foxconn, one of the world’s largest contract manufacturers for electronics, is thus instructive. It is important for policymakers to closely examine how the advent of industrial robots and their impact on manufacturing transformed companies in other developing nations.

 Despite the perils to manufacturing, the nascent debate on the skills and jobs crisis of the AI revolution until now has focused disproportionately on the importance of Indian IT companies building AI-related skills and capabilities and on the need to train Indian IT workers with AI skills to service the next wave of enterprise IT automation in the West.

 Though India does not suffer from a brain drain of top-quality AI talent from university research labs to the industry, it must be wary to avoid this concentration of intellectual energy. Though this volatility in the middle-skill labor market represents perhaps the most profound danger to the new economy, there exists a more subtle danger within the AI community itself.

**CHAPTER IV**

**DATA ANALYSIS**

**&**

**INTERPRETATION**

**4. PRIMARY DATA COLLECTION**

**TABLE 4.1**

**GENDER PROFILE**

|  |  |  |
| --- | --- | --- |
| Gender | No. of Respondents | Percentages % |
| Male | 63 | 61.76 |
| Female | 39 | 38.24 |
| Total | 102 | 100% |

**Figure 4.1**

Source- Primary data

 **INFERENCE**

Table 4.1 shows the gender analysis of respondents. This table shows that 61.76 % of respondents are male and 38.24 % are female respondents.

**TABLE 4.2**

**AGE PROFILE**

|  |  |  |
| --- | --- | --- |
| Age | No. of Respondents | Percentages % |
| 18-25 | 51 | 50 % |
| 25-35 | 36 | 35 % |
| 35-45 | 14 | 14 % |
| Above 45 | 1 | 1 % |
| Total | 102 | 100 |

**Figure 4.2**

Source- Primary data

**INFERENCE**

Table 4.2 shows the age group of the users. Under the study we have selected population associated with banks. Among them 50% of the users are between age group of 18-25,35% of them belong to age group of 25-35,and 14% of them belong to age group of 35-45, and 1% of respondents are above the age of 45. Here we can assume that age group of 18-25 are more aware about AI in banking sector.

**TABLE 4.3**

**PROFESSION**

|  |  |  |
| --- | --- | --- |
| Profession | No. of Respondents | Percentage % |
| Student | 20 | 20 % |
| Business | 22 | 22 % |
| Service | 10 | 10 % |
| Govt. Employee | 30 | 30 % |
| Others | 20 | 18 % |
| Total | 102 | 100 % |

**Figure 4.3**

Source- Primary data

**INFERENCE**

Table 4.3 shows the profession wise analysis of respondents. The collected data pointed that a large majority of selected respondents are government Employees that is 30%. It may be because of their increased awareness about AI in banking sector. 22% are engaged in business activities, followed by 20% are students, 10% related to service sector and remaining 18% of respondents related to other categories.

**TABLE 4.4**

**RELATION BETWEEN BANK AND USER**

|  |  |  |
| --- | --- | --- |
| Relation | No. of Respondents | Percentage % |
| Bank related employee | 14 | 13.73% |
| Account holder | 86 | 84.31% |
| others | 2 | 1.96 % |
| Total | 102 | 100 % |

**Figure 4.4**

Source- Primary data

**INFERENCE**

Table 4.4 shows how people are associated with banks. Out of the population, a large no. of them (84.31% to be exact) are Account Holders and rest of them are bank related employees (13.73%) and other categories (1.96%). It is clear that majority of the population are aware about customer care services provided by banks and the impact of AI in customer relationships.

**TABLE 4.5**

**BANKS USED BY ACCOUNT HOLDERS**

|  |  |  |
| --- | --- | --- |
| Banks | No. of Respondents | Percentage% |
| State bank of India | 45 | 44.12% |
| ICICI | 20 | 19.61% |
| HDFC | 24 | 23.53% |
| Others | 13 | 12.75% |
| Total | 102 | 100% |

**Figure 4.5**

Source- Primary data

**INFERENCE**

Table 4.5 shows the banks which are used by the customers. The collected data point out that a majority of the account holders are from State bank of India (44.12%), 19.61 % are from ICICI bank , 23.53% from HDFC bank and the rest are from other banks.

**TABLE 4.6**

**NUMBER OF YEARS IN USING BANKING SERVICES**

|  |  |  |
| --- | --- | --- |
| No: of years | No: of Respondents | Percentage % |
| Less than 5 years | 41.18 | 42 |
| 5-10 years | 26.47 | 27 |
| 10-15 years | 26.47 | 27 |
| More than 15 years | 5.88 | 6 |
|  | 100 | 102 |

 **Figure 4.6**

**NUMBER OF YEARS IN USING BANKING SERVICES**

Source- Primary data

**INFERENCE**

From the above table 4.6 , it shows that majority of the respondents are using banking services for less than 5 years (42.18%). And 26.47% of the respondents are using banking services for 5-10 and 10-15 years each. The remaining 5.88% of the respondents are using the services offered by the banks for more than 15 years.

**TABLE 4.7**

**TECHNOLOGIES USED**

|  |  |  |
| --- | --- | --- |
| Devices | No. of Respondents | Percentage % |
| Smart Phones | 54 | 52.94% |
| Laptop | 27 | 26.47% |
| Desktop | 20 | 19.61% |
| Others | 1 | 0.98% |
| Total | 102 | 100% |

**Figure 4.7**

Source- Primary data

**INFERENCE**

From table 4.7, the survey report shows that out of the whole population a large number of them are smart phone users (53%) and the rest of the technologies are not in frequent use. From this primary data we can assume that people are engaged more in mobile banking than traditional banking. Although the user population is high there was a small no. of population who did not use any technology.

**TABLE 4.8**

**DIFFICULTIES IN USING TECHNOLOGIES**

|  |  |  |
| --- | --- | --- |
| Difficulties | No. of Respondents | Percentage % |
| Illiterate | 16 | 15.69% |
| Lack of knowledge | 26 | 25.49% |
| Uneasy in handling the technologies | 21 | 20.59% |
| Lack of awareness | 31 | 30.39% |
| Others | 8 | 7.84% |
| Total | 102 | 100% |

**Figure 4.8**

Source- Primary data

**INFERENCE**

From Table 4.8 we can understand the different problems faced by users in modern banking systems such as digitisation, implementation of artificial intelligence in banking sector etc. Majority of the population are not aware about AI (30%) and lack of knowledge (25%) , some people face uneasy in handling the technologies (21%). A fewer section is illiterate and so they are unable to use these technologies.

**TABLE 4.9**

 **RESPONDENTS AWARENESS ABOUT AI IN BANKING SECTOR**

|  |  |  |
| --- | --- | --- |
| Particulars | No. of Respondents | Percentage % |
|  Highly aware | 18 | 17.65 % |
| Aware | 15 | 49.02% |
| Not aware | 34 | 33.33 % |
| Total | 102 | 100 % |

**Figure 4.9**

Source- Primary data

**INFERENCE**

Table 4.9 shows the users awareness towards artificial intelligence in Indian banking sector. It is observed that only 17.65% highly aware and most of the population 49.02 % has heard about AI and the remaining people are not aware (33.33%) about artificial intelligence.

**TABLE 4.10**

**KNOWLEDGE ABOUT AI APPLICATIONS**

|  |  |  |
| --- | --- | --- |
| Choice | No. of Respondents | Percentage |
| YES | 45 | 44.11 % |
| NO | 57 | 55.88 % |
| Total | 102 | 100 % |

**Figure 4.10**

Source- Primary data

**INFERENCE**

Figure 4.10 diagrammatic explanations make it clear that majority of the users or account holders are not aware about Artificial intelligence applications which are used in Indian banks. Here, from 102 respondents 57 of them are not aware and 45 of them are aware. There for the banks should provide information to their customers for more reliability.

**TABLE 4.11**

**KNOWLEDGE ABOUT CHATBOTS / OTHER DIGITAL PERSONAL ASSISTANTS**

|  |  |  |
| --- | --- | --- |
| Choice | No. of Respondents | Percentage % |
| YES | 52 | 91.2 % |
| NO | 5 | 8.8 % |
| Total | 57 | 100 % |

**Figure 4.11**

Source- Primary data

**INFERENCE**

Table 4.11 shows the details about the knowledge level of users towards ‘CHATBOTS’ and other digital personal assistants. Out of 57 respondents 52 of them aware about AI based digital personal assistance and the rest 5 of them are not aware about it.

**TABLE 4.12**

**‘CHAT BOTS’ WHICH ARE FAMILIAR TO USERS**

|  |  |  |
| --- | --- | --- |
| Chat bots | No. of respondents | Percentage % |
| EVA (HDFC) | 10 | 19.23 % |
| SIA (State Bank of India) | 28 | 53.84 % |
| IPal (ICICI) | 8 | 15.38 % |
| Other applications | 6 | 11.53 % |
| Total | 52 | 100 % |

**Figure 4.12**

Source- Primary data

**INFERENCE**

Table 4.12 shows the ‘CHATBOTS’ which are familiar to the customers. Basically there are many ‘CHATBOTS’ of different banks are available. They are the digital personal assistants of the bank. From our study there are 54% of the respondents aware about SIA, 19 % are aware about EVA, 15% aware about I pal, 12% are familiar about other Chatbot’s.

**TABLE 4.13**

**IMPACT OF AI IN CUSTOMER RELATIONSHIPS**

|  |  |  |
| --- | --- | --- |
| Particulars | No. of Respondents | Percentage % |
| Helpful | 20 | 19.6 % |
| Partially helpful | 78 | 76.5 % |
| Not helpful | 4 | 3.9 % |
| Total | 102 | 100 % |

**Figure 4.13**

Source- Primary data

**INFERENCE**

Table 4.12 shows opinion of the population about the Impact of Artificial intelligence in terms of customer relationships. It is examined that 19.60% of respondents agreed that AI is helpful and 76.50% agreed that it is partially helpful to the users and 3.90% assume that it is not helpful.

**TABLE 4.14**

**USERS RESOPONSE ABOUT TIME EFFECTIVENESS**

|  |  |  |
| --- | --- | --- |
| Choice | No. of Respondents | Percentage % |
| YES | 74 | 72.54 % |
| NO | 28 | 27.45 % |
| Total | 102 | 100 % |

**Figure 4.14**

Source- Primary data

**INFERENCE**

Table 4.14 reveals the suitability of Artificial Intelligence in terms of time saving. It gives a clear view about time effectiveness of Artificial intelligence in banking. Majority of the population agrees that AI is time effective (72.54%) and the remaining 27.45 % are not agreeing with the time effectiveness of AI in Indian banking.

**TABLE 4.15**

**USERS RESOPONSE ABOUT COST EFFECTIVENESS**

|  |  |  |
| --- | --- | --- |
| Choice | No. of Respondents | Percentage % |
| YES | 62 | 60.78 % |
| NO | 40 | 39.21 % |
| Total | 102 | 100 % |

**Figure 4.15**

Source- Primary data

**INFERENCE**

Table 4.15 reveals the suitability of Artificial Intelligence in terms of cost saving. It gives a clear view about cost effectiveness of Artificial intelligence in banking. Majority of the population agrees that AI is cost effective (60.78%) and the remaining 39.21 % are not agreeing with the cost effectiveness of AI in Indian banking.

**TABLE 4.16**

**ANALYSIS ON BETTER PERFOMANCE ON JOB BETWEEN AI AND HUMANS**

|  |  |  |
| --- | --- | --- |
| Particulars | No. of Respondents | Percentage |
| Humans | 29 | 28.43 % |
| AI | 45 | 44.12 % |
| Don’t know | 25 | 24.51 % |
| Prefer not to answer | 3 | 2.94 % |
| Total | 102 | 100 % |

**Figure 4.16**

Source- Primary data

**INFERENCE**

Table 4.16 shows the opinion of population about better performance in jobs in banking sector. It is clear that 28 % think humans will have better performance on jobs, a slightly increased percentage of 44% think that Artificial intelligence will have a better performance on jobs, 25% choose don’t know and 3 choose not to answer.

**TABLE 4.17**

**REACTION TO ARTIFICIAL INTELLIGENCE EMPLOYMENT ISSUE IN BANKING SECTOR**

|  |  |  |
| --- | --- | --- |
| Opinions | No. of Respondents | Percentage % |
| Stop developing AI technologies | 6 | 5.88 % |
| Learn how to work with AI | 64 | 62.74 % |
| Improve education level | 22 | 21.56 % |
| Choose fields least affected by AI | 10 | 9.80 % |
| Total | 102 | 100 % |

**Figure 4.17**

Source- Primary data

**INFERENCE**

Figure 4.17 bar diagram shows the reaction of population towards the employment issue in banking sector by the arrival of AI based technologies. It is clearly observed that 62.74% of the respondents likes to learn AI technologies, 21.56% think that the current education system should be improved, 5.88 % advocates stopping of development in AI technologies is better, and 9.80% thinks that we should choose fields least affected by AI.

**TABLE 4.18**

**SECURITY ASSURED BY ARTIFICIAL INTELLIGENCE IN BANKING**

|  |  |  |
| --- | --- | --- |
| Particulars | No. of Respondents | Percentage % |
| Highly secured | 30 | 29.41 % |
| Secured | 58 | 56.86 % |
| Not secured | 14 | 13.72 % |
| Total | 102 | 100 % |

**Figure 4.18**

Source- Primary data

**INFERENCE**

Table 4.18 reveals the users opinion about the security in using Artificial intelligence applications in banking. Majority of the respondents agree that AI is secured (56.86%) in terms of customer care services, privacy in transactions, safeguarding personal information etc. 13.72% reluctant to use AI applications because of security issues.

**TABLE 4.19**

**USERS OPINION ABOUT RELATIONSHIP BETWEEN ARTIFICIAL INTELLIGENCE TOWARDS GREEN ECONOMY**

|  |  |  |
| --- | --- | --- |
| Opinion | No. of Respondents | Percentage % |
| Affects green economy | 64 | 62.74 % |
| Neutrally affects | 26 | 25.49 % |
| Not affects | 12 | 11.76 % |
| Total | 102 | 100 % |

**Figure 4.19**

Source- Primary data

**INFERENCE**

Table 4.19 shows the users response regarding the relationship between Artificial intelligence towards green economy. Here majority respondents (63%) believe artificial intelligence will affect green economy, 25% sit on the fence and meagre 12 % thinks it will not affect green economy.

**TABLE 4.20**

**FUTURE OF ARTIFICIAL INTELLIGENCE IN BANKING SECTOR**

|  |  |  |
| --- | --- | --- |
| Choices | No. of respondents | Percentage % |
| 1 | 9 | 8.82 % |
| 2 | 7 | 6.86 % |
| 3 | 23 | 22.55 % |
| 4 | 37 | 36.27 % |
| 5 | 26 | 25.49 % |
| Total | 102 | 100 % |

**Figure 4.20**

Source- Primary data

**INFERENCE**

Table 4.20 shows users responses towards future of Artificial intelligence in banking sector. The responses are collected out of 5 rating. 36.27% rate 4/5 , 25.49% rate 5/5 , 2.55% rate 3/5 , 6.86% rate 2/5 , 8.82% rate 1/5. Thus it reveals that majority of the people think that in future there will be a positive impact by Artificial intelligence applications on banking sector.

**TABLE 4.21**

**FUTURE OF AI IN DIFFERENT BANKING FUNCTIONS**

|  |  |  |
| --- | --- | --- |
| FUNCTIONS  | No. of Respondents |   |
| 1 | 2 | 3 | 4 | 5 | Total |
| Accepting and lending functions | 52 | 24 | 12 | 8 | 6 | 102 |
| Agency functions | 12 | 24 | 52 | 8 | 6 | 102 |
| General utility functions | 24 | 36 | 16 | 12 | 14 | 102 |
| Other functions | 32 | 20 | 28 | 8 | 14 | 102 |

**Figure 4.21**

Source- Primary data

**INFERENCE**

Figure 4.21 shows the future scope of artificial intelligence in primary and secondary functions of banks such as accepting and lending functions, agency function, general utility functions and other functions. It seems that out of 102 responses, majority 52 give 1st rank in accepting and lending functions, 52 give 3rd rank in agency functions. 36 give 2nd rank in general utility functions and 32 give 1st rank in other functions of bank.

**CHAPTER V**

**FINDINGS, CONCLUSIONS**

**&**

**SUGGESTIONS**

**5.1 FINDINGS**

The study conducted on the impact of AI on INDIAN BANKING SECTOR.

* It was observed that majority of the respondents were males.
* The age group between 18-25 are more associated with the banks.
* It was found that most of the respondents were gov’t employees and business related persons.
* It was observed that majority of the respondents are associated with the bank as an Account Holder.
* Most of the account holders are from State Bank of India(SBI).
* A large no: of respondents are using banking services for less than 5 years and only a small no: of people are using the services of bank for more than 15 years.
* It was found that more no: of people are using smart phones and the rest of the technologies are not in frequent use. So people are more engaged in mobile banking than traditional banking.
* Majority of the respondents find difficulties in using banking technologies due to lack of awareness and knowledge. A fewer section is illiterate so they are unable to use these technologies.
* It was observed that only a few respondents are highly aware about AI in banking sector.
* Most of the respondents or account holders are not aware about AI applications used in Indian banks.
* It was analyzed that a large number of respondents have awareness about CHATBOTS and other personal assistance and a smaller portion are not at all aware.
* It was found that the most commonly used chatbot among the respondents were SIA which belongs to SBI.
* It was examined that most of the respondents have an opinion that AI is partially helpful in terms of customer relationships.
* Most of the respondents have agreed that AI has a positive impact on time as well as cost effectiveness in banking services offered.
* It was found that more of the respondents have an opinion that AI has a better performance on job in banking sector than humans. And a few thinks humans will have better performance on jobs.
* It is clearly observed that a large no : of respondents would like to learn about AI and a few thinks that stopping of development in AI technologies would be better which shows the reaction of population towards the employment issue in banking sector by the arrival of AI based technologies.
* Majority of the respondents agree that AI is secured in terms of customer care services, privacy in transactions, safeguarding personal information etc. a few are reluctant to use AI applications because of security issues.
* It is examined that most of the respondents believe AI will positively affect green economy as the mobile banking helps to reduce environmental risks and aims at sustainable development without degrading the environment. A few thinks it will negatively affect green economy.
* AI technologies enable banks to bring more efficiency to their operations and manage costs. All this transforms to increased revenue, reduces costs and a boost in profits. Most of the respondents have rated 4 out of 5 and they think that in future there will be a positive impact of AI on Indian banking sector.
* There will be a bright future in primary and secondary functions of banks such as accepting and lending functions, agency function, general utility functions and other functions.

**5.2 CONCLUSION**

From the above findings we can conclude that AI is playing a very crucial role in banking sector in reducing cost, mitigating risk, detecting fraud and increasing customer satisfaction but on the other hand many precautions should be taken while implementing it, as there is always a threat of leakage of data which could incur a huge loss to the banks. Artificial Intelligence is already been implemented in many banks like HDFC bank deployed Eva, State Bank of India has launched SIA and similarly other banks in India, to target customer satisfaction.

AI technologies enable banks to bring more efficiency to their operations and manage costs. All this transforms to increased revenue , reduces costs and a boost in profits and in future there will be a positive impact of AI on Indian banking sector. In the green economy space, AI may offer new opportunities to leverage data and the patterns within them to measure sustainability , promote efficiency. Hence we can conclude that AI is an emerging tool in banking sector.

**5.3 SUGGESTIONS**

Following are the suggestions recommended:

* Banks should take necessary steps to create awareness among customers about the advantages of AI in banking sector.
* Governments around the world should collectively come forward for the formulation of guidelines regarding the development of artificial intelligence and newer technologies
* As there is loss of jobs the Indian government must urgently undertake a complete revision of the current Indian education sector which is not suitable for training and educating students for getting jobs for future.
* Computer-related skills should be incorporated into all fields in order to effectively train students
* We as students also have the ultimate responsibility of upgrading our skills and preparing us for jobs of the future.

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**APPENDIXQUESTIONAIRE**

**“IMPACT OF ARTIFICIAL INTELLIGENCE IN INDIAN BANKING SECTOR”**

Dear sir/ma’am,

As a part of our project, we the final year B COM graduate students of St Paul’s College Kalamassery are conducting a study on the “IMPACT OF ARTIFICIAL ITELLIGENCE IN INDIAN BANKS”. We would require your assistance and support to understand AI applications which are being used by customers and employees at leading Indian banks, benefits of these AI applications in terms of reduction in cost, time and efforts & to study the customer knowledge and satisfaction towards AI in banks.

I therefore kindly request you to spare a few minutes to fill up this questionnaire. We assure you that any information collected during the survey, will be only used for Academic and research purpose and will kept confidential.

NAME **:**

ADDRESS  **:**

CONTACT NO**:**

GENDER **:** Male Female

AGE **:** 18-25 25-35

 35-45 Above 45

PROFESSION Student Business

 Govt.Employee Service Others

1. How you are associated with banks?

 Bank related Employee Account holders Others

2. Which bank do you have account?

 State Bank Of India HDFC ICICI

 Others

3. How many years you have been an account holder?

 Less than 5 yrs 5-10 yrs 10-15 yrs

 More than 15 yrs

4. Which one of the following you use the most?

 Smart phones Laptop Desktop

 Others

5. Do you find any difficulties in using these technologies?

 If so any of the following matters?

 Illiterate Lack of knowledge Lack of awareness

 Uneasy in handling Others

 Technologies

6. Are you aware about Artificial intelligence in banking sector?

 Highly aware Partially aware Not aware

7. Do you know about AI apps/ Applications?

 Yes No

8. Are you aware about ‘CHATBOTS’ or any digital personal assistants?

 Yes No

9. Which ‘Chabot’ are you familiar with?

 EVA (HDFC) SIA (State Bank of India) iPal (ICICI)

 Others Applications

10. Do you think AI is helpful in Customer Relationships?

 Helpful Partially helpful Not helpful

11. Is it Time effective?

 Yes No

12. Is it Cost effective?

 Yes No

13. Whom do you think have a better performance?

 Humans AI Don’t know

 Prefer not to answer

14. How do you think humans will react to this situation?

 Stop developing AI Learn how to work Improve Education

 Technology with AI Level

 Choose fields least affected

 by AI

15. Do you think it is secured method as compared to traditional banking?

 Highly secured Secured Not secured

16. Do you think Artificial Intelligence applications affect Green economy?

 Affects green economy Neutrally affect Not affect

17. In your opinion what will be the scope of Artificial Intelligence in future?

 1 2 3 4 5

18. Which are the key areas in terms of functions, Artificial intelligence will have better performance in future?

 Accepting and lending Agency functions General utility

 Functions Functions

 Other functions