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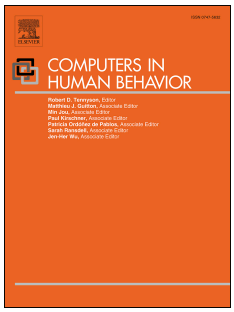

Chatbots in Customer Service within Banking and Finance: Do Chatbots Herald the Start of an AI Revolution in the Corporate World?

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Abstract

The main aim of this paper is to identify whether chatbots are useful for customer service, how they are impacting customer service in banking, and how professionals feel about the future impact of chatbots. Employing a largely qualitative approach, the study found that chatbots are a useful tool for customer service automation, with significant potential for providing good quality service. In general, sentiments towards chatbots were positive for simple tasks, with users and experts citing convenience, 24/7 availability, and speed as primary factors driving customer satisfaction levels. However, the limitations of chatbots in answer accuracy and reliability mean that they still require significant learning and development to be a sufficient solution for complex customer service problems. Chatbots are significantly limited in their capabilities and ability to parse customer queries. Therefore, they cannot be expected to handle all customer queries without some assistance from a human. On the other hand, chatbots have huge potential for learning, and artificial intelligence as a field presents a largely untapped universe of opportunity. This study thus highlights how chatbots are currently being used and how they are likely to be used in the future. Based on these findings, we develop an experimental framework that explains how to assess chatbots for dynamic customer service capabilities.

Key words: *Chatbots; Artificial intelligence; Customer satisfaction; Convenience; Learning & Development; Dynamic capabilities; Value creation; Banking & Finance*

1.0 Introduction

"Human language is the new user interface. Bots are the new apps." Satya Nadella, CEO of Microsoft (Murgia, 2016).

A chatbot is a computer program designed to simulate conversation with a human user (Oxford English Dictionary, 2017), existing since the 1960s. The popularity of chatbots surged in 2016, with platforms like Bank of America and Absa launching bots for standard banking procedures (Mills, 2017). Google Search Trends showed a sharp increase in interest, with "chatbot" popularity rising from 10% at the start of 2016 to 100% in March 2017 (Google Trends, 2020). Technology giants like Facebook and Microsoft have driven this trend.

Facebook opened its Messenger platform to chatbot developers in April 2016, resulting in over 34,000 bots (O'Brien, 2016). Microsoft launched developer tools and chatbots like Cortana and Tay, the latter forming its personality through tweets and online data (Weinberger, 2016). Amazon's Echo bot aims to create a smarter home and facilitates purchasing Amazon products on demand (Amazon, 2020).

The historical goal of artificial intelligence has been for a bot to pass the Turing test, being indistinguishable from a human in conversation (Davenport et al., 2020; Grewal et al., 2020; Huang and Rust, 2018; van Doorn et al., 2017). However, this aim has only been partially achieved as some chatbots have exhibited abusive behavior (Slate, 2015). The commercial surge in chatbots may shift the focus to practical applications in customer service and quality of situational learning, rather than mimicking humans. Facebook had to reduce chatbot operations after quality issues left 70% of user requests unfulfilled (Sun, 2017). Nonetheless, companies are using chatbots to help employees access policy or procedure information without human interaction (Upadhyay and Khandelwal, 2018).

Chatbots are easily accessible and universally understandable, providing convenience by being available 24/7 and offering instantaneous responses. This real-time advice makes transactional inquiries more comfortable for employees, such as requesting leave or understanding paid time off policies. The information provided by chatbots is accurate, up-to-date, and compliant with regulations and company laws. Regular interactions and common queries identified through chatbots can improve work culture and prompt necessary in-person actions.

However, the banking industry, traditionally slow to adopt new technologies, is now experimenting with chatbots at a rate comparable to other large firms. According to Nash (1950), the oligopolistic nature of the banking industry creates a need for banks to quickly

implement chatbots to stay competitive due to their interdependence on other firms' actions. Despite the rapid advancement of chatbots, crucial questions remain: Do chatbots add value to customer service? Do customers want them? Are chatbots the beginning of a customer service revolution? This study aims to contribute to the knowledge of technology acceptance in the banking industry by exploring professionals' perspectives on chatbots' impact, analyzing academic and practitioner literature on the current state of chatbots, and developing an experimental framework based on primary and secondary research. The objectives of this study are: To determine the barriers to the adoption of chatbots in the banking sector; To establish the drivers of chatbot adoption by bank users; To examine the organizational determinants of chatbot adoption in the banking sector; To determine the mechanics of value creation of chatbots in the banking sector.

The study provides an eclectic overview of the rapidly evolving chatbot technology and its value to customer services, particularly in the banking sector, by utilizing multiple research sources. Despite the potential value of chatbots to organizational processes, this area remains a nascent and narrow field, necessitating exploratory research to uncover its dynamics. Responding to this need, the study adopts a qualitative approach through semi-structured interviews to capture the lived experiences of chatbot users.

The rest of the paper is divided into five further sections. Section 2 reviews the previous literature relevant to this research. Section 3 describes the research methodology, including the purpose, philosophy, approach, strategy, and design, which encompasses the recruitment methods, data collection method, and research ethics. Section 4 discusses the findings and explores emergent themes from the research and their implications for assessing chatbots' customer service capabilities. Section 5 concludes the paper, offering guidance on managerial and practical implications as well as directions for future research.

2.0 Literature Review

Chatbots are designed to imitate human conversation and are frequently used in business as communication channels for both internal and external customers. They generate responses based on user input; for example, a simple "Hello" might return a greeting or an options menu to guide the user. Most commercial chatbots are found on platforms like Facebook Messenger, which has a large user base, enabling businesses to reach a broad audience (AppDeveloperMagazine, 2017). For instance, Absa's recent banking chatbot, BankBot, can process basic inputs and provide relevant responses. BankBot can even engage in small talk, demonstrating its conversational abilities. The quality of a chatbot is determined by how well it provides appropriate responses based on user input, a process that requires effective learning known as Deep Learning. Additionally, chatbots rely on Natural Language Processing (NLP) to understand language and match appropriate outputs logically.

[Insert Figure 1 and 2 about here]

Most businesses employ chatbots as a first point of contact or to provide answers to basic questions (Jee, 2016). The simpler approach to achieving learning and Natural Language Processing (NLP) is through a retrieval-based model, which uses a database of pre-defined responses. Advanced chatbots, using a generative model, can process an input, assess its context, and create a response from scratch without relying on pre-defined responses. Decoding appropriate outputs through semantics is crucial in chatbot creation (WildML, 2016).

A critical aspect of chatbot development is deciding on optimal deployment channels, as this significantly impacts the chatbot's success. The platform serves as the base of the user experience and dictates how customers access the chatbot. Chatbots can be deployed on various platforms, offering great flexibility (Microsoft, 2017). For example, some banks, such

as Bank of America and the Royal Bank of Scotland, have integrated chatbots into their own mobile apps. In contrast, others, like Absa and MasterCard, use external platforms like Facebook Messenger. Internally, chatbots are used to improve operational efficiency, such as JPMorgan's bot for deciphering legal documents quickly (Mills, 2017). Companies like Goldman Sachs and Accenture use chatbots for employee education and task performance. Even internally-used chatbots can utilize external platforms. For instance, Accenture uses a Skype chatbot to direct calls, and the Met Office uses bots to interact with big data for weather forecasts. Creating a positive experience for all clients requires a specialized developer skillset known as "user experience design of conversation" (Microsoft TechNet, 2017).

Statistically, Facebook Messenger is the most popular external platform for chatbot deployment. According to Statista (2016), Facebook Messenger scores 99/120 on the index, followed by Slack at 73/120, Telegram at 41/120, and Skype at 25/120. Facebook Messenger is the clear market leader in the chatbot platform space. Slack, designed for work-based team chatting, is unlikely to be a direct competitor for consumer bots, and no banks have publicly announced using Slack for external customer service. However, Slack could be important for deploying chatbots within banks for operational efficiency and internal customer service. Telegram, with its Bot Store available to 100 million active users (Kumar, 2017), could increase exposure to chatbots and encourage more businesses to use Telegram. Facebook Messenger, with over 1 billion users and 30,000 chatbots (Smith, 2017), significantly outnumbers Telegram bots, which are in the low thousands (Telegram Bot Store, 2017).

Chatbots have transformed the online customer experience by providing quick and easy access to customer support 24/7, helping to solve less complex issues and reducing customer uncertainty, which can lead to increased purchases (Hoyer et al., 2020). Similarly, chatbots can serve an important function within businesses. Employees can use AI chatbots to address

specific issues or problems, with the chatbots providing advice based on data from previous inquiries. This can reduce the HR workload, allowing HR professionals to focus on more significant issues, potentially decreasing the number of HR employees needed.

Chatbots offer employees an outlet to vent frustrations, as people are more likely to use profanity when speaking to a chatbot (Hill, Randolph Ford, and Farreras, 2015), allowing them to express things they might not say to an HR representative. However, chats are likely recorded and monitored, limiting complete freedom of expression. Hill et al. (2015) also found that people use shorter messages with chatbots, suggesting ease of communication and quicker resolution of issues compared to human interaction. Yet, some people cannot distinguish between AI and human conversation (Aron, 2011), meaning communication styles may not change based on whether they are talking to an AI or a person.

A major flaw of chatbots and AI is their dependence on extensive data. Successful operation requires access to comprehensive information (Trivedi, 2019), and replicating expert decision-making, as shown in medical fields (Chui, Manyika, and Miremadi, 2018), is data-intensive. Most companies, except the largest corporations, struggle with the high costs of data collection and storage. Companies can manage costs by creating sophisticated data management strategies to filter out less useful information (McGovern, 2018), but there is currently a lack of talent capable of doing this effectively.

In the coming years, more companies are expected to collect detailed data on employees, communication, and problems to implement and operate AI successfully. For AI to significantly impact business, HR departments will need to gather more detailed employee information, likely increasing employee surveys, feedback, and upward communication. In conclusion, Facebook Messenger is the leading platform for chatbots, while Slack is the

leader for work-based internal customer service chatbots. Many financial institutions develop their chatbots within their own mobile apps.

2.1 Technology Acceptance Model and Chatbot

There has been significant reporting on the potential of chatbots to enhance organizational processes, particularly regarding communication capabilities. However, a conceptual gap exists in understanding the generative mechanisms behind this potential, specifically the drivers and barriers of chatbot technology in the banking sector. Previous research has highlighted the importance of technology adoption models in explaining the behavioral aspects of individuals and organizations regarding the uptake and use of new technologies. Prominent frameworks include the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1977), the Technology Acceptance Model (TAM) (Davis, 1987), the Theory of Planned Behaviour (TPB) (Ajzen, 1985), and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). These models offer various insights into the contextual and technological factors influencing technology acceptance, identifying both drivers and barriers.

While existing studies have not specifically tested the validity of these models for chatbot adoption, the closely related context of blockchain adoption in the banking sector provides some insights. There is consensus that UTAUT is the most comprehensive framework for predicting the intended and actual use of technology (Venkatesh et al., 2003). In the UTAUT model, effort expectancy, performance expectancy, social influence, and facilitating conditions are the four basic predictors of behavioral intention. These predictors will also be employed in our research.

2.2. Value added potential of Chatbots

The second aim of this work is to examine the mechanisms of value creation of chatbots in the banking sector. Chatbots are already being used for personal banking, operations, and financial advisory tasks within major banks, indicating these as the primary current applications. This focus suggests that chatbots are primarily geared towards personal banking customers rather than corporate investment banking customers and high net worth individuals.

Focusing on personal banking could be particularly productive for banks. A PwC report based on a survey of 1,000 adults found multiple areas where chatbots could provide solutions. The financial services sector had the fourth most frustrated group of customers, with a frustration rating of 82.69/100 (PwC, 2016). Value is a nested concept composed of different layers, which can be unpacked to understand the diverse benefits chatbots bring to banking (Meriton et al., 2021).

3. Methodology

The research was conducted in two phases using a sequential triangulation design (see Figure 3). The first phase was exploratory and involved semi-structured interviews aimed at capturing the lived experiences of experienced managers regarding facilitators and barriers to chatbot adoption at both organizational and individual levels. Due to the nascent nature of the topic, secondary data was sought to complement and reinforce the managers' accounts, as their experiences might not yet be fully formed. The study aimed to develop an understanding of a relatively unexplored phenomenon rather than to generate generalizable laws. A convenience sampling strategy was adopted, resulting in a final sample of forty-five middle-level and senior professionals from eighteen banking organizations (see Table 1 in Appendix A for details). The sample included individuals with diverse experiences outside of banking to provide broader perspectives and enrich the findings.

The semi-structured interview format was chosen for its efficiency and thoroughness in gathering information (Yin, 1984; Mason, 2002). The pre-prepared interview protocol consisted mostly of open-ended questions to capture the managers' lived experiences with chatbot implementation in banking operations, particularly customer services. This format also allowed for probing answers for further clarification, making it flexible and useful for uncovering hidden meanings (see Interview Guide in Appendix B).

To mitigate bias, respondents were guaranteed anonymity and confidentiality, reassured that no identifying information would be revealed. Participants received complete project details, including its purpose, data management issues, and information security protocols, and signed consent was collected. Interviews were conducted via an online video communication platform, with some interviewees opting to remain anonymous by not using a webcam. Permission was obtained to record the interviews, and transcription mode was enabled to capture the content more effectively. Interviewees received a copy of the transcribed interview to ensure accuracy, enhancing the validity and reliability of the findings. See Appendix C for detailed data coding and Appendix D for a data processing example.

[Insert Figure 3 about here]

Furthermore, we developed the interview guide with a strong foundation in the relevant literature to ensure that the questions are both purposeful and justified. If the guide is presented without clear connections to established theoretical or empirical research, it risks lacking the necessary rationale for each question and how it relates to the study's objectives. In our study on chatbots in the banking sector, the interview questions were carefully constructed with direct references to models such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT)**.** These models were employed to explore critical factors such as perceived usefulness, ease of use**,**

and performance expectancy**,** which are known to influence technology adoption. Without grounding the questions in these frameworks, the guide might resemble a generic set of questions, rather than one that probes the specific theoretical issues or gaps highlighted in the literature.

Therefore, each question in the interview guide was explicitly justified by drawing on prior research in areas such as chatbot adoption, customer satisfaction**,** and behavioural responses in the banking and AI sectors. This ensures that the guide not only aligns with the existing body of academic knowledge but also addresses the key research questions in a methodologically sound manner.

After the validation of the transcribed interviews by the study participants, the analysis was conducted using deductive thematic analysis, as outlined by Braun and Clarke (2008), which includes five phases of thematic enquiry. Thematic identification was achieved through a bracketing process (LeVasseur, 2003; Hamill and Sinclair, 2010), allowing for the identification of themes that fit within the theoretical framework of this study. The findings from this phase served as the basis for further enquiry in the second phase of the study. To enhance the robustness of the findings, different data sources were combined. In the second phase, case studies aligned with the project aims were identified to provide real-life context for the findings from the first phase. Additionally, grey literature, such as industry and company reports relevant to the study's area of interest, was collected. These case studies supported the empirical findings and provided complementary evidence where possible. Appendix E provides detailed information on case selection and rationale.

4. Findings and discussions

4.1 Performance expectancy

Performance expectancy is defined as the users' expectation to the performance of adopted technology (Sarfaraz, 2017). Previous studies have shown a positive relationship between performance expectancy and behavioural intention to adopt a particular technology. However, perception of performance expectancy is also affected by convenience and perceived useability of the technology. In regards Chatbots, perceived usability and evolutionary fitness help to create a negative view of performance expectancy and thus be viewed as potential barriers.

> "*Some human advisors are quite slow, whereas Chatbots are instant*" (Respondent 1).

Direct usefulness was thought by respondents to be limited because of frequent errors made by Chatbots and lack of technical capability to have long, complex conversations and answer appropriately to customer queries. The professionals felt that direct usefulness for external customer service was more limited than internal customer service usage, although operational efficiency could indirectly benefit consumers if lower operating costs and higher profits led to lower prices and more investment in customer service.

> "*There are geopolitical and macroeconomic risks that cannot be foreseen by a Chatbot*" (Respondent 8).

The above respondent felt that researchers and industry experts alike could not easily predict the future usefulness of Chatbots for complex problem solving in customer service; they are based on artificial intelligence, and this is a fast-developing area with capabilities yet undiscovered.

4.2 Effort expectancy

Effort expectancy is defined as user perception of how they can use a technology easily (Onaolapo & Oyewole, 2018). Security and risk management concerns can be seen as cumbersome and therefore create a negative perception regarding effort expectancy for the

adoption of Chatbots. Furthermore, development cost is another operational aspect revealed with the potential to impact effort expectancy, this is because the more costly the technology the more it is likely to require managerial effort to convince the organisation to invest in it.

Security and risk management. In banking, mitigation of risk is highly important because loss of data can lead to financial loss to customers, which will have to be compensated by the bank. This could lead to a lack of trust and customer dissatisfaction. Therefore, to maintain good customer service in banking, Chatbots will need to be implemented on secure platforms. Some of the banks are using their own platforms via their own mobile apps; Bank of America's Erica is securely within their app, Santander UK operates their Chatbot through their SmartBank app and RBS' Luvo also operates within internal security systems, although it uses IBM technology.

This eliminates the requirement for banks to allow any data to flow outside of security barriers, and customers may feel safer using these apps instead of using an external platform such as Facebook Messenger; Absa's Facebook Chatbanking came under scrutiny because customers feared for the security of their data. In a 320-person poll carried out by Fin24 news, 81% said they would not use Facebook Messenger for banking because "it's too risky" (Fin24, 2016). One user of the site argued that: *"... banks can't even secure themselves properly now, how are they going to do it via a third-party platform?"*

These attitudes may stem from recent high-profile cybersecurity failures such as Tesco Bank's late 2016 raid, which saw £2.5m lost from roughly 9000 current accounts (Arthur, 2016), HSBC's DdoS attack in early 2016 which led to system failures (Dunkley, 2016) and JPMorgan's September 2014 hacking attack which led to personal details from 83 million accounts being stolen, with 76 million accounts' details leaked publicly for sale to cybercriminals (Leyden, 2014).

Thus, customers may feel that external Chatbots are a step too far into the unknown, and they may even distrust the integrity Facebook Messenger platform itself; Apple's Tim Cook publicly claimed that Facebook and Google both sell user data (Griffin, 2015). Furthermore, banks do not have any control over the security measures that Facebook use to protect user accounts, which may have records of Messenger conversations that the user had with the bot.

4.3 Social influence

Personality. For a bot to be likeable and enjoyable, they should have a coherent personality – an interesting experiment in this area has been carried out by Microsoft's Tay bot and their Zo.ai bot, both of which take user inputs to build their own personalities (Zo.ai, 2017). Tay was successful in building its own personality; however it ended up turning into a racist and posting offensive tweets – thus illustrating the volatility that this free learning approach can have (Price, 2017). It is debatable whether this project was successful or a failure because the bot did indeed learn, and the malicious content was learned by the posts made by Twitter users.

4.4 Individual level predictors of Chatbots acceptance

Previous studies employing the UTAUT framework have many have shown the moderating role of different demographic variables in different situations (e.g., gender, age, and experience) (Venkatesh et al. 2003; Venkatesh 2022). Likewise, the findings of this study seem to concur on certain demographic constructs as potential moderators of Chatbot adoption in banking. Note that here, mediation is used loosely and not in the statistical sense to illustrate the likely interactive role of these constructs.

Age differences. Chatbots as a customer service tool have only been recently introduced to the mainstream market, and thus it could be expected that due to the large technology age gap that exists between generations (FT, 2016) there would be a lack of adoption for a large

proportion of older consumers; over 65s in the UK made up 17.76% of the population in 2015 (World Bank, 2015), and it is highly likely that most have bank accounts considering that only 1.5 million people out of the UK's population of 64 million do not have a bank account. Some financial institutions are using Facebook messenger, such as Absa, MasterCard and American Express. The age distribution for Facebook users is greatly weighted towards younger users, and therefore this could limit market exposure. On the other hand, it was found in PwC's (2016) report that Millennials had a significant social media presence and they enjoy engaging in customer service through social media.

Gender differences. Interestingly, it was found in PwC's (2016) report that women would be significantly more likely to use a Chatbot for tasks such as shopping, with 20% of women stating this in comparison to only 12% of men. Additionally, men were found to be almost twice as likely to use bots as a quick troubleshooting utility (27% of men vs 14% of women). This suggests that banks should implement learning into their Chatbots which recognizes gender as a factor in personalising communications; for example, a female user could be slightly more likely to receive prompts based on product offerings given by the bank – but only if the user in question was found to have a high click rate of such prompts. These findings suggest that gender differences in the adoption of Chatbot can be attributed to certain services only. However, in general terms, gender differences may not be an issue when it comes to the adoption of the technology. Other individual level predictors of Chatbot can be filed under effort expectancy based on the UTAUT model and these include ease of use and interactivity.

Ease of use. Although initial Chatbots have been unreliable due to the challenges of recognizing context and having sufficient data in the repository, Mobile apps have been found to lack engagement – with 23% of users abandoning apps after one use. However, in-app messages improved user retention by 10% (O'Connell, 2016), so proactivity such as

customer prompts in Barclays Africa's ChatBanking and RBS' Luvo appears to improve customer retention through engagement. Chatbots have been found to exceed their benefits as perceived by consumers in every category tested, including huge differences between scores for key identified factors of 24-hour service (20/100 for apps, 68/100 for Chatbots), quick answers for simple questions (19/100 apps, 68/100 Chatbots) and Convenience (17/100 apps, 50/100 Chatbots).

Furthermore, some banks are integrating their Chatbots into their existing apps, such as Bank of America with their Erica bot, which allows users to keep the same security and verification systems they are used to. In addition, push notifications have been proven to be a useful tool to drive engagement, which can be useful for both mobile apps and Chatbots. Research results show that relevant push notifications can double app retention rates (Tode, 2012) and increase user engagement by 293% (D'Cunha, 2014). The use of push notifications within both apps and Chatbots could also lead to a reduction in the negative effect Ad-blockers have on marketing, which has been estimated to be set to cost digital publishers $27bn USD by 2020 (Juniper Research, 2016), and therefore, Apps and Chatbots in particular, have been assessed as a more effective channels by customers compared to websites and emails, which are accessed within web browsers..

Accordingly, these perceived benefits can help to improve the perception of users regarding the ease with which the technology can be used and therefore develop a positive effort expectancy perception in the minds of users. For these reasons, Sheth (2015) believes that firms will engage with their customers through Messenger platforms, which would be set to replace Mobile operating systems as the central platform, which is currently mobile app focused – particularly due to the ease of customer service through quick answers.

Interactivity. According to the PWC survey, 45% of buyers were found to need human contact in a buying process. In banking, customers tend to seek to follow the traditional and most preferred route of using face-to-face customer contact in-branch (PwC, 2016). All professionals interviewed for this paper believed that most complex banking tasks such as detailed account issues or investments would be more appropriately handled by a human for optimal customer service according to current Chatbot capabilities.

However, quick answers to simple questions may not require the traditional customer service channels to gain the 'human factor'; Chatbots can be made more personal and human-like by learning to relate to and mimic human behaviour through deep learning (Michaels, 2016), however this may be a difficult goal to achieve with current AI capabilities, and Chatbots on Facebook Messenger can also allow a Live Chat option that keeps a human in reach within the platform (Chatfuel, 2016). It can then be discerned that customers are more likely to develop a positive impression of Chatbot if they believe that human interactions or a closely matched service, is part of the customer experience.

4.5 Organisational predictors of Chatbot adoption

The respondents overwhelmingly felt that Chatbots could be very useful within their businesses both internally and externally; some respondents reported having internal Chatbots, which they agreed assisted operational efficiency within their firms, and all respondents agreed that Chatbots could be useful for their customers. All respondents agreed that Chatbot would be very useful for operating on the "*front line*" of customer service, operating 24/7 and answering simple queries on an easily accessible platform. Thus, they key identified useful benefits would be convenience, availability, and speed of service. All respondents felt that banking customer service should be built upon foundations of trust, accurate answers to queries, secure systems, and quick service. However, the experts

interviewed prioritised security and trust above other factors, and therefore deploying Chatbots to secure platforms is essential to delivering a service that customers trust and will want to use.

Following this, the experts interviewed all felt that Chatbots should be able to answer questions appropriately and allow an option to connect to a human if the Chatbot cannot solve the issue, however this function would be limited to working hours. Most respondents said that machine learning would be an effective way to reduce the margin of error for Chatbot answers.

4.6 Chatbot and value creation

Applying the tenets of dynamic capabilities to the primary and secondary data, two interrelated levers of Chatbot value-added potential are identified as performative and capabilities. The performative levers of Chatbot-enabled value include information transparency, responsiveness, customer satisfaction and loyalty, and cost savings. The capabilities lever of value identified is termed dynamic customer services capabilities comprising of customer engagement capabilities and customer services channel reconfiguration.

4.7 Performative value levers

Information Transparency. A Chatbot can be programmed with company details which they can share with the user on demand. For example, a Chatbot could answer the question "*where is your business located?"* with a pre-programmed response that outputs a Google maps' link which the user can then use to navigate to the destination instantly (Rohampton, 2016). In a 2016 PwC report, 46% of respondents rated lack of website details as a frustration. The main issues identified in the report, such as opening hours and addresses not being available could be solved by a Chatbot (PwC, 2016) which can either be programmed with this information

or have a built-in search function that can sweep the internet or the company website for details.

Responsiveness. It has been argued by Ludford (2017) that future customer service convenience will be greatly increased by messaging apps and Chatbots. Furthermore, respondents felt that the 24-hour service provided by a Chatbot was also a key benefit, and this is supported by PwC's (2016) report, which found that 68% of consumers felt that this factor was the most important. This was closely followed by getting "*quick answers to simple questions*" at 64%. Interestingly, only 18% rated having "*a good customer experience*" as important, which suggests that consumers feel that Chatbots should be primarily about efficiency. Moreover, Microsoft employees stated that Chatbots are available for instant messaging without any installation requirements and there are no device constraints – Chatbots can exist in a wider ecosystem which gives greater freedom for channel expansion (Microsoft, 2017).

Customer satisfaction and loyalty. It is evident that banking customers could benefit from Chatbots, however there is also a vast array of benefits that banks could enjoy – which would incentivise their use. Fully engaged customers were found to be 23% more profitable and loyal, and a 2% increase in customer retention has been found to equal an estimated 10% reduction in relative costs of that customer relationship. Furthermore, retail banking customers in particular who were fully engaged were found to provide 37% more annual revenue than customers who were actively disengaged (Neosperience, 2015).

Cost savings. The potential for cost savings are high with Chatbots because human advisors can be expensive, and therefore, if Chatbots can become useful and improve in quality, Chatbots could reduce the labour requirements of firms. Although, some industry professionals believe that Chatbots will never fully replace humans – such as Pizza Express

social lead despite their investment in Chatbots (Stewart, 2017). On the other hand, banks can make cost savings through internal customer service using Chatbots. JPMorgan's COIN bot analyses legal contracts within their business automatically, which has saved over 360,000 labour hours – which could be estimated at $39 per hour based on an hourly rate of a typical JPMorgan legal associate (Glassdoor, 2017), thus equating to $14 million.

Moreover, JPMorgan are using COIN for other tasks such as parsing emails and handling common IT requests, both of which can be time consuming tasks in a banker's day. They also plan to use bots in the future for business analysis tasks such as identifying new sources of revenue, reducing expenses and mitigation of risk (Mills, 2017).

4.8 Dynamic customer services capabilities

There are more than ten prominent banks across the world using Chatbots for the purpose of improving customer service. The findings suggest that banks can leverage Chatbots in their existing processes to create dynamic capabilities. For example, Chatbots are providing banks with the ability to reconfigure existing communication channels through automation to reach more customers and provide a more friction-free banking experience' (Mills, 2017), thus leading to dynamic customer services capabilities. Such capabilities, the results suggest, comprise of *customer engagement capabilities* and *customer services channel reconfiguration.*

Customer engagement capabilities. One of the main ways banks are leveraging Chatbots in their operations is to improve engagement with customers. This is being done through increasing efficiency of engagement by reducing the time it takes for a customer to reach a solution to their problem, and through increasing the quality of channels at the customer's disposal to conduct their banking (Mills, 2017; Mende et al., 2019; Lemon and Verhoef,

2016). One of the respondents was quite vocal expressing the value of Chatbots in this context as follows:

> "*Most users can abort a Chatbot conversation without remorse, unlike with a human advisor. However, creating a situation where a bot is merely a facilitator of conversations, such as in a group chat, would drive engagement*." (Respondent 9).

Erica, Bank of America's Chatbot, achieves customer engagement through helping customers to make smarter banking decisions by finding ways they can save money and allowing customers to use Erica to pay bills, all through a voice-enabled and menu-based system. Similarly, MasterCard, Absa, AllyBank, DBS Singapore and Santander UK all offer secure ways for customers to make banking enquiries, track spending and some offer transaction services.

Furthermore, Royal Bank of Scotland uses predictive analytics to detect possible future credit issues a user may have, for example predicting if a customer will default on planned outgoings based on planned inflows. Therefore, the bank will be able to use this automated assistant in the place of an expensive financial adviser and this can help drive customer engagement whilst simultaneously saving money and increasing speed of service. This provides banks with the dynamic capability to re-evaluate and adjust its offerings and the terms and conditions before the need arises.

The volume of big banks using Chatbots for similar Customer service purposes illustrates how Chatbots are indeed becoming very prominent in the banking sector. Over 75% of financial sector respondents in a survey by Personetics (2016) viewed Chatbots as a 'viable commercial solution now or within the next 1-2 years', and almost 50% of respondents already had ongoing Chatbot projects. Additionally, research found that 50% of banks take over 60 minutes to reply by messenger, whilst a Chatbot replies instantly (Marous, 2017).

Customer services channel reconfiguration. Respondents felt that Chatbots within their firm were very smoothly integrated within their internal communications systems, with one respondent citing the use of a Chatbot for streamlined connections to conference calls. Furthermore, respondents felt that such platforms would be distrusted by customers and therefore see low adoption rates for functions which handle sensitive data, such as payments and transfers. However, most respondents acknowledged that Chatbots have the potential to continuously transform existing customer services channels in ways unique to their circumstances. This means that Chatbots can enable continuous adaptation to customer preferences through a dynamic process of reconfiguration as summarised by one respondent.

"In theory, a Chatbot could hook into a database with customer information to allow personalized answers [in real time]. Like first-line (IT) support, a Chatbot could provide [a dynamic] service and [ongoing] account updates to customers." (respondent).

A concrete example of the transformative capability of Chatbots is exposed in the Omnichannel strategy of many banks as revealed by the analysis of secondary data. According to Personetics' whitepaper, 61% of banks believe that it is "*extremely important*" to create a seamless omnichannel experience, and Chatbots built on the platform of Messenger Apps (e.g. Facebook Messenger) have great potential for customer exposure – 2.5bn people have at least one messaging app installed (Personetics, 2016). Facebook recently invested in improving their Messenger platform - implementing a menu-based system which makes typing optional (Perez, 2017). However, this type of system has been slated as "*frustrating*" (Burnett, 2014) and it was found that 56% of Britons rated automated phone systems as their number one financial services' frustration (Mintel, 2010). Newer Chatbots such as Bank of America's Erica simply implements voice capabilities as an extra tool for accessibility.

Therefore, instead of forcing a customer to use a system they may find frustrating, customers now have greater choice in paths to take to resolve their problems. Bank of America believe in investing heavily in Voice AI technology, which reflects the prevalence of voice-activated Chatbots that operate on devices such as smartphones, with Windows' Cortana and Apple's Siri (Forbes, 2016).

Omnichannel customer service provides customers with multiple outlets from which to obtain their information (Lemon and Verhoef, 2016; Mende et al., 2019). PwC's (2016) report compared nine different communication channels through a quality index of 1-100 based on their net benefits delivered to the consumer, and it was found that Bots (84.60) were second only to face-to-face conversations (100). The closest other channels were Email (82.52), Online Chat (81.46), and Telephone at (78.59). Face-to-face is still the most preferred option, and it may be more reliable than Chatbots currently due to the high levels of Chatbot query failures. However, PwC's (2016) survey highlights that consumers do feel that Chatbots are of a very high quality, and thus it could be wise for companies to reduce investment in expensive, labour-intensive channels of customer service and invest more into developing high-quality Chatbots through hiring a few artificial intelligence experts and machine-learning experts rather than many customer service operators for the other channels.

This could potentially lead to performative levers of value in the form of a cheaper and better-quality customer service solution in the long-term if a Chatbot is set up on a free platform such as Api.ai or Chatfuel, which is used by large firms such as Adidas, MTV, British Airways and Uber.

In summary**,** the experts recognize the potential of Chatbot to provide banking firms with a competitive advantage when deployed with existing customer communication systems to achieve dynamic customer services capabilities. However, there is also agreement that banks

are not quite there in leveraging Chatbots optimally for value creation and there are technical as well as perceptual hurdles to clear. Yet, experts are confident that there is a way forward to achieving this recognising the need for patience and phased implementation as expressed succinctly by one of the experts:

> *"In banking, there will be three stages for Chatbot development; firstly, the Chatbot will be able to do generalised tasks such as answering FAQs and providing business details. The second stage will involve personalised alerts and login details. The third and final stage will involve ecosystem integration; all products and services will be linked by a Chatbot, and the bank will become the Chatbank." (Respondent 10).*

No respondents felt that Chatbots would be likely to fully replace human customer advisors soon, however one respondent stated that Chatbots would probably allow companies to reduce labor requirements through automating answers to simple queries, and one respondent said that Chatbots could eventually automate most customer service tasks that humans currently perform due to the high potential for development through machine learning.

5. Implications

The main objectives of this study were four-fold, focusing on the individual and organizational level barriers and enablers of chatbot adoption in the banking sector, as well as understanding the value-added potential of this technology. The research aimed to establish a theoretical and conceptual foundation for understanding chatbot adoption. Although the findings are exploratory, they offer valuable insights and lessons that can be inferred regarding the adoption and implementation of chatbots in the banking industry.

5.1 Managerial implications

This research addresses a significant gap in the academic literature regarding the use of chatbots for customer service, particularly in the banking sector (Grewal et al., 2020; Davenport et al., 2020; Huang and Rust, 2018). It provides practical insights into how

chatbots can be leveraged to enhance customer service by identifying the drivers of customer satisfaction and engagement. Survey respondents rated chatbots second only to in-person interactions, highlighting their potential if implemented correctly. Chatbots are cost-effective and easy for customers to use compared to other customer service channels.

The study suggests that banking and finance firms should hire artificial intelligence experts to develop chatbots and use existing chatbot builders for quick query handling through external platforms. For sensitive data, chatbots should be integrated within mobile applications to prioritize security. Extensive user testing is recommended to improve chatbot accuracy. Overall, chatbot development is highly desirable due to the significant opportunities for enhancing customer service at a low cost. However, chatbots should currently complement, rather than replace, existing customer service channels.

5.2 Managerial framework for adopting Chatbots in banking

The dynamics of chatbot adoption and their potential value creation mechanisms in the banking sector have been explained. These results offer insights into an experimental managerial framework for chatbot adoption, aimed at building dynamic capabilities for customer services enabled by chatbots. Based on primary and secondary research, this framework provides an overview of how dynamic capabilities in customer services could be achieved, focusing on key drivers of chatbot value creation such as quality, satisfaction, and engagement.

Presented in Table 2, the framework integrates banking-specific and generalized factors to understand these drivers. It assumes that most chatbot users will be personal banking customers or internal employees and uses a stage-based value creation assessment system. This system translates identified chatbot capabilities into accurate evaluations of customer service capabilities. The framework is structured in stages, with each assessment requiring an

action to achieve a desired result before progressing to the next stage. Successful chatbots can "graduate" to higher levels of functionality.

[Insert Table 2 about here]

The framework for chatbot adoption in banking is broken down into six stages, each assessing different capabilities:

1. Stage 1: Technical Performance - The chatbot can receive inputs and provide outputs, serving as a basic test platform.

2. Stage 2: Basic Conversation Parsing - The chatbot can engage in small talk with customers, though it offers little to no service usefulness.

3. Stage 3: Information Accuracy - The chatbot can function as a basic customer service bot, capable of answering simple questions and assisting with everyday banking issues.

4. Stage 4: User-Friendly Interface - The chatbot can be integrated into its own operating environment, such as a mobile application.

5. Stage 5: Complex Problem Solving - The chatbot can perform many functions of a trained human advisor, allowing firms to save resources and enabling customers to resolve complex problems 24/7.

6. Stage 6: Statistical Success - The chatbot has proven its ability to reconfigure existing resources and serve as a valuable customer service tool, thus being considered a success.

Each stage involves specific actions and results, representing incremental asset transformation activities within the experimental framework to achieve the desired results. This structured progression ensures that chatbots evolve from basic functionality to becoming integral tools for customer service (see Table 2 for more details).

5.3 Theoretical implications

Chatbots are currently in their infancy, showing great potential by providing useful customer service through answering simple queries, as demonstrated by multiple large financial institutions. However, their capabilities are limited due to their current knowledge and ability to parse customer queries, making them unable to handle all customer inquiries or complex problems without human assistance. Despite these limitations, chatbots have significant potential for learning, as artificial intelligence remains a largely untapped field. The study reveals that, similar to emerging technologies like blockchain, the Unified Theory of Acceptance and Use of Technology (UTAUT) framework can effectively examine the drivers, moderators, and barriers of chatbot adoption at both individual and organizational levels. The findings indicate that performance and effort expectancies are strong predictors of chatbot adoption, while negative perceptions of these factors can create barriers. This work is the first to extend the UTAUT framework to chatbot adoption.

Regarding value creation, chatbots have great potential for delivering quality customer service, but further development is needed to realize their full potential. Interviews and secondary data have showcased the transformative potential of chatbots. Integrating chatbots into existing customer service ecosystems, such as Omnichannel, can enhance the customer service capabilities of banking organizations. This integration can lead to dynamic customer service capabilities, including improved customer engagement and the ability to reconfigure customer service channels in response to changing demands. Chatbots can learn from individual customer inquiries and develop unique response capabilities over time (Mariani and Wamba, 2020). This study contributes to the dynamic capabilities literature by highlighting the concept of dynamic customer service capability, which is enabled by chatbots.

6.0 Conclusion

This work sought to interrogate the usefulness of Chatbots in customer services within the banking sector. Drawing on the capabilities-based perspective, Chatbots were conceptualized as an IT resource. By employing a largely qualitative approach, it emerged that Chatbots can be a useful tool for customer service automation, with significant potential for enhancing the quality of customer service. It was concluded that Chatbots have the potential to equip the banking sector with dynamic capabilities to handle and respond to customer inquiries under dynamic conditions in a timely and effective manner. However, given their limitations concerning accuracy and reliability, Chatbots still require significant learning and development to become self-sufficient in solving complex customer service problems. Therefore, Chatbots cannot be expected to handle all customer queries without some assistance from a human.

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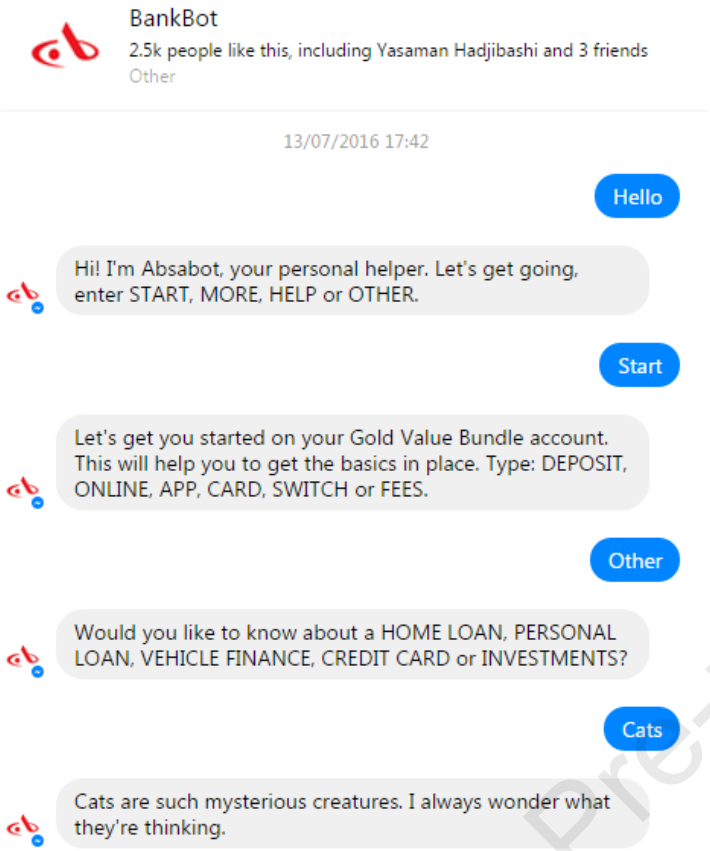

Figure 1. ABSA Chatbot

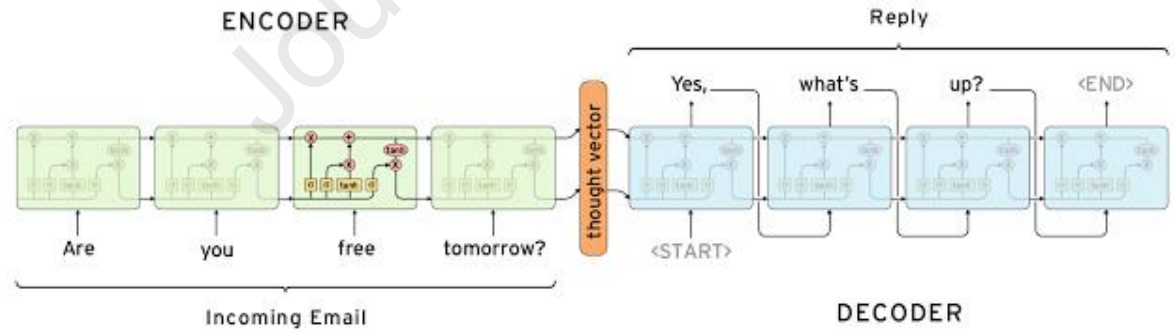

Figure 2. Decoding an email to create a response (WildML, 2016)

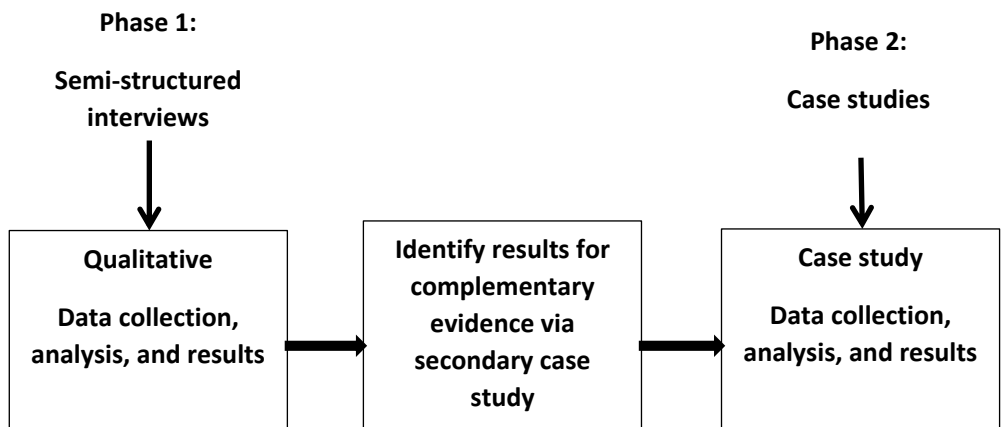

Figure 3. *Sequential data triangulation approach: Adapted from Hesse-Biber (2010)*

Table 1. Comparison of Interviews and Literature Findings

Findings	Similarities	Differences	Supporting interview statement	Supporting Sources
General Sentiment	High levels of positivity between both primary and secondary research. Hopefulness for the future. Both very positive about Chatbots' abilities to conduct simple customer service.	Respondents are slightly more sceptical of Chatbot abilities to carry out complex tasks. Grey literature, especially news articles, may be excessively positive.	*"I can definitely imagine a lot of businesses using Chatbots in the future, when they would be far more advanced and be far more interactive."*	Murgia (2016)
Barriers	Worries regarding security were prevalent for both respondents and secondary literature regarding Chatbots handling sensitive data on external platforms. However, both acknowledged that Chatbots have statistically had problems providing appropriate responses.	Respondents are professionals and therefore their points of view had greater concerns regarding the ability of a Chatbot to effectively manage a customer relationship and engage a customer. Interestingly, secondary research found a misalignment between firms' and customers' points of view relating to priorities.	*"Most users can abort a Chatbot conversation without remorse, unlike with a human advisor. However, creating a situation where a bot is merely a facilitator of conversation, such as in a group chat, would drive engagement."*	Fin24 (2016). Arthur (2016). Dunkley (2016)
Drivers	Both research types found that what drives the usefulness of Chatbots is	Secondary research also found that adoption could be driven by platform	*"The chatbot would eliminate the (need for human advisors to answer)*	Rohampton (2016). PwC (2016). Rimon (2016)

	encapsulated by practicality; convenience, speed, and accuracy to be the key factors needed.	optimisation. Additionally, efficiency was a significant topic within secondary research.	*smaller questions".*	
Factors	Chatbots were found to require careful review of the end user. Whilst a Chatbot may work well for an average UK customer, it may not work as well for an Italian high net worth investor.	Secondary research identified customer service factors based on gender and human interaction.	*"There are geopolitical and macroeconomic risks that cannot be foreseen by a Chatbot."*	PwC (2016). FT (2016). World Bank (2015)
Applications	There was overall agreement that Chatbots in their current state are very useful for customer service to be applied as basic assistants, such as for FAQ purposes or basic information. Both sources also agreed that future applications would be likely to include complex bots which would be capable of taking over more tasks currently performed by human advisors. Neither research source overwhelmingly felt that Chatbots would ever fully replace humans.	The interviews revealed interesting internal applications of Chatbots which revealed mostly opportunities for internal customer service and therefore operational efficiency. Secondary research found that integration into omnichannel strategies in big banks was beneficial for customer satisfaction, engagement, and retention, and that Chatbots could be used alongside mobile apps for optimal customer service outcomes in the areas of security and engagement.	*"Go to the Chatbot, signal the problem, and the customer service advisors will know as soon as possible so they can fix the problem."* *"In theory, a Chatbot could hook into a database with customer information to allow personalized answers. Similar to first-line (IT) support, a Chatbot could provide service and account updates to customers."*	Mills (2017). Personetics (2016). Perez (2017). Stewart (2017)

Table 2. Chatbot Acid Test

Stage	Action	Pass Result	Potential Function
1. Technical Performance	User inputs text to the Chatbot, seeking any response to test speed.	Chatbot replies at a reasonable speed, within 1-3 seconds with a stable internet connection.	Chatbot works at the most basic level, with the ability to receive inputs and provide outputs. Useful as a test platform.
2. Basic Conversation Parsing	User speaks to the Chatbot with simple phrases, such as "Hi," "goodbye" and "how are you?"	The Chatbot demonstrates the ability to accurately parse the information and formulate a relevant response.	Making small talk with customers, with little to no service usefulness.
3. Information Accuracy	User obtains information from company website or similar source, and then asks the bot questions regarding this information.	The Chatbot accurately relays the correct information back to the customer or utilises a built-in site search function to scrape information from the source and pastes it into the chat environment.	The Chatbot is now ready to be used as a basic customer service bot, able to fulfil simple questions and assist with everyday banking issues.

4.	**User-friendly interface**	User navigates through information provided by the Chatbot.	The Chatbot either offers helpful prompts to assist the user to find the resolution to their problem or uses a menu-based system to allow easy navigation through buttons.	The Chatbot is now sufficient to be deployed within its own operating environment, such as a mobile application.
5.	**Complex Problem Solving**	User has a complex issue that requires multiple stages of action to fix, with multiple informational inputs from the user.	The Chatbot can remember previous inputs, and then modify responses based on those inputs to create a comprehensive solution to the complex problem.	The Chatbot can now carry out many functions that a trained human advisor can, thus enabling a firm to save valuable resources, and enabling customers to solve complex problems 24/7.
6.	**Statistical Success**	User either finds Chatbot useful enough to continue using it or abandons the Chatbot.	The Chatbot should have a high customer retention rate with regular usage.	The Chatbot has proven to be a useful tool for customer service and can be considered a success.

Appendix A: Table 1. The socio-demographic characteristics of participants.

Gender	Age	Job
Male	34	Senior Manager
Other	34	VP
Other	34	VP
Male	53	Manager
Male	58	VP
Male	54	VP
Female	60	Manager
Female	56	Manager
Male	30	Director
Other	58	Senior Manager
Female	46	VP
Female	31	Manager
Male	55	Director
Male	54	Director
Other	31	VP
Male	36	Manager
Other	58	Director
Other	38	VP
Male	38	VP
Male	58	VP
Female	57	Manager
Other	46	Senior Manager
Other	57	Director
Other	48	Director
Male	34	VP
Female	60	Manager
Male	37	VP
Female	58	Manager
Other	36	Manager
Other	43	Manager
Female	44	Senior Manager
Female	50	Senior Manager
Male	30	VP
Male	46	Director
Male	31	VP
Female	34	Senior Manager
Other	41	Manager
Female	59	VP

Female	33	Director
Female	40	Senior Manager
Female	54	Senior Manager
Male	51	VP
Female	45	Manager
Female	61	Director
Male	35	VP

Appendix B: Interview Guide

Introduction

1. Welcome and Introduction

- Thank the participant for their time.
- Briefly introduce the purpose of the study.
- Assure confidentiality and explain the interview format.

Background Information

2. Professional Background

- Can you please describe your current role and responsibilities?
- How long have you been working in the banking industry?
- Have you had any direct experience with implementing or using chatbots in your current or previous roles?

Perception of Chatbots

3. Usefulness of Chatbots

- In your experience, how useful do you find chatbots for customer service in banking?
- Can you provide examples of how chatbots have been utilized in your organization?

Justification: These questions aim to understand the participant's direct experience and perceptions of chatbot usefulness in customer service, aligning with the study's aim to evaluate the effectiveness of chatbots in the banking sector.

4. Impact on Customer Service

- How do you think chatbots are impacting customer service in banking?
- What feedback have you received from customers regarding their interactions with chatbots?

Justification: These questions seek to gather insights on the real-world impact of chatbots on customer service and customer satisfaction, which is crucial for assessing their overall effectiveness.

Challenges and Limitations

5. Barriers to Adoption

- What do you see as the main barriers to the adoption of chatbots in your organization?
- How do these barriers affect the implementation and performance of chatbots?

Justification: Identifying barriers to adoption helps to understand the challenges faced by organizations in implementing chatbot technology, which is essential for addressing these issues in future developments.

6. Limitations of Chatbots

- What limitations have you observed in the performance of chatbots?
- How do these limitations affect the overall customer experience?

Justification: Understanding the limitations of chatbots provides insight into areas that require improvement and highlights the gaps between current capabilities and customer expectations.

Future Outlook

7. Future Impact of Chatbots

- How do you foresee the future impact of chatbots on customer service in the banking industry?
- What advancements or changes do you expect to see in chatbot technology?

Justification: These questions aim to gather predictions and expectations about the future of chatbots, which can guide strategic planning and innovation in the banking sector.

8. Organizational Strategy

- How is your organization planning to integrate or expand the use of chatbots in the future?
- What factors are driving your organization’s strategy regarding chatbots?

Justification: Understanding organizational strategy helps to see how banks plan to leverage chatbot technology moving forward, providing insights into long-term trends and strategic priorities.

Justification for Questions

The questions in this interview guide are designed to achieve several key objectives:

1. Capture Professional Experience: Understanding the participant's background and experience with chatbots provides context to their responses and helps to validate their insights.
2. Evaluate Usefulness and Impact: Questions about the usefulness and impact of chatbots are central to the study's aim of assessing their effectiveness in customer service.
3. Identify Challenges: Exploring the barriers and limitations of chatbots helps to identify areas that need improvement and informs strategies to overcome these challenges.
4. Understand Future Perspectives: Questions about the future impact and organizational strategy provide foresight into how chatbots are expected to evolve and be utilized, guiding future research and development.
5. Comprehensive Insight: The final open-ended question ensures that participants can share any additional thoughts, making the data collection thorough and inclusive of all relevant experiences.

By addressing these areas, the interview guide aimed to gather comprehensive and actionable insights that contributed to the body of knowledge on chatbot technology in the banking industry and inform practical applications.

Appendix C Detailed Description of Data Coding

Step-by-Step Description of Data Coding:

1. **Preparation:**
   - Transcription: All interviews were transcribed verbatim to maintain the integrity of the data. Familiarization involved multiple readings of the transcripts to identify initial patterns.
2. **Initial Coding:**
   - The data were broken down into meaningful units, and each unit was assigned an initial code. For example:
     - "Advantages"**:** Responses mentioning convenience, speed, or accessibility were grouped here.
     - "Challenges"**:** Any comments on technical barriers, security concerns, or chatbot limitations were coded under this category.
3. **Development of Coding Scheme:**
   - Codes were grouped into broader categories:
     - Advantages of Chatbots**:** Subcategories included "Convenience," "24/7 Availability," "Speed," and "User Engagement"**.**
     - Challenges**:** Subcategories included "Technical Barriers," "Security Issues," and "User Resistance"**.**
4. **Refinement and Consistency Check:**

- The coding scheme was refined by revisiting the transcripts, ensuring that codes were applied consistently across all data. A second researcher reviewed a sample of the transcripts for inter-coder reliability.

5. **Application of Codes:**
   - Each transcript was systematically coded using the final coding scheme. Annotations were added to each code to provide context and clarity. For example, for a participant discussing the importance of chatbot availability, the annotation might read, "User emphasizes the value of 24/7 service for routine banking tasks".
6. **Identifying Themes:**
   - Once the codes were applied, recurring patterns and themes were identified. For example:
     - "Customer Satisfaction" emerged as a theme combining "Speed," "Availability," and "Convenience."
7. **Thematic Analysis:**
   - Themes were analyzed in the context of the research questions and related back to the theoretical frameworks discussed in the literature, such as the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT)**.**

Coding Elements Used:

1. Professional Background:

Codes: Current Role, Responsibilities, Banking Experience, Chatbot Experience

Purpose: Understand the participant's background and context for their responses.

2. Perception of Chatbots:

Codes: Usefulness, Examples of Utilization, Customer Feedback

Purpose: Assess the perceived effectiveness and impact of chatbots.

3. Challenges and Limitations:

Codes: Barriers to Adoption, Technical Barriers, User Resistance, Performance Limitations

Purpose: Identify obstacles to chatbot adoption and areas for improvement.

4. Future Outlook:

Codes: Future Impact, Expected Advancements, Organizational Strategy

Purpose: Gather insights on the anticipated future role and development of chatbots.

5. Final Thoughts:

Codes: Additional Insights, Uncovered Themes

Purpose: Capture any additional relevant information provided by participants.

By following this detailed coding process, the study aimed to systematically analyze the qualitative data, uncover meaningful patterns, and provide actionable insights into the use and impact of chatbots in the banking industry.

Table of Codes:

Main Code	Sub-Codes	Example Responses
Advantages	- Convenience	"Chatbots are always available and fast, which is perfect for quick questions."
	- 24/7 Availability	"I like that I can access help any time of day without waiting for human support."
	- Speed	"They provide answers instantly, much quicker than waiting on hold."
Challenges	- Technical Barriers	"Sometimes chatbots can't understand more complex queries, which can be frustrating."
	- Security Concerns	"Customers worry about sharing sensitive information with chatbots."
	- User Resistance	"Older customers prefer speaking to a human; they don't trust AI for important tasks."

Theme Tree (outline):

- **Main Theme: Customer Satisfaction**
  - Sub-themes:
    1. Convenience
    2. Speed
    3. 24/7 Availability
  - Linked to the research question: *How do chatbots impact customer satisfaction in the banking sector?*
- **Main Theme: Barriers to Adoption**
  - Sub-themes:
    1. Technical Limitations
    2. Security Concerns
    3. User Resistance
  - Linked to the research question: *What are the barriers to chatbot adoption in banking?*

Outputs and Classification Categories:

- In the analysis, the coded transcripts were entered into qualitative analysis software (e.g., NVivo) to categorize responses under the themes mentioned above. The classification categories include "Convenience," "Challenges," and "User Engagement"**.** These outputs helped visualize the frequency of specific themes and codes in relation to others.

Transition from Themes to Key Points:

The analysis process systematically linked each theme to the study's research questions. For example, the theme "Customer Satisfaction" was broken down into the sub-themes

"Convenience"**,** "Speed"**,** and "Availability"**,** and was tied directly to responses highlighting these chatbot features as key contributors to improved customer service in banking. By presenting data in this structured manner, the analysis provided a comprehensive understanding of the use and impact of chatbots in the banking sector, ensuring that all themes were aligned with the research objectives.

Appendix D Data Processing Example

Step-by-Step Coding Process

1. **Transcription**: All interviews were transcribed verbatim to ensure the accuracy of the data.
2. **Initial Coding**: Each transcript was reviewed, and segments of text were coded into initial nodes (categories) reflecting the content. For example, segments discussing the advantages of chatbots were coded under "Advantages," while segments discussing limitations were coded under "Limitations."
3. **Categorization and Hierarchical Structuring**: Similar codes were grouped into broader categories and subcategories. For instance, "Advantages" might include subcategories like "Convenience," "24/7 Availability," and "Speed."
4. **Refinement**: Codes and categories were refined by revisiting the transcripts to ensure consistency and accuracy.
5. **Thematic Analysis**: Patterns and recurring themes were identified from the coded data. These themes were related back to the research questions to provide insights.
6. **Narrative Construction**: The themes were interpreted, and direct quotes from interviews were used to illustrate key points.

By structuring the data in this manner, the analysis was systematically carried out to draw meaningful insights from the interviews. The themes identified were then linked back to the research questions, providing a comprehensive understanding of the use and impact of chatbots in the banking sector.

Appendix E Case Selection and Rationale

Rationale for Case Selection:

Relevance to Project Aims: The selected cases directly relate to the aims of the study. The cases represent different areas of operation, ensuring a broad spectrum of real-life contexts that enrich the findings from the first phase of the investigation.

Availability of Data: These cases were chosen due to the availability and accessibility of detailed data, which is crucial for thorough analysis and validation of findings.

Previous Successes: Each case has been recognized for its achievements in their respective areas, providing rich examples of successful implementation and outcomes.

Case Selection

The selection of cases for this study was based on their relevance to the research objectives and the diversity of their chatbot implementation. The selected firms were leading organizations in the banking sector that had adopted chatbot technology, either internally for operational efficiency or externally for customer-facing services. The firms and chatbots selected include:

- **Bank of America – Erica**: A voice-activated chatbot integrated within the bank's mobile app, Erica helps users with tasks such as paying bills, tracking expenses, and providing financial advice. Erica was selected due to its wide adoption and innovative use of AI-driven capabilities, positioning it as a leader in personal banking services.
- **Royal Bank of Scotland – Luvo**: Luvo uses IBM's Watson technology to handle basic customer queries and transfer complex issues to human advisors. This case was selected because of its combination of AI capabilities and human oversight, allowing the exploration of how chatbots complement traditional customer service models.
- **JPMorgan – COIN**: An internal chatbot designed to parse legal documents and handle compliance queries, COIN was chosen due to its focus on improving operational efficiency in back-office tasks, demonstrating the potential of chatbots in internal corporate applications.

These cases were selected for their diversity in chatbot applications—spanning personal banking, customer service, and internal operations—and for the availability of data regarding their implementation and performance. Each case provided insight into how chatbot technology is integrated into existing processes, the challenges faced, and the results achieved in terms of customer or operational outcomes .

Data Collection, Coding, and Analysis:

Data was collected from multiple sources including interviews, official reports, internal documents, press releases, and secondary data from industry reports and academic studies. Digital tools were used to organize and store collected data, ensuring systematic handling of qualitative information. Furthermore, an inductive coding approach was employed, starting with open coding to identify initial themes and patterns directly from the data.

Process:

Step 1: Open coding involved breaking down the data into discrete parts, closely examining each part, and comparing for similarities and differences.

Step 2: Axial coding was then used to identify relationships among the open codes, grouping them into categories that represented broader themes.

Step 3: Selective coding was conducted to integrate and refine these categories into core themes that align with the research questions and aims of the study.

Thematic Analysis: Themes identified through coding were analyzed to understand the underlying patterns and insights. This involved examining the frequency of themes, their connections, and the context in which they appeared.

Cross-Case Analysis: Comparing findings across the cases helped to identify commonalities and differences, enhancing the robustness of the conclusions.

Validation: Triangulation was used to validate the findings by cross-referencing data from different sources and methods. Feedback from participants and stakeholders was also sought to ensure the accuracy and relevance of the interpretations.

The second phase of the investigation provided real-life context to the initial findings through the careful selection and analysis of relevant case studies. This methodology facilitated a deeper understanding of the practical implications and applications of the study's findings, supporting the overall research objectives.

Data Code

The initial open coding process resulted in numerous codes that were then grouped into broader categories and themes. The following table outlines the open codes and their eventual categories:

Open Codes	Category	Example Response
24/7 availability	Advantages	"I like that I can access help any time of day without waiting for human support."
Speed	Advantages	"They provide answers instantly, much quicker than waiting on hold."
Convenience	Advantages	"It’s much easier to ask a chatbot for simple things than to call or wait for an email."
Security concerns	Challenges	"I’m not sure about sharing my personal information with a bot. Who’s in control of my data?"
Technical limitations	Challenges	"The chatbot can’t always understand complex questions, so you end up needing to talk to a person anyway."
Integration with human advisors	Mitigating Strategies	"It’s useful when the chatbot can transfer you to a real person when it doesn’t know the answer."
Training AI for complex queries	Future Opportunities	"There’s potential for chatbots to get better at complex conversations, but they need more development."

Open Codes	Category	Example Response
Customer feedback	Impact	"Customers love the speed of service, but some don’t trust AI to handle their more sensitive queries."

- Chatbots are a useful tool of customer service automation with significant potential for good quality customer service.
- 24/7 availability and speed as primary factors driving customer satisfaction.
- The study thus highlights how Chatbots are currently being used, and how they will likely be used in the future.
- We develop an experimental framework which explains how to assess Chatbots for customer service capabilities.

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: