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Abstract
Computer programs or software that communicate with humans using natural language are referred to as chatbot applications. To provide customer care support services, there are no well-formulated guidelines for the implementation of artificial intelligence chatbots in Kenyan telecom companies. This study proposes an adoption framework for deploying artificially intelligent chatbots in Kenyan telecom companies. This was accomplished by determining the current level of the installation of chatbot apps in Kenya and identifying the primary metrics that might be used as indications for the dissemination of chatbots. A review of the earlier frameworks and models on technology adoption was conducted to determine the relevant metrics. A combination of research approaches was used in this study, with questionnaires and interview schedules being used to obtain quantitative and qualitative data, respectively. To examine qualitative data, content analysis was what was used. Using tables and charts, descriptive analysis was performed on the quantitative data, and the findings were presented. AI specialists working for Safaricom PLC and the Communications Authority of Kenya were the ideal candidates for this position. From the two different telecommunications companies, a sample was selected for the research study utilizing the Delphi approach. In this approach, the researcher reaches out to experts in the area of the study to gain in-depth knowledge of the issue being investigated because they serve as a guide on aspects to consider before using AI chatbots for customer support services provision. The results showed that chatbot applications are randomly implemented, the telecom firms are ready to adopt AI chatbots for customer service support. The adoption of the framework will help the telecom industry accept a reliable chatbot application which will in turn provide faster, accurate, and reliable service support to customers thus saving time and cutting costs. The framework that was built has the potential to serve as a guiding principle in the process of implementing chatbot technology within the telecom business settings. Further research should be done on the use of AI chatbots in other sectors like healthcare and agriculture.

Introduction
In our society today, most sectors are digitising and automating their processes for efficiency. Human labour has become obsolete due to the disruption of labour markets brought about by software programs' rising complexity and availability. In this light, businesses' adoption of artificial intelligence

chatbots to supplement human customer service representatives is a crucial development. Machines, specifically computer systems, can display intelligence, which is called artificial intelligence (AI). In this subfield of computer science, researchers seek to understand how to program computers to sense their environment, analyse that data, and then use it to take actions that increase their likelihood of completing predefined tasks (Russell & Norvig, 2002). One term for these kinds of robots is artificial intelligence.

Some prominent uses of artificial intelligence include advanced web search engines like Google Search, recommendation systems used by YouTube, Netflix, and Amazon, voice-activated assistants like Siri, Google Assistant, and Alexa, autonomous vehicles like Waymo, tools for creativity and generative art like Apple Intelligence and ChatGPT, and games where players use strategy like chess and Go. Nevertheless, many applications of AI are not considered to be AI: "A significant amount of cutting-edge artificial intelligence has made its way into broad applications, often without being referred to as AI. This is because as something becomes more useful and widespread, it is no longer referred to as AI." (AI set to exceed human brain power Archived 2008-02-19 at the Wayback Machine CNN, 2006) (Kaplan & Haenlein, 2019).

Alan Turing pioneered substantial studies that he developed and named "machine intelligence" (Copeland, 2004). John McCarthy, Marvin Minsky, Nathaniel Rochester, and Claude Shannon are generally acknowledged as the most influential pioneers in artificial intelligence. They were the ones who initiated the academic discipline of artificial intelligence in the year 1956. There were several periods of optimism in the field (Russell & Wen, 1997), which were then followed by periods of disappointment and limited funding, which are collectively referred to as the "AI winter" (Russell & Wen, 1997; AI, 1993). When deep learning beat all preceding artificial intelligence approaches in 2012, funding and interest in the field skyrocketed. This trend continued after 2017 with the development of the transformer architecture, which further fuelled the field's growth. Companies, institutions, and laboratories primarily headquartered in the United States were the driving force behind significant advancements in artificial intelligence (Frank, 2023). As a result, the AI boom that occurred in the early 2020s had materialised.

This study aimed to develop an artificially intelligent chatbot adoption framework for real-time customer care support. This was done by determining the status of chatbot implementation and by selecting key metrics that serve as indicators for chatbot adoption.

Empirical Studies

Empirical studies on chatbots explore various aspects, including their effectiveness, user satisfaction, design considerations, and applications across different sectors. The notable empirical studies on chatbots include a survey of the impact of chatbot use on customer satisfaction and understanding of chatbot users. It investigated how chatbot use affects customer satisfaction in e-commerce, which provided insights into how different chatbot features impacted user experience and satisfaction (Zhang & Zheng, 2019). Research was done on the impact of chatbots on customer service, evidence from the financial services sector. This examined the impact of chatbots on customer service in the financial industry, focusing on user satisfaction and service efficiency (Liu & Li, 2020).

In addition, a study, "Designing Chatbots for Effective Human-Computer Interaction: An Empirical Study of the Chatbot's Interaction Design", explored design principles and usability considerations for chatbots, providing empirical evidence on what makes a chatbot effective and user-friendly (Chai & Tan, 2019). A study was conducted on "The Effect of Chatbot Design Features on User Experience: An Empirical Study" This research examined how various design features of chatbots affect user experience and satisfaction (Kopp & Lingenfelser, 2018). A review of "Evaluating the Effectiveness of a Health-Related Chatbot for Symptom Checking and Health Information" assessed the effectiveness of a chatbot designed to provide health information and symptom checking,

focusing on accuracy and user satisfaction (Ramo & Cole-Lewis, 2020). A study was conducted on "Chatbots for Mental Health Support: An Empirical Study of User Engagement and Outcomes". This study explored the use of chatbots for mental health support, analysing user engagement and the impact on mental well-being (Firth & Torous, 2021).

A research study was done on "The Effectiveness of Chatbots in Educational Settings: A Review of Empirical Studies". This review paper summarised empirical studies on using chatbots in educational contexts, highlighting their effectiveness in enhancing learning experiences (Al-Azawei & Alowayr, 2020). Research on "Chatbots as Learning Tools: An Empirical Study of Their Impact on Student Engagement and Learning Outcomes" investigated how chatbots impact student engagement and learning outcomes in higher education (Johnson & Johnson, 2019). The study "Challenges in Deploying Chatbots: An Empirical Analysis of Common Issues and Solutions" was done. This paper discusses the common challenges when deploying chatbots and provides empirical insights into practical solutions (Salehahmadi & Goodwin, 2021).

Lastly, a study was conducted on "Understanding the Limitations of Chatbots in Customer Service: An Empirical Study" This study investigated the limitations of chatbots in customer service scenarios and their impact on user satisfaction (Mehta & Rakesh, 2020). These empirical studies provide a comprehensive view of various aspects of chatbots, including their effectiveness, design, applications, and limitations. They are valuable resources for understanding how chatbots can be optimised and utilised across different domains.

Chatbot Implementation

Artificial intelligence chatbots may automate a company's internal business processes and customer communications. These apps are driven by artificial intelligence and use NLP to communicate with people via voice or text. This subsection will discuss the current state of chatbot deployment on a global, regional, and local scale.

Global Implementation of Chatbots

In the U.S., Siri is a chatbot developed by Apple, a widely known virtual assistant integrated into iOS devices. It handles tasks like setting reminders, answering questions, and providing information (Aron, 2011). Cortana, or Microsoft's Cortana, is a virtual assistant available on Windows devices that helps with scheduling, reminders, and information retrieval (Yang et al., 2021). IBM Watson is a powerful AI chatbot used in various industries, including healthcare, finance, and customer service, for tasks ranging from data analysis to customer support (Murtaza et al., 2016). WeChat Official Account Chatbots: WeChat, a central messaging platform in China, supports numerous official account chatbots used by businesses, services, and government bodies to interact with users (Yuan et al., 2021).

Regional Implementation of Chatbots

In Nigeria, Ubenwa is a chatbot designed to provide maternal and child health support by analysing a baby's cry to assess health conditions. AI technology aims to improve healthcare delivery (Ubenwa – The first technology for interpreting infant cry sounds, n.d). In South Africa, Moya, developed by the South African tech company Botlhale, is a chatbot designed for general assistance and customer service (Air Conditioning Specialists – Johannesburg, Gauteng, n.d).

Local Implementation of Chatbots

Chatbots in Kenya are being used across various sectors, from customer service to healthcare and agriculture. M-Pesa Chatbot: M-Pesa, a popular mobile money service in Kenya, uses a chatbot to assist users with various queries related to transactions, account management, and service inquiries. This chatbot helps users navigate the M-Pesa ecosystem more efficiently (Safaricom introduces an M-Pesa chatbot for customer queries" Techweez, 2020). Hela: Health Chatbot; Hela is a health-focused

chatbot developed to provide information and support regarding health conditions, symptoms, and medical advice. It aims to increase access to healthcare information in Kenya (Hela: The AI-powered chatbot transforming health information in Kenya" The Star Article, n.d.).

Aah! Chatbot: Aah! is designed to assist users with financial literacy and savings tips. It is part of a broader initiative to improve financial inclusion and awareness in Kenya (! Chatbot: Promoting financial literacy in Kenya" Business Daily Africa, 2021. Business Daily Africa Article, n.d.). AgroHub Chatbot**:** AgroHub provides agricultural information and support through a chatbot. It offers advice on farming practices, pest control, and crop management, helping farmers make informed decisions.

Chatbots in Kenya are being implemented in various sectors, including mobile money, healthcare, agriculture, and disaster management. These chatbots aim to improve service access, enhance customer support, and provide valuable information.

Methodology

The research was carried out using a combination of methods to determine the nature of the connection between chatbot adoption and the telecommunications business. This approach had been used in earlier research, and the results showed that it was successful in explaining the correlations that exist between a variety of characteristics. In this research, the Delphi approach was used. When using the Delphi approach, the researcher talks to people who are already knowledgeable in the field of the study. An in-depth familiarity with the studied subject can only be achieved by using this strategy. A descriptive survey was used to carry out this research and achieve its objectives.

A descriptive survey was the proper method to determine the current state of chatbot deployment in the telecom business. The researcher built an adoption framework to help telecom firms deploy chatbot applications. The focus was on identifying essential criteria that guided the development of the framework. To validate the suggested adoption framework, the research used experts' opinions. An interpretation of scientific facts about a particular subject and in the assessment of goods is what is meant by the term "expert opinion." This interpretation is provided by experts or specialists who know a particular field. While verifying the proposed adoption model, this approach was used in the research.

Location of the Study

The study focused on two Kenyan telecommunications businesses: Safaricom PLC and the Communications Authority of Kenya (CAK). These industries held a larger proportion of the market share.

Target Population

A complete group of people is referred to as the target population, and it is from this population that research data is lncollected, and conclusions are drawn. The target population was the artificial intelligence specialists from Safaricom PLC and the Communications Authority of Kenya. For the study, artificial intelligence technologies included chatbots, NLP, AI models, Machine learning, and voice recognition.

Sampling

The researchers use sampling as a design method to choose a subset of the population to be studied (Saunders et al., 2009). This study used a technique called purposive sampling in this investigation. This method of non-random selection selects members of the target population based on whether or not they meet specific requirements. The Communications Authority of Kenya and Safaricom PLC were chosen for their artificial intelligence expertise. The researcher made a physical visit to both telecommunications companies and stated the cause for the visit to the helpdesk personnel. Through the helpdesk staff, the researcher was connected to the leader of the IT team. Following a briefing on

the research's purpose, the information technology team leader chose AI specialists who participated in Zoom interviews, followed by questionnaires.

Data Presentation, Analysis and Discussion of Results

Table 1: Reliability Test

Variable	Cronbach alpha
Organizational Metrics	0.871
Technological Metrics	0.761
AI chatbot adoption	0.891

Following the testing of all variables, the results make it evident that the required Cronbach's Alpha value of 0.70 or above is attained to ensure the internal consistency of the data (Yin, 2013). Quantifying the degree to which a test measures its target construct is known as data validity measurement (Kothari, 1978). Ideally, validity is the extent to which the research results correctly represent the phenomenon under study (Yin, 2013). It is reasonable to assume that the data sample follows a normal distribution as the sampling metric correctly indicated a KMO value greater than 0.5. This is in keeping with Table 1 provided by Kaiser – Meyer – Olkin. If the KMO value is more than 0.5, then the data may be considered to be distributed regularly.

Bartlett's Test Sphericity examined the item-to-item correlation matrix to test the null hypothesis. The identity matrix was constructed based on the participants' data for all the practical factors. Chi-Square was used to analyse Bartlett's Test, and the results are provided in Table 2. There was a significant difference between all variables at the 5% significance level, indicating that the null hypothesis was rejected.

Table 2: Test for Validity

Metrics	KMO test	Bartlett's test of sphericity		
		Chi-Square	df	Sig.
Organizational Factors	.906	221.26	4	0.000
Technological Factors	.907	340.74	4	0.003
AI Chatbot adoption	.891	334.70	4	0.002

Extraction Method; Principal Component Analysis.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon \text{ .... (1)}$$

In the equation, the Y value represents Chatbot Adoption, X_1 represents organisational metrics, X_2 represents technological metrics, and ε value represents the error term in the model

Therefore, using the Regression Coefficient obtained, we get;

$$Y = 5.022 + 0.783 * X_1 + 0.009 * X_2 + \varepsilon \text{ .... (2)}$$

As seen by the above equation, an increase of one unit in the organisational component would result in a 0.783 percentage point rise in the adoption of chatbots in telecom companies. If the technology metric is increased by one unit, there will be a 0.009 per cent rise in the usage of chatbots.

Moderating Effects

Investigating whether the introduction of chatbots was tempered by consumer demand, government regulation, and the need for automation was an essential step. We used several R2 and Beta weights

to ascertain the impact of the moderating factors. As a rule, the Beta value ought to be higher than 0.1, and if it is higher than 1, it indicates that multi-collinearity exists. Following is a scale that was utilised:

i. 0.1 and 0.2 are beta values that indicate a small effect.
ii. 0.3 and 0.5 are beta values that indicate a medium effect.
iii. Significant effects are shown by values above 0.5.
iv. No effects are shown by values less than 0.1.

Table 3: Moderating Effects

	R^2	Beta	Significance
OM + NA+GR	0.025	0.502	0.285
OM + CP+GR	0.084	0.384	0.012
OM + CP + NA	0.029	0.356	0.328
TM + GR + NA	0.006	0.521	0.478
TM + GR + CP	0.013	0.121	0.903
TM + CP + NA	0.017	0.016	0.129

OM = Organizational metrics
TM = Technological metrics
GR = Government regulation.
NA = Need for automation
CP = Customer pressure

The findings in Table 3 indicate the many moderating variables that may impact the adoption of chatbots in this research. These aspects include the need for automation, government regulation, and customer pressure from customers. As the beta value of 0.502 indicates, the need for automation and government regulation significantly impacts the variables that make up the organisation. As shown by the Beta value of 0.384, the influence of customer pressure and government regulation on the variables of the organisation is found to be moderate. Based on the 0.356 beta score, it can be concluded that customer demand and the need for automation have a mild impact on the company's factors. Based on the 0.521 Beta value, it can be seen that government regulation and the need for automation significantly impacted the technology metrics. The 0.121 beta figure demonstrates that government regulations and customer demand only marginally affected the technology variables. As shown by the Beta value of 0.016, customer demand and the need for automation did not impact the technology metrics.

Organisational considerations, technological metrics, and moderating factors all have a role in determining whether or not chatbot technology is used for real-time customer care help, as shown in the study. The examined variables were shown to have a correlational link with one another. Nine main chatbot adoption variables have been found based on the research findings. These considerations influence the prevalence of chatbots in telecom companies' customer care departments. These metrics include:

i. **Perceived benefits:** It's the perceived benefit of using a chatbot for real-time customer care help, such as saving money, improving the customer experience, and receiving assistance in real-time.

ii. **Top management support:** To turn policies into objectives, they need the backing of executives. They have a say on matters that impact the whole company. They support an invention.

iii. **Organisational readiness** is the degree to which a company can adopt novel ideas. Get equipped with the necessary information technology (IT) and monetary assets (financial and otherwise) to use chatbot technology.

iv. **Compatibility:** is the ability for two systems to function together as intended, with no modifications required. The seamless integration of AI chatbots and human customer service personnel shows this.

v. **Complexity:** how easy or hard it is to use the system. In terms of simplicity of use, people are more likely to embrace a straightforward system and less likely to reject a convoluted one.

vi. **Technology availability/readiness:** it is a person's propensity to use new technologies to improve their home life or their job. The latest technology has to be trustworthy, safe, and backed by a solid infrastructure.

vii. **Customer pressure:** Consumers demand answers quickly and often when they contact customer service for help. The need for automation arises from competing industries incorporating new advancements into their day-to-day operations.

viii. **Need for automation:** A desire to automate certain operations on the part of the firm.

ix. **Government regulation:** The rules the state sets about how a business must carry out its operations.

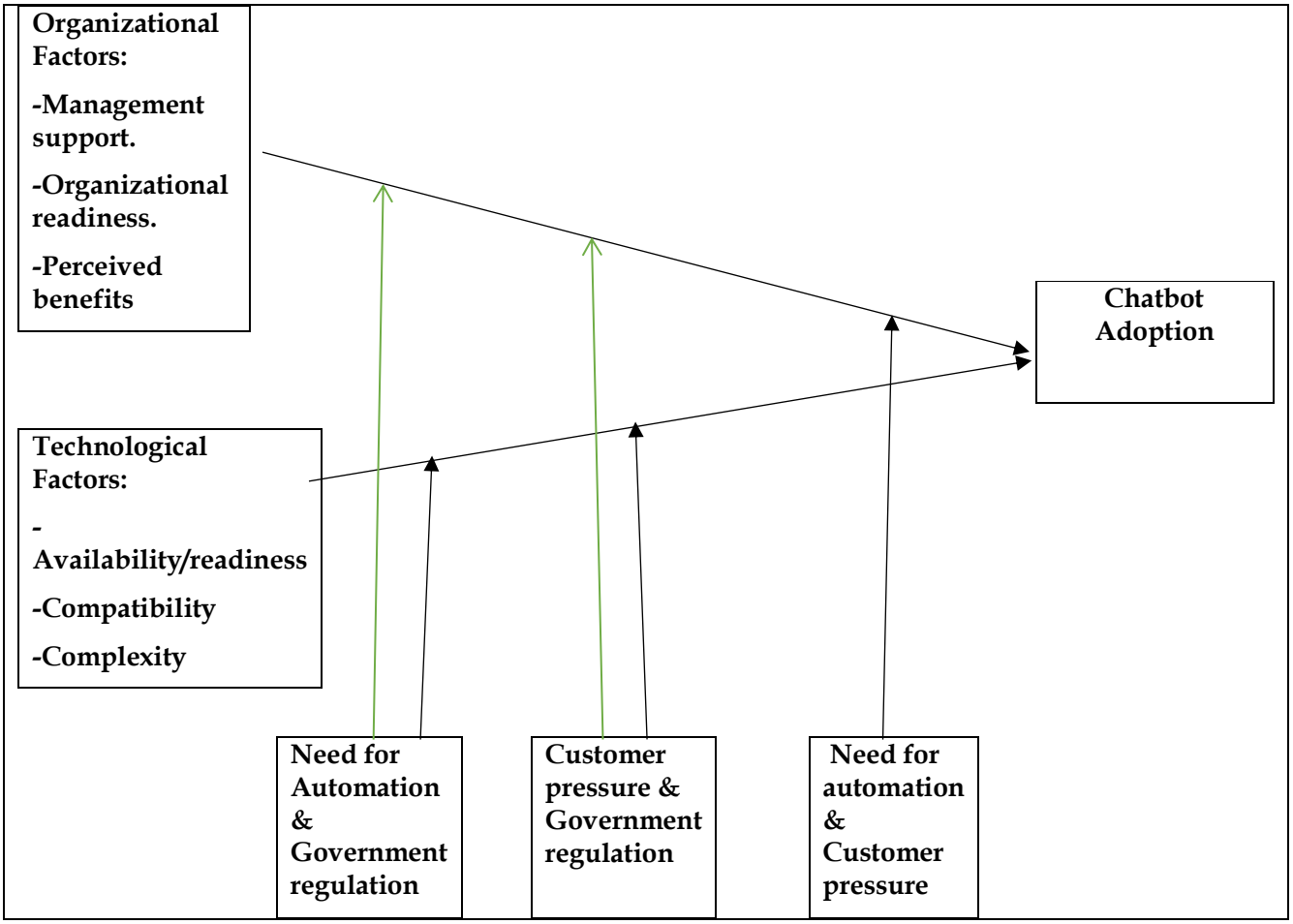

Figure 1: Chatbot Adoption Framework

Conclusion

Technology that utilises chatbots is applied in a haphazard manner and to a limited extent. The results determined that the telecommunications industry is prepared to embrace chatbot technology,

particularly those that use open artificial intelligence and big language models, such as ChatGPT. As a consequence of automation, there will be a reduction in the number of human agents or customer-care representatives required, which, according to the new technology, will result in cost savings and improved consumer insights. A straightforward and suitable technology is necessary for the chatbot. Artificial intelligence chatbot technology has several benefits, including a decrease in the time it takes to respond to client requests and a reduction in costs. The adopted application must be a fair and responsible AI for consumers.

The key metrics identified include; management support, perceived benefits, organisational readiness, technology readiness, complexity, compatibility, customer pressure, need for automation and government regulations. According to the findings of this research, the framework built has the potential to serve as a guiding principle in implementing chatbot technology within the telecom business setting. As a consequence of implementing an artificial intelligence chatbot, users will not have to spend a significant amount of time waiting for replies to their inquiries, ultimately leading to an improved customer experience.

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