

Comparing Customer Satisfaction Between AI Chatbots and Human Live Agents in E-commerce: The Roles of Perceived Warmth, Perceived Competence, Trust

Rachel Cathleen Wijaya Oey, National Quemoy University, Taiwan
Li Hui Chang, National Quemoy University, Taiwan
Yu Fang Yen, National Quemoy University, Taiwan
Darryl Valencio Wijaya Oey, National Quemoy University, Taiwan

The Asian Conference on Cultural Studies 2026
Official Conference Proceedings

Abstract

The rapid development of e-commerce has encouraged companies to implement AI chatbots as a customer service facility to improve efficiency and speed. Human live agents are considered superior in building emotional relationships and handling complex problems. This explains that psychological factors perceived by customers under the type of service agent also influence customer satisfaction. This research aims to compare customer satisfaction between AI chatbots services and human live agents services in an e-commerce context. It further examines how customers' psychological perceptions—perceived warmth, perceived competence, and trust—affect customer satisfaction under each service condition. Based on the Stereotype Content Model (SCM), customer perceptions of service agents based on perceived warmth, perceived competence, and trust can influence customer satisfaction. The research gap found is the lack of research comparing the two types of service agents in a single integrated conceptual model. This research uses a quantitative approach with a comparative and within-subject design. The population is e-commerce users in Indonesia who have used AI chatbots and human live agents services. Respondent data was collected through an online questionnaire survey and analyzed using SPSS. The results of this research found that the increase in customer satisfaction by AI chatbots and human live agents occurred due to different psychological factors. Perceived competence had a stronger predictive effect on customer satisfaction under AI chatbots services, while perceived warmth and trust were stronger under human live agents. This indicates that both types of services are complementary in e-commerce.

Keywords: AI chatbots, human live agents, customer satisfaction, perceived warmth, trust

iafor

The International Academic Forum
www.iafor.org

Introduction

The rapid growth of the e-commerce industry is driving companies to leverage various digital technologies to improve the quality of customer service. One innovation that is increasingly being adopted is AI chatbots. This technology is capable of providing quick responses, serving customers 24 hours a day, and handling basic needs at a relatively lower cost. As customer expectations for practical and easily accessible services increase, the use of AI-based chatbots continues to increase (Marshall, 2026; SellersCommerce, 2025; Shukairy, 2025).

However, despite these advantages, AI chatbots still have limitations, particularly when faced with complex issues or situations involving customers' emotional responses. In such situations, the presence of human live agents is often considered more effective because they are able to demonstrate empathy, understand the context more deeply, and tailor their responses to customer needs (Huang et al., 2024; Huang & Rust, 2021). This indicates that customer satisfaction is not only determined by the speed or efficiency of service, but also by how customers perceive and interpret the interactions they experience.

To explain this phenomenon, this research uses the Stereotype Content Model (SCM), which states that individuals' evaluations of a group are generally based on two main dimensions: perceived warmth and perceived competence (Abele et al., 2021). In the context of customer service, perceived warmth refers to the perception of the service provider's friendliness and goodwill, while perceived competence relates to the ability to resolve issues effectively. Both of these aspects are known to play a crucial role in shaping customers' evaluations of the services provided, whether by AI or humans (McKee et al., 2023). Additionally, the factor of trust is a critical element in digital environments as it can reduce uncertainty while simultaneously increasing customers' confidence in the services they use (Huang et al., 2024; Wang et al., 2023).

Although research on AI chatbots and customer service continues to evolve, there are still a number of gaps that have not been extensively studied. Most studies tend to examine AI chatbots and human live agents separately (Hsu & Lin, 2023). On the other hand, the variables perceived warmth, perceived competence, and trust are generally studied separately, so the relationship between the three in explaining customer satisfaction has not been extensively analyzed in an integrated form (Cai et al., 2024; Huang et al., 2024; Xu et al., 2022). Furthermore, research that directly compares the two types of services using a within-subjects approach remains relatively limited.

Based on this gap, this research aims to compare customer satisfaction levels between AI chatbots and human live agents in the context of e-commerce. In addition, this research also examines the influence of perceived warmth, perceived competence, and trust on customer satisfaction for each type of service, as well as compares the strength of the influence of these three factors between the two types of services.

Literature Review and Hypotheses

This research adopts the Stereotype Content Model (SCM) to understand how customers evaluate service agents in the context of e-commerce. In this model, evaluations of a social entity are generally based on two main dimensions: perceived warmth and perceived competence (Abele et al., 2021; Fiske et al., 2002). Perceived warmth refers to how

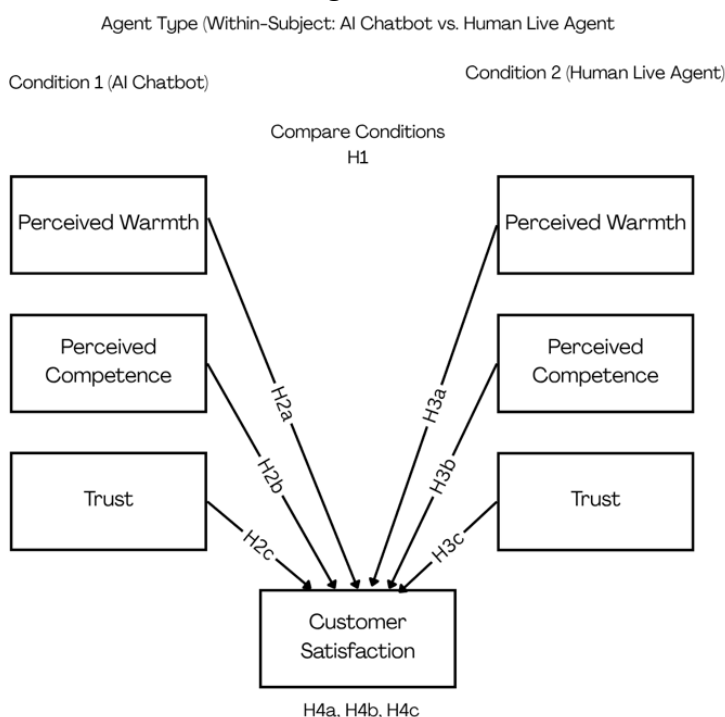
customers view the friendliness, concern, and goodwill of service agents. Meanwhile, perceived competence relates to perceptions of the agent's ability, expertise, and effectiveness in completing tasks. Previous studies have shown that these two dimensions are not only used in evaluating humans but are also relevant for evaluating artificial intelligence-based technologies such as AI chatbots (McKee et al., 2023).

In e-commerce, customers can interact with both AI chatbots and human live agents. Although both share the same goal of providing customer service, perceptions of the two often differ. AI chatbots are generally viewed as superior in terms of competence because they can provide quick, consistent, and relatively accurate responses. Meanwhile, human live agents are generally considered superior in terms of warmth because they can demonstrate empathy, understand customers' emotional states, and provide more personalized responses (Huang et al., 2024; McKee et al., 2023). Besides these two dimensions, trust is also a critical factor in the e-commerce context, given that customers frequently face uncertainties regarding data security, the accuracy of information, and the outcomes of their transactions (Wang et al., 2023).

Several studies have shown that the use of AI chatbots can improve customer satisfaction, particularly for routine and informational services, such as providing product information, answering frequently asked questions, or assisting with order tracking (Hsu & Lin, 2023; Huang et al., 2024; Wang et al., 2023). However, in more complex situations or those involving emotional aspects, human live agents tend to yield higher satisfaction levels. This is due to their ability to build trust and provide responses that better align with customers' emotional needs (Huang et al., 2024; Wang et al., 2023).

Perceived warmth plays a crucial role in shaping customer satisfaction, as interactions that are perceived as friendly, caring, and empathetic can foster positive evaluations of the service (Cai et al., 2024; Huang et al., 2024; McKee et al., 2023). Furthermore, perceived competence also makes a significant contribution, as customers tend to feel more satisfied when service agents are perceived as capable of providing accurate information and effective solutions (Hsu & Lin, 2023; Huang et al., 2024; McKee et al., 2023). Meanwhile, trust serves as a factor that helps reduce perceived risk while increasing customer confidence in service quality, which eventually has a positive impact on customer satisfaction levels (Huang et al., 2024; Wang et al., 2023).

Figure 1
Research Framework Diagram



Based on previous research, AI chatbots and human live agents show different service characteristics, meaning that they have the potential to result in different levels of customer satisfaction. Therefore, this research proposes the hypothesis that there is a difference in customer satisfaction under AI chatbots services and human live agents services in the context of e-commerce (H1). Within the framework of the Stereotype Content Model (SCM), perceived warmth is one of the factors that influence how customers evaluate service agents. When service agents are perceived as friendly, caring, and capable of showing empathy, customers tend to give more positive ratings of the service experience they receive (Cai et al., 2024; Huang et al., 2024; McKee et al., 2023). Therefore, perceived warmth is hypothesized to have a positive influence on customer satisfaction, for both under AI chatbots (H2a) and human live agents (H3a).

Furthermore, perceived competence is also expected to contribute to customer satisfaction. Customers generally feel more satisfied when service agents are perceived to be competent in providing information and resolving issues effectively (Hsu & Lin, 2023; Huang et al., 2024; McKee et al., 2023). Thus, perceived competence is hypothesized to have a positive effect on customer satisfaction under AI chatbots services (H2b) and human live agents (H3b).

Moreover, trust is also a key factor influencing customer satisfaction. Customers who have a high level of trust in service agents tend to provide more positive evaluations of their service experiences (Huang et al., 2024; Wang et al., 2023). Therefore, it is hypothesized that trust has a positive effect on customer satisfaction under AI chatbots (H2c) and human live agents (H3c).

Due to the differences in characteristics between AI chatbots and human live agents, the effects of perceived warmth, perceived competence, and trust on customer satisfaction are also expected to vary between the two. Thus, this research proposes the hypothesis that there

are differences in the effects of perceived warmth (H4a), perceived competence (H4b), and trust (H4c) on customer satisfaction between AI chatbots services and human live agents.

Methodology

Research Design

This research applies a quantitative approach with a within-subject comparative design to compare customer satisfaction levels between AI chatbots and human live agents in the context of e-commerce. Besides comparing these two types of services, this research also examines the influence of perceived warmth, perceived competence, and trust on customer satisfaction under each service condition. The choice of a within-subject design is based on the consideration that each respondent is asked to evaluate both types of service agents. Thus, differences between individuals can be minimized, making the comparison results more accurate (Creswell & Creswell, 2022; Lakens, 2022). This approach is also consistent with a number of previous studies that examined the comparison between AI chatbots and human live agents in the context of digital-based customer service (Hsu & Lin, 2023; Huang et al., 2024).

Data Collection and Sampling

The data for this research was collected through an online survey using a structured questionnaire adapted from previous studies on AI chatbots, digital customer service, and customer satisfaction (Hsu & Lin, 2023; Huang et al., 2024; Wang et al., 2023). Each question item was measured using a 5-point Likert scale (Hair et al., 2022). The order of evaluation for AI chatbots and human live agents was randomized to reduce potential bias in questionnaire completion. The research population consisted of e-commerce customers in Indonesia who had experience using both AI chatbots and human live agents. Sampling was conducted using purposive sampling, with respondent criteria including Indonesian citizenship, a history of transactions via e-commerce platforms, and experience interacting with both types of services. This approach was used to ensure that the respondents involved truly possess relevant experience in evaluating both service conditions (Cai et al., 2024; Wang et al., 2023). Based on recommendations from previous studies, the minimum number of respondents required to participate in this research questionnaire is approximately 5 to 10 respondents per question item (Bujang et al., 2024). Given the 40 measurement items included in the questionnaire, the minimum sample size required was 200 valid respondents. Furthermore, when using multiple regression analysis, sample size determination must consider effect size, the number of predictor variables, and the significance level, as recommended by Hair et al. (2022). Based on these considerations, the sample size in this research is considered sufficient to support the statistical analysis.

Measurement Instruments

This research examines four main constructs: perceived warmth, perceived competence, trust, and customer satisfaction. Perceived warmth is measured through customers' perceptions of friendliness, attentiveness, empathy, goodwill, and comfort during interactions with service agents. Meanwhile, perceived competence reflects customers' evaluations of agents' capabilities, including effectiveness, level of knowledge, efficiency, and reliability in providing service. The trust variable is measured based on customers' perceptions of their level of trust in service agents, which includes aspects of honesty, goodwill, a sense of

security, and confidence in using the service. Meanwhile, customer satisfaction is measured through several indicators, such as overall satisfaction, the alignment of the service with expectations, the perceived experience, satisfaction with the service outcomes, and the intention to use the service again in the future.

Data Analysis

The data in this research was analyzed using SPSS. The initial stage involved data screening and descriptive analysis aimed at describing the characteristics of the respondents and the distribution of the data obtained (Hair et al., 2022). Next, the validity and reliability of the instruments were tested using corrected item-total correlation and Cronbach's alpha to ensure the quality of the measurement tools used (Hair et al., 2022). In the next stage, a paired-sample t-test was used to compare customer satisfaction levels between AI chatbots services and human live agents services, in accordance with the within-subjects design applied in this research (Lakens, 2022). To analyze the influence of perceived warmth, perceived competence, and trust on customer satisfaction, multiple regression analyses were conducted separately for each type of service. The final stage involved comparing the results of the two regression models to identify differences in the strength of the influence of psychological variables on customer satisfaction between AI chatbots and human live agents services (Huang et al., 2024; Wang et al., 2023).

Result and Discussion

Respondent Profile

This research distributed a total of 400 questionnaires. After the data screening process and the elimination of invalid responses, 385 valid questionnaires were obtained, with a validity rate of 96.25%. The respondent profile shows that the majority are women (57.1%), in the 26–30 age range (28.6%), and are predominantly students (34.8%) and private-sector employees (34.3%). Most respondents used e-commerce platforms several times a week (41.8%) and had used customer service 2–3 times in the past six months (47.0%).

Table 1

Analysis of Demographic Profile (N = 385)

Variable Name	Category	Frequency (n)	Percentage (%)
Gender	Female	220	57.1%
	Male	165	42.9%
Age	18–20 years	102	26.5%
	20–25 years	101	26.2%
	26–30 years	110	28.6%
	31–35 years	44	11.4%
	> 35 years	28	7.3%

Employment Status	Student	134	34.8%
	Private Sector Employee	132	34.3%
	Civil Servant	75	19.5%
	Entrepreneur	38	9.9%
	Others	6	1.5%
Platform Usage Frequency	Several times a week	161	41.8%
	Almost every day	142	36.9%
	Several times a month	67	17.4%
	Rarely	15	3.9%
Frequency use of Customer Service in the Last 6 Months	2–3 times	181	47.0%
	4–5 times	106	27.5%
	1 time	78	20.3%
	More than 5 times	20	5.2%

Descriptive Statistics, Validity, and Reliability Analysis

The results of the descriptive analysis show that the mean scores for all variables are in the high range, ranging from 3.94 to 4.08. In comparison, human live agents consistently received higher mean scores than AI chatbots on all variables examined, which are perceived warmth, perceived competence, trust, and customer satisfaction. This indicates that respondents tend to have a more positive perception of interactions with human agents. Meanwhile, instrument quality testing showed that all items met the validity criteria, as indicated by corrected item-total correlation (CITC) values above the minimum threshold of 0.30. Reliability testing also yielded high Cronbach's Alpha values, ranging from 0.861 to 0.905 for AI chatbots and 0.877 to 0.887 for human live agents. Based on these results, it can be concluded that the research instrument possesses good levels of consistency and reliability.

Table 2
Descriptive Statistical Analysis of Research Variables

Variable	AI Chatbots Mean (SD)	Human Live Agents Mean (SD)
Perceived Warmth	3.97 (0.79)	4.06 (0.77)
Perceived Competence	3.95 (0.82)	4.08 (0.76)
Trust	3.95 (0.77)	4.06 (0.76)
Customer Satisfaction	3.94 (0.85)	4.07 (0.77)

Table 3
Validity and Reliability Analysis of Research Variables

Agent Type	Variable	Item	CITC	Cronbach's Alpha
AI Chatbots	Perceived Warmth	AI Chatbots are friendly when serving me (AI_W1)	0.626	0.861
		AI Chatbots show concern when serving me (AI_W2)	0.690	
		AI Chatbots can understand my feelings when providing service (AI_W3)	0.660	
		AI Chatbots have good intentions when serving me (AI_W4)	0.704	
		AI Chatbots are easy to approach and comfortable to interact with (AI_W5)	0.718	
	Perceived Competence	AI Chatbots are competent in handling my issues (AI_C1)	0.754	0.887
		AI Chatbots provide effective solutions (AI_C2)	0.734	
		AI Chatbots have sufficient knowledge (AI_C3)	0.716	
		AI Chatbots work efficiently (AI_C4)	0.724	
		AI Chatbots perform reliably (AI_C5)	0.705	
	Trust	AI Chatbots are trustworthy (AI_T1)	0.737	0.869
		AI Chatbots provide honest information (AI_T2)	0.652	
		AI Chatbots act in accordance with my needs (AI_T3)	0.705	
		The solutions provided by AI Chatbots are safe to follow (AI_T4)	0.653	
		I feel confident in the results obtained from AI Chatbots (AI_T5)	0.719	

Customer Satisfaction	Overall, I am satisfied with AI Chatbots services (AI_S1)	0.784	0.905	
	AI Chatbots services meet my expectations (AI_S2)	0.772		
	My experience with AI Chatbots services is pleasant (AI_S3)	0.749		
	I am satisfied with the solutions provided by AI Chatbots (AI_S4)	0.755		
	I would use AI Chatbots services again in the future (AI_S5)	0.746		
	Perceived Warmth	Human Live Agents are friendly (H_W1)	0.759	0.882
		Human Live Agents show concern (H_W2)	0.703	
		Human Live Agents understand my feelings (H_W3)	0.723	
		Human Live Agents have good intentions (H_W4)	0.710	
Human Live Agents are easy to approach (H_W5)		0.691		
Human Live Agents	Perceived Competence	Human Live Agents are competent (H_C1)	0.724	0.878
		Human Live Agents provide effective solutions (H_C2)	0.671	
		Human Live Agents have sufficient knowledge (H_C3)	0.728	
		Human Live Agents work efficiently (H_C4)	0.731	
		Human Live Agents perform reliably (H_C5)	0.695	

Trust	Human Live Agents are trustworthy (H_T1)	0.722	0.877
	Human Live Agents provide honest information (H_T2)	0.685	
	Human Live Agents act in accordance with my needs (H_T3)	0.695	
	The solutions provided by Human Live Agents are safe to follow (H_T4)	0.774	
	I feel confident in the results obtained from Human Live Agents (H_T5)	0.661	
Customer Satisfaction	Overall, I am satisfied with Human Live Agents services (H_S1)	0.768	0.887
	Human Live Agents services meet my expectations (H_S2)	0.707	
	My experience with Human Live Agents is pleasant (H_S3)	0.711	
	I am satisfied with the solutions provided by Human Live Agents (H_S4)	0.752	
	I would use Human Live Agents services again in the future (H_S5)	0.695	

Hypothesis Testing

The results of the paired-sample t-test indicate a significant difference between AI chatbots and human live agents across all variables examined. These differences are evident in perceived warmth ($t = -4.101$, $p < 0.001$), perceived competence ($t = -5.061$, $p < 0.001$), trust ($t = -5.175$, $p < 0.001$), and customer satisfaction ($t = -4.277$, $p < 0.001$). These findings indicate that the two types of service do indeed provide different experiences for customers, thus supporting Hypothesis H1. However, the effect sizes were relatively small, with Cohen's d_z values ranging from 0.209 to 0.264, indicating that although the differences were statistically significant, their practical significance was relatively modest. Furthermore, the regression analysis results show that the three variables, which are perceived warmth, perceived competence, and trust, all have a positive and significant influence on customer satisfaction, both for AI chatbots and human live agents ($p < 0.001$). In the AI chatbots service, perceived competence appears as the most dominant factor influencing customer satisfaction ($\beta = 0.561$). Meanwhile, for human live agents services, perceived warmth ($\beta = 0.260$) and trust ($\beta = 0.273$) had a relatively stronger influence compared to AI chatbots.

Thus, all hypotheses from H2a to H3c can be considered supported. Further comparative results also support these findings. The results of the comparison of standardized coefficients suggest that the role of each variable may vary across the two types of service. For AI chatbots, perceived competence is the most dominant factor in predicting customer satisfaction. Meanwhile, for human live agents, perceived warmth and trust have a relatively greater influence on customer satisfaction (H4a-H4c). To assess the potential for multicollinearity, this research examined tolerance values and the variance inflation factor (VIF). The results show that all tolerance values are above 0.10 and all VIF values are below 10.00, for both the AI chatbots and human live agents models. This indicates that multicollinearity is not a significant concern in the regression analysis conducted (Hair et al., 2022).

Table 4
Paired Sample t-Test Results of Research Variables

Variables	AI Chatbots Mean (SD)	Human Live Agents Mean (SD)	Mean Difference	t-value	p-value	Cohen's dz
Perceived Warmth	3.97 (0.79)	4.06 (0.77)	-0.091	-4.101	< 0.001***	0.209
Perceived Competence	3.95 (0.82)	4.08 (0.76)	-0.126	-5.061	< 0.001***	0.258
Trust	3.95 (0.77)	4.06 (0.76)	-0.115	-5.175	< 0.001***	0.264
Customer Satisfaction	3.94 (0.85)	4.07 (0.77)	-0.128	-4.277	< 0.001***	0.218

Note. n = 385; SD = Standard Deviation; ***P < 0.001

Table 5
Multiple Linear Regression Analysis Results of Research Variables

Variable	AI Chatbots (β t p-value)			Human Live Agents (β t p-value)		
Perceived Warmth	0.226	5.700	< 0.001***	0.260	6.206	< 0.001***
Perceived Competence	0.561	14.109	< 0.001***	0.445	10.255	< 0.001***
Trust	0.194	4.763	< 0.001***	0.273	5.615	< 0.001***
Model Fit	AI Chatbots		Human Live Agents			
R ²	0.898		0.894			
Adj. R ²	0.898		0.894			
F	1122.468***		1076.029***			
Durbin-Watson	1.942		1.779			

Note. Dependent Variable = Customer Satisfaction; ***p < 0.001

Discussion

The results of this research indicate that human live agents generate higher levels of customer satisfaction compared to AI chatbots. These findings suggest that, although AI chatbots are superior in terms of speed and efficiency, customers still value interactions with humans more highly. This is closely related to human agents' ability to demonstrate empathy, understand situations more deeply, and build emotional connections during the service process. Interactions with human live agents allow for more personalized communication and emotional support, aspects that AI chatbots still struggle to fully replicate. These findings

align with several previous studies by Zhou et al. (2023), Zhang et al. (2025), Deng and Yan (2025). More specifically, when it comes to AI chatbots services, perceived competence is the most significant factor in improving customer satisfaction. This means that customers tend to evaluate AI chatbots based on their ability to provide accurate information, effective solutions, and quick, consistent responses, mainly based on their functional performance rather than relational aspects. In contrast, for human live agents services, perceived warmth and trust actually have a greater influence. This indicates that in interactions with humans, customers consider not only functional aspects but also the quality of the relationship built during the service process. Human live agents are more strongly influenced by emotional and relational aspects, including warmth and trust. These findings are also consistent with previous research indicating that AI chatbots are more competent, while human live agents are more prominent in emotional and relational aspects (Zhang et al., 2025; Zhou et al., 2023).

Overall, the findings of this research support the Stereotype Content Model (SCM) framework, which emphasizes the importance of the competence and warmth dimensions in shaping customers' evaluations of service agents. However, the role of these two dimensions appears to differ depending on the type of service used. Competence is more dominant in the context of AI chatbots, while warmth and trust are more prominent with human live agents. Based on these findings, e-commerce companies may consider implementing a hybrid service strategy, which combines the efficiency of AI chatbots with the interpersonal skills of human live agents, to create a more optimal customer experience.

Conclusion

This research aims to compare customer satisfaction levels between AI chatbots services and human live agents, while also analyzing the role of perceived warmth, perceived competence, and trust in influencing satisfaction for each type of service. The results indicate that customer satisfaction with human live agents tends to be higher than with AI chatbots. Furthermore, the three variables which are perceived warmth, perceived competence, and trust were found to have a positive and significant influence on customer satisfaction, both in AI-based services and in services involving human agents. However, the strength of each factor's influence differs across these two contexts. For AI chatbots, perceived competence is the most dominant factor, indicating that customers prioritize the system's ability to provide accurate information and effective solutions. In contrast, with human live agents, perceived warmth and trust actually have a greater influence on customer satisfaction. This indicates that in interactions with humans, customers consider not only performance aspects but also the quality of the relationship built during the service process. Thus, it can be concluded that customers tend to evaluate AI chatbots based on functional aspects, while human live agents are evaluated through a combination of functional and relational aspects.

Theoretical Implications

This research contributes by extending the application of the Stereotype Content Model (SCM) to the context of digital services, specifically by simultaneously examining the roles of perceived warmth and perceived competence in AI chatbots and human live agents. The findings confirm that perceived competence remains a key factor in shaping customer satisfaction, particularly in technology-based services. Meanwhile, perceived warmth and trust appear to play a more prominent role in service contexts involving human live agents. Furthermore, this research also helps fill a gap in the literature by employing a within-

subjects design, which allows for a direct comparison between AI chatbots and human live agents within the same research framework. This approach provides a more comprehensive understanding of how customers evaluate both types of services.

Practical Implications

For e-commerce companies, the findings of this research suggest that AI chatbots and human live agents should be positioned to complement one another. AI chatbots can be optimized to handle tasks that require speed, accuracy, and efficiency, such as answering common questions or providing basic information. Meanwhile, human live agents continue to play a crucial role in handling more complex situations, particularly those requiring empathy, contextual understanding, and the ability to build trust with customers. Thus, implementing a hybrid service strategy that combines the strengths of AI chatbots and human live agents can be an effective approach to improving customer satisfaction. Additionally, companies also need to continue developing the capabilities of AI chatbots so they can better display a more “human-like” side, thereby increasing the perceived warmth and trust customers have in the services provided.

Limitations and Future Research

This research has several limitations that should be noted. First, this research was conducted solely in the context of e-commerce, so the results obtained may not necessarily be directly generalized to other service sectors. Each industry has different characteristics of customer interactions and needs, which could potentially influence the research results. In addition, this research utilized self-report questionnaires, which may be influenced by subjective judgments and the tendency of respondents to provide socially desirable answers. The cross-sectional design also limits the ability to draw causal inferences or observe changes in customer perceptions over time. Moreover, the sample was restricted to Indonesian consumers, which may constrain the generalizability of the findings to other cultural settings. Participants were asked to recall their past experiences with AI chatbots and human live agents, which may introduce recall bias. The research also did not account for differences in the complexity of customer service situations or variations across e-commerce platforms, both of which could have affected customer evaluations and satisfaction.

Furthermore, this research focuses only on three main variables: perceived warmth, perceived competence, and trust. However, there are various other factors that can also influence customer satisfaction. Therefore, future research is recommended to test this model in different industry contexts, such as tourism, banking, or healthcare. Future research may also consider additional variables, such as perceived usefulness, perceived risk, and emotional attachment, to provide a more comprehensive understanding of customer satisfaction in AI- and human-based services.

References

- Abele, A. E., Ellemers, N., Fiske, S. T., Koch, A., & Yzerbyt, V. (2021). Navigating the Social World: Toward an Integrated Framework for Evaluating Self, Individuals, and Groups. *American Psychological Association*, 128(2), 290–314.
- Bujang, M. A., Omar, E. D., Foo, D. H., & Hon, Y. K. (2024). Sample size determination for conducting a pilot study to assess reliability of a questionnaire. *Restorative Dentistry & Endodontics*, 49(1), e3.
- Cai, N., Gao, S., & Yan, J. (2024). How the communication style of chatbots influences consumers' satisfaction, trust, and engagement in the context of service failure. *Humanities & Social Sciences Communications*, 11, 687.
- Creswell, J. W., & Creswell, J. D. (2022). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (Vol. 6). SAGE Publications.
- Deng, Z., & Yan, J. (2025). The Effect of Perceived Warmth, Competence, and Social Presence of AI- Driven Chabots on Consumers' Engagement and Satisfaction. *SAGE Open*, 1–19.
- Fiske, S. T., Cuddy, A. J., Glick, P., & Xu, J. (2002). A Model of (Often Mixed) Stereotype Content: Competence and Warmth Respectively Follow From Perceived Status and Competition. *Journal of Personality and Social Psychology*, 82(6), 878–902.
- Hair, J., Hult, G., Ringle, C., & Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (Vol. 3). SAGE Publications.
- Hsu, C. L., & Lin, J. C.-C. (2023). Understanding the user satisfaction and loyalty of customer service chatbots. *Journal of Retailing and Consumer Services*, 71, 103211.
- Huang, D., Markovitch, D. G., & Stough, R. A. (2024). Can chatbot customer service match human service agents on customer satisfaction? An investigation in the role of trust. *Journal of Retailing and Consumer Services*, 76, 103600.
- Huang, M. H., & Rust, R. T. (2021). A strategic framework for artificial intelligence in marketing. *Journal of the Academy of Marketing Science*, 49, 30–50.
- Lakens, D. (2022). Sample Size Justification. *Collabra: Psychology*, 8(1).
- Marshall, C. (2026, January 13). 59 AI customer service statistics for 2026. Zendesk: <https://www.zendesk.com/sg/blog/ai/productivity/ai-customer-service-statistics/#georedirect>
- McKee, K. R., Bai, X., & Fiske, S. T. (2023). Humans perceive warmth and competence in artificial intelligence. *iScience*, 26, 107256.
- SellersCommerce. (2025, May 12). *AI in eCommerce Statistics (2025)*. SellersCommerce: <https://www.sellerscommerce.com/blog/ai-in-ecommerce-statistics/>

- Shukairy, A. (2025, May 9). *Chatbots In Customer Service – Statistics and Trends [Infographic]*. Retrieved from invesp: <https://www.invespcro.com/blog/chatbots-customer-service/>
- Wang, C., Li, Y., Fu, W., & Jin, J. (2023). Whether to trust chatbots: Applying the event-related approach to understand consumers' emotional experiences in interactions with chatbots in e-commerce. *Journal of Retailing and Consumer Services*, 73, 103325.
- Xu, Y., Zhang, J., & Deng, G. (2022). Enhancing customer satisfaction with chatbots: The influence of communication styles and consumer attachment anxiety. *Frontiers in Psychology*, 13, 902782.
- Zhang, Y., Ozsomer, A., Canli, Z. G., & Baghirov, F. (2025). Artificial Intelligence Chatbots Versus Human Agents in Customer Satisfaction: The Role of Warmth and Competence. *Journal of Interactive Marketing*, 61(2), 1–15.
- Zhou, Q., Li, B., Han, L., & Jou, M. (2023). Talking to a bot or a wall? How chatbots vs. human agents affect anticipated communication quality. *Computers in Human Behavior*, 143, 107674.

Contact email: oeyrachelcw@gmail.com