

## Utilization of AI-Based Chatbots to Enhance Customer Service in MSME E-Commerce

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### Abstract

The rapid growth of e-commerce has pushed micro, small, and medium enterprises (MSMEs) to adopt digital technologies to remain competitive. Among emerging innovations, artificial intelligence (AI)-based chatbots have gained significant attention as tools for enhancing customer interaction and service quality. This study explores the utilization of AI chatbots in improving customer service performance among MSMEs operating in the e-commerce sector in Makassar, Indonesia. Using a qualitative descriptive approach, data were collected from 15 MSMEs through semi-structured interviews, participant observation, and document analysis. The findings reveal that chatbot adoption significantly improves service responsiveness by reducing response times from 5–10 minutes to under one minute, enhances operational efficiency by automating routine tasks, and increases customer satisfaction and engagement. However, several challenges remain, including technical limitations, integration costs, and customer resistance to automated communication. The study also highlights the effectiveness of hybrid service models that combine chatbot automation with human support to address complex inquiries. These findings contribute to understanding AI adoption among MSMEs in emerging markets and provide practical insights for businesses seeking to optimize digital customer service strategies. Overall, AI-based chatbots represent a strategic tool for strengthening MSME competitiveness and achieving sustainable growth in the digital era.

Keywords: AI chatbot; Customer Service; Digital Transformation; E-commerce; MSMEs.

### 1. Introduction

The rapid advancement of digital technologies has significantly transformed the landscape of commerce and consumer behavior worldwide. Among these transformations, electronic commerce (e-commerce) has emerged as a major driver of the global digital economy, enabling businesses of all sizes to reach wider markets and operate more efficiently [1]. In Indonesia, this transformation is closely tied to the role of micro, small, and medium enterprises (MSMEs), which contribute more than 60% to the national gross domestic product (GDP) and employ the majority of the workforce [2]. The integration of digital platforms has provided MSMEs with opportunities to expand their market reach and improve customer engagement. However, this digital shift also introduces new challenges, particularly in maintaining high-quality customer service in a competitive and fast-evolving online environment [3].

Customer expectations in the digital era have evolved substantially. Consumers increasingly demand real-time responses, personalized interactions, and seamless service experiences throughout their purchase journey [4]. Many MSMEs, however, face difficulties in meeting these expectations due to limited human resources, financial constraints, and gaps in technological expertise. As a result, traditional communication methods—such as manual messaging or direct phone calls—often lead to slow response times, inconsistent service quality, and missed opportunities to build customer trust and loyalty [5]. Since customer

satisfaction and responsiveness are closely linked to business success in e-commerce, addressing these service gaps is essential for MSMEs seeking to remain competitive [6].

In response to these challenges, many businesses have begun adopting AI-powered chatbots as an innovative solution to improve customer service operations. Chatbots are software applications that use artificial intelligence (AI), natural language processing (NLP), and machine learning to simulate human-like conversations and provide automated support [7]. They are capable of handling repetitive inquiries, delivering instant responses, and offering 24/7 availability—all of which contribute to improved customer experience and operational efficiency. For MSMEs, chatbots are particularly attractive because they offer a cost-effective solution that reduces the need for additional staff while enabling integration with popular communication platforms such as WhatsApp, websites, and social media channels [8].

The effectiveness of chatbot technology in enhancing customer service has been well-documented. Singh and Kumar [9] found that AI-driven chatbots significantly reduce response times and enhance communication quality in customer-facing services. Similarly, Hsu and Lin [10] highlighted that chatbot service quality measured through reliability, responsiveness, and information accuracy plays a critical role in shaping user satisfaction and loyalty. Moreover, Jenneboer et al. [11] demonstrated that chatbots contribute not only to improving customer satisfaction but also to strengthening customer loyalty and retention in online business environments. These studies collectively show that chatbots have a transformative effect on how businesses engage with their customers.

Despite these promising results, existing literature predominantly focuses on large companies and developed markets, leaving a significant gap in understanding how MSMEs in emerging economies, such as Indonesia, implement and benefit from chatbot technology [12]. MSMEs possess unique characteristics such as resource limitations, lower levels of digital literacy, and distinct customer interaction patterns that require context-specific analysis [13]. Additionally, some challenges persist, including the cost of chatbot integration, limited customization options, and customer resistance to non-human interactions [14]. These issues are often overlooked in existing studies but are critical to understanding the real-world dynamics of chatbot adoption in small business contexts.

This research seeks to address these gaps by providing an in-depth analysis of how AI-based chatbots are utilized to enhance customer service among MSMEs in the e-commerce sector in Makassar, Indonesia. Through a qualitative research approach involving 12–15 MSMEs, the study explores the implementation of chatbot technology, its impact on service speed and quality, and the challenges faced during its adoption. The findings are expected to contribute both theoretically and practically expanding scholarly understanding of AI applications in customer service and guiding MSMEs in designing effective, sustainable, and customer-centric digital strategies.

## 2. Methodology

This study employed a qualitative descriptive research design aimed at exploring how AI-based chatbots are utilized by micro, small, and medium enterprises (MSMEs) in the e-commerce sector to enhance customer service quality. A qualitative approach was deemed appropriate because it allows for an in-depth understanding of the experiences, perceptions, Proceedings homepage: <https://icbens.umpalopo.ac.id/>

and strategies of MSME owners and managers regarding chatbot adoption [15]. The methodology was structured to ensure transparency, replicability, and alignment with the research objectives.

### 2.1. Research Design

The research followed a descriptive-qualitative design, which focuses on describing and interpreting phenomena based on the perspectives of participants in their natural context. This design was selected because the aim of the study is not to test hypotheses but to understand the processes, impacts, and challenges associated with chatbot utilization in MSME customer service operations [16]. The study was conducted between March and May 2025.

### 2.2. Research Site and Participants

The research was carried out in Makassar City, Indonesia, one of the fastest-growing e-commerce hubs in Eastern Indonesia. The study involved 15 MSMEs operating in various e-commerce sectors such as fashion, food and beverages, electronics, and household goods. Participants were selected using purposive sampling, focusing on MSMEs that had integrated AI-based chatbot systems into their customer service workflows for at least six months prior to data collection. This criterion ensured that participants had sufficient experience with chatbot technology to provide rich and meaningful insights [17].

The selected MSMEs varied in size, ranging from microenterprises with fewer than 10 employees to medium-sized businesses with up to 100 employees. Approximately 60% of the participants used chatbots integrated into WhatsApp, while others employed website-based or multi-platform solutions. This diversity allowed the study to capture a range of implementation contexts and user experiences.

### 2.3. Data Collection and Analysis

Data were collected and analyzed simultaneously using a **multi-method qualitative approach** to ensure a rich and comprehensive understanding of chatbot utilization. The primary data collection methods included:

- Semi-structured interviews: Conducted with 15 MSME owners or managers, each lasting between 45 and 60 minutes. The interviews explored topics such as motivations for chatbot adoption, implementation strategies, perceived benefits, challenges, and customer responses [18].
- Participant observation: The researcher observed chatbot-customer interactions over a two-week period, focusing on the types of inquiries, response speed, and interaction quality [19].
- Document review: Business records, chatbot interaction logs, and customer feedback reports were analyzed to triangulate the findings and validate the interview and observation data [20].

The data obtained from these methods were analyzed using thematic analysis, following Braun and Clarke's six-step framework [21]. Data were first transcribed and coded, then categorized into emerging themes that reflected key patterns and insights. Three major themes were identified: (1) improved service responsiveness, (2) operational efficiency and enhanced customer experience, and (3) implementation challenges and user resistance.

To ensure the trustworthiness of the findings, triangulation across data sources was conducted, and member checking was employed to confirm the accuracy of interview

transcripts. Ethical standards were upheld by obtaining informed consent from all participants, ensuring anonymity, and securing ethical clearance from the affiliated institution [22], [23].

### 3. Result and Discussion

#### 3.1. Result

This study involved 15 micro, small, and medium enterprises (MSMEs) operating in various e-commerce sectors in Makassar, Indonesia, which has emerged as one of the most dynamic centers of digital entrepreneurship in Eastern Indonesia. The participating businesses represented diverse industries such as fashion (33.3%), food and beverage (26.7%), electronics (20%), and household goods (20%), reflecting the breadth of e-commerce activities in the region. Most business owners were male (60%), and the majority of enterprises were classified as micro- or small-sized businesses with fewer than 50 employees.

Regarding the technological context, 60% of participants reported using WhatsApp-based chatbots, while 26.7% employed website-integrated chatbot systems, and 13.3% adopted multi-platform chatbot solutions. More than half of these businesses (53.3%) had been using chatbot technology for over one year, demonstrating a level of maturity and familiarity with the technology that provided valuable insights into its effectiveness and limitations.

Table 1. Profile of MSME Respondents

Variable	Category	Frequency	Percentage
<b>Gender of Owner</b>	Male	9	60%
	Female	6	40%
<b>Business Type</b>	Fashion	5	33.3%
	Food & Beverage	4	26.7%
	Electronics	3	20%
	Household Goods	3	20%
<b>Chatbot Platform</b>	WhatsApp	9	60%
	Website	4	26.7%
	Multi-platform	2	13.3%
<b>Chatbot Usage Duration</b>	6–12 months	7	46.7%
	>12 months	8	53.3%

Source: Authors' field data (2025).

Thematic analysis of interviews, observations, and supporting documents revealed three major themes representing the core findings of this research:

1. Enhanced Service Responsiveness
2. Improved Operational Efficiency and Customer Experience
3. Implementation Challenges and User Resistance

#### 1. Enhanced Service Responsiveness

A major finding of this study is that AI-based chatbots significantly improved the speed and consistency of responses to customer inquiries. All respondents reported that before implementing chatbot systems, average response times ranged from 5 to 10 minutes, depending on staff availability and workload. After adopting chatbots, response times decreased dramatically to under one minute, with many businesses reporting near-instantaneous replies to basic queries.

This enhanced responsiveness was directly linked to higher levels of customer satisfaction and engagement. Several MSMEs observed that quicker responses reduced cart abandonment rates and increased the likelihood of customers completing transactions. As Participant 4 shared:

*“Since we started using a chatbot, customers receive answers almost instantly, and they are more likely to complete their purchases.”*

Furthermore, automated responses ensured that customers could interact with businesses 24/7, which was previously not possible due to staffing limitations. This continuous availability contributed to building stronger customer trust and loyalty, particularly among consumers accustomed to on-demand service experiences.

## **2. Improved Operational Efficiency and Customer Experience**

The second major result concerns the operational benefits derived from chatbot adoption. By automating routine tasks such as answering frequently asked questions, checking order status, and providing product details, chatbots reduced manual workload by an estimated 40–60%. This reduction allowed business owners and staff to redirect their focus toward strategic activities such as marketing, product development, and customer relationship management.

Participants reported not only time savings but also noticeable improvements in overall customer experience. Automated and consistent messaging improved communication clarity, minimized human error, and created a more professional brand image. In addition, 80% of respondents reported a measurable increase in positive feedback and repeat purchases following chatbot integration. Participant 7 explained:

*“Before, I had to reply to every message myself. Now, the chatbot handles most inquiries, and I can focus on growing my business.”*

Many MSMEs also highlighted the scalability of chatbot technology, noting that the system could handle multiple customer interactions simultaneously — a task that previously required additional staff. This scalability was especially beneficial during promotional campaigns or seasonal peaks when message volume increased significantly.

## **3. Implementation Challenges and User Resistance**

Despite the numerous advantages, MSMEs also faced several challenges in implementing chatbot solutions. Some participants reported technical limitations, such as difficulty in customizing chatbot scripts or integrating the chatbot with their existing e-commerce platforms. Others mentioned financial barriers, particularly the cost of premium chatbot services or advanced features, which could be significant for micro-sized enterprises.

A key challenge identified was customer resistance to interacting with non-human agents. Approximately 30% of respondents noted that some customers expressed dissatisfaction with automated responses, especially in cases requiring nuanced understanding or personalized solutions. Participant 12 commented:

*“Some customers still prefer talking to a real person, especially when they have special requests.”*

To address these challenges, several MSMEs adopted hybrid approaches, combining chatbot automation for basic queries with human support for complex issues. This strategy allowed them to balance efficiency with the need for personal interaction, thereby enhancing overall service quality.

### Thematic Analysis of Research Findings

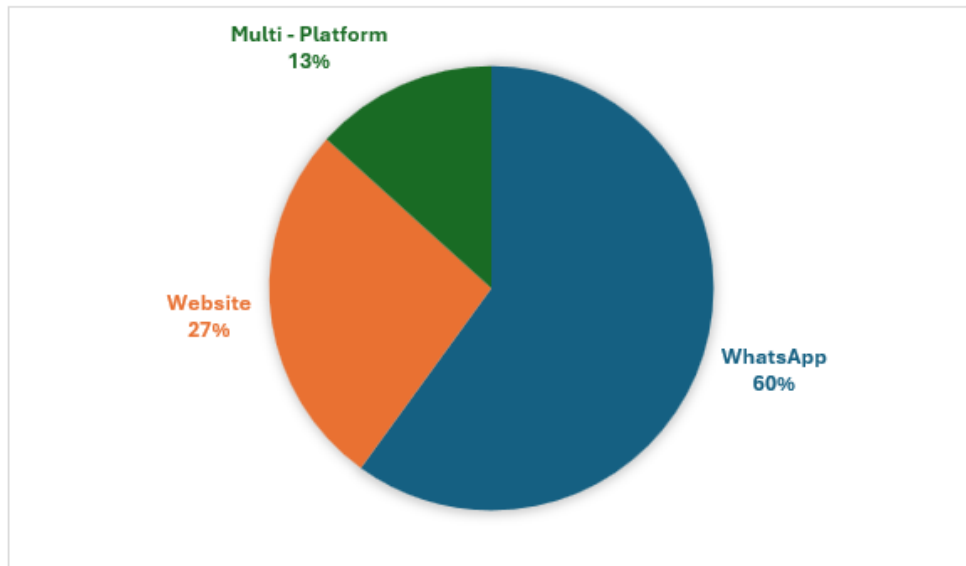
To ensure transparency in the data interpretation process, Table 2 summarizes the thematic analysis, illustrating how raw data from interviews and observations were categorized into codes, sub-themes, and overarching themes. This table serves as a bridge between the raw data and the narrative findings presented above.

**Table 2. Thematic Analysis of AI Chatbot Utilization by MSMEs**

Theme	Sub-theme / Category	Illustrative Codes (from Data)	Representative Participant Quotes
<b>Enhanced Service Responsiveness</b>	Faster reply time	“Response time dropped from 5–10 min to <1 min”	“Since we started using a chatbot, customers receive answers almost instantly...” (P4)
	24/7 availability	“Chatbot active even outside working hours”	“Customers appreciate that they can ask questions anytime.” (P6)
<b>Operational Efficiency &amp; Customer Experience</b>	Reduced manual workload	“40–60% decrease in manual tasks”	“Now the chatbot handles most inquiries, and I can focus on growing my business.” (P7)
	Increased customer satisfaction	“More repeat purchases and positive feedback”	“We’ve noticed more returning customers since chatbot adoption.” (P9)
	Scalability of interactions	“Chatbot can handle multiple conversations”	“During campaigns, chatbot responses scale effortlessly.” (P10)
<b>Implementation Challenges &amp; User Resistance</b>	Technical limitations	“Difficulty customizing chatbot”	“It’s hard to make the chatbot understand complex questions.” (P11)
	Customer resistance	“30% customers prefer human interaction”	“Some customers still prefer talking to a real person.” (P12)
	Cost constraints	“Premium features expensive for micro businesses”	“Upgrading chatbot services is costly for us.” (P14)

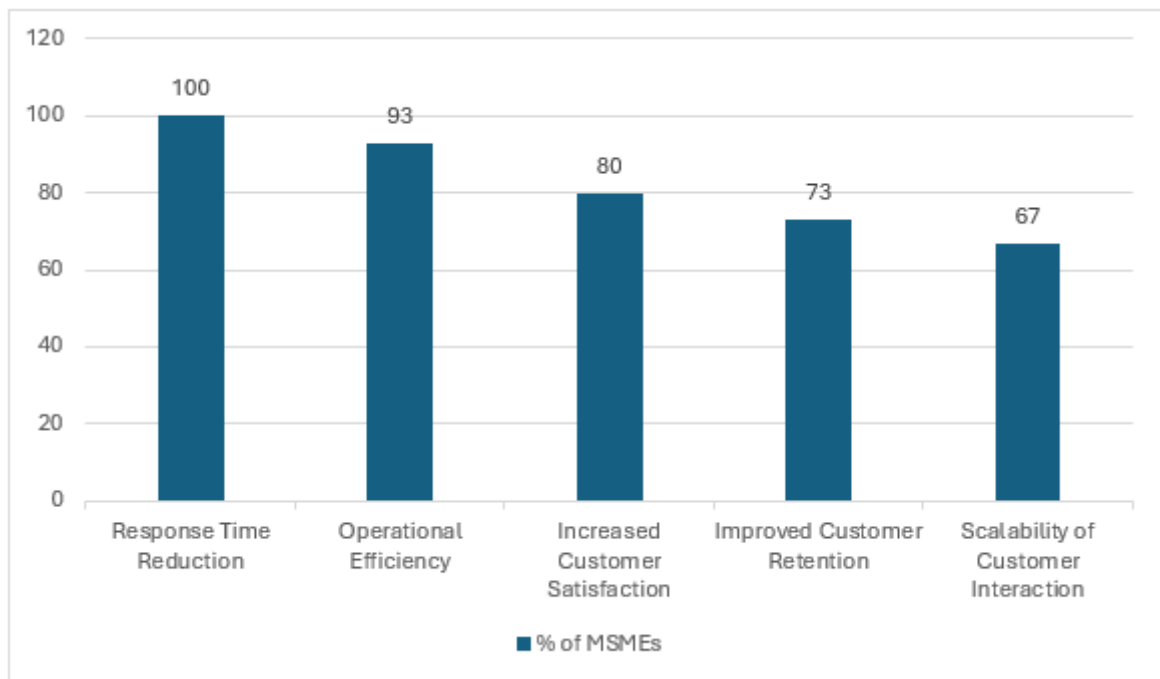
Source: Authors’ thematic analysis (2025).

### Graphical Representation of Findings



**Figure 1.** Distribution of Chatbot Platforms Used by MSMEs

*Source: Authors' processed data based on MSME survey findings (2025).*



**Figure 2.** Primary Benefits Experienced After Chatbot Implementation

*Source: Authors' data analysis (2025).*

### 3.2. Discussion

The findings of this study provide compelling evidence that the integration of AI-based chatbots significantly enhances the customer service capabilities of MSMEs operating in the e-commerce sector. These results support and extend existing literature on the transformative

role of artificial intelligence in small business operations, while also shedding light on unique challenges faced by MSMEs in emerging market contexts.

A key finding is the substantial improvement in service responsiveness following the adoption of chatbot systems. All participating MSMEs reported dramatic reductions in response time from 5–10 minutes to under one minute enabling businesses to meet customers' growing expectations for real-time communication. This finding aligns with previous studies that emphasize the importance of response speed as a critical determinant of customer satisfaction and loyalty in digital service environments [24], [25]. For example, Verma and Choudhary [26] highlighted that rapid responses directly enhance trust and reduce customer churn, while Jenneboer et al. [27] demonstrated that chatbot-enabled responsiveness contributes significantly to customer engagement and purchase intention. The 24/7 availability offered by chatbots also represents a strategic advantage for MSMEs, bridging service gaps caused by limited staffing and operational hours a challenge commonly reported in small business contexts [28]. Also in line with research results [1] found that The results of the study indicate that Partially, the variables of digital marketing have a positive and significant effect on the purchase decision of Azarine products. Also in line with research results [1] found that The results of the study indicate that (1) Partially, the variables of digital marketing have a positive and significant effect on the purchase decision of Azarine products.

The second major contribution of this study concerns operational efficiency and customer experience. Automation of routine inquiries reduced manual workload by up to 60%, allowing business owners to allocate resources more effectively. This echoes findings from Chen and Xu [29], who reported that automation technologies streamline service workflows, enhance organizational productivity, and improve user experiences. Moreover, the enhanced customer satisfaction observed in this study reported by 80% of participants is consistent with the view that personalization and immediacy in chatbot communication foster deeper customer relationships [30]. Importantly, these outcomes demonstrate that chatbots are not merely tools for reducing costs but can serve as strategic assets that enhance competitiveness in crowded digital marketplaces.

However, this study also highlights persistent implementation challenges and user resistance, providing a nuanced perspective often overlooked in prior research. Despite the technological benefits, approximately 30% of MSMEs reported that customers expressed dissatisfaction when interacting with automated systems, particularly when queries were complex or context-specific. This reflects the limitations of current AI capabilities, which still struggle with understanding nuanced human language and emotions [31]. Similar concerns have been noted by Khan and Alvi [32], who found that customer resistance can undermine the effectiveness of AI adoption, especially in markets where consumers strongly value human interaction. Additionally, technical barriers such as limited customization options and the high cost of advanced chatbot features remain significant obstacles for smaller enterprises a challenge echoed in studies on digital technology adoption among MSMEs in developing countries [33].

The findings of this study also underscore the importance of hybrid service models, which combine chatbot automation for routine tasks with human support for complex issues. Several participants in this research adopted such models to balance efficiency with personalization, resulting in more positive customer feedback and greater service

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effectiveness. This approach is consistent with recommendations by Brandtzaeg and Følstad [34], who argue that hybrid systems often deliver superior customer experiences by leveraging the strengths of both machine automation and human empathy. As chatbot technology continues to evolve, such hybrid approaches may represent a transitional phase toward more advanced, context-aware AI systems capable of handling a wider range of customer needs.

Finally, the study contributes to the broader discourse on digital transformation and MSME competitiveness. While previous research has primarily examined chatbot adoption in large corporations or Western contexts, this study provides context-specific insights into how MSMEs in Indonesia navigate technological change. The findings suggest that, despite resource constraints, small businesses can leverage AI-based tools to achieve meaningful service improvements and competitive advantages. This has important implications for policymakers, technology providers, and MSME support organizations, highlighting the need for targeted training, affordable technology solutions, and supportive digital ecosystems to accelerate AI adoption in the small business sector [35].

#### 4. Conclusion

This study examined the use of AI-based chatbots to improve customer service among MSMEs in Makassar's e-commerce sector. The findings show that chatbot adoption significantly enhances service responsiveness, operational efficiency, and customer experience, helping MSMEs remain competitive in the digital marketplace. However, challenges such as technical limitations, integration costs, and customer resistance still hinder optimal implementation.

The results highlight the importance of hybrid service models and context-specific strategies to maximize the benefits of chatbot technology. Future research should explore the quantitative impacts of chatbot adoption on business performance and examine its scalability across different sectors. Overall, AI-based chatbots offer a strategic solution for MSMEs to strengthen customer relationships and achieve sustainable growth in the digital era.

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