

EXPLORING THE IMPACT OF AI-POWERED CHATBOTS ON CUSTOMER EXPERIENCE IN INDIAN BANKING

Lakshya Patwa

Turiba University, Latvia

Abstract

This study looks at how AI-powered chatbots are changing the way customers interact with banks in India. It explores different chatbot platforms, how well they perform, and the challenges banks face. Based on real insights, the paper suggests ways to make chatbots more helpful and personalized using NLP and machine learning—so banks can offer better service and keep up with the pace of digital change.

Keywords: AI-powered Chatbots, Indian Banking, Customer Experience, Natural Language Processing, Digital Transformation, User Interaction, Chatbot Implementation

INTRODUCTION

Artificial intelligence (AI) has become an important topic of consideration in business. The financial services industry in India is using AI to drive innovation and make better decisions. This trend is accelerating in the wake of the COVID-19 pandemic as more and more businesses re-imagine themselves in the 'AI era' and leaders think through how to make AI mainstream. As digitization is increasing and mobile internet users are rising, banks are now required to deliver fast and personalized services [40].

AI Adoption in Indian Banking

In the last few years, the banking landscape has been substantially altered because of emerging and evolving technologies. It started with internet banking, and moved on to Mobile Banking. Now, with simplified payment interfaces such as home-grown UPI, transacting on the mobile phone through Digital Banking has become commonplace, if not important. The next step in terms of technological innovation is using ChatBots [1]. Through strategic partnerships and the integration of cutting-edge technologies like AI and data analytics, we remain agile and poised for sustained growth in the digital era [2]. Together with Machine Learning (ML), AI technologies are being deployed in asset management, algorithmic trading, credit underwriting, and fraud detection.

Furthermore, AI optimises IT operations, digital marketing, and realtime analysis of customer transactions, improving risk management and customer experience. The report states, "AI optimises IT operations, digital marketing, and real-time analysis of customer transactions, improving risk management and customer experience" [4]. Also, In India, Scheduled Commercial Banks (SCBs) leverage AI for data analytics, fraud detection, and deploy chatbots for customer service. Innovations like the Jan Dhan-Aadhar-Mobile (JAM) trinity and the Unified Payments Interface (UPI) are driving financial inclusion and digitisation, facilitating ~131 billion transactions for fiscal 2024 [4].

What Is AI-Powered Chatbots?

AI-powered Chatbots are virtual assistants who can interact with customers through chat/chatbots. Artificial intelligent chatbots are super relied on Machine Learning. India's financial sector is undergoing a significant transformation driven by the relentless pace of digitalization, which is reshaping how financial institutions operate and interact with their customers. New technologies, such as artificial intelligence (AI), big data and blockchain, are fostering innovations that can enhance the efficiency and accessibility of financial services. Yet, the journey towards digitalization is not without its challenges.

As India continues to leverage technology to drive inclusive growth and sustainable development, it becomes imperative to critically examine the opportunities and challenges that accompany this transformative journey [5]. Chatbots are artificial intelligence powered programs that help a customer with their requirements. Most banks have started placing Chatbots on their websites to direct

customers to the right place. With an evolution of technologies, Chatbots are helping transform the traditional banking experience [1].

Importance Of Customer Experience

Customer experience is very important factor in banking industry, it is influencing overall satisfaction and customer's loyalty. The report from "The Reserve Bank of India – Financial Stability report (July 2024) talks that improving or enhancement in customer experience is a first important drive for adaptation towards digitalization among all banks and NBFCs.

The report also says, "providing enhanced customer banking experience, remaining competitive, and improving operational efficiency and risk management are the major drivers of their digitalization efforts." The focus on customer centric solutions or strategies increasing the industry's recognition of seamless delivery, efficiency and personalised services to meet the need of customers [6]. Banking ChatBots are redefining the way the customer interacts with the bank. They are making it easier for customers to access information and for them to fulfil their requirements. They are helping banks understand customers better, and are providing customers a simpler option to get their requirements sorted. By helping banks with last mile service delivery, ChatBots are redefining customer experience [1].

UNDERSTANDING AI-POWERED CHATBOTS

"ChatBots are artificial intelligence powered programs that help a customer with their requirements. Most banks have started placing ChatBots on their websites and mobile apps to answer customer queries and help them with their banking needs." [1]. The terms chatbot, AI chatbot and virtual agent are often used interchangeably, which can cause confusion. While the technologies these terms refer to are closely related, subtle distinctions yield important differences in their respective capabilities. Chatbot is the most inclusive, catch-all term. Any software simulating human conversation, whether powered by traditional, rigid decision tree-style menu navigation or cutting-edge conversational AI, is a chatbot. Chatbots can be found across nearly any communication channel, from phone trees to social media to specific apps and websites [7].

AI chatbots are chatbots that employ a variety of AI technologies, from machine learning—comprised of algorithms, features, and data sets—that optimize responses over time, to natural language processing (NLP) and natural language understanding (NLU) that accurately interpret user questions and match them to specific intents. Deep learning capabilities enable AI chatbots to become more accurate over time, which in turn enables humans to interact with AI chatbots in a more natural, free-flowing way without being misunderstood. Virtual agents are a further evolution of AI chatbot software that not only use conversational AI to conduct dialogue and deep learning to self-improve over time, but often pair those AI technologies with robotic process automation (RPA) in a single interface to act directly upon the user's intent without further human intervention [7].

A. Definition and types (rule-based vs AI-based)

"AI-powered chatbots or virtual assistants can provide instant and personalised support. Through a series of questions, these tools can help you resolve your banking queries." [8] India's financial sector is undergoing a significant transformation driven by the relentless pace of digitalization, which is reshaping how financial institutions operate and interact with their customers. As India continues to leverage technology to drive inclusive growth and sustainable development, it becomes imperative to critically examine the opportunities and challenges that accompany this transformative journey [5].

This chatbots are created using Natural Language Processing (NLP) and Machine Learning (ML), which make bots to understand and interpret user inputs, allowing them to provide relevant and context-aware responses. Unlike rule-based chatbots that operate on predefined scripts, AI-powered chatbots can learn from interactions, adapt to new scenarios, and handle a broader range of queries [5]. The availability of large volumes of data enabled by digitalization has opened scope for the use of AI/ML techniques for faster processing and analysis of data as well as for macroeconomic

forecasting [9]. In central banks, Big Data and Machine Learning are being used in a variety of areas, including research, monetary policy, and financial stability [13] Big data and ML can improve inflation forecasting performance [11] [12].

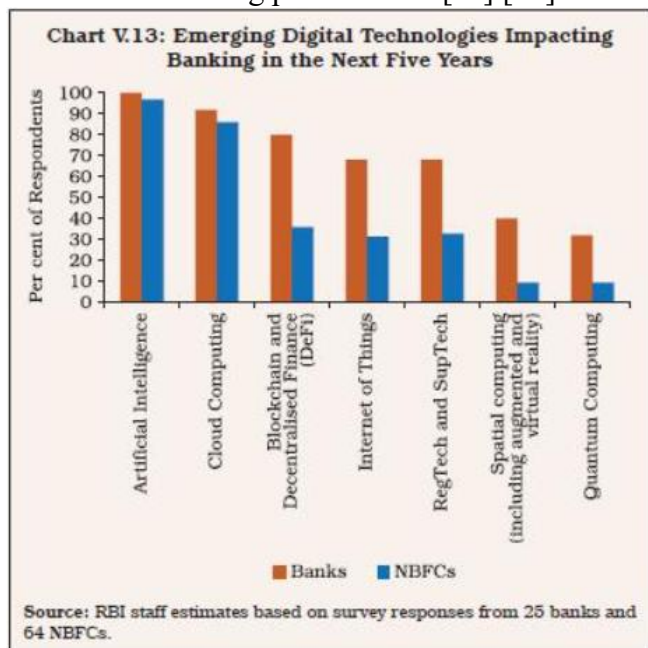


Figure 1. Growth of Digitalization

B. Technologies used (Natural Language Processing, Machine Learning)

“AI-powered chatbots or virtual assistants can provide instant and personalised support. Through a series of questions, these tools can help you resolve your banking queries.” [14]. The RBI has recognized the potential of Artificial Intelligence (AI) and Machine Learning (ML) in processing large datasets, which can aid in fraud detection and monitoring financial transactions. These technologies are becoming central to financial services innovation [15]. Furthermore, the RBI has indicated that regulated entities may consider adopting AI and ML technologies to support effective monitoring as part of ongoing due diligence processes. The availability of large volumes of data, enabled by digitalization, has opened the scope for the use of AI/ML techniques for faster processing and analysis of data, as well as for macroeconomic forecasting.

AI-powered chatbots in banking leverage several advanced technologies:

Natural Language Processing (NLP): Natural language processing (NLP) is a subfield of computer science and artificial intelligence (AI) [17] that uses machine learning [18] to enable computers to understand and communicate with human language. NLP powers advanced language models to create human-like text [19] for various purposes. Pre-trained models, such as GPT-4, can generate articles, reports, marketing copy, product descriptions and even creative writing based on prompts provided by users. NLP-powered tools can also assist in automating tasks like drafting emails, writing social media posts or legal documentation. By understanding context, tone and style, NLP sees to it that the generated content is coherent, relevant and aligned with the intended message, saving time and effort in content creation while maintaining quality [20].

Machine Learning (ML): Artificial intelligence (AI) in finance is the use of technology, including advanced algorithms and machine learning (ML), to analyze data, automate tasks and improve decision-making in the financial services industry. Artificial intelligence [17] in finance refers to the application of a set of technologies, particularly machine learning [18] algorithms, in the finance industry. This fintech enables financial services organizations to improve the efficiency, accuracy and speed of such tasks as data analytics, forecasting, investment management, risk management, fraud detection, customer service and more. AI is modernizing the financial industry by automating traditionally manual banking processes, enabling a better understanding of financial markets and creating ways to engage customers that mimic human intelligence and interaction [18].

C. Common functions in banking

Artificial Intelligence (AI), Machine Learning (ML), and Big Data are becoming central to financial services innovation. They can also help in fraud detection and in identifying better ways of monitoring use of funds by borrowers, track suspicious transactions, etc. by processing large datasets [21]. Advanced analytics and real-time monitoring of emerging cybersecurity risks will be critical in detecting potential threats and enabling pre-emptive action. AI and ML are being applied in areas such as risk management, regulatory reporting, data management, compliance, e-KYC / anti-money laundering (AML)/ [22].

Combating the Financing of Terrorism (CFT), and fraud prevention. Within the RBI, big data analytics, AI, and ML have been extensively employed in monetary policy, research, and data management functions [16]. Reserve Bank of India (RBI) in its premier annual publication titled ‘Report on Trend and Progress of Banking in India 2022-23’ made a note on adoption of AI in Indian Banks, where in it is cited, that RBI performed a textual analysis on the annual reports of Indian Banks from FY2016 to FY2022 [16].

ADOPTION OF CHATBOTS IN INDIAN BANKS

Figure 1. Placeholder for AI Chatbot System Architecture

Table 1. Sample Chatbot Adoption Metrics in Indian Banks

The application of Artificial Intelligence (AI) in the Indian banking industry is gaining ground day-by-day and it is likely to herald a new era of efficiency coupled with innovation for customer satisfaction. Reserve Bank of India (RBI) in its premier annual publication titled ‘Report on Trend and Progress of Banking in India 2022-23’ made a note on adoption of AI in Indian Banks, where in it is cited, that RBI performed a textual analysis on the annual reports of Indian Banks from FY2016 to FY2022.

The report mentioned that as at the end of June 2023, 11 out of 12 PSBs and 15 out of 21 PVBs had some form of Chatbot by using AI and ML technologies and in most cases, the Chatbots are accessible through the banks’ websites. End of June 2023, 11 out of 12 PSBs and 15 out of 21 PVBs had some form of Chatbot by using AI and ML technologies and in most cases, the Chatbots are accessible through the banks’ websites [23].

A study published in the ITM Web of Conferences highlighted that chatbots in Indian banks are becoming central to financial services innovation. They aid in fraud detection, monitoring fund usage by borrowers, and tracking suspicious transactions by processing large datasets [24].

A. Growth of digital banking

Recently, Artificial Intelligence (AI), Machine Learning (ML) and Big Data are becoming central to financial services innovation. Analysis of vast amount of data, both structured and unstructured, has been made possible using these techniques. Increasing levels of expectations of compliance to regulations and a greater focus on data and reporting has brought RegTech and SupTech into limelight. They are being applied in areas such as risk management, regulatory reporting, data management, compliance, e-KYC / anti-money laundering (AML)/ Combating the Financing of Terrorism (CFT), and fraud prevention [22].

Banks leverage our digital leadership to serve the unbanked and underbanked population in the country, helping them enter the financial mainstream [25]. The initiative and proactive approach of banking institutions to promote digital banking services has given very positive results on variety of parameters regarding increase in the customer’s response of digital banking services. Many Banking institution have come forward to offer different types of digital banking services in last decade. The data given below indicates how digital banking industry has increased significantly since 2015 [26].

B. Reasons for chatbot adoption

Customer queries

Banks provide a plethora of information on their websites. Navigating this information can get tedious and complicated and finding the right information when the customer needs it is a task.

However, with the introduction of ChatBots, the first thing that the customer sees is a popup asking the customer what he needs. By typing in a few words or clicking a few options, the customer is navigated to the right page with the information that he requires. This bot, although very simple, helps to reduce the time it would have taken the customer to find the right information [1].

Payments

Some banks have introduced chat bots to help their customers with payments. These ChatBots collate the different offers that the bank's customers can avail and consequently help them complete the payments. These ChatBots help make the payment process simpler without the customer having to take additional efforts to pick the right offer and avail it. One such ChatBots is HDFC Bank OnChat which works on Facebook Messenger to help with all sorts of bill payments [1].

Interactive Voice Response systems

Several banks have automated voice response systems to interact with the customer. Calling the bank's toll free number first directs the customer to a Chatbots which finds out what the customer needs and directs the customer to the right place. If there is information that the ChatBots can provide by itself, it lets the customer select those options and provides the information. It connects to a customer care executive if the customer so wishes. These voice response systems also call the customer to verify large or unusual transactions made on a credit or debit card [1].

C. Application for selected financial products

The latest ChatBots being introduced into the market now allows you to perform basic transactions. Through simple instructions, you can now easily apply for selected loan, insurance and even Credit Cards, directly from the messenger platform. HDFC Bank OnChat is one such, that allows you to perform the above mentioned options [1].

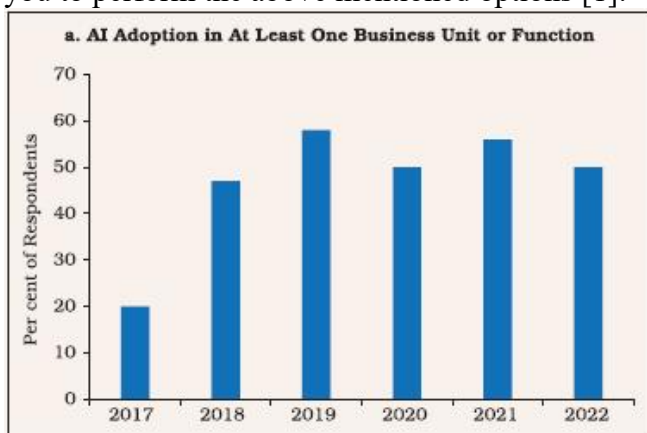


Figure 2. AI Adoption

Banking ChatBots are redefining the way the customer interacts with the bank. They are making it easier for customers to access information and for them to fulfil their requirements. They are helping banks understand customers better, and are providing customers a simpler option to get their requirements sorted. By helping banks with last mile service delivery, ChatBots are redefining customer experience [1].

CASE STUDIES FROM INDIAN BANKS

A. HDFC Bank – EVA

HDFC bank's chatbot called EVA (Electronic Virtual Assistant) has features of 24/7 assistance for banking queries, Multilingual support, including Hindi, Voice search capability, Instant information on products, services, and account details. It has successfully handled over 2.7 million customer queries within six months of launch, Interacted with over 530,000 unique users. And it was recognized as India's largest banking chatbot. However, this bot has some limitations: Initially limited

to English language; later expanded to include Hindi. Also it primarily addresses routine queries and for complex issues may require human intervention. [28] [29].

B. ICICI Bank – iPal

ICICI Bank – iPal has features of AI-based virtual financial assistant. It is Available 24/7 on the bank's website and mobile app. It handles general banking queries and basic transactions like bill payments and fund transfers. It provides personalized contextual offers. It successfully managed around 6 million queries within eight months of launch, achieved nearly 90% accuracy in responses which reduced call centre costs by 25%. However it has limitations like it is limited to English language interactions. And it may not handle complex queries requiring human judgment [30][31].

C. SBI – YONO Chat

State Bank of India (SBI) – YONO Chat has Features integrated into the YONO (You Only Need One) app which assists with everyday banking tasks like checking balances, fund transfers, and bill payments. And it also provides information on products and services. It successfully enhanced customer engagement through digital channels and streamlined access to banking services via a unified platform. However it has limitations like it's users have reported difficulties in locating essential features within the app, inconsistent labelling and terminology leading to user confusion and technical glitches and performance issues reported by some users [32][33].

D. Axis Bank – Axis AHA

Axis Bank – Axis AHA has Features like AI-powered virtual assistant available 24/7. It handles a range of banking services including fund transfers, bill payments, and credit card applications. And it provides personalized recommendations and support services. It successfully managed over 20 million customer queries with 97% accuracy, achieved 40x user growth since inception which reduced email volumes by shifting customer inquiries to the chatbot. However it has limitations like it was initially limited to English language interactions and it may require further enhancements to handle more complex customer needs [34] [35].

IMPACT ON CUSTOMER EXPERIENCE

A. 24/7 Service Availability

AI-powered chatbots can provide round-the-clock (24/7) assistance. It helps customers to do tasks like checking balances, transferring funds, and applying for loans at any time. Which is really helpful for customer satisfaction and operational efficiency [36].

B. Faster Issue Resolution

Chatbots can handle multiple chats and interact with many customers at the same time which is great for responding to customer during peak times and improving overall customer service with less investment for call centres [37].

C. Personalized Communication

AI-powered chatbots can remember and do analysis of each customer's data and respond with offer tailored financial advice, product recommendations, and personalized banking experiences, which is time saving and more efficient for improving customer engagement [38].

D. Customer Satisfaction Trends

The integration of AI chatbots in banking has led to increased customer satisfaction by providing instant responses, reducing wait times, and improving efficiency [39].

CHALLENGES AND LIMITATIONS

A. Data security and privacy

Keeping customer data safe is the highest priority concern for Indian banks. The cyber threats are even becoming more smarter and so sophisticated that bank have to make sure that chatbot data, conversation or any interections are not insecure and any data of customer is not breached with proper protection. Foe which banks can implement stringent encryption measures and adhering to privacy laws, such as India's proposed Personal Data Protection Bill [41].

B. Navigating regulatory compliance

The banking sector in India is subject to strict regulatory oversight by bodies like the RBI. Banks have to make sure that chatbots are following and adhering with existing regulations and are adaptable to future legislative changes is a significant challenge. Banks must follow these regulations carefully to avoid penalties and make sure that their AI tools are compliant to all rules and regulations [41].

C. Overcoming language diversity

India has many languages and dialects, from which 22 are official languages, India's linguistic diversity creates a considerable challenge. Most of the customers are speaking multiple languages and countless dialects. With more and more adoption of online and digital banking, it is important to develop chatbots that understand and respond accurately in various languages, which is critical for providing inclusive customer service and customer satisfaction [41].

D. Balancing automation with human touch

AI-chatbots can handle multiple types of queries efficiently. There are different type of concerns to be solved, some customer interactions require the empathy and understanding of a human agent. Banks must handle a balance between automation and the need for human intervention to ensure customer satisfaction and customer's trust [41].

E. Managing customer trust and expectations

Building trust in automated systems is essential for their acceptance by customers. Banks have to manage customer expectations effectively, by making sure that chatbots are reliable and can handle queries satisfactorily. Overcoming skepticism about AI's ability to understand and resolve complex issues is crucial [41].

F. Technical limitations and integration issues:

Indian Banking sectors do face unique challenges when they have to implement chatbots, in such highly regulated environment it has lot of complexities to integrate advanced technologies. Integrating chatbots into existing banking systems without disrupting services is a difficult task. There are many technical limitations, such as understanding context, ambiguity, or complex queries, and it can disrupt the effectiveness of chatbots. Banks will have to keep continuous development and training of AI models are necessary to enhance their capabilities [41].

CUSTOMER FEEDBACK AND PUBLIC RESPONSE

A. HDFC Bank – EVA:

Social media and app reviews: “All possible app functionalities are embedded in the PWA”, “Extremely happy with new UI/UX”, “it’s simply brilliant and very user friendly.”, “The new interface is so intuitive & seamless.” [42]

B. ICICI Bank – iPal:

ICICI Bank has integrated its AI powered multi-channel chatbot, 'iPal', with the world's two most popular voice assistant apps—Amazon Alexa & Google Assistant — to enable its retail banking customers to undertake an array of banking services with just a simple voice command. [43]

C. SBI – YONO Chat:

YONO SBI app receives mixed reviews with users praising its functionality and ease of use, while others report issues with registration, UPI setup, and login errors. Some users rate it highly for being a comprehensive banking solution, while others criticize its performance and frequent crashes. Overall, the app's convenience and features are appreciated by many, although technical problems persist for some users [44].

D. Axis Bank – Axis AHA:

"I chatted with Axis Aha and selected the option "Credit Card limit Enhancement" And I got reply with "Yes, you contact us with -----/----- or ----- (toll-free) to decrease the credit limit on your Credit Card" [45].

CONCLUSION

A. Summary of key points

AI-powered Chatbots are virtual assistants who can interact with customers through chat/chatbots [5]. They are making it easier for customers to access information and for them to fulfil their requirements [1]. By helping banks with last mile service delivery, ChatBots are redefining customer experience [1]. It has successfully handled over 2.7 million customer queries within six months of launch [28]. Chatbots can handle multiple chats and interact with many customers at the same time [37]. The integration of AI chatbots in banking has led to increased customer satisfaction by providing instant responses, reducing wait times, and improving efficiency [39].

B. Final thoughts on chatbot effectiveness

Banking ChatBots are redefining the way the customer interacts with the bank [1]. They are helping banks understand customers better, and are providing customers a simpler option to get their requirements sorted [1]. AI-powered chatbots can provide round-the-clock (24/7) assistance [36]. It successfully managed over 20 million customer queries with 97% accuracy [34].

C. Scope for future improvement

Banks have to make sure that chatbot data, conversation or any interactions are not insecure and any data of customer is not breached with proper protection [41]. Banks must handle a balance between automation and the need for human intervention to ensure customer satisfaction and customer's trust [41]. India's linguistic diversity creates a considerable challenge [41]. There are many technical limitations, such as understanding context, ambiguity, or complex queries, and it can disrupt the effectiveness of chatbots [41].

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Figure 1. Placeholder for AI Chatbot System Architecture

Table 1. Sample Chatbot Adoption Metrics in Indian Banks

| Bank | Chatbot Name | Queries Handled (millions) |
|------|--------------|----------------------------|
|------|--------------|----------------------------|

| | | |
|-----------|--------------|----------------------------|
| HDFC Bank | EVA | 2.7 |
| Bank | Chatbot Name | Queries Handled (millions) |
| HDFC Bank | EVA | 2.7 |