A Study on The Impact of Artificial Intelligence With Regards to the Indian Banking Sector with Special Reference to Bengaluru

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Abstract

In the last couple of years, the banking sectors in India have increasingly deployed and implemented AI technologies. Banking is one of the sectors which are seeing rapid adoption of AI, as banks are being proactive about improving customer experience by leveraging the abundance of data which the business revolves around. AI is found in all streams of operations such as Retail, health care centers, Logistics, lending, Inventory control, Farming, insurance or wealth management, AI technologies have shown potential of making them all better. The use of Artificial Intelligence in Banking is focused on providing good customer service or engagement such as balance inquiry, accessing mini statements, fund transfers, etc. Thus improving the improving the efficiency of operations.AI will take away all the Bengaluru city there is when it comes to banking, and use the huge amount of structured as well as unstructured data. It provides enormous benefits such as better customer experience operations, reduced operational costs and risks, fraud detection, Improved loan facility and provides quick solutions to customer queries and grievances.

The Research has been conducted to study the impact of AI. The Researcher are mainly collecting the large number of data with the help of primary data from a sample size of 50 respondents with the help of structured questionnaire and the Researcher is going to analyze the data using Logistic Regression Analysis, F- Test and secondary data which is analysed by descriptive analysis. By this study the Researcher will know the amount of impact that has taken place during the course of time.

Keywords: Artificial Intelligence (AI), Banking, Business Intelligence (BI), Data Analytics, Transaction Monitoring

Introduction

In the Indian Economy, Banking sector plays a very important part in terms of technological innovation. With increased use of technology, there has been an increase in cost effectiveness, productivity and efficiency in banking operations. It has helped in making small value transactions

viable. It also provides variety of choices, creates new market etc…. It has been noticed that Banks have turned into a place of customer-centric and technologically compliant.

Banking, Financial and Legal Services, Education, Insurance, Automotive Industry, Healthcare diagnostic centres are the areas that has been going through continuous technological disruptions. Every Now and then, a new trend is being adopted by these sectors to make it more easy and convenient for the customers. Most of these changes today are for enriching the consumer's experience.

Few decades ago, Traditional Banking in India had faced a lot of problems such as long waiting lines for customer services lack of security, low customer retention, unnecessary bank charges...Banking sector has fully modernized and automated itself to provide better customer service by adapting various technological innovations such as core banking solution, No frills account, Demat account, Net banking, Mobile banking, ATMs, E- banking services, e-KYC, and much more... Since 2016, Banking sector has adopted Artificial Intelligence, Chat bots, Robotic process Automation, AI virtual assistants, Machine Learning etc. Several banks in India and abroad have adopted robotics to ease their banking operations, which brings great workforce efficiency and speedy delivery of services.

In India, State Bank of India was the first to launch SIA (SBI Intelligent Assistant), an AI-enabled virtual assistant, helps in assisting customers with everyday banking tasks and addresses the customer enquiries. Then secondly, HDFC had introduced "Eva," which stands for Electronic Virtual Assistant. Eva assists with providing information about the bank's products and services instantaneously and solves customers' queries and provides them with better services. Thirdly, ICICI

Bank had launched software applied robotics in various business processes across the functions of the company. Similarly, Bank of America launched 2 AI tools such as "Erica" which provides smart solutions to the bank's customers. "CashPro" which uses artificial intelligence (AI) and machine learning (ML) to predict future cash positions of clients' accounts.

A lot of banks and financial institutions are using AI Based systems to ease front-end, middle-end, back-end process for achieving a better functional design. The Investment bank JPMorgan Chase had launched COIN to recognize complex contracts saving almost 360,000 of man-hours and handles IT access requests from employees. This has helped the bank in solving the customer's queries quickly thereby reducing the response time, handling large volumes of tasks; reduce error rates and operational costs, track the loopholes in their systems and minimize risk, helps to study and recommend untapped investment opportunities etc.

Review Of Literature

Dr. Navleen Kumar, Ms. Supriya Lamba Sahdev, Dr. Monika Sharma, Laraibe Siddiqui (2020) In their study reported that the impact of artificial intelligence in banking sector has been enormously beneficial in terms of reducing the chances of fraud and scams, manages large volumes of data, increases the productivity and efficiency of employees, to carry out effective decision making, data security etc.AI acts a financial advisor in tapping investment opportunities. Banks has applied AI to improve the customer experience and retention. The influence of Artificial Intelligence in the banking sector and how it's changing the face of Modern-day banks. Various innovative and advanced technologies has brought many changes in the face of Modern banks such as Drive thru Banking, Bank stations, Passbook Updation

Kiosks, Chabot's-The Intelligent Banking Assistant, Cash deposit machine, ATM Machine Helpline, Mobile Banking, Block chain Technology and AI-based algorithms and Fraud detection. Artificial Intelligence brings out various benefits to customers like speed of services, user friendly and doubles the security system in banks.

Praveen Kumar Donepudi (2017) In his study viewed that Artificial Intelligence has different uses in banking like fraud detection, uses chatbots and virtual assistants to help the customers, detects security threats and accuracy in processing operations. Machine Learning technique helps in credit scoring the customers. It helps to predict whether the client will be able to pay the money back or not. Both Artificial intelligence and machine learning techniques are the future of Banking.

Ritu Tuli & Sameer Salunkhe (2019) In their study reported that the role of artificial intelligence in providing customer services for Banks. AI allows customers to plan out personalized experience by giving customers the right decisions, helps to understand the customer better, taking advantage of real-time decisioning and predictive analysis. With AI, it is possible to automate operations and to improve businesses. Since AI is in the early stage of implementation, banks must promote the AI services to the customers by increasing the volume of transactions through the bank app as regular users will get updated.

Matthew Sainsbury, FST Media [2012] Artificial Intelligence (AI) has become the next technological innovation for banks as they look to leverage their investment in mobile to provide better customer experience. Standard Chartered and Citi Banks are developed with AI solutions to assist with staff training, and reduce human error at all points in the process of customer engagement and transaction processes.

Dr. Munish Sabharwal (2014)- This report will look at the Indian Banks using AI- based technologies and different purposes for using them. Most of the Indian banks use AI for Automatic Cheque book Re-order facility, Employees performance evaluation, Credit evaluation and portfolio analysis. Indian Banks must start to implement AI based technologies for more complex purposes like Signature Verification, Damage/ Risk Assessment, Employee Performance Evaluation and Investment Forecasting etc. which will operations much easier.

G. Koteswara Rao & Roshan Kumar [2011] Banks can use technology to improve their efficiency in handling the customers, up to date monitoring the information system, accuracy in transactions, performance and they can get the sustainable competitive advantage. With internet facility, the customers need not visit the bank branch nor wait in long queues. All banking transactions such as funds transfer, obtaining credit cards, checking bank balance etc. can be done while sitting at home or any location. Online banking services are available 24X7. According to our study, we can conclude that proper integration of Business Intelligence and Knowledge Management can help bank to get wider benefits for customers.

Dr.C.Vijai. (2019) this study subjected the areas, applications and challenges of artificial intelligence is being used by the banks. Major problem is lack of training seen in the bank employees associating with the advanced tools and applications of the use of AI in banking, Data Silos and Legacy IT Infrastructure and to keep up with the regulatory standards of government and compliance with the Central Bank.

Dr. V. Padmanabhan & V. Princy Metilda (2021) - In their study explained the meaning of Artificial Intelligence and reasons for adopting the Artificial

Intelligence in banking sector. The implementation of Artificial Intelligence in Banking Industries and how Artificial Intelligence has positively and negatively impacted the Indian Banking Industry.

Krunoslav Ris, Zeljko Stankovic and Zoran Avramovic (2020) - In their study explained how implementing Artificial Intelligence in the Banking Business correlates with the Human factor. This state the decisions in Banks depend on Human factor which is time-consuming and most of the decisions goes wrong due to incomplete and inappropriate information. So will deal with these issues intelligently and monitor all the information related to customer and stakeholders. Artificial Intelligence uses real time data to co-ordinate and provides proper guidelines to customer based on the banking regulations. This will help the banks to increase their performance in terms of profitability and customer satisfaction. The purpose of this study is to replace human factor with AI, so as to improve the efficiency and effectiveness of service delivery and goodwill and profits of banks. AI contributes to scientific and professional achievement to the development of Artificial Intelligence.

Saloni Tripathi, Riya Garg and Krishna Varshini (2022)- This report will look at how Artificial Intelligence is evolved over the years, reasons for adopting Artificial Intelligence in the banking sector like self-employment, operational efficiency, risk management etc. The uses of Artificial Intelligence in the banking sector such as customer interface, customer insights and personalization etc. The list of Indian Banks using AI, the future of AI in the banking, the impact of Artificial Intelligence in banking, Benefits and Disadvantages of Artificial Intelligence in banks.

Ahmad Ghandour (2021) - This report will look into how AI has penetrated in the banking industry with the help of internet and automated online banking services. The opportunities of AI in banking sector are smart wallets, strong customer satisfaction and relationship, data driven Ai systems to support forecasting, decision making and problem- solving processes, detection of money laundering and frauds, opportunity to promote digital financial inclusion. The challenges are privacy violation concerns, loss of human touch, lack of adequate quality datasets to train and test AI algorithms and restrictive AI implementation and operational resources.

B.Thirumoorthi, Dr Priya Kalyanasundaram & Dr. S. Naganandhini (2022)- This report will look at the correlation between the usage of Artificial Intelligence and interest income of selected banks. The Dissection the effect of Artificial Intelligence in financial execution and different uses of AI in banking sector. Man- made AI has brought various changes in income parameters of the bank. With use of AI, banks have increased their performance in various ways like more productive business processes, offer personalized services to customers, due to this advancement banks can expand their branches all over the world with less expense, which has made banks superpower in processing and governing the operations.

Geetha (2021) - Her study stated that the perception of clients and customers about the usage of Artificial Intelligence in the banking and financial services. Adoption of AI in banking and financial services has brought positive development in such a way that promotes efficient service delivery to customers and clients, which brings overall satisfaction and retention.

*Veerla Veeranjaneyulu (2021)-*This study focuses on AI's application in India's banking sector and explores the capabilities of Artificial Intelligence to deliver positive result for successful implementation in Indian Banking sector.

Fares H, Butt & Mark lee (2022) - This report will look into the utilization of artificial intelligence in the banking sector and how does AI effect the customer's banking journey in 3 states such as front stage, back stage and support processes.

Kishore Meghani (2020)- This Report will look into use of Artificial Intelligence and Block chain In Banking Sector. The areas of Artificial Intelligence can be used in banking sector such as Personalized Financial Services, Smart Wallets, Voice Assisted Banking, Customer support, Underwriting, Block chain hastening payments, Digitalization instead of branch lines, Reduce Costs, Mitigate Risk and Increase Revenue. The benefits of block chain technology in banking sector are raising funds, faster payment, quick clearance and settlement system, trade finance and loans or credits. The potential future of Artificial Intelligence will help in providing personalized customer experience, detects any flags or frauds and conducts further investigation, replaces human factor, back office operations reduces data cost savings, increases the volumes of transactions and revenue growth, makes reasonable choices of lending,24x7 customer support, help employees to shapes strategies etc… will reap all the benefits which will eventually turn the banks into an automated centers, helps to shape the future of Modern banks.

Akshaya Thayaseelan, Simeon A Babatunde & Hatem El-Gohary (2021)- This report will look into the Effect of Artificial Intelligent Enabled Technology on Customers Experience in Banking Sector. The usage of Digital banking and experiences of customers. Most of the customers hesitate to use virtual assistants and Chat bots, banks must educate them as they are reliable and trustworthy. Banks must also develop their banking app and aim to provide all services through the bank app so that it reaches the demands of clients and customers all the corners of the world

Research Gap

Few studies have been conducted regarding the impact of Artificial Intelligence with regards to Indian Banking sector on primary data. This present study is an attempt to know the impact and customer satisfaction level before and after implementation of Artificial Intelligence among Indian Banking sector.

Research Objectives

- To study the level of impact of artificial intelligence among Indian banks sectors
- To analyse the customer satisfaction level before and after implementation of AI.

Hypothesis

Table 1: Hypothesis of the study

H10	There is no impact on AI among Indian Banking
H1a	There is an impact on AI among Indian Banking
H20	There is no variance in the customer satisfaction level before and after implementation of AI
H2a	There is a variance in the customer satisfaction level before and after implementation of AI

Statement of The Problem

The use of Information Technology in all spheres of banking sector has promised to deliver better customer services and helps to sustain competitive advantage over other banks. IT helps to maximize banks of pro-active measures such as strengthening banks infrastructure in respect of security, communication and networking etc. This is done in order to keep constant touch with the customers.

SMS
VARANASI

The customers have high expectations and have become more demanding now as they are also more techno-savvy as compared to their counter parts of the past years. Information technology poses both positive as well as negative impact. The present study is analyzing the changes in the banking sector due to the technological advancement and its impact and its variance of implementation of AI on the banking sector.

Scope of The Study

All Banks follows the norms and statutory regulatory compliance with RBI and the need for computerization of banks was felt in the late 1980's and recommended by Dr. C. Rangarajan committee and other committees as well. Since then the Banks have benefitted in several ways by adopting newer technologies. Therefore their policy for implementation of the latest technology in branches of a particular bank are same anywhere. Therefore, the area of research chosen by the researcher is Bengaluru city, as it is a well-developed city having branches of most of the banks.

Methodology

The Researchers have used both sources of data such as primary data and secondary data. The primary data collected by the researchers from 50 customers through structured questionnaire and secondary data collected from various websites, journals, and articles etc. Snow ball sampling technique was used for collecting the data in this study. Factor analysis, Regression analyses, F Test are the tools used by the researcher to analyses and interpret the data.

Analysis and Discussion

To analyze impact of Artificial Intelligence on the Indian Banking sector the 20 variables were considered for dimension reduction. An explorative factor analysis for the variables of the Artificial Intelligence was done.

The impact of Artificial Intelligence in Indian banking sector, KMO is found to be .870 indicating an adequate sample size. The significance ($p<0.000$) of the Bartlett's Test of Sphericity reveal that the variables

Explained the dimension to a large extent. This can be understood that the number of components identified in factor analysis

Table 2: Showing KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.870
Bartlett's Test of Sphericity	Approx. Chi-Square	1076.474
	df	171
	Sig.	.000

The extraction and the total variance explained by the items. The initial Eigen values above one were considered. It is found that the varimax rotation of the factors showed three factors converging. They together explained 78.323% of the impact of Artificial Intelligence in Indian banking sector.

Table 3: Showing the Rotated Component Matrix of Factor Analysis Rotated Component Matrix[a]

		Component		
		1	2	3
Utility and Accessibility	Brings enhanced productivity	0.795		
	Integrating other applications	0.79		
	Convenient to use	0.773		
	Tailor-made accounting	0.702		
	Efficiency in transactions	0.686		
	Eliminates human errors	0.668		
	Leveraging futuristic technologies	0.641		
	Upgrades	0.573		
Low Cost and High Level Computing	User friendly		0.832	
	Convenient collaboration		0.801	
	Customer support and helpdesk		0.698	
	Real-time analysis of results		0.688	
	Reduce paper work		0.679	
	Digitalization and automation		0.664	
	Bandwidth		0.527	
Security and sustainability	Image and face recognition.			0.815
	Customer support and helpdesk			0.766
	Enhances prompt payment instrument			0.762
	The efficiency of fraud			0.672
	Flexibility			0.621

The rotated component matrix shows what factors explain the various dimensions or components. The close analyses of the group of items are done to understand the dimension explained in the factor analysis.

Table 4: Showing the Regression Analysis on the impact level on the Indian Banking

Regression Analysis Impact Level on The Indian Banking:

Dependent variable	The impact of Artificial Intelligence on the Indian Banking
Independent Variable	Utility and Scalability, Low Cost and High Level Computing & Secure storing and management and sustainability
Walden test	53.25%
Hit ratio	78.07
R2 Value	65.25
Significant value	.01

The table show that all the variables seem to be significant by Wald's test for significant of variable. The model validity given by the Hit-Ratio = 78.07. The hit ratio accuracy of prediction 78.07 (>75%) indicate that the model would predict with an average accuracy of 78.07% which is highly acceptable. Further, it is to be noted that the r^2 value is also high (.652>0.6) for the model and also significant level is 0.01. So the researchers reject the null hypothesis and accept the alternative hypothesis

Table 5: Showing that Null hypothesis is rejected and Alternative hypothesis is accepted.

H0	There is no impact on AI among Indian Banking	Rejected
Ha	There is an impact on AI among Indian Banking	Accepted

F TEST

To analyze the customer satisfaction variance in Indian Banking sector the researcher used F-Test.

Table 6: Showing that F Test Two Sample for variances

F-Test Two-Sample for Variances		
	Variable	Variable 2
Mean	9740.2	8664.4
Variance	7768999.7	5643996.8
Observations	10	10
df	9	9
F	1.376506751	
P(F<=f) one-tail	0.382172639	
F Critical one-tail	6.388232909	

The above table shows the average market value of real estate in the various places in Bengaluru. After considering the customer satisfaction variance in Indian Banking sector before and after the implementation of AI the researcher used F-test to analyses the variance. F value = 1.376506751 which is less than F Critical one-tail value 6.388232909. So the researcher rejects the null hypothesis and accepts the alternative hypothesis.

Table 7: Showing that Null hypothesis is rejected and Alternative hypothesis is accepted.

There is no variance in the customer satisfaction level before and after implementation of AI	Rejected
There is a variance in the customer satisfaction level before and after implementation of AI	Accepted

Research Findings

Objective 1: To study the level of impact of artificial intelligence among Indian banks sectors.

From Regression Analysis, the Dependent variable is the impact of Artificial Intelligence on the Indian Banking and the independent variable is Utility and Scalability, Low Cost and High Level Computing & Secure storing and management and sustainability. The model validity given by the Hit-Ratio = 78.07. The hit ratio accuracy of prediction 78.07 (>75%) indicate that the model would

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predict with an average accuracy of 78.07% which is highly acceptable. Further, it is to be noted that the r^2 value is also high (.652>0.6) for the model and also significant level is 0.01. So the researchers reject the null hypothesis and accept the alternative hypothesis..i.e There is an impact on AI among Indian Banking.

Objective 2: To analyse the customer satisfaction level before and after implementation of AI.

From F-test to analyses the variance. F value = 1.376506751which is less than F Critical one-tail value 6.388232909. So the researcher rejects the null hypothesis and accepts the alternative hypothesis. i.e. There is a variance in the customer satisfaction level before and after implementation of AI.

Conclusion

The research clearly suggests that the use artificial intelligence based technological applications. All the Indian Banks should initiate the process of the use of most modern expertise such as Artificial Intelligence based technological applications to provide customized services and products to its customers as well as in Transaction Monitoring.

HBR notes that 'If a typical person can do a mental task with less than one second of thought, we can probably automate it using AI either now or in the near future.' However, it's the culture of a start-up to try these things faster and iterate on innovations like AI. As they gather the data through aggregation, there's the potential for newer challenger banks to steal market share, as they use data and technology to offer a far more useful (and perhaps holistic) banking experience.

Recommendations

The primary of Artificial Intelligence in the

banking sector is to cater the needs and requirements of customers. Banks and financial services companies are using Artificial Intelligence for monitoring the operations and their performance. Banks will start implementing AI in both internal and external process to comply with the regulatory standards.

The application of Artificial Intelligence in Indian banking sector is although in the nascent stage. AI will help banks to reduce costs by increasing productivity in processes. Driving the banking sector with the AI technology will enhance the banking processes in various ways like, preventing them from the cyber threats and maintaining the confidentiality of the customer's information is much needed. In order to face the difficulties in future without adapting of the new technologies in banking sector, the best way is to adapt with these technologies and thus making those difficulties as opportunities in future which helps to grow as robust and reliable banking sector.

Scope For Future Research

- How Artificial Intelligence has replaced human staff in banks for processing banking operations?
- How Artificial Intelligence can be threat to cybercrimes?
- Future application of Artificial Intelligence can detected easily such as Anti-money laundering and loan risk assessment.

Limitations of The Study

- This study was conducted with 10 selected banks such as ICICI Bank, HFDC Bank, Axis Bank, Bank of Baroda, Yes bank, City union bank, Kotak Mahindra Bank, State Bank of India, Canara Bank and Central Bank customers.

•· The study is about the impact of artificial intelligence on bank customers.

•· This study pertains to Indian banking sector.

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