Enhancing Customer Service: A Comparative Analysis of AI-Powered and Human-Driven Approaches

Aryan Tele[1], Sakshi Changan[2], Vaidehi Kale[3], Laukik Marathe[4], Dr. Suvarna Patil[5] and Mrs. Sneha Kanawade[6]

[1, 2, 3,4,5,6]Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune-44, India

[1]E-mail: telearyan12@gmail.com

[2]E-mail: changansakshi02@gmail.com

[3]E-mail: vaidehidevkale@gmail.com

[4]E-mail: laukikmarathe@gmail.com

[5, 6]Dr. D. Y. Patil International University, Akurdi, Pune-44, India

[5]E-mail: suvarnapat@gmail.com

[6]E-mail: sneha.shete18@gmail.com

Abstract

In today's dynamic landscape of burgeoning advertising and digital marketing, customer service stands as an essential guide for consumers navigating through the buying journey. It's not just about addressing queries and concerns; customer service also serves as a crucial element for providing confirmation and reassurance. Recently, AI has made its foray into customer service through website chatbots, aiming to streamline the consumer experience. According to a study, by 2026, 42% of CX leaders foresee AI significantly impacting voice-based interactions. However, the challenge arises when chatbots fall short or are deemed untrustworthy. In fact, a survey revealed that in 2023, 68% of customers expressed reluctance to engage with subpar chatbots again. In this fast-paced digital age, consumers expect prompt and seamless resolution of their queries, catering to individuals across all generations. This paper seeks to delve into the existing customer service land scape, pinpointing areas for enhancement. This paper does a comparative study between the traditional human-based and AI-involving customer service systems. The paper proves that customer care service system with major integration of AI and minor involvement of humans in order to handle the complex and risky decision-making tasks is the best way to tackle various problems related to it.

Keywords:

AI-based customer service, human-based customer service, Artificial Intelligence (AI), Natural Language Processing (NLP), Machine Learning (ML), Large Language Modules (LLM), Mobile UI, Voice based AI

1. Introduction

The rapid advancement of artificial intelligence (AI) has reshaped various sectors, and one of the most notable transformations is occurring in customer service. Traditionally, customer service was handled by human agents who engaged directly with customers to resolve queries, provide support, and enhance user satisfaction. The increasing demand for faster, more efficient, and cost-effective service has led to integration of AI-powered solutions, particularly voice-based artificial intelligent assistants. They are designed to mimic human interaction, address customer queries autonomously and handle repetitive tasks. Recently, the implementation of AI in customer service has gained significant momentum which is primarily driven by improvements in natural language processing, machine learning, and large language models. Review compares efficiency of traditional human-based customer service with approaches involving artificial intelligence.

1.1 Evolution Of The Customer Care Service Industry

The customer care service industry has evolved significantly from traditional human-based interactions to incorporation of advanced AI-driven solutions. Initially, it primarily relied on in-person and phone conversations. Here, human representatives responded to inquiries and concerns. This enhanced relational trust and fostered interpersonal bonds. It worked for personalization but had issues with slow response times, scalability, inconsistent service etc. Client satisfaction went down as a result. AI based customer support emerged as a game changer when digital technologies evolved. It allows businesses to handle more conversations at once. Plus it gives instant answers to customer questions. AI enabled technologies increase customer happiness, productivity and accessibility 24/7 with instant fixes. A big shift in the industry is moving to AI powered customer service which puts user first and improves service delivery. Also it redefines what is great customer service. The traditional human based customer care industry has been replaced by voice activated AI bots and similar innovative technologies.

1.1.1 Customer Service Without AI Integration (The Traditional Method)

Human-based service models are crucial for meeting client needs because it offers emotional intelligence and empathy. These are essential for establishing meaningful friendships. They thrive at both simple and complex conversations for context dependent

problem solving. The ability to adjust an approach over time enhances personal experiences. This encourages trust in sensory emotional interactions. Human agents are better equipped to address difficult problems since it requires qualities like creativity and adaptability. They provide solutions that are tailored to each client's particular requirements.

1.1.2 Customer Service With AI Integration

Communication between businesses and customers has changed so much since application of artificial intelligence in customer service. Chatbots, voice assistants and big language models have enabled businesses to offer automated 24/7 support for many questions. Wait times are shorter with computational intelligence. They allow businesses to grow without hiring more staff. Giving trustworthy answers that reduce human error is one of its main benefits. And overall more efficient. Cost and efficiency. AI does the boring work, reduces need for a big support team. AI-based customer care solutions have a lot of disadvantages despite their many advantages. Its primary flaw is inability to recognize and respond emotional cues. As a result, handling becomes delicate or emotionally charged interactions seem difficult. While AI is excellent at answering basic inquiries, it often struggles with complex issues that call for a more thorough understanding of the situation.

Because it relies on high-quality data, mistakes could lead to answers that are insufficiently accurate. Many clients still prefer to communicate with people. Since AI cannot replicate warmth and compassion of human agent, dealing with it might generate a sense of disconnection. Despite the difficulties, using AI has many advantages like improved productivity, lower operational costs and quicker query resolution.

1.2 Organization Of The Paper

The design of this study is specifically designed to offer a comprehensive comparison between conventional human-based customer care systems and AI-powered substitutes. This begins with an introduction that gives background knowledge by discussing evolution of artificial intelligence and customer service. It is followed by a Literature Review, which explores existing studies on both traditional and AI-based approaches. Core of this paper is its Comparative Analysis, which evaluates performance metrics like efficiency, cost, and flexibility across the two systems. The Discussion section synthesizes these findings, emphasizing strengths and weaknesses of each model. Finally, this paper concludes with Conclusion and References.

2 Systematic Analysis of Different Customer Service Approaches

Table.1. Systematic Analysis of all different Customer Service Approaches

Paper	Dataset	Methodology	Findings	Limitations
1	Chatbots Dataset	Template Analysis	Effective in pedagogical roles as interlocutors	Scripted responses, limited understanding
2	RICO, PixelHelp	LLM Prompting, DFS	Lightweight, generalizable solution for UI interaction	Depends on view hierarchy, no visual data
3	Scopus, Web Science	Systematic Review	Potential for productivity in AEC industry	Limited data coverage, technical challenges
4	Call Records, Transcripts	DID Estimation	Reduced complains for simple requests, effective for older users	Initial novelty impact, speech recognition errors
5	User Interactions	NLP, ML Models	Improves satisfaction, cost-cutting, personalized services	Privacy concerns, struggles with emotions
6	Generated Texts	Textual Comparison	Effective context understanding, needs feedback loops	Lacks empathy, struggles in multi-turn dialogues
7	Questionnaires	CFA, SEM	Enhanced personalization, gathers feedback, loyalty boost	Perception variability, errors harm trust
8	CRM Feedback	Case Studies, Qualitative	Empathetic AI improves relationships, seamless integration	Resistance to AI, fear of job loss
9	Employee Data	Statistical Analysis	Training improves CRM, management support crucial	Potential bias in feedback

Paper Title	Integration	Operational Time	Operational Cost	Efficiency	Data Security	Error Handling	Accuracy
[4]	AI	Improving	Low	High	Moderate	Inconsistent	High
[5]	AI	Instant	Low	High	Moderate	Inconsistent	High
[6]	AI	Instant	Low	High	Limited	Moderate	High
[8]	Human	Slow	High	Moderate	High	High	High
[9]	Human	Slow	High	Moderate	Moderate	High	Moderate
[10]	Human	Variable	High	Moderate	High	Moderate	High
10	Satisfaction Metrics	Comparative Analysis	Employee satisfaction boosts service, escalations improve empathy		Survey biases, limited generalizability		

The literature review above compares AI-based and human-based customer service systems, highlighting the respective strengths and limitations. AI systems, such as the chatbots and the voice assistants, excel in handling repetitive tasks, offering efficiency, scalability, and cost reductions, especially in the fast-paced environments like call centers. However, they struggle with the complex, emotionally sensitive issues due to the limited ability to understand nuances and provide empathy. On the other hand, human-based systems perform better when dealing with complex context-rich challenges. It has several disadvantages, such as slower reaction times, higher costs, and scaling problems, but it also increases trust through emotional intelligence. This review suggests that a hybrid model would be the best choice. Thus, employing AI to boost productivity while relying on humans for complex interactions.

3 Parameter Analysis

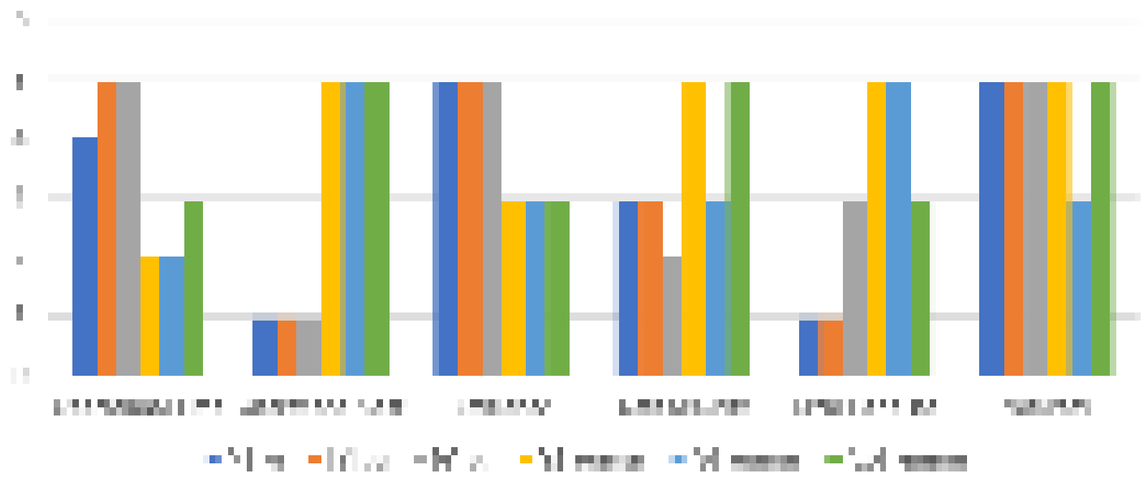
The speed at which the AI-powered customer support system operates is one of its advantages. As algorithms learn, they typically react immediately or get better over time. Because the systems can process several requests at once without requiring human labor, they operate remarkably smoothly and economically. As a result, they have very low running costs. However, there are currently problems with data protection because automated systems are susceptible to hacking. They also react inconsistently to mistakes, especially when the issue is unclear or complex. Human-driven systems greatly increase data security. They make mistakes more skillfully and exhibit emotional intelligence in their interactions. They also tend to have a bit slower reaction times and greater operating costs because it requires ongoing personnel. Human agents are reliable for handling complicated demanding issues especially in some fragile client interactions where empathy and relationship building are crucial. Hence, we can conclude, AI helps with efficiency and cost reduction, but human agents are necessary for handling delicate or complex issues and building client trust. A balance between human and AI based resources is necessary to be maintained.

Table2. Comparative analysis of various parameters of Customer Service Systems

4 Results

The review highlights that AI customer service systems outperform traditional human based models in several key areas; particularly efficiency and cost-effectiveness. AI systems provide instant 24/7 responses, allowing businesses to scale operations without need for additional personnel. This leads to faster query resolutions, reduced wait times, and overall higher operational efficiency. AI is more cost-effective as it automates repetitive tasks and minimizes the need for large customer support teams, reducing overhead costs. These systems excel in handling routine inquiries with high accuracy, making them a valuable tool for businesses looking to improve service efficiency. The comparative study of various factors concerning AI and human based customer service from table 1 can be seen in the figure 1 given below.

Figure 1. Comparative study of various factors related to AI and human based customer care service.



The paper also points out limitations of AI-based systems like their

inability to fully understand and respond to emotional cues. This makes AI less effective in handling complex, emotionally sensitive issues where human agents excel. Traditional human based systems are slower and more expensive but provide personalized experiences through emotional intelligence. This fosters stronger customer relationships. The review concludes that a hybrid model, combining strengths of AI' s efficiency and human agents' emotional intelligence, could offer best solution for optimizing customer service.

5 Discussions

1. AI-based systems offer superior efficiency, cost reduction, and scalability which handles large volumes of customer inquiries accurately in less time.

2. AI excels in all routine tasks, providing consistency, all-time availability, reducing operational costs by minimizing human intervention.

3. Human agents are more effective in addressing the complex, emotionally charged issues, adaptability, and personalized engagement.

4. AI struggles with the understanding emotional cues, limiting its effectiveness in sensitive interactions.

5. Human-based customer service fosters a bit more stronger customer relationships through empathy, problem-solving, and trust-building, despite being slower and more costly.

6. Review suggests that hybrid model combining AI' s efficiency with human emotional intelligence and problem-solving capabilities offers most effective solution for optimizing customer service.

6 Conclusion

Review concludes that AI-based customer service systems offer some significant advantages in factors like efficiency, scalability, and cost-effectiveness, excelling at automating routine tasks and providing instant responses. However, they lack a bit of emotional intelligence and adaptability which is needed for handling complex, emotionally sensitive interactions, whereas human agents outperform due to the ability to build trust and provide personalized solutions. Hybrid model combining AI' s strengths with human emotional intelligence is recommended as the most effective solution, ensuring both the operational efficiency and high-quality customer interactions, while enhancing customer satisfaction and relationships

7 Future Scope

The future of artificial intelligence in customer service looks promising, with advancements in NLP, emotional AI, and machine learning expected to enhance some of AI' s ability to understand context and handle complex, emotionally charged interactions. As AI develops, it will be able to address more of the sophisticated customer queries and even respond empathetically, narrowing gap between AI and human agents. Hybrid models that combine artificial intelligence for routine tasks with human agents for complex issues will become better optimized, with deeper integration with CRM platforms. Future research will explore new personalized AI experiences, ethical considerations, and balance between automation and maintaining human-centric values in customer service.

8 References

[1] Belda-Medina J, Calvo-Ferrer JR (2022) Using Chatbots as AI Conversational Partners in Language Learning. Applied Sciences (Switzerland) 12:. https://doi.org/10.3390/app12178427

[2] Wang B, Li G, Li Y (2023) Enabling Conversational Interaction with Mobile UI using Large Language Models. In: Conference on Human Factors in Com puting Systems - Proceedings. Association for Computing Machinery

[3] Saka AB, Oyedele LO, Akanbi LA, et al (2023) Conversational artificial intel ligence in the AEC industry: A review of present status, challenges and oppor tunities. Advanced Engineering Informatics 55

[4] Wang L, Huang N, Hong Y, et al (2023) Voice-based AI in call center customer service: A natural field experiment. Prod Oper Manag 32:1002– 1018. https://doi.org/10.1111/poms.13953

[5] Binti FA, Roslan M, Ahmad NB The Rise of AI-Powered Voice Assistants: Analyzing Their Transformative Impact on Modern Customer Service Para digms and Consumer Expectations

[6] Tirado-Olivares S, Navío-Inglés M, O' Connor-Jiménez P, Cózar-Gutiérrez R (2023) From Human to Machine: Investigating the Effectiveness of the Con versational AI ChatGPT in Historical Thinking. Educ Sci (Basel) 13:. https://doi.org/10.3390/educsci13080803

[7] Tulcanaza-Prieto AB, Cortez-Ordoñez A, Lee CW (2023) Influence of Cus tomer Perception Factors on AI-Enabled Customer Experience in the Ecuado rian Banking Environment. https://doi.org/10.3390/su151612441 S

[8] L endel -milan Kubina V Human Resources Management & Ergonomics HUMAN DIMENSION OF CRM

[9] Ghalenooie MB, Sarvestani HK (2016) Evaluating Human Factors in Customer Relationship Management Case Study: Private Banks of Shiraz City. Procedia Economics and Finance 36:363– 373. https://doi.org/10.1016/s2212 5671(16)30048-x

[10] C hicu D, Pàmies M del M, Ryan G, Cross C (2019) Exploring the influence of the human factor on customer satisfaction in call centres. BRQ Business Re search Quarterly 22:83– 95. https://doi.org/10.1016/j.brq.2018.08.004