

The Impact of Consumer Trust in AI and Brand Attitudes on Continued Use of Robotic Menu Customization

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Abstract

This study investigates the role of consumer trust in artificial intelligence (AI) and brand attitudes on the intention to continue using robotic menu customization services, focusing on the coffee industry as a transformative context for AI-driven innovations. Using the Stimulus-Organism-Response (S-O-R) framework, the study examines how trust and brand attitudes mediate consumer behavior, highlighting the moderating influence of demographics such as age, income, education, and satisfaction. The findings underscore the critical interplay between trust, brand perception, and continued engagement, offering practical implications for businesses to enhance customer loyalty through personalized AI services.

Keywords: AI trust, brand attitude, Service satisfaction, service robots, continuance intention

1. Introduction

The integration of automation, artificial intelligence (AI), and big data into the restaurant industry is significantly enhancing operational efficiency while offering customers more tailored and convenient dining experiences. Robots are now performing a range of tasks, such as greeting guests, delivering orders, and cleaning, improving service efficiency and reducing the workload on staff (Sung & Jeon, 2020). As the global economy evolves, demand for efficient, convenient, and intelligent services is increasing. With advancements in information and communication technologies (ICT) like 5G and AI, new food tech innovations and business models that blend IT with the restaurant industry have emerged. In particular, the coffee industry is embracing cutting-edge technologies to create unique brand experiences. Companies such as Briggo and Cafe X in the U.S., Aabak in Australia, Monty Cafe in Russia, and Dal.komm in South Korea, with its robot barista B:eat, are leading the way in AI-driven services (Robotics Tomorrow, 2020; Sung & Jeon, 2020).

Despite the rapid adoption of AI robots in the coffee sector, research in this area remains limited compared to the growing interest. Existing studies have focused on AI in food processing (Asis et al., 2022), product evaluation (Duong et al., 2020), new product development (Fesaghandis & Pooya, 2018), and meal delivery (Gursoy et al., 2019), but the direct interaction of AI robots with consumers to customize personalized products remains underexplored. Additionally, there is little research on how demographic factors influence this interaction.

Theoretically, understanding the factors that shape consumer behavior is essential for advancing models in marketing, consumer psychology, and information systems. Trust in AI is a relatively new area of study and can enrich existing theories on technology adoption. Trust in AI reduces user anxiety and resistance to automated systems, leading to more positive consumer experiences (Senathirajah et al., 2024). By incorporating trust as a key variable, we can refine these models to better understand the factors that drive technology acceptance, especially in the AI context.

This study examines the role of consumer trust in AI and brand attitude in influencing the intention to continuously use robotic menu customization services, using brand attitude as a mediator. Trust in AI enhances consumers' attitudes toward the brand, making them perceive it as reliable, innovative, and customer-centric. This positive brand attitude, fueled by trust, can foster brand loyalty and increase the likelihood of continued use.

Demographic differences, such as age, education, income, and satisfaction, also play a significant role. People of different ages have varying levels of familiarity and comfort with technology, which influences their perceptions and expectations. Higher education levels typically correlate with a better understanding of technology, while income levels affect consumers' ability to access and afford advanced services. Satisfied consumers are more likely

to trust the service and develop a positive brand attitude, leading to continued use. These factors can interact with brand attitudes to influence usage intentions, and understanding these moderating effects helps companies better target their markets and tailor services to different consumer groups. Personalization strategies can enhance trust and satisfaction, further driving continued usage.

This study empirically analyzes the impact of AI-based product customization services on brand marketing, consumer attitudes, and behavioral intentions in the coffee industry. It is grounded in previous research on robots in the restaurant industry and aims to achieve the following objectives: (1) Investigating the link between consumer trust in AI and their intention to continue using AI product customization services; (2) Exploring how AI customization services in the coffee industry influence brand perceptions and continued service use; and (3) Analyzing the role of demographics, such as age, education, and income, in moderating these relationships, with a focus on their satisfaction with AI-driven customization services.

This study makes two key contributions: First, it introduces a novel application of AI robots in product customization, distinct from their use in delivery services explored in earlier research. Second, it sheds light on the relationship between consumer trust in AI and their continued use of AI product customization services, offering fresh insights into consumer engagement with AI. Additionally, it explores how factors such as age, education, income, brand attitude, and satisfaction affect the intention to consistently use AI-based services in the coffee industry. These findings not only deepen our understanding of AI's impact on coffee brands but also provide practical implications for marketing strategies in the coffee and restaurant sectors. Companies are encouraged to adopt AI technology to offer personalized services, enhancing customer engagement and loyalty.

In recent years, artificial intelligence (AI) has revolutionized the service industry, enhancing efficiency and enabling hyper-personalized experiences. The coffee industry, with its emphasis on consumer engagement and brand loyalty, represents a unique testing ground for such innovations. Despite widespread adoption of AI technologies, research remains sparse on how consumer trust and brand attitudes mediate behavioral intentions, particularly in contexts like robotic menu customization. This study aims to address this gap by examining demographic moderating factors and proposing actionable strategies for leveraging AI in customer-facing roles.

2. Theory and Hypotheses

2.1 Coffee Industry and Artificial Intelligence

With the Fourth Industrial Revolution, the service delivery model in the restaurant industry, including the coffee sector, is undergoing a transformation driven by the ongoing integration of AI and robotics (Duong et al., 2020). In an effort to reduce labor costs and enhance operational efficiency, many businesses in the industry have begun adopting robots and related technologies (Limna et al., 2021). Today, robot baristas are increasingly common, offering 24/7 self-service with minimal space requirements, making them highly practical in a variety of settings (Sung & Jeon, 2020).

As living standards improve, consumers no longer view dining out merely as a means to satisfy hunger but also as an opportunity to enjoy better service and a more engaging experience (Eiseman & Jonsson, 2019). Currently, most robots in coffee shops are primarily focused on basic tasks like coffee preparation. While they significantly improve operational efficiency, they do little to address the personalized needs of customers or enhance the overall consumer experience. As a result, the introduction of AI-powered service robots capable of offering menu customization is likely to influence consumers' attitudes and behavioral intentions. This study aims to explore these innovations, moving beyond the simple product-preparation capabilities of current service robots.

Recently, as AI technology has been integrated into the service industry, researchers have explored various aspects of robot services, such as their role in the hospitality sector (Pinillos et al., 2016), their quality and image in airport guidance services (Shen et al., 2020), and other related fields. Within the coffee industry, numerous studies have focused on the introduction of robot baristas, examining aspects like robot development strategies (Mukherjee et al., 2022) and their adoption in coffee shops (Limna et al., 2021).

However, most existing research has focused on the technological improvements needed for service robots, overlooking how the introduction of these robots affects consumer attitudes and behaviors. Additionally, previous studies have primarily concentrated on robot baristas that perform basic coffee-making tasks, without considering how AI-based robots can offer more diverse and personalized services. This study aims to fill this gap by exploring how AI-driven service robots that offer menu customization influence consumer attitudes and behaviors in the coffee industry, using the S-O-R framework.

2.2 S-O-R Framework

The S-O-R framework, derived from environmental psychology, explains how an external stimulus (S) influences an internal state or organism (O), which then results in a behavioral response (R). This model is widely used in consumer behavior research to understand the impact of various factors on consumer decision-making (Arora, 1982; Jacoby, 2002; Hochreiter et al., 2022; Mehrabian & Russell, 1974; Verhagen & Dolen, 2011).

In the context of AI-driven services, trust serves as the initial stimulus that shapes consumers' perceptions and attitudes. Trust is a critical factor in adopting new technologies, especially AI, where reliability and ethical concerns are significant. Consumers' trust in AI influences their confidence in the technology's ability to provide accurate, personalized, and secure services. The "organism" level represents internal processes, such as emotions, attitudes, and cognitions. In this study, it specifically refers to consumers' attitudes toward the coffee brand using robotic menu customization. Positive trust in AI enhances consumers' overall perception of the brand, leading them to view it as innovative, reliable, and customer-centric. This positive attitude mediates the relationship between the initial stimulus (trust in AI) and the final behavioral response.

The "response" is the consumer's intention to continuously use the robotic menu customization service. This behavioral intention is shaped by the internal attitudes influenced by the initial trust in AI. The S-O-R framework provides a clear pathway for understanding how an external factor (trust in AI) affects internal psychological states (brand attitudes), ultimately leading to specific consumer behaviors (consistent usage intentions).

Using the S-O-R framework to analyze how trust in AI influences consumers' intention to consistently use robotic menu customization services offers valuable insights. It allows for a detailed understanding of how external stimuli (trust) impact internal attitudes (brand perception), which in turn drive specific behavioral outcomes (continued usage intentions). This approach contributes both to theoretical development and to the practical enhancement of consumer engagement with AI-driven services.

The Stimulus-Organism-Response (S-O-R) framework has been widely used to understand consumer behavior in digital environments. However, its application to AI-driven services, especially in the context of robotic customization, remains underexplored. While existing studies have focused on trust as a direct predictor of technology adoption, few have considered its mediating role in shaping brand attitudes and behavioral intentions. By integrating trust into the S-O-R framework, this study contributes to a nuanced understanding of how consumers interact with AI in low-stakes, high-frequency contexts like coffee purchasing.

Based on the above theoretical background, this study proposes the following research hypotheses:

- Consumers' trust in AI positively influences their intention to consistently use robotic menu customization services. (H1)
- Consumers' brand attitudes mediate the relationship between trust in AI and their intention to consistently use robotic menu customization services. (H2)

2.3 Moderating Effect of Age, Income Level, Educational Level and Consumer Satisfaction

Moderators influence the strength or direction of the relationship between the independent variable (stimulus) and the dependent variable (response). In this context, moderators help explain how consumer characteristics affect the impact of trust in AI (S) on brand attitudes (O) and, ultimately, on the intention to consistently use the service (R).

The main reason consumers use AI is to save time and costs, seeking tangible benefits (Global Network, 2019). Older consumers, in particular, value AI's ability to provide timely and accurate information, which enhances their daily lives (Aguilar et al., 2020; Schroeder et al., 2023). As they age, they are more likely to adopt AI and encourage others to do the same. Higher-income consumers can afford premium AI services (Nguyen & Malik, 2022), which may strengthen the relationship between trust in AI and brand attitudes, increasing usage intentions. Lower-income consumers, however, need to perceive economic value for AI to significantly affect their brand attitudes and usage intentions (Flavián et al., 2022; Gursoy et al., 2019). Consumers with higher education levels tend to better understand AI, which boosts trust and enhances the impact of brand attitudes on usage intentions (Samek et al., 2017; Madu & Musa, 2024). Likewise, consumer satisfaction with previous interactions reinforces the effect of trust on brand attitudes and usage intentions (Bindroo et al., 2020; Nguyen et al., 2019). Dissatisfied consumers may need more trust-building efforts to achieve similar outcomes (Chi et al., 2021).

Including age, education, income, and satisfaction as moderators within the S-O-R framework provides a more nuanced understanding of how trust in AI influences brand attitudes and usage intentions. Older consumers tend to value consistent experiences and are more influenced by positive brand attitudes. High-income consumers are

more likely to value AI-driven customization, making positive brand attitudes more impactful. Educated consumers better understand AI's benefits, leading to stronger brand attitudes and usage intentions. Finally, satisfied consumers develop stronger brand attitudes, increasing their intention to use the service consistently.

Based on the above theoretical background, this study proposes the following research hypothesis:

- The relationship between consumers' brand attitudes and their intention to consistently use robotic menu customization services is moderated by demographic factors, including age, income, education, and satisfaction level. Specifically, the positive impact of brand attitudes on usage intention is stronger for older consumers, those with higher income and education levels, and consumers with higher satisfaction levels. (H3)

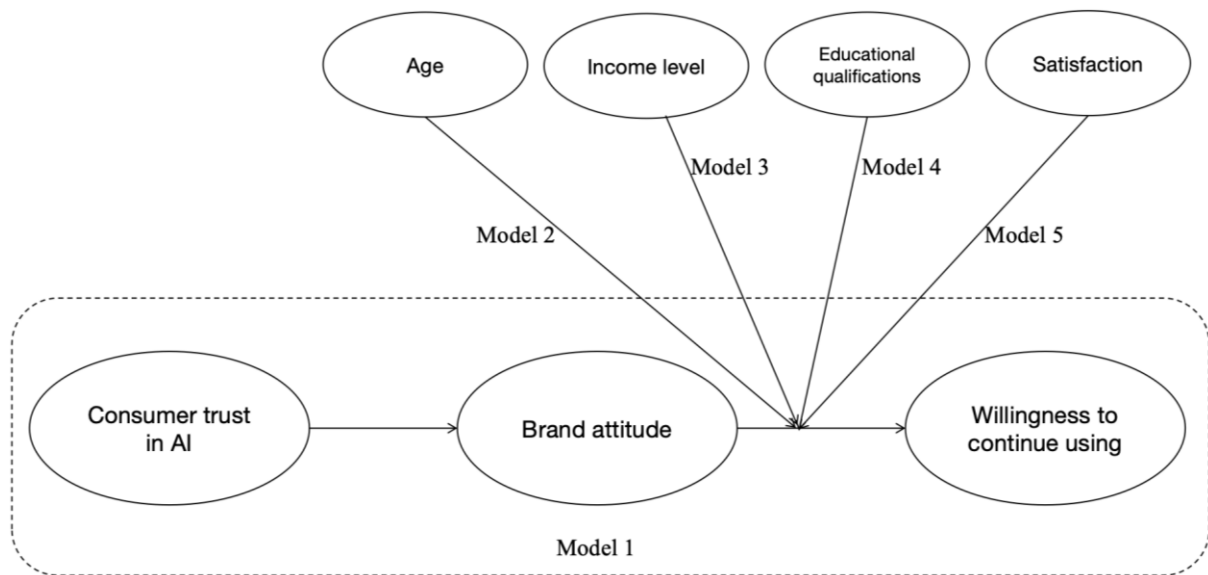


Figure 1. Conceptual model

3. Method

3.1 Data Collection

This study collected data through an online survey conducted in December 2023, targeting adults with permanent residence in Shanghai, China. The goal was to explore consumers' preferences when choosing coffee brands for daily consumption, as well as their perceptions of AI-based service robots in coffee shops. Shanghai was chosen as the sample due to its status as the city with the largest number of coffee shops in the world—8,085 coffee shops, significantly outpacing other cities. As both a leading destination for international coffee brands entering China and the city with the highest concentration of local coffee businesses, Shanghai is a key hub for coffee culture and consumption in the country.

A convenience sampling method was employed, and two attention-check questions were added to the questionnaire to ensure the quality of responses. The questions, "I don't speak Chinese" and "I don't live on Earth," were included to identify inattentive respondents, who were excluded if they answered "agree." A total of 209 valid responses were collected, and after removing those that did not meet the study's criteria, 185 responses were retained for final data analysis. The study employed a convenience sampling method, which, while practical, may limit the generalizability of the findings. Future research could address this limitation by adopting stratified random sampling to ensure a more representative sample. The questionnaire was rigorously pilot-tested on a sample of 30 respondents to ensure clarity and reliability, with modifications made based on feedback. SPSS 27 was chosen for its robust capabilities in handling complex regression models and its wide acceptance in behavioral research.

3.2 Measures

The survey for this study was structured in two main sections. Part 1 consisted of demographic questions (e.g., gender, age, occupation, education, and income level) as well as attitudinal questions aimed at understanding consumers' preferences in choosing a coffee brand and their attitudes toward AI services. Part 2 focused on the research model and the specific constructs under investigation.

Consumer trust in AI was defined as the consumer's belief in and trust towards a company, a brand's product incorporating AI services, or the use of AI in these services (e.g., "I believe AI can understand and accurately assess my preferences"). This construct was measured using the scale developed by Kim & Lee (2021) to assess consumer trust in AI.

Brand attitude referred to consumers' overall evaluation of coffee brands that utilize AI-based service robots (e.g., "The brand is satisfactory"). This construct was measured using the scale developed by Keller & Aaker (1992) for assessing brand attitudes.

Continuance intention was defined as the consumer's intention to continue using the robotic menu customization service offered by the coffee brand (e.g., "I intend to continue using this service in the future"). The measurement scale used for this construct was adapted from Bhattacharjee (2001).

In addition to these constructs, factors influencing consumers' intention to continue using the service were also considered. Specifically, consumer satisfaction with the robotic menu customization service was included (e.g., "This service is helpful to me"). Satisfaction was measured using the scale from Parasuraman et al. (1988).

All items related to consumer trust, brand attitude, continuance intention, and satisfaction were assessed using a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree).

4. Results

4.1 Respondents' Characteristics

The demographic characteristics of the respondents are summarized in Table 1. Of the 185 valid responses, the sample was evenly distributed between males and females. The largest age group was between 21 and 30 years, accounting for 32.4% of the respondents. In terms of education, the majority of participants held a bachelor's degree, representing 46.5% of the total sample. Regarding income levels, most respondents reported an income range of 5,001 to 10,000 yuan, which also accounted for 46.5% of the sample. When asked about the factors they prioritize when choosing a coffee brand, the majority of respondents (32.4%) indicated that taste was the most important consideration.

Table 1. Respondent profile(n=185)

Demographic and Behavioral Factors	Total(N=185)	
	N	%
Gender		
Male	97	52.4
Female	88	47.6
Age		
21-30	60	32.4
31-40	43	23.2
41-50	53	28.6
50 and above	29	15.7
Education		
Junior high school and below	6	3.2
high school	19	10.3
College degree	42	22.7
Undergraduate degree	86	46.5
Graduate or above	32	17.3
Income		
5000 and below	6	3.2
5001-10000	86	46.5
10001-20000	53	22.7
20001 and above	40	21.6
What is the most important thing you pay attention to when drinking coffee (choosing a coffee brand or other beverage brand)?		
Taste	60	32.4
Brand awareness	58	31.4
Price	50	27.0
Advertising methods	17	9.2

4.2 Measurement Model

This study analyzed the 185 final questionnaire responses using primarily Linear Regression with One Variable analysis. Before conducting the main analysis, a reliability test was performed on the scales used in the study to assess the stability and consistency of their measurements. This process included both test-retest reliability and internal consistency analyses. Specifically, Cronbach's alpha coefficient was employed to evaluate the internal consistency of the scale items, ensuring their reliability. As shown in Table 2, the scales demonstrated a high degree of consistency across the items.

Additionally, a validity analysis was conducted to verify that the scales accurately represented the constructs they were intended to measure. The analysis included evaluations of content validity, construct validity, and criterion validity. In summary, the results of the reliability and validity analyses indicate that the scales used in this study exhibit both high reliability and validity.

Table 2. Items and constructs of the study(n=185)

Factors and items	α
Consumer trust in artificial intelligence	.87
Consumer brand attitude	.86
Consumer's willingness to continue using	.86
Consumer satisfaction	.78

4.3 Results of the Structural Model

4.3.1 Model0: Association between consumer trust in Artificial Intelligence (AI) and consumer intentions towards continued use of robot menu customization services

The extent to which consumers' trust in AI influences their consumption behavior remains a subject of debate (Akdim et al., 2021; Mende et al., 2019). To further investigate this relationship, Model 0 examines the link between consumer trust in AI and their propensity to regularly use robotic menu customization services. The results indicate that consumer trust in AI did not show a significant correlation with the intention to consistently use the robotic menu customization service ($b = 0.02$; $SE = 0.06$; $p = 0.74$). These findings are presented in Table 3. As a result, H1 was not supported, meaning that consumers' trust in AI does not directly influence their intention to continue using robotic menu services in coffee shops.

In other words, there is a lack of significant direct relationship between consumers' trust in AI and their intention to continue using it, and subsequent research needs to explore the possible mediating and moderating factors in the above-mentioned influencing relationship to understand consumers' decision-making process. One possible explanation for this finding is that ordering coffee is generally considered a low-risk activity. Consumers' low risk perception may explain why trust in AI did not have a direct impact on their intentions. The consequences of a mistake (e.g., receiving the wrong drink) are relatively minor, which could make trust less critical in this context compared to higher-stakes situations, such as those involving medical or financial services (Dewi et al., 2021).

Table 3. Regression analysis results for direct effects of Models 0(n=185)

Dependent variable: intent to continue using	B	SE	Beta	t	p
constant	4.86	0.30	-	16.38	0.00
Consumers trust in AI	0.02	0.06	0.03	0.33	0.74

4.3.2 Model 1: Mediation through Customer Attitudes Towards Coffee Brands Using Robot Menu Customization Services

Model 1 examined how consumer trust in AI influences brand attitudes toward coffee shops that use robotic menu customization services, and whether brand attitudes moderate the relationship between consumer trust in AI and the intention to consistently use these services. In support of H2, the results showed a positive relationship between consumer trust in AI and consumers' brand attitudes toward coffee shops using robotic menu customization services ($b = 0.09$; $SE = 0.05$; $p = 0.08$). Furthermore, consumers' brand attitudes were positively correlated with their intention to continue using these robotic services ($b = 0.20$; $SE = 0.08$; $p = 0.01$).

These findings suggest that brand attitude acts as a mediator in the relationship between consumers' trust in AI and their intention to consistently use robotic menu customization services. Specifically, consumer trust does not directly influence consumption behavior, but instead affects it indirectly through positive emotional or attitudinal shifts.

Table 4. Regression analysis results for mediating influence of Models 1(n=185)

Dependent variable: brand attitude	B	SE	Beta	t	p
constant	5.63	0.27	-	20.89	0.00
Consumers trust in AI	0.09	0.05	0.13	1.79	0.75
Dependent variable: willingness to continue using	B	SE	Beta	t	p
constant	6.01	0.42	-	14.17	0.00
brand attitude	0.20	0.08	0.19	2.57	0.01

4.3.3 Model 2: Moderating Effect of Customer'S Age

Model 2 extends Model 1 by introducing age as a moderator in the relationship between consumers' brand attitudes toward coffee shops using robotic menu customization services and their willingness to consistently use these services. As shown in Table 5, the interaction between consumers' brand attitudes and their age significantly influenced their willingness to continue using the robotic menu customization service. Specifically, the link between consumers' brand attitudes and their willingness to use the service regularly is moderated by age. For older consumers, established trust and loyalty to a brand appear to have a stronger impact. If older consumers already trust the brand, they are more likely to embrace its robotic services, even if they initially have reservations about the technology.

Table 5. Regression analysis results for indirect effects of Models 2(n=185)

Mode2	R	R ²	Adj. R ²	SE	ΔR^2	ΔF	df1	df2	F
2-1	0.189	0.036	0.025	1.426	0.036	3.385	2	182	0.036
2-2	0.193	0.037	0.021	1.428	0.037	2.338	3	181	0.075

4.3.4 Model 3: Moderating Effect of Customer'S Income Level

Model 3 extends Model 1 by introducing income level as a moderator in the relationship between consumers' brand attitudes toward coffee shops using robotic menu customization services and their willingness to consistently use these services. As shown in Table 6, the interaction between consumers' brand attitudes and their income level significantly influences their willingness to continue using the robotic menu customization service. Specifically, the relationship between consumers' brand perceptions and their intention to persist in using the service is moderated by their income level.

Consumers with higher income levels are more likely to place greater importance on brand attributes such as quality, prestige, and alignment with personal values, rather than focusing on cost. As a result, for these consumers, brand attitudes have a stronger impact on their willingness to consistently use the robotic menu customization service. This is due to their greater discretionary spending power, which enables them to prioritize the value and experience offered by the brand over price considerations.

Table 6. Regression analysis results for indirect effects of Models 3(n=185)

Mode3	R	R ²	Adj. R ²	SE	ΔR^2	ΔF	df1	df2	F
3-1	0.200	0.040	0.029	1.423	0.040	3.781	2	182	0.025
3-2	0.202	0.041	0.025	1.426	0.041	2.577	3	181	0.055

4.3.5 Model 4: Moderating Effect of Customer'S Educational Qualifications

Model 4 extends Model 1 by introducing educational attainment as a moderator in the relationship between consumers' brand attitudes toward coffee shops using robotic menu customization services and their willingness to consistently use these services. As shown in Table 7, the indirect effect of consumers' educational qualifications on their willingness to consistently use the robotic menu customization service is significant through the interaction between their brand attitudes and educational attainment.

More specifically, the relationship between consumers' brand attitudes and their intention to continue using the robotic menu customization service varies according to their level of education. As consumers' educational attainment increases, the influence of their brand attitudes on their willingness to consistently use the service strengthens. Higher education levels typically enhance consumers' cognitive and critical thinking abilities, enabling them to evaluate brands and their offerings more thoroughly. This deeper evaluation fosters stronger brand attitudes, which, in turn, significantly impact their continued use of the service.

Table 7. Regression analysis results for indirect effects of Models 4(n=185)

Mode4	R	R ²	Adj. R ²	SE	ΔR^2	ΔF	df1	df2	F
4-1	0.187	0.035	0.025	1.426	0.035	3.311	2	182	0.039
4-2	0.188	0.035	0.019	1.430	0.035	2.202	3	181	0.089

4.3.6 Model 5: Moderating Effect of Consumer Satisfaction with Robot Menu Customization Services

Model 5 extends Model 1 by introducing consumer satisfaction with the robotic menu customization service as a moderator in the relationship between consumers' brand attitudes toward coffee shops using robotic menu customization services and their willingness to continue using these services. As shown in Table 8, the indirect effect of consumer satisfaction on their willingness to consistently use the robotic menu customization service is mediated by the interaction between their brand attitudes and satisfaction with the service.

More specifically, the relationship between consumers' brand perceptions and their inclination to consistently engage with the robotic menu customization service is contingent upon their level of satisfaction with the service. When consumers are more satisfied with the robotic menu customization service, the influence of their brand attitudes on their willingness to continue using the service becomes stronger. High satisfaction with the service enhances the overall perception of the brand's quality, making consumers more likely to remain loyal to the brand and continue using the service.

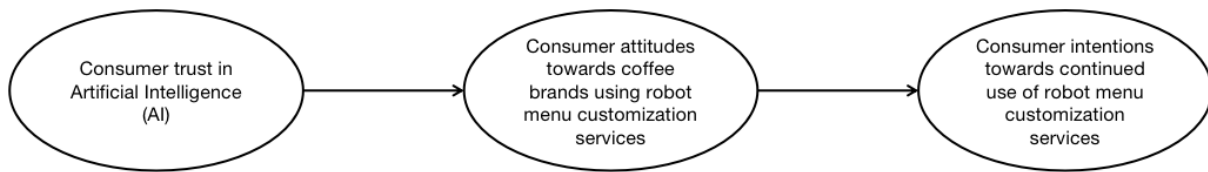
Table 8. Regression analysis results for indirect effects of Models 4(n=185)

Mode5	R	R ²	Adj. R ²	SE	ΔR^2	ΔF	df1	df2	F
5-1	0.205	0.042	0.032	1.421	0.042	4.002	2	182	0.020
5-2	0.215	0.046	0.030	1.422	0.046	2.919	3	181	0.035

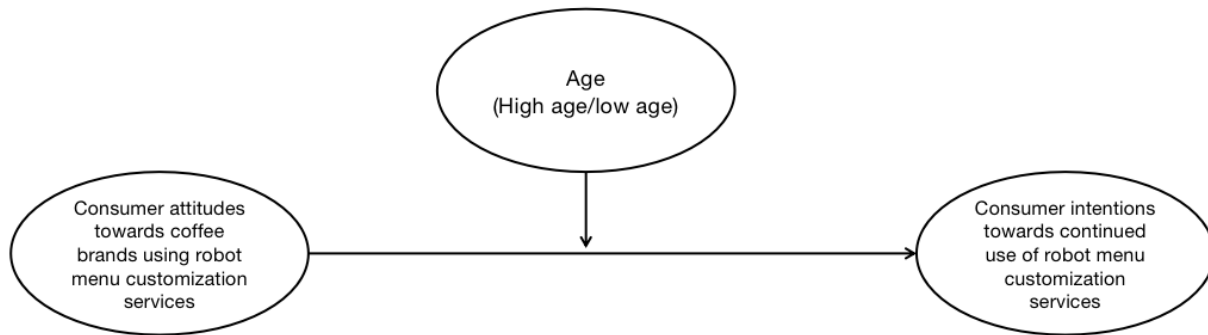
Model0: association between consumer trust in Artificial Intelligence (AI) and consumer intentions towards continued use of robot menu customization services



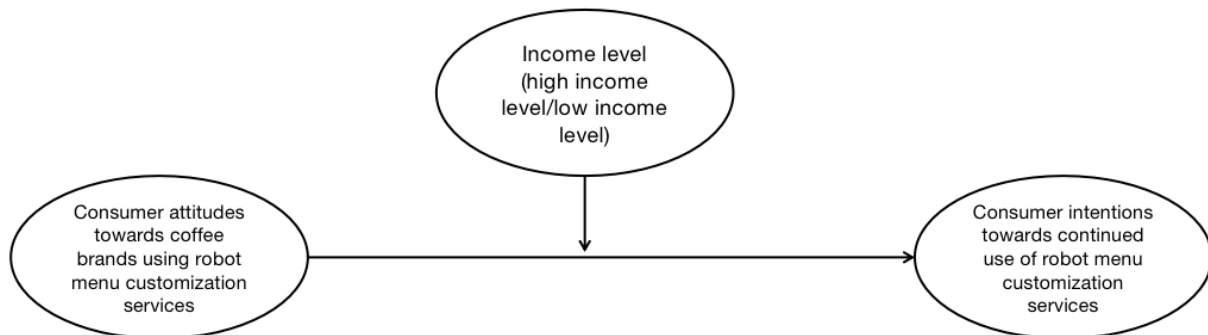
Model 1: mediation through customer attitudes towards coffee brands using robot menu customization services



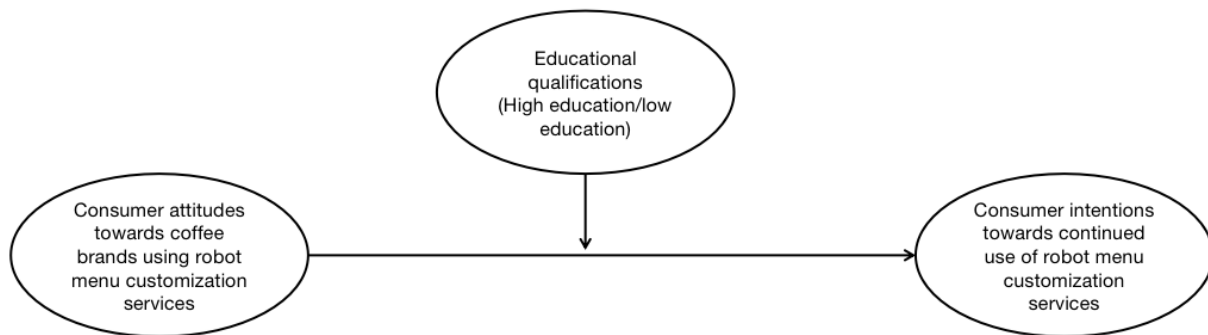
Model 2: moderating effect of customer's age



Model 3: moderating effect of customer's income level



Model 4: moderating effect of customer' educational qualification



Model 5: moderating effect of customer satisfaction with robot menu customization services



Figure 2. Overview of models with results

5. Discussion

When studying AI services, consumer trust is a critical factor that significantly impacts user acceptance, satisfaction, and continued use (Glikson & Woolley, 2020). Trust influences consumers' perceptions of AI's reliability and competence. When consumers trust AI, they are more likely to adopt and integrate it into their routines (Chi & Hoang, 2023) and continue using the service regularly (Chen et al., 2022). Therefore, fostering trust in AI is essential for service delivery, as it directly affects consumers' future consumption behavior and willingness to engage with AI-driven services, particularly in innovative settings like robotic menu customization.

This research explores how consumers' brand attitudes toward coffee shops employing robotic menu customization services influence their future commitment to the service. It also examines how demographic factors (e.g., age, income, education) and satisfaction with the service affect this relationship. Specifically, the study aims to evaluate the direct or indirect impact of consumer trust in AI on consumption behavior, considering how brand attitudes, satisfaction, and demographic characteristics play a role in this process.

Various methods exist to measure consumer trust in AI, and AI-driven robots offer a range of services. In this study, we use the scale from Kim & Lee (2021) to measure consumer trust in AI, focusing specifically on menu customization services in coffee shops. Model 0 shows no significant correlation between consumer trust in AI and their willingness to consistently use the robotic menu service. However, Model 1 reveals that consumer trust in AI significantly influences their intention to use the service, mediated by their positive brand attitudes toward the coffee shop. The non-significant direct effect of trust on continuance intention suggests that consumers may not directly associate their trust in AI with low-risk decisions like coffee purchases. Instead, trust appears to manifest through enhanced brand perceptions, underscoring the importance of leveraging brand attributes to foster loyalty. Businesses should focus on reinforcing brand identity and showcasing AI as an extension of their values. For instance, emphasizing sustainability or community engagement in AI-driven services could resonate more deeply with consumers.

In the S-O-R framework of this study, trust in AI (stimulus) influences internal psychological states (organism), such as brand attitudes, which, in turn, lead to behavioral responses (intention to use the service). This pathway suggests that the direct effect of trust on usage intention is less significant because trust shapes attitudes toward the brand, which then drives behavior. Consumers may not directly associate their trust in AI with the robotic service itself, but rather with the brand offering it. A positive brand attitude can encapsulate trust in AI, making it a stronger predictor of usage intention.

To better understand the relationship between brand attitudes and consumers' willingness to continue using robotic menu customization services, this study explores four potential moderators. These moderators help explain why some studies have shown a positive relationship between brand attitudes and continued usage intention.

The first moderator is age. As shown in Model 2, age moderates the relationship between brand attitudes and consumers' willingness to continue using the service. Older consumers, who may require more assurance about the ease of use and usefulness of robotic services, are more likely to be influenced by positive brand attitudes. This can help mitigate concerns, making them more willing to use the technology. The second moderator is income. Model 3 shows that higher-income consumers are more likely to value brand attributes such as quality and prestige, which reinforces the importance of brand attitudes in their decision-making. These consumers are often willing to

pay a premium for brands they trust, making brand attitudes a stronger influence on their usage intention. The third moderator examined is education level. Model 4 indicates that higher education strengthens the relationship between brand attitudes and the willingness to continue using the service. Educated consumers tend to seek and process more detailed information about brands, which makes their positive brand attitudes more influential in their decision to continue using the service. Finally, this study explores the moderating role of consumer satisfaction in Model 5. Higher satisfaction strengthens the influence of brand attitudes on consumers' willingness to continue using the service. Satisfied consumers experience less cognitive dissonance between their positive brand attitudes and their behavior, making them more likely to continue using the service as it aligns with their favorable views of the brand.

5.1 Theoretical Contributions

This study offers several theoretical contributions. First, it advances the service robotics literature by demonstrating that consumer trust in AI and positive brand attitudes toward coffee shops using robotic menu customization services act as enablers, rather than deterrents, of continued service use. While prior research on the direct impact of consumer trust in AI on consumption behavior has been inconclusive, this study reveals that trust does not directly influence behavior. Instead, it is mediated by psychological factors, suggesting a more complex relationship between trust and consumer behavior, with brand attitudes playing a key role in shaping consumption decisions.

Second, this study sheds light on the moderating effects of demographic factors such as age, education, income level, and satisfaction on the relationship between brand attitudes and the intention to continue using robotic services. By exploring these moderators, the study enriches the service robotics literature and lays the groundwork for future research into how consumer demographics influence behavioral outcomes.

Finally, the study emphasizes the crucial role of consumer trust in AI and positive brand attitudes, contributing to a deeper understanding of the application of robotic services in coffee shop settings.

5.2 Practical Contributions

Understanding that consumers' brand attitudes toward coffee shops using robotic menu services mediate the relationship between their trust in AI and their willingness to continue using the service offers valuable insights for practical applications, teaching and public policy.

First, the section on economic and business impact. Coffee shops can leverage positive brand attitudes by emphasizing their innovative use of robotic services in marketing campaigns. Highlighting trust in AI and the seamless experience it provides can attract tech-savvy and quality-conscious customers. By focusing on building and maintaining trust in AI while strengthening positive brand attitudes, coffee shops can enhance customer satisfaction and loyalty, leading to increased repeat business and reduced churn rates. Utilizing robotic menu services as a unique selling point can differentiate a coffee shop from competitors.

Second, the part about the impact on teaching. Incorporate case studies of coffee shops using robotic menu services into business and technology curricula to illustrate how technology, brand management, and customer trust intersect. Develop interdisciplinary courses that cover technology adoption, brand management, consumer psychology, and service quality to provide a holistic understanding of how AI impacts consumer behavior.

Finally, the section on public policy impact. By demonstrating the positive impact of robotic services on customer satisfaction and brand perception, businesses can help shift public attitudes towards greater acceptance of AI technologies.

The coffee industry provides a real-world environment where AI robots can be tested and validated. Observing how customers and staff interact with AI robots in a coffee shop can yield insights into human-robot interaction, acceptance, and usability. But focusing solely on the coffee shop scene has its limitations. Challenges faced in a coffee shop (e.g., noise, space constraints) might differ significantly from those in other industries, potentially skewing the research outcomes. To address these limitations and further the research, conduct studies in various service industries such as retail, healthcare, hospitality, and logistics to understand the broader applicability of the technology.

5.3 Limitations and Future Research

As with most research, this study faced some limitations. In what follows, this study highlights how these can be explored through future research. This study uses an online questionnaire, which has certain limitations. In addition, although Shanghai, which has the largest number of coffee shops, was selected as the key research area, the situation in other cities or countries should also be investigated. Future research should validate the findings of

this study through laboratory experiments or field studies with physical service robots. And, this study expects future research to collect larger but also more diverse data samples to further validate and extend the findings of this study. For example, future research can collect data from Beijing, Guangzhou and other regions to compare cities in China, or collect data from the United States, the United Kingdom and other regions to compare countries.

This study identifies consumer satisfaction with robotic menu customization as a key moderator, suggesting future research could explore how consumer satisfaction is measured across different research domains. For example, cross-sector comparisons could be conducted in future research. Research could compare satisfaction measurement in different sectors such as hospitality, technology, and healthcare. This could identify commonalities and differences in measurement methods and their effectiveness.

Moreover, this study advances the S-O-R framework by integrating trust and demographic moderators to understand AI adoption in service contexts. Practical implications include the need for personalized marketing strategies that emphasize trust-building and brand differentiation. Future research could expand this work by conducting longitudinal studies or exploring cross-industry comparisons to validate and generalize the findings.

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