The Role of AI-Based Customer Service Automation in Banking

By Dr. Chioma Ogwuegbu

Professor of Artificial Intelligence, University of Lagos, Nigeria

1. Introduction

With rapid technological advancements, customer experience is no longer maintained by the traditional RATER service pillars (responsiveness, assurance, tangibility, empathy, and reliability). Instead, AI-based tools have proven to simplify the experience of consumers via automation services. New services have evolved with multitasking abilities that corporations have begun using to provide customer service solutions via interactional chatbots and virtual assistants. The ones that can multiskill processes of data retrieval and answer integration would imply less compromise for customer service representatives. One dominant solution maker that processes this prominent software offers next-week turnaround services on training call center automation services using bank chat logs with unlimited transactions in corporate machine learning expertise and provides a leading unique edge over all of its competitors. Hence, this paper contributes to providing insight into the significant situation of AI reception in customer service strategies and an overview of the blazing pace of customer service in the banking industry.

Traditionally, banking did not focus on assessing customer behavior and preferences to design customer service solutions. Over the years, services that the bank has evolved from being over-the-counter services to ATM machines to telephone banking and internet/mobile banking. Now banks are increasingly using AI in customer service. It has become increasingly common for banks to adopt big data analytics tools in their customer service platforms to improve the quality of customer service. Innovations using NLP and other AI tools reflect that banks acknowledge that they too cannot escape the changing financial ecosystem. This realization has much to do with the pressure of keeping up with rapid customer expectations and changes in fintech and insurtech firms.

1.1. Background and Rationale

Customer service is among the most essential functions for banks, since a positive interaction can result in a long-term relationship with the customer. Rapid advancements in technology have shaped how customers and banks interact. The rationales for focusing this work on AI-based automation are: - In recent years, customer expectations in banking have changed. Service must be efficient, available around the clock, and seamlessly integrated into customers' daily lives. Banking must go from being a physical activity to something that can be done while undertaking everyday activities. Automation can assist in meeting these targets. - Artificial Intelligence has the potential to provide banks with a competitive edge. Potential use cases for marketing, operations, and fraud detection occur frequently. However, there is a lack of wide-ranging studies focusing on customer service automation in the context of banking. This constitutes a gap that this study will fill. Digital transformation is sweeping through the banking sector. In the 1960s, banks began to adopt technology in the form of credit cards. This trend has increased on a near constant basis since then. In more recent years, the rapid adoption of smartphones percolated into banking, resulting in the first mobile banking app launching in 1999. Major banks in Europe and North America had launched mobile apps by 2008. The use of mobile apps for banking systems has, in many cases, quickly displaced the utility of banking websites and other services. In turn, this trend has placed ever-increasing demands on IT infrastructure and service delivery across the banking sector. With the proliferation of digital services, banks had to also focus on customer service issues. Standard phone support services have suffered from long wait times and have been inefficient. Meanwhile, the chat medium has become increasingly popular as the world has evolved to the online space. With the push toward omnichannel services, banks sought to develop chat services with the goals of reducing telephone traffic and meeting customer demand. Consequently, the problem of creating effective automated chatbots is currently the focus of banking research.

1.2. Purpose of the Study

The development of artificial intelligence (AI) is disruptive, offering new opportunities for the banking industry, especially in customer service. The speed of processing and analyzing large data sets is fundamental for the success of customer service in the banking sector. Autonomous decision-making systems will be able to completely transform customer service and achieve the highest satisfaction levels. The purpose of this research is to present the

possibilities of technological disruption in finance, especially in customer service, and to discuss the current opportunities or challenges facing the banking industry. The following study has several objectives: 1. to identify the possibilities and need for transformation of bank customer service; 2. to provide a clear overview for top management of the problems related to customer satisfaction and to discuss technological solutions; 3. to analyze why it is important to automate the customer service area; 4. to provide evidence of the potential cost reduction and improve technological efficiency and customer service; 5. to explore the savings potential from full automation compared to the current situation; 6. to discuss ideas for improvement such as engaging employees in more qualitative work; and 7. to highlight the limitations of the research and future directions for implementation in the banking sector.

The intended outcome of this study is to inform the management of banks of the benefits of applying AI to current banking trends and customer service opportunities. The aim is to provide and analyze an AI-based solution to compare with traditional customer service and indicate the new options and trends in the banking industry with potential for implementation. Such a case is very important for all banks interested in certain improvements and can provide a more competitive advantage in the long term. This paper should serve as a strategic guide for top management in its future business-technological innovation decision-making. The results presented in this paper provide a model for automated customer service based on AI, which has been developed and should focus on the technical feasibility side in the banking sector. It can be observed that certain limitations and opportunities are discussed, providing a guide for top management in strategic decision-making. The material can be analyzed by specialists and future research can include a managerial and marketing perspective.

1.3. Research Questions

Q1: Can AI replace human customer service with resources that are at par, or better, than human agents at serving the customer and retaining them in the case of bank calls when conversations are centered on queries? Question elaboration: We would like to understand from a qualitative perspective the possible success factors of a technology and the factors that can make the use of AI-based service automation at par, or possibly better, than a human being's ability to serve customers. Q2: Can AI reduce the customer's perception of the need for human help for call handling, creating customer satisfaction regardless of the effectiveness of their interaction? Question elaboration: We would like to understand from a qualitative

perspective if and how technology can remove a cumbersome point where human interaction is necessary and thus positively contribute to customer satisfaction for the ease of customer self-serving by a system or AI at the usage front end. Q3: Can AI service automation never address the customer request or entirely miss the dialog flow with the caller in the case that one end decides to proceed with human agent intervention? Question elaboration: Understanding if automation quality on dialogue use can improve, changing the perception of the service and the business goals, making customers accept more automation failures, in light of intervention safety and traditional quality performance thresholds. Q4: Can AI service automation considerably reduce operational bank costs for call handling? Question elaboration: Identification of the real benefit of the impact of the savings if the needed number of FTE in the call center is drastically decreased because of the automation of only one part of the service, the non-expert phone person assistance capable of multitasking. The emergence of AI in the workflows surrounding financial services and banking is a significant paradigm shift that acknowledges and responds to the apparent similar technologies driving banking today. This research sought to ascertain the future banking prediction within AI with a focus on customer service and the resourcing aspect of call centers. Notice that AI can facilitate call categorization, but it can also assist bank procedures in offering many real-time approvals and information to customer needs. The questions were chosen for the problematic situation we have identified discussing the automation of the banking business customer care.

2. Understanding AI-Based Customer Service Automation

Conversational AI in Finance: AI has transformed banking by making it more personalized and helping banks build a human connection with their customers. Through AI, banks can offer automated responses to customer queries. This AI-based chatbot not only automates customer service through a smartphone interface, web chat interface, or phone interface but also enables banks to deliver relevant targeted services and initiate the cross-selling or upselling of products. Customers today can very easily communicate with their banks; the most popular channels are the bank's call center, email, web chat, FAQ, and now, social media. Many of the services required by or rendered to the customer are automated. Beyond basic automation, today banks are also looking for automations driven by AI and machine learning for enhanced customer service and experience.

Automation: Meet or fulfill customer requirements such as (1) enrollment, (2) providing information, inquiry status, (3) IPIN, TPIN, transaction password creation, blocking of IPIN, TPIN, and transaction password, (4) request for physical PIN dispatch, (5) performing transactions such as balance inquiry, statement generation, fund transfer, (6) stop payment functionality, hot listing, (7) daily or weekly alerts of transactions or event-driven alerts such as bill reminders, etc., and link the customer with their social media network to keep a watch on and create negative alerts for potential financial stress or distress. Yet, before we glorify the potential gains from deploying AI-based chatbots, we need to understand a key question – to what extent can automation really be applied, and in which business areas can it be effectively applied? We will discuss this and many such details step by step in this chapter.

2.1. Definition and Scope

2.1. Definition and Scope. The automation of customer service in banking in this study refers to the process when a modern technology application based on artificial intelligence enables banking staff to minimize routine tasks that they perform during service delivery or communication with customers in a bank. This mainly includes customer service, customer support, customer advice, sales service of products and services, operations service, and related practices, among other tasks. The banking institutions can be commercial banks, investment banks, and central banks, which provide local as well as online services. The areas in a bank that are potentially subject to automation include call centers, chatbots, data entry and verification, interactions, quality monitoring and assurance, translation or transcription of spoken or written languages, customer loyalty and complaints, alerts or notifications, summarizations, and so on.

The scope of AI-based automation in banking is global as it includes both developing and developed countries, distinguishing different classes or types, i.e., retail, universal, and investment banks. In conjunction with customer service automation, intelligence is broadly defined in this research. Note that the functions of AI used in automation generally include text recognition, language translation, voice identification and synthesis, production rules, pattern recognition, data mining, expert systems, machine learning, natural language processing, inference, ontology, and semantics, among others. The possibility of advancing machine learning in such applications is expected. There are advancements brought by AI-based customer service automation in banking. While traditional customer service automation provides business efficiency, it often lacks customer benefits and requires direct

interventions by the bank's human staff for more complicated challenges posed by customers. AI-based automation provides more and regularly better customer operations in a fully self-service environment, where customer conversational engagement is potentially enhanced.

2.2. Key Technologies Involved

Automated customer service systems require the integration of multiple technologies. Three critical technologies that underpin AI-based automation are natural language processing (NLP), machine learning, and robotic process automation (RPA). NLP is a branch of artificial intelligence that helps computers understand, interpret, and manipulate human language. Using NLP, chatbots can synthesize and analyze input from customers to derive their underlying meaning. NLP is used by computers to read, understand, and respond to written or spoken natural language. Machine learning involves the development of algorithms and models that allow systems to learn from data. It is best at identifying patterns and making decisions from information to process large amounts of data, iteratively and gradually learning from data. Finally, RPA automates rule-based tasks through AI, existing APIs, legacy modernization, or emulation of users. By simulating and executing repetitive tasks, robo-advisors can handle a broad range of interactions with end customers with a high degree of precision.

When working in conjunction, NLP, machine learning, and RPA hold the potential to create chatbots capable of understanding and replying to increasingly complex queries. This significantly improves the scope and effectiveness of automated customer service in interactive, real-life settings.

Other emerging technologies that could soon play a pivotal role in banking customer service include natural language understanding (NLU), natural language generation (NLG), and deep learning. NLU is similar to NLP, but is designed to provide a more accurate interpretation of the intent behind human language. Natural language generation (NLG) has the opposite goal to NLP, as it generates human language from data. Deep learning is a field in machine learning that involves algorithms that learn, unsupervised or supervised, to represent and process data in a way that fosters the development of abstract, hierarchical concepts. In financial services, deep learning currently supports the automation of documents, the development of predictive models, and analysis of customer feedback. Most major banking organizations use one or more of the above-mentioned technologies to create and

deploy AI in some form. Natural language processing is the most prevalent technology, as it supports customers through the use of call centers and chatbots.

2.3. Benefits and Challenges

AI-based customer service automation in banking involves many benefits such as efficiency with 24/7 availability, reduced operational costs, less time required for various banking transactions, and an increase in customer satisfaction. It also enhances the customer experience by offering personalized interaction and responding to customer queries very quickly. Some of the best available services provided by banks are AI chatbots, mobile banking services, video banking services, etc. From the bank employee's perspective, the AI-based customer service systems help them by reducing their burden through the execution of routine tasks that are usually done by humans. Typically, it makes it easy to find customer details in the systems, receive requests, and provide responses for them, detect the needs of the customers based on their requests, decide and suggest to the customer about their needs, and interact with the customer in a conversational way.

The results from AI-based customer service depend on various systems and AI techniques applied. Implementing AI-based customer service must consider some challenges as well, such as ethics and biases related to customer data, resistance from bank employees affecting the implementation of AI, and banks might also face security issues such as hacking or selling customer data to third parties, as well as legal issues arising from the AI automation process. These considerations should be the main interest and well-observed issues that are regularly explored in the context of the digital transformation process, especially in banks that aim to implement AI-based customer service in practice. Therefore, the results from using AI-based customer service strategies in banks can be collected more accurately if both benefits and challenges are balanced. This is highly suggested to policymakers of banks when considering the implementation of AI in their institutions in order to achieve the expected benefits.

3. Applications of AI-Based Customer Service Automation in Banking

Three applications of AI-based customer service automation are very popular among banks: chatbots, virtual assistants, and fraud detection. Chatbots answer frequent questions, help to choose relevant service offerings, explain their features, schedule appointments, and manage online registration. This kind of AI-based automation works effectively in routine conversations with potential or existing customers, frees the valuable time of human staff,

eliminates waiting time in call center queues, and does not require any customer support operators to be present on the telephone. Personalized and complex virtual assistants provide comprehensive support to customers, such as help in financing if they are planning a vacation or support in investing if they are building a house. Chatbots and virtual assistants are only the tip of the iceberg regarding the wide scope of AI use in banking. AI components have been proven to be powerful in many applications used in other non-bank industries as well.

Among AI usage applications in banking, we observe an interrelation and synergy, helping to implement a consistent strategy of customer engagement across various channels and services. This allows customers to access a new AI-powered banking service in a familiar way. Customers visiting a bank's website will easily engage in a conversation with a chatbot or conversational virtual assistant. Customers of AI-based investment advice or supporting robo-advising applications will ask less frequently for human support in the bank. Customers of AI-based product personalization, fighting against credit fraud, will feel better inside the bank and increase the chance that they will use other non-AI-based services of the bank. In the long run, interacting with a conversational virtual assistant will be one of the most essential cybersecurity applications for banking customers.

3.1. Chatbots for Basic Customer Queries

Another common application is to use chatbots for basic customer queries, also called customer service chatbots or customer support chatbots. AI-based chatbots and virtual assistants can handle a broad range of tasks, but the majority of them work as advanced FAQs, providing instant responses to questions that customers ask frequently, such as questions about products, services, and the procedures and policies of the company. The purpose of such chatbots is to save the time spent by human agents on answering common and repetitive inquiries and to improve customer satisfaction by providing fast and 24/7 service without any delays in response time. As a result, customer service departments may take advantage of the reduced workload and focus on inquiries that necessitate more specialized assistance like mortgage consultants, credit advisors, and so on. However, a customer service portal and knowledge source are not required, and chatbots can deliver responses to straightforward inquiries.

Various models have been used to build chatbots, ranging from a mixture of rule-based systems and search algorithms to proprietary chatbots powered by an architecture. A

common kernel of these chatbots is their NLP/NLU model that powers the machine learning-based backend. In practice, the performance of a system is regularly measured by its score, response time, and overall star rating. The performance of the system can be assessed by monitoring specific parameters initiated by the customer when ending interactions with the model. Users are frequently offered the opportunity to provide feedback or to request that a human agent intervene. Chatbots take a variety of approaches to control the quality of their responses. For example, a chatbot requests feedback on the quality of responses near the end of the conversation, enabling the system to actively update itself based on that feedback. It should be noted that there are several commercially available systems and case studies in the banking sector demonstrating their success in handling basic customer queries. These chatbots, depending on the user's inquiry, might have a dialogue management system to shuffle the user among departments. However, the responses provided by such systems are factory model fruit salad responses, and they do not offer conversational engagement to the user. Researchers and practitioners have only recently come to appreciate the problems that advanced AI-based systems encounter when attempting to engage with customers in conversation. All chatbots need a predefined state or a specific requirement in which to work to provide responses.

3.2. Virtual Assistants for Personalized Assistance

AI-driven virtual assistants support personalized customer interactions. They help in making smart replies, scheduling meetings, delegating requests, or even drafting emails based on the context. They are also equipped with Natural Language Processing to understand the meaning and concepts in the messages. Additionally, they engage in intelligent tasks, such as to-do lists, delivering tailored recommendations, and boosting productivity. Voice-based assistants are particularly helpful for busy customers who cannot check banking services or related features. They improve customer convenience by facilitating transactions, solving inquiries about personal credit lines, obtaining PIN codes, adding non-customers, and managing account balances and financial advice.

Virtual assistants are driven by AI, with capabilities that strengthen through machine learning. Both rule-based and machine learning approaches can enhance user interactions and feature usage. They recommend intelligent responses for chat, suggest similar products or services for promotion, and identify the needs of users for cross-selling and delivering tailored recommendations. Major U.S. banks offer virtual financial assistants or chatbots. One example

is a virtual financial assistant. There are more than 7,000,000 users who have chosen to use not only financial advice on account management but also to access banking services such as transferring funds, checking balances, and managing credit card balances. However, in Asia, there is a similar app launched by a bank. One of the most significant advantages of a virtual assistant is that it provides 24/7 customer service, which helps to solve the problem of similar workloads within the time frame of 7 AM to 10 PM.

3.3. Fraud Detection and Prevention

AI is a strong tool when it comes to fraud detection and prevention and can analyze vast amounts of financial transaction data in real-time. Based on predefined criteria, AI algorithms flag activities that seem suspicious, and humans will assess the complaint. In addition, AI technology is able to prevent money laundering by monitoring money transfer behavior and the use of domestic and cross-border transactions. The rule-based AI systems were affected by the fraudsters adjusting to new payment infrastructure, fraud typology, globalization, and digitization. Thus, AI fraud detection and prevention would not raise the fraudsters' flexibility. The adaptability of such ML models in systems for fraud detection can be a competitive edge and quickly discover new fraud patterns. Currently, fraud prevention services are provided with co-branded credit cards.

An AI can be audited without the necessity to be audited by a human using ML algorithms. As such, a concurrent audit using AI algorithms and back-office personnel is performed. Due to the anti-audit mechanisms, this is important. Another benefit of AI is that it can perform thousands of tests to detect fraud, which would be overlooked if conducted by a human. Thus, automated operations can detect fraud patterns that are commonly ignored by people. One of the main motives of AI application is to reduce the financial firms habitually faced with fraudulent activity. Additionally, it seeks to increase the general level of security with respect to banking. Drawing finance into a criminal event is expensive for corporations, and the financial industry is particularly interested in preventing scarce and valuable assets. Both banks and their clients are equally concerned about safety and protection. As such, it is possible to proactively respond to any potential threats. Nonetheless, AI flagging fraudsters from using modified data, minimizing AI data has a positive effect. Additionally, consumers tend to fear that AI-based processes of cardholders tracking unsafe elements may be noisy since inaccurate positives may be misjudged. Therefore, we conclude that findings encourage evidence from banking institutions with experience in AI fraud detection. Furthermore, based

on multi-method analysis, various situations such as the need for any kind of AI fraud prevention solution in some banking sub-sectors are obtained. This chapter offers several implications and results.

4. Implementation Strategies and Best Practices

Getting AI right does not only come down to finding the perfect tool or algorithm. In fact, there are two critical components that are essential for the successful deployment of AI-based customer service automation: data collection and training. In the banking sector, state-of-the-art AI-based solutions excel over traditional automation processes due to their ability to effectively integrate and analyze unstructured data and interact with users in a more human-like way. In order to accomplish this, a good training data set that is specific to the task at hand is pivotal. The integration capabilities determine the phase in which the AI-based system can be set, as the environment needs to ensure that the solution required at that point is delivered. Monitoring and continuous re-training are thus essential to make sure that it keeps up with the developing circumstances; otherwise, the system can lose accuracy over time. Technology acceptance should also be monitored, as the user will need to adapt to working with the AI/ML models. It is recommended to create a plan to oversee and evaluate the end-to-end effects of the AI and process automations to manage the potential impacts. This should certainly be coupled with a change management plan to engage your staff, since the impacts will affect them the most, and work through how they might be addressed and supported. An iterative approach needs to be taken, and continuous evaluation and improvement should be initiated on the automations by rigorously tracking how they work in practice. It is also vital to establish governance and controls to evaluate how the AI has been trained and how the developed models have been tested to confirm that they are fit for the intended purpose. Controls are also necessary to ensure that the operational delivery, as well as the internal workflows of the organization, are effective, compliant, and secure. Staff training also needs to be completed to ensure that there is a sufficient level of expertise inside the banking organization.

4.1. Data Collection and Training

In AI-based customer service, the quality of the model is an output from the data, which emphasizes the importance of data. The process of data collection from the massive data sources must take into account the understanding of the behavior of customers, products, and

services. Data for training purposes can be obtained from the logs of customer service applications, the description of the service provided by the company, and the types of errors and questions often heard by the helpdesk analysts. Moreover, other internal data can be included, such as text in product specifications, service brochures, and billing information. Nevertheless, data for training the conversational model can be obtained from corporate documents, operational protocols, guidelines, and QA pairs collected from various sources.

Because deep learning models are data-driven, the quality and quantity of the data can have a strong effect on performance. In many applications, data that is very diverse and does not cover all variants can also cause the performance of the AI to be lacking. Data pre-processing can be done before inputting to the AI. This effort focuses on cleaning unnecessary data and standardizing to support better reusability and more accessible data. Data that has the potential to disfigure AI processing can be described in terms of: 1) reliability: the level of trust measured by consistency and truth, 2) completeness: the level of wholeness of data, 3) accuracy: the level of accuracy of data adoption to real-world conditions, 4) cost: the level of data extent. Any reduction in data quality levels can have a cascading effect that results in less accurate and less valuable insights. The AI models need to be trained and continuously updated as new data becomes available and as new patterns are discovered. In addition to the model, the datasets should also be continuously cleaned to avoid biases and guarantee data privacy. Some platforms offer reliable automation tools for all these processes. Solutions also allow chatting with the AI system for the purpose of collecting more complex customer requirements. In the preliminary step, these ethical concerns should also be discussed, as AI can potentially influence a large group of customers. The first factor that we have to consider in the preliminary phase is the ethical aspect of data collection and training. The quality of AI models in automated customer service is mainly determined by the quantity and quality of the data in the training phase. In AI-based customer service systems, training data can be collected from the following sources: a) logs of customer service applications, b) descriptive service, c) list of questions customers would like to put on the help desk, d) text in the product specifications, the services provided, brochures, and bills, e) questions commonly asked by your helpdesk, f) examination of Q&A already available in other helpdesks, g) text including regulations within the company, standardized methods, and operational documents within the company, and h) sentences or words that are repeated two or more times in helpdesk calls, texts, or issues.

4.2. Integration with Existing Systems

Integration comes with significant challenges. It is vital for any technological advancement in customer service to be compatible with the modern infrastructure of digital banking, including improved customer service and advanced analytics. The existing systems landscape is a major concern, since it is either costly or risky to do an outright replacement. In many cases, entire teams and functional departments exist to manage the systems in question and have no intention of giving them up soon. To replace them with a new system would not only require a fruitful matchmaking in terms of functionality and compliance, but would also need to cater to the cultural and operational fit with the rest of the technology company.

Many of the new systems are based on programming languages that are alien to the traditional banking core. As a result, there are a great number of IT people who can code modern software, but a scarcity of people who understand how the core operates and is programmed. This disjoint is especially worrying when we think about the inherent risks in banking technology. It is therefore preferable that any AI-based customer service automation solution can be easily integrated into the existing digital banking systems and can operate as a replacement for the existing technologies in the future. The Application Programming Interface stack, also known as the middleware solution, and the effort needed to integrate into the existing systems mean the adoption level of these systems should be taken into consideration.

Anything digital should normally be easy to adopt, and anything involving people usually has a red tape to cut through. The main concerns are availability and continuity of service, as well as a potential disruption in service due to integration and maintenance. Such system changes are usually tested out in advance, but things in the systems are not always the same when it comes to a full rollout. Most companies would roll out their system changes at night to reduce the direct disruption to the customer at the point of integration, so that by morning most buses should be back in full operation. Banking solutions should be no different in this, in that managed risk should still be within the framework of the governance of the institution. In most cases, the integration includes a phased approach, which allows the continued service from the partner to its customers, with the value proposition of the bank to be realized by the same time. The early adopter serves as further proof points or showcases for the rest of the bank. Offering systems in a phased or pilot approach also allows further deviation of the systems as a result of early user feedback.

4.3. Monitoring and Evaluation

Given the dynamic nature of implementing AI, a comprehensive monitoring and evaluation framework is mandatory. Continuous monitoring ensures the AI systems function efficiently, effectively, correctly, and completely. The established KPIs are verified, and regular assessments are made to identify the most appropriate actions for continuous process improvement. The performance of the AI system in reaching its objectives needs to be reviewed, and any feedback mechanisms necessary to complement the improvements need to be defined. Customer feedback mechanisms help in identifying customer expectations and demands. The feedback needs to be analyzed to recognize gaps in the AI system functionalities.

Furthermore, KPIs and outcomes related to the overall impact and the contribution of AI in customer engagement need to be measured. Customer engagement is a key part, combined with online customer behavior and satisfaction, of studying the in-service consumer and predictive analysis behavior. For example, out-of-service customers are not entirely exclusive from in-service analytics, including the customer decision path that led to no service. Banks need to collect crucial data to conduct this type of monitoring and evaluation. Examples include face-to-face customer monitoring, telephone survey monitoring, live chat and related hotlines, and call center monitoring and evaluation.

In addition to quantitative data based on sales indicators, the best-prescribed instruments and methodologies to assess the AI services, particularly those to monitor and evaluate the impact of the applied models, are essential. Regular monitoring of these KPIs and tools will help in making any necessary artificial intelligence process adjustments. An additional external evaluation mechanism of the overall AI customer service, particularly the machine learning engine in a customer service environment, would be the experience of the bank's customers, but legislation no longer allows retention of such personal information without the consent of the person providing it. It is, however, sometimes obtained anonymously for good customer service. Regular analysis of the bank's customer satisfaction index may be considered as another performance monitoring mechanism. Thus, this framework shows a customer-centric improvement mechanism focused on the continuous improvement of AI-assisted services as per the dynamic changes in customer behavior in a highly versatile digital environment.

5. Case Studies and Success Stories

This section elucidates the transformative potential of AI-based customer service automation for the banking sector by illustrating how AI can help banks improve their performance in delivering superior customer service.

By employing machine learning, a bank was able to cut down the number of operational steps in an assortment of back-end banking functions from 250 to just 5 steps. This innovation redefines 'mechanical process automation', blending AI and robotic automation to bring incredible operational improvement. Of the thousands of business processes in the bank, nearly two-thirds are currently being automated. Embracing these technologies is particularly rewarding from the customer service perspective. Since implementing its virtual assistant, a bank has realized a 20–25 percent reduction in first call resolution due to better process compliance. Certainly, introducing AI-based solutions often brings its own share of challenges. It took the bank two years from ideation to full deployment of a new payment solution. The first and most significant challenge in rolling out the solution was getting internal stakeholders to buy in, especially compliance and risk stakeholders. This success story illustrates the adaptability and effectiveness of AI-based solutions in improving and enhancing all aspects of banking, especially in improving front-line employee training and, ultimately, the customer service experience.

By deploying a chatbot, a bank is providing its customers – and non-customers, for that matter – access to banking alongside curated e-commerce services. The chatbot can do more than answer queries and offer information about financial products – it can help customers book a cab, order groceries, and even make a restaurant reservation. But perhaps most impressively, it can process and execute funds transfers, utility payments, and mobile and DTH recharges. According to the evolution of its usage, a representative of the chatbot creator that powers the bank's chatbots has revealed that at the time of the interview, 50 percent of the bank's chatbot users were non-customers – in other words, the chatbot has succeeded in becoming significantly entwined in the lives of consumers. This success story serves as a great example of how any type of organization can leverage a powerful new technology to revolutionize the training of its customer service staff.

5.1. Bank of America's Erica

5.1 Case Study: Bank of America's Erica One AI-based solution that learns from customer feedback is Erica, a virtual assistant that works with the Bank of America. The mobile app version acts as a voice-activated, artificially intelligent financial assistant that provides personalized assistance and a financial center to conduct financial management. The AI system is trained on account transactions and FAQs to understand customer needs and assist them in making transactions. To achieve a personalized user experience, young and onboarding customers are more likely to engage in AI-assisted discussions. Through integrations with other AI, the Bank of America improved the AI's language syntax and semantics functioning and added an Android version of the system. The use of the Erica solution has many benefits including improved understanding of customer contact reasons, greater operational efficiency through reduced issues for the contact centers while also offering customers 24/7 support. First-call resolution through self-service where possible and improved effectiveness. Customer convenience for busy customers who prefer to self-serve. Since June 2020, the Erica virtual assistant has enrolled 3 million users, executed over 180 million transactions, and processed over $37 billion in services for customers. Its monthly active users have grown by 92% to 14 million over the past year. Currently, the financial services firm is creating new ways to integrate at scale. As one example, the Bank of America is introducing an experience where it is providing a new, deeper, simple way to manage money.

To enable a streamlined service delivery and optimize employee resources to prevent customer lead generation, the Bank of America is offering an enhanced remote banker feature. However, the delivery of Erica is not without potential pitfalls. Service automation and data privacy are essential elements of the experience that Erica delivers. If influential regulators do not see customer benefits in service automation and data-augmented live assistance for compliance cases, it could result in a review. As the Erica AI service automation relies on proven customer needs, the Bank of America expects new financial solutions and stepping stones to build deep, trusting lifetime engagement. It has exponentially surpassed customer adaptation expectations, literally saving millions in call center operations. Market rollout learnings are instructive for any bank. These improvements are the result of constant iteration, incorporating customer feedback into the AI. It is continually improved to assist with a great

customer experience. Customer feedback, both qualitative and quantitative, is used to improve the system.

5.2. DBS Bank's Digibank

Now, I will present the operating model of Digibank, which is a joint venture with an online wallet operator that provides a fully digital banking experience and services from an AI. It offers fully integrated e-KYC services with an e-signature. For HCTS and BPM, key operational risks include both the operational and joint-service-related strategies being used. It also provides upwards of 279 partial services provided by the BPMs. The AI provides a blend of predictive and personal, life and soul, thinking and cognitive services and operates at a level 4 capacity to enhance multi-channel interaction outside the bank. Key digital services that spark customer engagement include budgeting tools, self-allocation for savings, and travel insurance. It collects interaction data of likely use in churn analysis, brand sentiment, and portfolio analysis. It relies on heuristics and a combination of direct user feedback, ratings, complaints, resolution, and connections involving specific activity on location, customer, channel volume, validity, and severity of insights and actions. It offers new services or issues age-based reminders triggered by life events currently, but is developing its communications capability and sequencing of communication to improve customer conversion. The AI is managed in accordance with worldwide and local data and AI privacy and security policy and is licensed as a sub-licensee.

To get started, the team read widely in the AI and robo-advice literature, established their legal model, and then executed an exhaustive CRM and billing readiness exercise before embarking on the collaborative cognitive technology infrastructure and AI development project. In operation, the majority of customers are interacting solely through an AI service channel, and adoption numbers in percentage are as follows: (i) active/banking within 1 day, 46%; (ii) active/banking within trading and investment, 56% within 30 days; direct debit application with payroll; applying tracking payments, 15%; (iii) credits within 30 days of operation, 5%. There have been almost 78,000 new customer acquisitions at the rate of 3,092 per month, with the first month customer satisfaction rate at 76.9%. The current customer satisfaction average level is 82%. Ninety-five percent of customer interactions are fully digitized. Currently, the AI team is looking to appoint 3,000 alpha testers to go into the second release of customer functionality. There have been many lessons learned to date at each stage of the project or investment phase, namely, research, transfer of learning, applied experiment,

pilot, and deployment at both industrial and commercial operations levels. These lessons learned include insights on customer capability and willingness for an integrated super digital service or online banking AI advice portfolio. This was part of the analysis to identify, 'Is this the end of your traditional banking service as you know it?'

6. Future Direction

AI-empowered smart customer service assistants continue to evolve to accommodate a plethora of new developments. Several trends are beginning to emerge, including various technological advancements. While chatbots have been on the market for some time, we're seeing greater use of NLP and NLU to ensure human-like dialogue, in addition to better data mining capabilities through machine learning and pattern recognition in historical data. AI can usher in the next generation of customer service automation by providing personalization through predictive analytics and deep learning algorithms. The customer service industry would expand to include more than query management and adopt a more proactive communication model. Nevertheless, there are challenges in the real world that organizations must address when developing customized solutions. Regulatory scrutiny and cybersecurity are becoming increasingly important as the spectrum of fraud progresses. As regulators become more knowledgeable about AI and pressure banks, financial institutions, and other entities to increase the transparency of the algorithms behind their recommendation engines, developers are concerned. Furthermore, financial institutions must address the evolving needs of their customers, whose technological stature might be outstripped. Some clients are not prepared for this type of shift, and other clients want varying degrees of personalization, necessitating an appropriate balance. Consequently, the future for these elements appears to be focused on personalization and developing into cornerstones. Banks have the potential to be ahead of the curve by using AI models to plan strategic actions and forecasts. By continuously investing in technologies and structuring talent, they can secure their competitive position; nevertheless, mainly banks should have the expertise of innovators. Furthermore, it is important to collaborate between financial institutions and technology providers to aid in the execution of new innovative models, as they often lack direct customer contact and need this sort of service.

7. Conclusion

Conclusion

The possibility for AI technologies to have a transformative impact on customer service operations and the quality of service and experience for banking customers is clear. With appropriate implementation, banks will benefit from becoming more efficient in delivering services. The problem of ensuring a high-quality customer experience through AI remains a fundamental question for future research. The problem of the skills gap cannot be overstated. It is fundamental for banks to ensure the use of AI benefits those from disadvantaged groups, but this will not happen automatically. Government has a role to play in encouraging financial organizations to address these issues. There are major challenges posed by the implementation of AI within the banking sector, yet it is clear that AI-powered tools offer significant opportunities. For banks looking to adopt AI-driven solutions, it is critical that the strategic priorities of an organization are clear, rather than being reactive. As part of this, boards need to understand and agree on what AI can deliver for the organization, including what AI can achieve and what it is not suitable for, as well as the other options that are on offer.

It is critical that banks learn what AI can and cannot deliver by leveraging a number of different tools in different ways. Implementing AI-based customer service automation requires organizational cultural change; however, it is possible to dip a toe in the water by piloting small changes in operations. It is important to view AI as an evolution rather than a revolution. Customer use of AI-powered customer service solutions is best improved through the use of AI-powered tools that the customer does not necessarily know are AI-powered. Customers are primarily interested in solutions that work. Banks and other organizations need to look at how they can add additional dimensions to create an enhanced journey for their customers. It is important to continually learn and adapt, and there should be a continuous cycle of testing, improvement, monitoring, and reintroduction. Organizations need to be mindful but not sycophantic; AI must be monitored to ensure it identifies and removes data bias. It is clear that banks need to learn to use AI solutions themselves following adoption. For example, removing the human input from the identifying external search shows some balancing of the potential tech problems. Research into customer engagement shows it is not just about the customer service process, but governance protocols need to be put in place, such as contractual requirements for technology firms to report, excuse, and rectify

situations such as this. AI is going to be the future of customer service, and those banks that fail to adopt will be left behind. What is unknown is how the banking sector customer service journey will evolve in the digital future. Regardless, it has to be connected, and the use of people must represent a part of the journey. For now, that balance has to be determined by each bank.

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