

AI Chatbot Knowledge-centric Services for Enhanced Customer Interaction

Sithembiso Khumalo, Tryphosa Bonolo Mashigo and Wafeequa Ben

College of Business and Economics, Department of Information and Knowledge Management,
University of Johannesburg, South Africa

bonolomashigo22@gmail.com

skhumalo@uj.ac.za

wdinath@uj.ac.za

Abstract: The internet and the growth in internet users have undoubtedly influenced the evolution of chatbot development and adoption. Various industries are increasingly adopting Artificial Intelligence (AI) and chatbot technologies to manage customer interactions and enhance customer service. As these industries increase the deployment of AI chatbot to support their customers and improve their user-experience, it's therefore significant for them to understand the knowledge-centric service delivery. This study investigates the knowledge-centric quality service and responsiveness of a rule-based WhatsApp chatbot implemented by a South African mobile telecommunications service provider in resolving customer queries. The study adopted a mono-method approach within the interpretivism paradigm, where qualitative insights gathered through thematic analysis of interviews with three employees and a further platform evaluation. The chatbot immediately replies and presents the main menu with various options for the user to select. The matrix shows how the chatbot performed in each main menu task/item relative to usability, accuracy, performance, and interactive responsiveness. Findings highlight the importance of ongoing performance monitoring and iterative improvements in AI-driven knowledge interface design to align with evolving customer expectations and industry benchmarks for service quality. This study contributes to the growing discourse on AI-driven customer knowledge-centric service solutions in South African mobile telecommunications and other industries by offering a comprehensive framework for evaluating and enhancing chatbot effectiveness. This research paper positions chatbots as a knowledge-mediation interface that translates organizational information into task-oriented exchanges, shaping escalation pathways, retention of operational know-how and customer experience.

Keywords: Quality service, Knowledge-centric, Responsiveness, Artificial intelligence, Chatbot, Telecommunication

1. Introduction

The proliferation of chatbot technologies has revolutionised the landscape of customer service, enabling organisations to meet the growing demand for quick, convenient, and personalised self-service solutions (Rossmann, Zimmermann, & Hertweir, 2020:237). However, the existing gap between the standards and expectations and the actual performance of chatbots highlights the importance of organisations possessing the capability to assess and monitor chatbots effectively. Evaluating the effectiveness of chatbots in customer query resolution necessitates a focus on customer interactions and experiences. This study specifically adopts an approach that integrates information and knowledge retrieval, linguistic proficiency, and AI capabilities to evaluate the effectiveness of a conversational chatbot in resolving customer queries within the South African mobile telecommunications industry.

2. Research Question

How effective is a knowledge-centric rule-based AI chatbot in resolving customer queries?

2.1 Research Sub-questions

1. What specific factors influence the chatbot's success or failure in resolving common customer queries?
2. What types of queries does the chatbot struggle to resolve, and what are the common characteristics of these challenges?
3. What specific improvements could enhance the chatbot's capability to resolve queries more effectively?

3. Literature Review

3.1 The Rise of Chatbot Deployment in Industries for Customer Service

Chatbots have gained considerable popularity (Khan & Das, 2018:5). Miklosik et al. (2021:106530) define chatbots as software programs designed to converse with people by receiving and responding to natural language inputs (Khan & Das, 2018:5). Nyongesa et al. (2020:106) provide a more business-and customer-

focused definition, defining chatbots as application programs that are powered by AI and use natural processing language to automate internal business processes, customer interactions, and support computer-human communication through voice and text (Khan & Das, 2018:5; Misischia et al., 2022:422).

3.2 Aspects of Human-chatbot Interactions Based on Chatbot Design Approaches

The development and growth of AI contribute to the enhancement of chatbot abilities to imitate human agents (Adamopoulou & Moussiades, 2020:1) and, therefore, enable service support provision that is quick and convenient using natural processing language, machine learning algorithms, and deep learning techniques (Adamopoulou & Moussiades, 2020:375). There are six chatbot classifications that influence the linguistic characteristics of chatbots relative to their core functionality. These classifications are based on the goal that the chatbot aims to achieve, and the input processing and response generation method that produces appropriate responses. According to Adamopoulou and Moussiades (2020:379), a chatbot can be classified as informative, conversational, and task-based (per the goal of the chatbot), and rule-based, retrieval-based, and generative-based (per input processing and generation methods). Caldarini et al. (2022:8) also discuss implementation approaches to chatbots, specifically rule-based chatbots and AI chatbots, which can be described as retrieval-based and generative-based, respectively, and support the classification of chatbots by input processing and generation methods. Figure 1 compares the classification of chatbots by goal and input processing and generation.

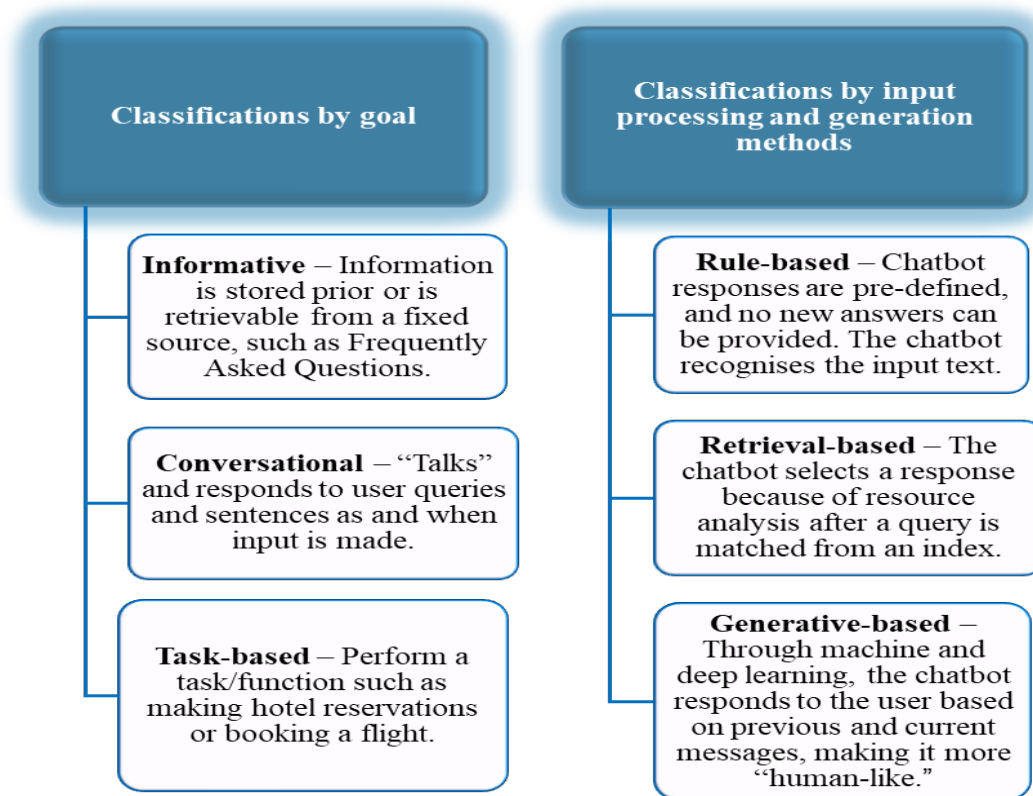


Figure 1: Chatbot classifications by goal and by input processing and generation methods based on Adamopoulou and Moussiades (2020) and Caldarini et al. (2022)

3.3 Challenges and Considerations in Implementing Chatbots for Customer Service

Chatbot implementation presents challenges that organisations need to consider. One significant challenge is ensuring the chatbot can handle complex or ambiguous customer queries effectively (Chen et al., 2022:8). Research by Li (2022:01) highlights the importance of robust intent recognition and dialogue management techniques to understand and respond to customer queries accurately. Human language complexity and the diverse range of customer queries can pose difficulties in achieving high accuracy rates and make it crucial to invest in advanced NLP algorithms and machine-learning models to improve the chatbot’s ability to comprehend and generate appropriate responses (Olujimi & Ade-Ibijola, 2023:3). Additionally, organisations must continuously monitor and update the chatbot’s training data and algorithms to adapt to evolving customer needs and language patterns (Manikanta, Rushi, Lalitha, Goud, Suresh & Daniya, 2022:1664).

Finding the right balance between automation and human intervention is critical in implementing chatbots for customer service. While chatbots can handle a significant volume of customer interactions efficiently, there are instances where human intervention becomes necessary. An article by Conversational AI (2022) highlights the importance of human resource management in chatbot implementation to ensure seamless transitions between automated responses and human support. Organisations must define clear escalation paths and train customer service representatives to intervene when necessary. The ability to seamlessly transfer complex or sensitive queries from the chatbot to a human agent contributes to maintaining service quality and customer satisfaction (Hsu & Lin, 2022:2). Furthermore, organisations must establish effective monitoring systems to identify situations where chatbots may struggle and promptly provide human support (Chen et al., 2022:7).

4. Methodology

Interpretivism was used to understand employee insights. An in-depth interview, and platform evaluation as qualitative techniques. In-depth interviews provided qualitative insights into the chatbot's purpose, limitations, and improvement efforts from an internal perspective at TELCO X. Platform evaluation aimed to evaluate chatbot functionality based on its capabilities to resolve queries, and it involved the researcher interacting with the chatbot from a customer perspective. It allowed for firsthand observation of the chatbot's ability to handle various query types, its navigation, and the overall user experience, providing qualitative insights that triangulated with interview data and objective report metrics. The study adopted the narrative inquiry strategy to gain insights into the research question and sub-questions. The narrative inquiry strategy leverages conversations to comprehend social patterns, with participants and their dialogues serving as sources of information (Savin-Baden & Van Niekrek, 2007:463). Through open-ended interview questions, the researcher captured narratives explaining the chatbot's intended purpose, performance challenges, and ongoing improvement efforts. The interview questions were originally guided by the main research questions. The study adopted purposive sampling, where the sample population was selected based on the researcher's judgement. The researcher identified a research population of five TELCO X employees from two departments as potential participants in the study: the Online Platforms unit in the Digital Online department and the ICT Solutions unit in the Products and Solutions department. The final sample included employees from the Digital Online Department, who met the criteria specified to determine individuals who would offer valuable insights for data collection purposes.

Participants were selected based on technical expertise, operational experience and involvement in chatbot performance improvement. Depicted below are profiles of the research sample, summarising the participants' experiences while maintaining their anonymity. These profiles introduce the three participants and use the pseudonyms Anonymous 1, Anonymous 2, and Anonymous 3 for their identities. This small sample size for the qualitative interviews is a limitation of the study. While this limits the generalizability of the qualitative findings, the in-depth nature of the interviews with highly relevant participants still provides rich insights into the chatbot's operational context and expert perspectives within TELCO X. This limitation is further addressed in Section 4.12.

Table 1: Interviewee Profiles (Source: Authors' Own)

 Anonymous 1 Role: Digital Platforms and Product Specialist: Chat and NoFunds TELCO X Experience: Former employee for a year and 6 months, with ten years of prior experience in IT.	 Anonymous 2 Role: Product Owner: USSD and Chat TELCO X Experience: Current employee since August 2022, with 11 years prior experience in IT and financial services.	 Anonymous 3 Role: Manager: Consumer Digital Transformation TELCO X Experience: Current employee since August 2023, with 15 years of prior experience in IT and telecommunications, insurance, and financial services.
--	---	---

4.1 In-depth Interviews

In-depth interviews were conducted, which fostered conversations to aid the researcher in better understanding chatbots, chatbot design for customer query resolution, and chatbot functionality evaluation. The interview schedule consisted of open-ended technical questions highlighting the participant's technical experience and views and supporting inquiry into chatbots. These interviews provided crucial insights into the internal perspectives on the chatbot's development, intended purpose, operational challenges, and continuous improvement efforts. expert opinions on observed chatbot performance patterns and user experiences, thus providing a richer understanding. Thematic analysis was applied to the qualitative interview transcripts and selected rich narrative segments from the chatbot interaction reports, where content analysis alone is insufficient. To ensure the application of ethical standards during research, the researcher obtained approval from UJ's Research Ethics Committee. The researcher obtained a permission-granting letter from TELCO X's Information Privacy Office, allowing the researcher to collect primary and secondary data from employee participants. The letter was then submitted to the UJ Ethics Committee for research approval and record purposes.

5. Results and Discussion

TELCO X has a chatbot hosted on WhatsApp, a free messaging application that allows users to exchange instant text and voice messages, make voice and video calls, and share media over the internet (WhatsApp.com, 2024). This study evaluates TELCO X's chatbot's performance to determine how effective the chatbot is in resolving queries, and this chapter presents and analyses the key findings from the research conducted. The chatbot was evaluated by practically prompting questions regarding issues faced by clients, these questions were derived from the company's site in the Frequently Asked Questions section.

5.1 WhatsApp Chatbot Evaluation

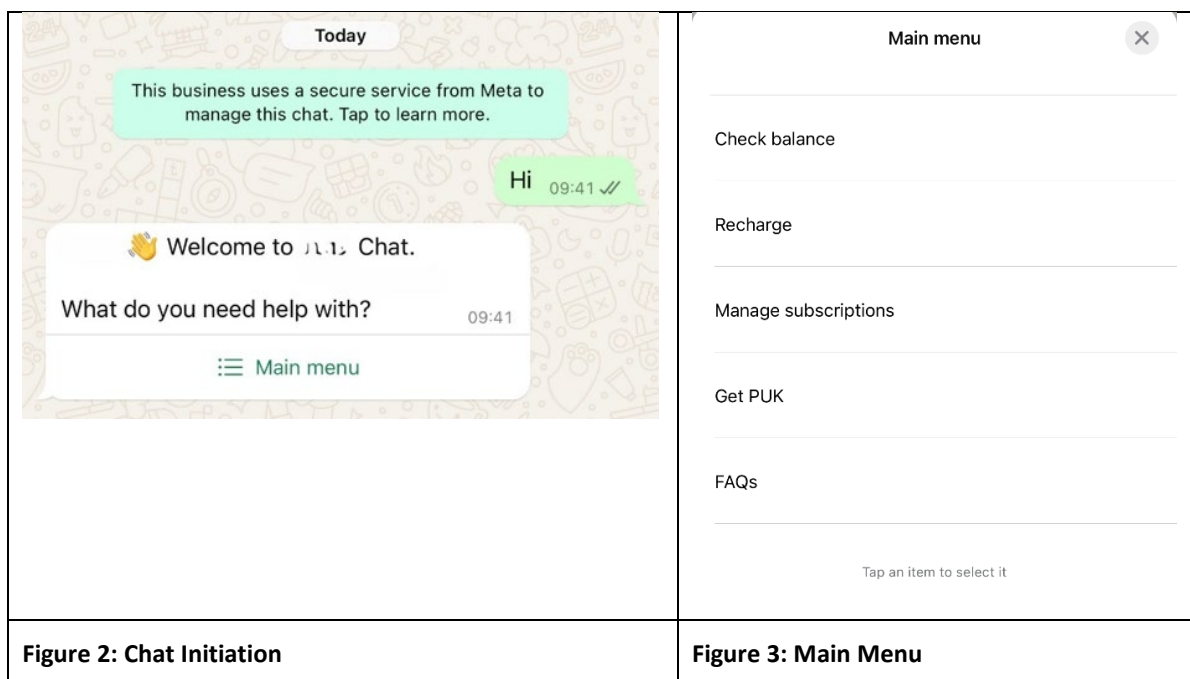
The researcher evaluated the rule-based chatbot by interacting with it across various use cases. This evaluation assessed how effectively the chatbot handles customer queries, guides users through different processes, and supports task completion. The evaluation matrix covers critical performance areas, namely, usability, accuracy, task performance, response time, and user satisfaction, to comprehensively view the chatbot design's strengths and limitations.

5.2 Core Areas for Evaluation

- Usability – Evaluates how easy and intuitive it is to interact with the chatbot, whether the interface is user-friendly, how instructions are conveyed, and whether the navigation is smooth throughout different task processes.
- Accuracy – Assesses the chatbot's ability to provide correct and relevant information in response to queries, including the accuracy of the options offered for tasks.
- Task Performance – Evaluates how effectively the chatbot guides users through queries from start to finish and its ability to facilitate multi-step interactions.
- Interactive Responsiveness – Assesses the chatbot's ability to guide the conversation by offering relevant follow-up options or actions. This involves real-time engagement where the chatbot anticipates the user's next needs.

5.3 Evaluation Matrix

Once the number is saved, the user begins the conversation by sending a message to trigger the chatbot's response. The chatbot immediately replies and presents the main menu with various options for the user to select. This initial step is critical in establishing the interaction and allows users to navigate the available services and make selections based on their needs.



5.3.1 Interpretation of evaluation outcome

The evaluation of TELCO X's chatbot highlights its effectiveness in handling routine tasks but reveals limitations with complex queries. The chatbot is designed with predefined response options, and because of this, users cannot type freely unless prompted. Instead, users must choose from a list of responses, which ensures clear and guided interactions but restricts flexibility. The chatbot efficiently performs simple tasks. The chatbot has an airtime/data recharge function and shows competence in displaying the available bundles and understanding how much airtime the user wants to purchase. However, the payment process cannot be completed within the chatbot; instead, users are provided with a link to an external payment portal.

The chatbot has an FAQ function that provides information to users regarding TELCO X's services, but the researcher noted some limitations during the evaluation. The interaction with the FAQ menu options exposes the chatbot's inability to complete more complex queries, such as SIM swaps, contract upgrades, data usage reports, fraud, and lost or stolen devices. The chatbot provides user instructions and tips to address their needs/issues but lacks the functionality to execute these actions. The reliance on instructions rather than functionality suggests that the chatbot's design focuses on informational support rather than functional problem-solving for more complicated requests. A task like "buying airtime for another number" is an example where functionality overlaps, as this action requires user input for a phone number and could be more intuitively placed under the main recharge menu instead of being a part of the FAQs.

A positive feature is the chatbot's follow-up interaction pattern after every task. The chatbot asks the users if they need further assistance and offers the main menu again if "yes" is selected. However, the chatbot's ability to offer human assistance is inconsistent. While users choose to be transferred to a human agent for balance inquiries and subscription management, the option is not readily available for other tasks, especially those in the FAQ section. Complex tasks may require human interaction, but the inconsistent availability of the option limits the chatbot's overall utility and can be frustrating for users who may need human assistance. The chatbot resolves routine tasks and provides clear responses and guidance for these. However, it struggles with complex tasks and relies more on instructions than functional support. While the follow-up options and escalation to a human agent are positive features, their selective availability raises concerns regarding the chatbot's ability to fully serve customer needs without requiring additional user effort or external input. The chatbot can improve by integrating the ability to complete transactions and offering human agent assistance more consistently across all query types.

In this section, the researcher analyses the insights gathered from interviews with the three participants – Anonymous 1, Anonymous 2, and Anonymous 3. The researcher aimed to identify key themes that align with research objectives and complement the use case analysis and platform evaluation findings to understand stakeholder experiences with the chatbot better. Thematic analysis is a qualitative method used to identify,

analyse systematically, and report patterns/themes within data (Jack Caulfield, 2023). For this research, thematic analysis provides a structured approach to uncovering critical insights about the TELCO X chatbot's effectiveness in resolving customer queries. This approach enabled a comprehensive understanding of the strengths and limitations of chatbot use from different stakeholder perspectives. Through thematic analysis, the researcher identified five key themes: the impact of the Fourth Industrial Revolution on chatbots, human-chatbot interaction, task performance and escalation, customer behaviour insights, and critical success factors for chatbot development and design. These themes are derived from the insights of three participants, each of whom shared unique perspectives based on their experiences with the TELCO X chatbot.

Theme 1: Impact of the Fourth Industrial Revolution on Chatbots

Anonymous 1 emphasized the role of conversational AI in making customer service more seamless: *"Conversational AI mainly from chatbots has enabled customers to resolve queries or find out information easily and quicker."*

Anonymous 2 highlighted that chatbots now rely on big data to improve response accuracy and adaptability: *"...and that really requires one to be able to use data to learn and relearn multiple times in order to give appropriate responses, and also those appropriate responses are driven through context..."*

Anonymous 3 noted how the evolution of chatbot technologies over the last few years has improved user experiences and operational efficiency: *"The evolution of chatbots started with menu-based, then conversational, and now natural language processing... that evolution has made it better in terms of user experience and better for businesses in terms of saving time and money."*

The participants' insights highlight chatbots' growing sophistication. Chatbots have become more accurate and adaptable due to big data and machine learning, enabling continuous learning and context-driven responses. The evolution of chatbot technology from menu-based interfaces to conversational models and now natural language processing has significantly improved user experiences and operational efficiency. These observations align with the research framework's User-Centric Information Processing component, which focuses on AI capabilities and information retrieval. These insights align with the advancements of the Fourth Industrial Revolution (4IR).

Theme 2: Human-Chatbot Interaction

Anonymous 1 noted the importance of balancing automation with human support: *"A hybrid of non-human and human intervention is needed depending on the nature of the business... some customers find it hard to purely self-serve and need assistance along the customer journey."*

Anonymous 2 expressed similar thoughts about human intervention: *"There are situations where customers get frustrated with the chatbot, and you need an agent to step in. That's why having both is crucial."*, and noted that some resistance to technology persists: *"like you know how some people are resistant to technology as some just don't like technology... It's like asking 'how do people feel?' about smartphones. In my view, chatbots are effective. The challenge with them is designing the journey well enough that it serves the purpose..."*

Anonymous 3 highlighted the growing user acceptance of chatbots as a digital tool, especially given the convenience of interacting on familiar platforms like WhatsApp: *"I think we live in an age where, in contrast to before, people are more willing to chat with bots as long as they do what they want... I think that part is quite critical. If I get what I want, as long as it meets my needs, then customers are happy. There's been good sentiments from customers' point of view."*

The human-chatbot interaction theme emphasizes the need for a balance between automation and human support to ensure optimal customer experience. Although chatbots effectively handle routine and repetitive tasks, there are situations where human intervention becomes necessary, particularly when customers encounter frustration when interacting with the chatbot for complex tasks. This reflects the importance of integrating human agents in the service journey and acknowledges that not all customers are comfortable with full automation. Positive human-chatbot interaction also depends on the chatbot's ability to provide seamless transitions between the chatbot and human support. Designing a well-structured user journey is critical to ensuring the chatbot fulfils its purpose efficiently. The growing acceptance of chatbots, especially on familiar

platforms like WhatsApp, highlights the importance of meeting user needs promptly and effectively. These insights align with the research framework's Holistic Quality Assessment and User-Centred Satisfaction and Acceptance components and note that balancing AI and human support is key to improving user experiences and satisfaction.

Theme 3: Task Performance and Escalation Process

Anonymous 1 highlights the gradual implementation of the TELCO X chatbot and its performance in resolving complex queries: *"The chatbot is still relatively new and its full impact on reducing call centre traffic has yet to be realised. However, the goal is to deflect calls to the chatbot, thus reducing pressure on call centre agents... We have break out to agents within certain key use cases. If a customer can't resolve a query, then they can request to chat with an agent via WhatsApp..."*, *"...obviously SIM swaps. Here we will see a lot of failures and abandons, and success generally will be lower. This is an issue across the business. I have experienced it myself that some of these questions that they ask when you do SIM swaps..."*

Anonymous 2 and 3 describe the escalation to human agents for tasks beyond the chatbot's capability.

Anonymous 2: *"So those are some of the ways that I implemented to deflect people who discourage them from making calls and try to get them to go chat first before really speaking to an agent. Because an agent then becomes a person who is only utilised for really, really important queries than queries where answers can quickly be addressed by the chatbot."*

Anonymous 3: *"...but that would be the typical way of handing it over. Umm, it's basically now you hand it over to the agent... I will chat to the agent instead of chatting to the bot and it will also say "I can't resolve your query"..."*

The task performance and escalation process theme emphasize the chatbot's role in managing routine tasks and outlines the importance of escalating more complex queries to human agents. However, limitations are noted, particularly in resolving complex queries like SIM swaps, where the failure rate is high. Escalation to human agents is critical in cases where the chatbot cannot provide adequate solutions to ensure that customers can still access timely and practical support. This seamless transition from chatbot to human assistance is needed to maintain customer trust and satisfaction. The research framework's Task Performance component is reflected here, considering that the chatbot handles more straightforward queries and human agents step in for more intricate queries to ensure continuity and quality of service.

Theme 4: Customer Behaviour Insights and Chatbot Data Utilisation

Participants emphasized the importance of analysing data from chatbot interactions to inform system improvements:

Anonymous 1: *"Customers can rate the service and leave comments about their experience. This information is used to see how we can better improve the current flows, or which new features are needed the most. Customer service data is also used, where the biggest call centre drivers are used to create an automated journey on the chatbot."*

Anonymous 2: *"...One of the ways that we utilise it (data) is through keyword training or what you call utterances... utilising the data to train that chatbot actively for that purpose..."*

Anonymous 3: *"There's a drop-off when a customer stops chatting with the bot, and it times out. We try to understand which journeys people normally drop off on and what could be the problem. And then the other part would be when the person didn't get a response, but "Why was it taking too long to respond?" or "Something was down? There was a technical error?". So those small things add up to what can be improved..."*

The customer behaviour insights and chatbot data utilisation theme highlight the critical role that data from chatbot interactions plays in driving improvements. Participants emphasized how customer feedback and interaction data refine chatbot flows and develop new features. Analysing behavioural data, such as drop-off points and response times, use cases where users face challenges are identified, allowing for targeted enhancements. Interaction data supports continuous improvement of chatbot performance. Additionally, using

data for keyword training and utterance recognition helps improve the chatbot's accuracy and adaptability, making it more effective in handling queries.

Theme 5: Critical Success Factors for Chatbot Implementation

Anonymous 1 identified use case design as a critical success factor: *"The key success factor is creating use cases that will reduce call centre traffic... Gathering data of the most queried queries and creating simplified journeys that will enable customers to resolve them without having to call the call centre or visit a physical store."*

Anonymous 2 considers the organisation's objective in implementing chatbots: *"cost saving through either the reduction or the repurposing of headcount and, it's in the quality of service... employee satisfaction is improved by allowing people to do what is meaningful... it's also consistency in the quality and speed of service... the quality of the data that the chatbot relies upon must be as accurate as it possibly can be."*

Anonymous 3 notes that explicit purpose, continuous learning from customer data, and strong leadership sponsorship are essential: *"I think clearly outline the vision of what the chatbot is intended to do in your organisation... the second part is you need the right partners from a technology perspective in implementation... you need a sponsor as the other critical factor because the sponsor will help you get the right team resources budget... to understand the journeys in detail, analyse the queries, the type of queries that the organisation wants to resolve on the chat bot and make sure that you don't take them as is, you redesign them for the chatbot."*

The critical success factors for the chatbot implementation theme highlight several vital elements essential for a successful deployment. A clear understanding of use case design is crucial. It allows organisations to identify the most common customer queries and create streamlined, user-friendly journeys that reduce call centre traffic. Additionally, strong leadership sponsorship, clearly defined goals, and continuous learning from interactive data are essential to aligning chatbot implementation with organisational objectives. Success also depends on having the necessary technological resources to ensure that chatbot systems are purpose-driven and adaptable on accurate and reliable data, which influences the quality and speed of service.

5.4 Comparative Analysis of Themes

The comparative analysis of the themes reveals critical insights into operational, technical, and strategic factors influencing the effective use of chatbots for customer service and query resolution. There is a strong consensus on the value of chatbots in automating routine tasks. However, while chatbots are highly effective in managing these routine tasks, there is a shared emphasis that human intervention remains necessary for complex queries. A critical point of comparison is in the escalation process from chatbot to human support. The distinction between task performance and user satisfaction indicates that participants recognise the same need for escalation. However, their emphasis varies relative to criticality. The perspective shared suggests that the escalation process is primarily an operational necessity to some and is central to customer experience management for others. Data-driven decision-making is crucial in chatbot refinement, and leveraging insights from customer interactions to improve chatbot functionality is essential. Organisations can identify use cases where the chatbot struggles and make targeted improvements by analysing user feedback, behaviour patterns, and drop-off points. Data is integral to enhancing the technical backend of chatbots and refining AI and machine learning algorithms for better accuracy and adaptability. The success of chatbot implementation is also tied to strategic alignment within the organisation. Leadership support, clearly defined objectives, and continuous improvement processes are critical to ensuring the chatbot reaches its full potential.

6. Conclusion

This paper evaluated a rule-based chatbot's effectiveness. The analysis was guided by an integrated theoretical framework comprising the user-centric information processing, holistic quality assessment, and user-centred satisfaction and acceptance components. Interviews with relevant stakeholders. The researcher identified critical themes affecting chatbot performance through qualitative insights from interviews conducted with employees with experience working with chatbots. The findings highlighted that while the chatbot efficiently handled routine tasks, its limitations in resolving complex queries pointed to the need to improve AI capabilities, linguistic processing, and task flow design. Based on these findings, the researcher recommends enhancing the chatbot's usability, task performance, and overall user satisfaction. Overall, the comparative insights highlight a shared understanding of the value of chatbots in enhancing operational performance and customer experience.

For a chatbot to effectively resolve queries, there must be a balance between automation and human intervention, continuous data-driven improvements, and chatbot strategy alignment with broader organisational goals. This multi-dimensional approach ensures that chatbots evolve as operational efficiency tools and critical components in delivering consistent and high-quality customer service.

Ethics declaration: This research required ethical clearance and was obtained through the University of Johannesburg's College of Business and Economics Research Ethics Committee (UJCBEREC).

AI declaration: I would like to declare that a portion of this research was generated using AI tools, mainly for language editing and editing.

References

- Adamopoulou, E. and Moussiades, L. (2020). An Overview of Chatbot Technology. *IFIP AICT*, 584(2020): 373–383. Available from: https://doi.org/10.1007/978-3-030-49186-4_31
- Adamopoulou, E. and Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, 2(2020): 00006. Available from: <https://doi.org/10.1016/j.mlwa.2020.100006>
- Caldarini, G., Jaf, S. and McGarry, K. (2022). A Literature Survey of Recent Advances in Chatbots. *Information* 2022, 13(41):1-22. doi: <https://doi.org/10.3390/info13010041>
- Caulfield, J. 2023. *How to Do Thematic Analysis | Step-by-Step Guide and Examples*. Available from: <https://www.scribbr.com/methodology/thematic-analysis/#:~:text=Thematic%20analysis%20is%20a%20method,meaning%20that%20come%20up%20repeatedly>
- Chen, Q., Lu, Y., Gong, Y. and Xiong, J. (2022). Can AI chatbots help retain customers? Impact of AI service quality on customer loyalty. *Internet Research*, doi: <https://doi.org/10.1108/INTR-09-2021-0686>
- Conversational AI. (2022). *Balancing Humans and Bots in Customer Support*. Available from: <https://www.linkedin.com/pulse/balancing-humans-bots-customer-support-conversational-ai-chatbots/>
- Hill, J., Ford, W.R. and Farreras, I.G. (2015). Real conversations with artificial intelligence: A comparison between human–human online conversations and human–chatbot conversations. *Computers in Human Behaviour*, 49(2015): 245–250. Available from: <https://dx.doi.org/10.1016/j.chb.2015.02.026>
- Hsu, C. and Lin, J. (2023). Understanding the user satisfaction and loyalty of customer service chatbots. *Journal of Retailing and Consumer Services*, 71(4)1-10. doi: <https://doi.org/10.1016/j.jretconser.2022.103211>
- ITWeb. (2019). *MTN Chat launches*. Available from: <https://www.itweb.co.za/content/RgeVDMpO5jL7KJN3>
- ITWeb. (2020). *Vodacom uses chatbot to enhance customer engagement*. Available from: <https://www.itweb.co.za/content/rW1xLv59m9ovRk6m>
- Khan, R. and Das, A. (2018). *Build Better Chatbots: A Complete Guide to Getting Started with Chatbots*. India: Apress.
- Li, J. (2022). Multi-round Dialogue Intention Recognition Method for a Chatbot Based on Deep Learning. In *Multimedia Technology and Enhanced Learning. ICMTEL 2022. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering*, 446:561572-. Edited by Wang, S.H. and Zhang, Y.D. doi: https://doi.org/10.1007/978-3-031-18123-8_44
- Miklosik, A, Evans, N. and Qureshi, A.M.A. (2021). The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review. *IEEE Access*, 9(2021): 106530-106539. doi: <https://doi.org/10.1109/ACCESS.2021.3100885>
- Misichia, M.V., Poecze, F. and Strauss, C. (2022) Chatbots in customer service: Their relevance and impact on service quality. *Procedia Computer Science*, 201(2022): 421–428. doi: <https://doi.org/10.1016/j.procs.2022.03.055>
- MTN. (2023). *Self-service MTN Chat*. Available from: <https://www.mtn.co.za/home/help/content/3494341>
- MyBroadband. (2021). *Vodacom, MTN, and Telkom WhatsApp chatbots compared*. Available from: <https://MyBroadband.co.za/news/cellular/425704-vodacom-mtn-and-telkom-whatsapp-chatbots-compared.html>
- Nyongesa, G., Omieno, K. and Otanga, D. (2020). Artificial Intelligence Chatbot Adoption Framework for Real-Time Customer Care Support in Kenya. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 6(6): 100-117. doi: <https://doi.org/10.32628/CSEIT20667>
- Oluji, P. and Ade-Ibijola, A. (2023). NLP techniques for automating responses to customer queries: a systematic review. *Discover Artificial Intelligence*, 3(20). doi: <https://doi.org/10.1007/s44163-023-00065-5>
- Rossmann, A., Zimmermann, A. and Hertweir, D. (2020). *The Impact of Chatbots on Customer Service Performance*. doi: https://doi.org/10.1007/978-3-030-51057-2_33
- Vodacom. (2023). *Tobi – The Vodacom ChatBot*. Available from: <https://www.vodacom.co.za/vodacom/shopping/v/tobi#:~:text=Using%20state%20of%20the%2D,put%20TOBi%20to%20the%20testMTN.>
- MTN. (2023). *Self-service MTN Chat*. Available from: <https://www.mtn.co.za/home/help/content/349>