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Exploring the impacts of using the artificial intelligence voice-enabled chatbots on customers interactions in the United Arab Emirates

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Article Info

ABSTRACT

Over the past decade, chatbots have experienced a significant increase in popularity, especially since the outbreak of COVID-19. In the United Arab Emirates, most businesses have accelerated their digital transformation and are relying on chatbots as a primary way to interact with customers. However, many of these chatbots lack a voice input option for customers. This study investigates the benefits and challenges of incorporating artificial intelligence (AI) voice-enabled chatbots into United Arab Emirates (UAE) businesses and how this impacts customer experience. Qualitative research techniques were used to gather information, and the results demonstrate that implementing AI chatbots with voice input and sentiment analysis features can enhance the customer experience by making it more efficient and convenient. Additionally, the study found that AI chatbots can ultimately save businesses time and money, and while they may reduce the need for human agents, they will not replace them entirely. Finally, an implementation framework and suggestions are provided for businesses that are interested in adopting AI voice-enabled chatbots for customer interactions.

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1. INTRODUCTION

The COVID-19 pandemic has led to the widespread adoption of digital transformation in various organizations. This has resulted in a significant increase in customer inquiries through support channels such as live chat, email, call centers, and chatbots, particularly in the United Arab Emirates (UAE). Consequently, customer experience has become a top priority for organizations. Through technology, they seek methods to enhance customer satisfaction and comprehend the requirements in a cost-effective and efficient manner [1]. One approach is the implementation of artificial intelligence (AI) to analyze customer interactions and extract sentiments from chatbot data to gain insights and improve the overall customer experience [2].

This study focuses on the use of AI to analyze customer interactions with voice-enabled chatbots in the UAE. This study examines the effectiveness of natural language processing (NLP) technology in chatbots [3] a type of narrow AI for extracting meaningful information from customer interactions and determining the intent of their questions [4]. This study is particularly interested in the use of voice-enabled chatbots as they are becoming increasingly popular and have a significant impact on customer service

interactions in service firms. The goal is to use data obtained from sentiment analysis (SA) of customer interactions to better understand and address customer issues and inquiries.

This study examines the impact of AI on customer experience over time in the UAE by analyzing the audio and text sentiments of customer interactions with voice-enabled chatbots. Despite the growing research on customer experience and AI-enabled tools, there is a lack of literature on this topic in the UAE. The goal is to understand how AI voice-enabled chatbots influence customer experience and how these change over time, as the importance of customer experience continues to grow [5].

AI is a field of computer science that involves the creation of machines that can perform tasks that would typically require human intelligence. It combines elements of computer science, psychology, philosophy, neuroscience, and engineering. AI aims to mimic human intelligence by using machine learning, reasoning, and self-correction [6]. Three main types of chatbots are commonly used for various purposes: support, skills, and assistance. Support chatbots are designed to handle specific problems and are typically used for customer service. They use AI and machine learning to answer customer questions, and require the ability to understand the context and take multiple actions. Single-turn chatbots designed to perform specific tasks such as those found on smart home devices are known as skilled chatbots. These chatbots do not need to understand many contexts, because they are mainly used to execute user commands. Assistant chatbots are designed to assist users in completing tasks and are highly conversational and smart, similar to human-like interactions, such as Siri. All chatbots were conversational in nature [7]. AI voice-enabled conversational chatbots include Siri (Apple), Alexa (Amazon), Cortana (Microsoft), and Google Assistant. These chatbots are capable of understanding and responding to natural language voice commands and inquiries, and can carry out various actions [8]–[12].

The chatbot market is rapidly expanding, with projections of growth from $250 million in 2017 to over $1.34 billion in 2024 [13]. In the United States, over 21% of adults and 80% of Generation Z use voice- or text-based bots to search for information and purchase. Several businesses, including Domino's Pizza and American Eagle Outfitters, have incorporated chatbots into their operations to facilitate order taking and provide recommendations to customers. Companies such as Facebook, eBay, Amazon, and WeChat use chatbots for conversational commerce [14]. In the UAE, Chatbots and voice-enabled chatbots have become increasingly popular in the UAE, particularly in the public sector. Government entities are increasingly utilizing AI technologies to improve customer experiences and increase satisfaction [15]. The UAE is known to be an early adopter of AI and its applications enhance the well-being and happiness of citizens and customers [16].

Customer experience is shaped by the interactions between customers and service providers [17]. Customers tend to have a comprehensive understanding of their experiences, which include various internal and personal responses to their interactions with an organization [18]. Additionally, customer experience is a complex concept that encompasses various aspects such as the customer's cognitive, emotional, behavioral, and social responses. This is important to take into consideration when assessing the effectiveness and cost of a business [2], [19], [20]. Measuring customer experience can also be an effective way to evaluate the quality of voice assistance services.

Previous research has shown that customers may be hesitant to use chatbots for personal issues or to assist with purchasing decisions because they lack empathy and personal feelings, making them less reliable in terms of payment methods or product recommendations [13]. However, studies have also revealed that customers prefer voice chatbots to text chatbots because they enhance customer experience and allow longer conversations, resulting in positive and happy feelings [11]. Studies [21] have found that customers positively experience AI voice chatbots. Customers have reported that one of the main advantages of using voice chatbots is their ability to save time while completing their tasks. Additionally, voice chatbots offer customers the option to interact with them through either voice or text, providing them with the flexibility to choose the most appropriate method depending on the context or situation [22]. An example of this is when customers use the Apple AI Voice chatbot (Siri), they have the option to use either voice or text commands [21]. Research also suggests that people are impacted and influenced by the human-like characteristics of AI Voice Bots and that incorporating these elements into chatbots can be an effective marketing strategy to attract customers [23]. In addition, Amazon AI developers are working to enhance Alexa (AI voice assistant) by adding individual personality and social characteristics, which will improve chatbots' ability to engage in conversation [12].

Recent studies have shown that customers face challenges when interacting with voice chatbots, one of which is language limitation. Some AI voice chatbots can only operate in certain languages, making it difficult for customers to communicate effectively. Additionally, the use of "always listening" devices in services provided by voice chatbots can raise privacy concerns [24]. Another challenge is the lack of trust in AI chatbots as they are still in the process of development [25]. However, research suggests that customer satisfaction can be increased by addressing these limitations [23]. An illustration of this is that in the healthcare sector, virtual assistants can offer customized health and fitness advice based on information collected by

smartwatches or fitness trackers [26]. Additionally, customer experience can affect purchasing decisions, especially regarding product type and brand trustworthiness [20].

2.　METHOD

This study employed a qualitative approach, incorporating a triangulation method that included an open-ended online questionnaire, interviews, and document reviews. The purpose of using Triangulation has been used to overcome potential biases by combining different ideas, methodologies, and observations. The study participants were individuals from different industries who had experience interacting with AI chatbots or who had been customers of companies that use AI chatbots for customer service. Additionally, multiple relevant literature reviews of AI-enabled chatbots (text or voice) were used to enhance the research. Whether the response to the open-ended questions is a list, a brief response, or lengthy narrative must be provided in all cases [27]. An online questionnaire was administered using Google Forms and forms. Document reviews were used to analyze and extract information from relevant documents [28]. This approach helped reach a conclusion for the research topic and understand the general perception of bots in different industries in UAE.

This study employed a qualitative approach using a combination of methods, such as an open-ended online questionnaire, interviews, and document reviews to gain a thorough understanding of the subject [29]. The triangulation method ensures that bias in using a single measure can be eliminated by combining different ideas, methodologies, and observations. This study focuses on the effects of AI voice-enabled chatbots on customer interaction in the UAE. This study used non-random sampling methods, such as snowball and convenience sampling, to select participants from the UAE. The sample includes leaders in the IT field from companies that have implemented AI voice-enabled chatbots; experts in AI; developers and vendors who assisted in the adoption of these chatbots; and customers who have interacted with AI text or voice chatbots.

3.　RESULTS AND DISCUSSIONS

3.1.　Customers interactions with the chatbots

Most interview participants used chatbots to communicate with service providers across industries such as banking, online shopping, and food delivery. Chatbots are preferred by human customer service agents because of their availability and quick assistance without the need to wait in queues. However, chatbots lack emotion and intelligence, making it difficult to understand customer queries for the first time. Therefore, customers need to use a simple language and repeat their queries precisely.

In addition, according to our interviews, some service providers eliminated human interaction and forced customers to connect with chatbots as their primary means of receiving assistance. For instance, most responses stated negative interaction with a common chatbot solution in the region, "Eva" by one of the main banks in the country. The bank has tried using top-notch technologies such as Eva, a voice chatbot solution, to improve its customer experience. According to most participants, the chatbot was designed to handle only basic assistance queries. For more complex issues, customers were required to speak with a human representative. However, the bank did not provide customers with the option to speak with a live agent, which caused frustration when communicating with the chatbot. Other common positive interactions with chatbot solutions in the UAE include chatbots by Du, a telecommunications company in the UAE, and the Dubai electricity and water authority (DEWA). These chatbots have been stated as positive experiences that give customers the flexibility to solve issues.

The use of AI voice-enabled chatbots in customer interactions has both advantages and disadvantages, according to the participants in the study. Customers find these chatbots convenient and useful for quick, simple inquiries, and appreciate that they are available 24/7. However, when a chatbot cannot resolve complex issues, customers become frustrated and prefer to speak with human agents. This aligns with previous research that found that customers find AI voice chatbots efficient for simple queries but lack the ability to handle more complicated problems, leading to dissatisfaction [29], [30].

3.2.　Customer preference

According to our research, many customers prefer voice-enabled chatbots to text-based ones. This is because they find it faster to provide feedback through voice as opposed to typing. An example given by one participant in the study was that they prefer to use voice recordings in WhatsApp instead of typing, as it saves time, "I find voice to be more convenient and efficient, especially in situations like driving or when I am in a hurry and don't have time to type out a long question." Another participant also stated interestingly that, "Voice chatbots are better, it will be easier, even for elderly people. The ones who cannot type. Okay. So, it is easier for them to record a message or talk in their natural language. Then, yes voice is more convenient". However, when it comes to more complex issues, customers tend to prefer human agents to the current generation of

chatbots, which have a limited vocabulary and responses. Research [11], [23] has revealed that customers find voice chatbots more appealing because of the personalization aspect and that incorporating a voice feature in AI-enabled chatbots enhances the customer experience by enabling them to hold more extended conversations, leading to a more positive experience overall. However, as highlighted in previous research, customers may find that AI chatbots provide standardized responses and lack the ability to understand more complicated topics, leading them to prefer human agents [24].

3.3. Improvement of the current text chatbots

According to our research, voice chatbots can improve the customer experience in the UAE, especially for quick and simple inquiries. However, it could be even more effective if the voice feature is integrated into text chatbots for customers who type a hassle, particularly in urgent situations. By incorporating sentiment analysis and NLP, chatbots can better understand customer emotions and respond appropriately to them. As one participant noted, "this would lead to more data and input, which would ultimately improve business processes and the overall customer experience in the future."

This research suggests that organizations can improve their overall customer experience by identifying and addressing negative customer feedback. Additionally, incorporating proactive intelligence into chatbots can make them more effective at understanding and responding to customer needs. The study also highlighted that AI voice-enabled chatbots, when given the capability of applying functional intelligence, can greatly enhance customer experience by being faster, interactive, easier to understand, and able to deliver customer satisfaction information. Furthermore, research [30] shows that by using natural language, AI-based chatbots can improve customer experience and become more popular.

3.4. Technologies used to implement AI-voice chatbots

In this section, we highlight an example of an AI-Voice chatbot used by an organization in the UAE. Information regarding the feedback collection solution was obtained through sample implementation and interviews with individuals who were directly involved in the project. The organization plans to use cutting-edge AI standards and technologies to effectively manage both structured and unstructured client interactions in the Emirate. The organization has adopted a voice feedback collection tool that utilizes Microsoft and AI services to quickly process and analyze customer feedback in real-time. This can be accomplished by integrating a plugin into an organization's mobile or website applications, providing customers with the option of providing feedback using text or voice after receiving a service. The feedback will be processed according to its format using Cognitive Services application programming interface (API), such as the Translator API, which is used to translate feedback from its original language to the desired language, the Speech-to-Text API which converts audio recordings into text, the Text Analytics API which identifies the sentiment and analyzes the words used in the feedback, the Content Moderation API which evaluates the appropriateness and suggestiveness of text feedback, and a custom algorithm which evaluates the tone of voice in audio feedback.

The collected data will be presented in a dashboard portal that displays key information such as customer feedback sentiments, common words used, languages, and the location of feedback. It provides a comprehensive view of the performance metrics for all branches in one place. The dashboard may include branch-specific analysis visualizations such as overall sentiment, branch-specific positive sentiment scores, and the amount of feedback received. Additionally, it provides detailed sentiment analysis with visualizations such as mean score/feeling, quantity of feedback, and word prevalence/cloud by emotion, and reviews over a period of time.

3.5. Customers' feedback insights

Based on the data provided by the respondents, we provide the results of the model, including accuracy, customer preferences, and actions taken by the management. The respondents analyzed approximately 500 customer feedback items, including both text and audio. The accuracy of the AI model is greater than 80%. We inquired about the difference between text and voice feedback, and the respondent stated that customers found the voice feature more convenient because it was faster to provide feedback than type. However, the respondent also mentioned that there were some limitations to using voice feedback, one of which was the model's ability to understand the different dialects of customers in the region.

24% of the feedback received was negative and 48% was positive. According to the respondents, the machine's feedback detection was accurate, and they examined more data to ensure that the AI model was learning and improving. The feedback was analyzed using AI sentiment analysis tools and displayed on a dashboard for decision-makers to identify weaknesses in the system and services and improve them. Owing to COVID-19 and fewer in-store interactions, customers are now more comfortable providing services from home and prefer not to visit public places. The organization focuses on enhancing the user experience to improve customer satisfaction, as the UAE prioritizes customer and citizen satisfaction. As such, the organization uses AI cognitive services to make reporting easier and near real-time, and pays more attention to negative feedback

so that managers and decision-makers can quickly identify areas for improvement and enhance customer experience.

3.5.1. Model accuracy for sentiment analysis
The accuracy of the sentiment analysis model was determined by categorizing each feedback with dominant sentiment and emotion. For example, each feedback is assigned a sentiment (positive, neutral, or negative) to test whether the algorithm correctly predicts the sentiment. The goal was to achieve an accuracy of 80-85% for each accuracy metric. In other words, for a sample testing set of 100 feedbacks with sentiment, emotion, and tone identifications, the algorithm should correctly identify 85 of them. Table 1 comparison between the AI-detected sentiment and actual sentiment of a set of sample feedbacks.

Table 1. Sample data of sentiment analysis: Predicted vs actual sentiments

No	Feedback samples	Actual sentiment	Predicted sentiment	Correct prediction (1 for yes, 0 for no)
1.	"Buses were late, I missed my appointment"	Positive	Negative	0
2.	"I loved visiting the branch, it is so well-designed"	Positive	Positive	1
3.	"Transportation service has improved drastically!"	Positive	Positive	1
4.	"Healthcare is horrible in this state!"	Negative	Negative	1
5.	"This new feedback feature is amazing!"	Positive	Positive	1
Total v/s. Correctly Predicted		5		4

Therefore, we used correct predictions over the total feedback to calculate the accuracy of the sentiment analysis.
Overall Sentiment Accuracy = correct predictions/total predictions×100%=4/5×100%=80%.

3.5.2. Emotion analysis
The process for determining the emotional sentiment of each customer feedback in the Cognitive Engine involves comparing it with a dataset sample of previously labeled feedback. The accuracy of the sentiment analysis was determined by measuring the overall accuracy across all the data used to build the model. A comparison between the predicted AI and the actual tone of a set of sample feedback is presented in Table 2.

Table 2. Sample data of emotion analysis: Predicted vs. actual tone

No	Feedback *The feedback submitted in Arabic is translated into English using the Translator API.	Actual tone	Predicted tone	Correct match (1 for yes, 0 for no)
Feedback 1.	Thank you so much to all the traffic officers. The death of what they limited to the effort and on the reception and on the spaciousness of the chest, thank you very much, hi *	Happy	Happy	1
Feedback 2.	God and his blessing. God bless you for these good efforts and treatment and reception well received and God bless once again. *	Happy	Happy	1
				2

Overall Emotion Accuracy=Correct Predictions/Total Predictions=2/2=100%

3.5.3. Speech-to-text
The process of converting speech to text and determining its accuracy involves the use of an API that provides transcription of audio input. Accuracy was determined by calculating the word error rate (WER), which is the ratio of the number of incorrect words recognized during the process to the total number of words in the feedback transcript. The formula for the WER is $(S+I+D)/N$, where S is the number of word substitutions, I is the number of word insertions, D is the number of word deletions, and N is the total number of words in the feedback [31]. An example of this calculation is provided in the text, where the transcribed feedback has 3-word substitutions, 4-word insertions, and one-word deletions, and the overall accuracy is determined by taking the average WER for all the feedback received.

Calculation of WER=(3+4+1)/41=0.195

Speech-to-text Accuracy=(1–WER))×100=(1–0.195)×100=80.5%

3.6. Contributions and recommendations of the study

The main contribution of this study is the successful integration of various tools and services, such as AI-based text and audio analyzers, to address the diverse communication needs of businesses and consumers. This research examines the use of this technology from multiple perspectives and contributes to the literature on AI voice-enabled chatbots and text chatbots by providing insights from the perspective of customers in the UAE. Additionally, it adds to the existing literature on customer experience (CE) by suggesting an advanced method of using chatbots, which includes incorporating a voice component and utilizing the emotion analysis capabilities of AI for customer communication and interaction data. This study also highlights the potential benefits of using processed data for businesses and customers.

This study suggests that organizations in the UAE that have strong customer interactions through calls, emails, or other channels should consider implementing AI voice-enabled chatbots. Additionally, organizations that already have regular chatbots should consider adding voice as an input method, which will increase adoption and provide more data to improve the customer experience. The study also recommends that customers have the option to choose between a text chatbot, voice chatbot, or human agent, depending on their needs. It is important for organizations to proceed with caution when implementing emerging technologies, such as AI voice-enabled chatbots, by starting small through a trial period or developing a minimum viable product (MVP) to measure the return on investment and benefits before fully committing to a solution to avoid losing significant funds if the investment does not perform as expected. Figure 1 can be used as a framework or lifecycle for implementing an emerging technology such as an AI voice-enabled chatbot in the organization.

Figure 1. AI voice enabled chatbots implementation integrated framework

4.   CONCLUSION

The findings of this research suggest that incorporating voice chatbots and utilizing AI-based sentiment analysis tools can significantly improve the customer experience in the UAE. This study recommends that organizations consider incorporating voice capabilities into their chatbots and take a cautious approach to implementing new technologies by starting with a smaller-scale trial period. This study also highlights the need for chatbots to understand natural spoken language and dialects, have advanced intelligence, and provide easy access to human customer service agents. This study focuses on the use of AI voice-enabled chatbots and sentiment analysis to improve customer interactions. Future studies could explore the potential of using videos as an input for chatbots and the privacy concerns that may arise with this approach. Further research should examine the relationship between trust and AI biases. This study also highlights the

potential of chatbots to detect changes in voice tone. Future studies could delve deeper into the analysis of voice pitch to determine whether chatbots can respond appropriately to these changes.

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