International Journal of Hospitality Management 131 (2025) 104300

Contents lists available at ScienceDirect

International Journal of Hospitality Management

journal homepage: www.elsevier.com/locate/ijhm

How do tourists perceive green customer-love service in restaurants? A qualitative exploration of AI and human collaboration

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ARTICLE INFO

Keywords:
Social technology
Artificial Intelligence
Food tourism
Gastronomy
Online review
Qualitative research
Restaurants

ABSTRACT

Tourism and hospitality producer–consumer dynamics require social technology. Online reviews significantly influence restaurant service and encourage repeat visits and referrals. In response to online reviews, this qualitative research examines tourists' perceptions of a Green Customer-Love Service system in restaurants, based on artificial intelligence (AI) and human co-creation. The originality of this research lies in the proposed framework, which suggests responding to both positive and negative reviews to build customer satisfaction, trust, and loyalty. Findings indicate that 'green customer-love service' requires strategic communication, operational efficiency, and personalization. Sustainable practices in food tourism emphasize authenticity and transparency. Human–machine collaboration, particularly in AI-driven feedback management, could strengthen the connection between technology and sustainability.

1. Introduction

In the context of the social construction of knowledge and reality, Social Technologies (STs) are the communicative embodiment of a social topic at the level of organizational, administrative, and social planning (Kasavin, 2017). STs present three different dimensions: (1) richness, as the capacity to quickly express non-verbal and verbal cues and convey meaning; (2) interactivity, including rapid feedback; and (3) social presence, referring to the perceived closeness of virtual team members (Johannessen et al., 2001). New forms of interaction and group dynamics are made possible by STs because they release latent creative potential in their users. This promotion of creativity implies that human subject agents are the core of STs, equipped with their unique sets of experiences, perspectives, abilities, routines, lexicons, and inherited cultural norms (Kasavin, 2017).

STs are enabled by information technology, allowing for decentralized control over the production, distribution, and consumption of both materials and communications (Bughin et al., 2011). Technologies such as Internet of Things (IoT), Artificial Intelligence (AI), collaborative robotics, and big data analytics are used by public and commercial organizations to meet the challenges posed by Industry 5.0 (Holroyd, 2020; Maddikunta et al., 2022). STs are inevitably connected to AI. Together, ST and AI help establish co-creation strategies and offer services more closely aligned with consumer preferences in the experience economy (Lash, 2006; Miles, 2020). Previous studies highlight that innovation and originality are key components of the Industry 5.0 vision (Nahavandi, 2019; Longo et al., 2020). In addition, reviews and STs provide vital information on customer perceptions of tourist services, as well as travelers' motivations and satisfaction (Hu et al., 2019; Zhao et al., 2019).

In recent years, there has been growing interest in AI and its adoption across various contexts (e.g., Filieri et al., 2021; Ivanov et al., 2024; Soliman and Al Balushi, 2023), including hospitality-related sectors (e.g., Gursoy et al., 2023; Jabeen et al., 2022; Sigala et al., 2024) and customer emotions (Bagozzi et al., 2022; Han et al., 2023; Maduku et al., 2024). In this vein, Bagozzi et al. (2022) highlight that AI-driven service

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https://doi.org/10.1016/j.ijhm.2025.104300
Received 8 August 2024; Received in revised form 7 May 2025; Accepted 26 May 2025
Available online 3 June 2025

interactions can evoke a diverse range of emotions in both customers and frontline employees, spanning basic, self-conscious, and moral emotions. However, research exploring how AI tools influence customer service interactions and emotions remains scarce (Limna and Kraiwanit, 2023), particularly in the context of restaurants. While the advantages of using AI—such as ChatGPT—to address customer inquiries, including review management, have been acknowledged (Dwivedi et al., 2023), its specific impact on managing restaurant reviews within the context of food tourism remains underexplored. Moreover, existing literature tends to emphasize the role of generative AI tools in enhancing task performance (e.g., Dikmen and Burns, 2022) but pays comparatively less attention to their influence on psychological factors such as customer emotions (Han et al., 2023). Notably, there has been limited investigation into the emotional dynamics generated by AI-driven interactions. Critical questions remain unanswered, such as how AI's tone, empathy, and personalization affect customers' emotional connections.

In addition, a significant gap exists in the literature regarding the capabilities of AI tools (e.g., ChatGPT) in implementing co-creation services tailored to consumers' needs. Prior studies have explored how the deployment of AI can shape and deliver personalization (Fusté-Forné and Orea-Giner, 2023) and predictive analysis (Solakis et al., 2024). However, there is relatively limited research on the application of AI-based interactions that empower consumers to engage in the co-creation of digital services, especially within the experience economy where customer activation and satisfaction are critical. In this respect, Euchner (2023) emphasizes the importance of directing research toward understanding how AI can enhance our current capabilities to drive innovation and achieve superior outcomes, highlighting this as a central and enduring challenge.

Moreover, while many businesses now use AI tools for customer engagement (Gupta and Khan, 2024), there is limited research on utilizing these tools to advance sustainable practices through collaborative responses to customer reviews. In this context, Kar et al. (2022) argue that the role of AI in environmental sustainability remains a subject of ongoing debate, with differing views on whether it serves as a central driver or merely a contributing factor. While researchers have focused on the economic implications of AI—particularly in terms of its resource consumption—the broader questions regarding its long-term impact on sustainability have yet to be fully addressed. Although sustainability considerations are essential when implementing social technologies (Hick and McNutt, 2002; Tussyadiah and Miller, 2020), existing studies on AI-enabled communication tend to prioritize customer satisfaction (Zahra et al., 2023), often overlooking the integration of sustainable practices within AI interactions. AI's potential to influence customer perceptions and promote sustainable behavior through environmentally conscious messaging remains largely unexplored.

To fill these gaps, this exploratory qualitative research aims to investigate tourists' perceptions regarding the development of a Green Customer-Love Service system in restaurants, which integrates AI and human co-creation. This green customer service system consists of co-creating responses to restaurant reviews, providing each customer with a personalized reply, offering suggestions, resolving issues collaboratively, and encouraging health- and environmentally-conscious dining practices.

Research questions arising from this study are as follows:

RQ1. What role does AI play in a Green Customer-Love Service system that focuses on enhancing sustainable interactions and service quality among food tourists?

RQ2. In what ways could AI-driven solutions support co-creation strategies to deliver services that align with food tourists' sustainability expectations in an experience-driven society?

RQ3. How do AI-driven solutions contribute to the co-creation of sustainable responses to customer reviews, enhancing both environmental and social sustainability in the restaurant industry?

Although this research relies on commercial AI tools due to the lack of freely available alternatives, its originality lies in the proposed framework, which underscores the imperative of developing AI as a Social Technology. This perspective highlights the need for AI solutions that are accessible, inclusive, and sustainable, ensuring alignment with social and environmental values beyond mere commercial utility.

2. Literature review

2.1. Customer service and AI in restaurants

The service industry, including the restaurant sector, is experiencing increased competition due to shifts in customer expectations driven by business growth. In such a competitive business climate, organizations (e.g., restaurants) must meet customer expectations to expand and remain sustainable. To do so, businesses must learn how to either meet or surpass consumer expectations (Malik et al., 2020). This has prompted business managers to devise novel approaches to maintain a sustainable competitive edge, retain current clientele, and attract new customers (Tuncer et al., 2021). These approaches emphasize efficient customer service strategies, as they are crucial to the restaurant industry's success. In addition, restaurant owners must possess the ability to manage all facets of their operations and be agile and responsive to succeed in today's experience economy. The development of customer value is key to increasing business success. By striving to meet their clients' needs, restaurants can achieve this (Nemeschansky, 2020).

The success of service providers largely depends on customers' perceptions of quality, which also affects long-term profitability (Elbaz et al., 2023a). Consequently, there has been a notable shift and advancement in the quality of service provided by restaurants (Tuncer et al., 2021). The existing literature highlights how crucial customer service is in determining consumer satisfaction in service-related businesses, including restaurants. For instance, Brady and Cronin (2001) demonstrate that service quality is strongly associated with expectations, customer satisfaction, and perceived service value. According to Lau et al. (2011), when individuals perceive higher service quality, they report greater satisfaction. Conversely, when a consumer experiences service failure in a fine-dining restaurant—as opposed to a fast-food chain—they are likely to have higher expectations, which could lead to more negative behavioral consequences (Akarsu et al., 2023).

Despite its importance, delivering top-quality customer service in tourism and hospitality organizations can be challenging for a variety of reasons. According to Akarsu et al. (2023), due to high levels of human involvement, varying consumer expectations, human error, and the inherently variable nature of service delivery, offering flawless service remains difficult for tourism and hospitality businesses (Elbaz et al., 2023b).

In recent years, the restaurant and food delivery industries have witnessed explosive growth, fueled by consumers' insatiable demand for quick and convenient solutions. To attract and retain customers in this dynamic market, businesses must continuously innovate. AI presents both emerging and established businesses with a game-changing opportunity (Yaiprasert and Hidayanto, 2024). To improve customer experience and operational efficiency, AI has become increasingly prevalent in the service industry—especially hospitality and tourism—due to rapid technological advancement and digitization (Prentice et al., 2020). According to Shah et al. (2023), customer engagement is shaped by their perceptions of automation, personalization, efficiency, and precision in service quality. These perceptions influence customers' acceptance of AI services. Shah et al. (2023) show that greater consumer interaction with AI services leads to increased acceptance.

According to Sigala et al. (2024), AI tools empower hospitality professionals to enhance operational efficiency and effectiveness by providing staff with the capability to rapidly analyze large datasets related to guest preferences. As a result, organizations (e.g., restaurants) can design and deliver highly personalized services tailored to customer needs, while also generating targeted promotional content that resonates with their audiences.

Considering the above, AI has the potential to transform the restaurant industry through innovative means that enhance profitability, promote sustainable (or green) practices, improve customer service, and increase operational efficiency. In terms of organizational performance and profitability, AI plays a key role in supporting sales by crafting personalized recommendations, allowing it to function as a recommender system. This enables the technology to boost sales through up-selling or cross-selling strategies and streamline booking processes, thereby contributing to an improved and seamless customer experience (Dwivedi et al., 2023).

2.2. Green customer-love service

The growing environmental impact of service providers has attracted significant attention from both academia and industry (Madanaguli et al., 2022). This concern is driven by increasing competition, evolving customer expectations, and the pressing need to ensure customer satisfaction. In response, many businesses have begun adopting green practices to address these challenges (DiPietro et al., 2013). However, certain sectors—such as the restaurant industry—have been relatively slow to implement sustainable measures. This delay contributes to environmental issues, including excessive waste, high energy consumption, and elevated carbon emissions, underscoring the urgent need for sustainable solutions to reduce their ecological footprint (DiPietro et al., 2013; Madanaguli et al., 2022).

Restaurants are major consumers of electricity and water and generate substantial pollution, food waste, and plastic waste. Consequently, sustainability has emerged as a key priority within the industry. By adopting sustainable practices, restaurants can contribute to societal well-being, enhance customer service and satisfaction, and minimize environmental harm (Madanaguli et al., 2022). Furthermore, there is a growing trend of customer support for businesses that implement green practices, reflecting increasing consumer awareness of the environmental consequences of their purchasing decisions (Moon, 2021; Orea-Giner and Fusté-Forné, 2023).

Consumers often employ diverse reasoning strategies to justify their purchasing decisions, seeking brand promises that align with their personal values and desired self-image. This connection fosters deeper relationships with brands and cultivates brand love (Singh and Wagner, 2024). In this vein, brand love is characterized by a combination of behaviors, thoughts, and emotions that reflect a strong desire to establish or sustain a close connection with a brand, product, or product category (Ahuvia et al., 2020), such as restaurants.

Given this context, this study introduces the concept of "Green Customer-Love Service" (GCLS)—a customer service framework that integrates environmental sustainability with exceptional care and leverages advanced AI tools. GCLS focuses on delivering customer satisfaction while reducing environmental impact through green practices such as promoting eco-friendly products, minimizing waste, and utilizing sustainable materials in the restaurant experience.

The rationale for integrating smart technologies is that they can enhance GCLS by creating a more intelligent and efficient service framework. Automation plays a pivotal role in improving operational efficiency, advancing sustainable practices, and enriching the customer experience. This technological integration aims to optimize business processes and meet modern consumer expectations for environmentally responsible and personalized services, benefiting both businesses and their customers (Buhalis et al., 2023). Additionally, Madanaguli et al. (2022) highlight numerous advantages associated with adopting green practices in restaurants. Notably, consumers are more inclined to support green products when they perceive them as authentic and genuinely environmentally friendly.

2.3. Reviews in restaurants

Nowadays, customers shop through a variety of channels, including social networking apps, mobile devices, and online marketplaces. As a result, businesses need to implement an omnichannel strategy that seamlessly integrates all customer touchpoints (Yaiprasert and Hidayanto, 2023). The development of social networking sites, blogs, microblogs, discussion forums, and online communities offers online users and potential clients of hospitality enterprises (e.g., restaurants) a valuable opportunity for interactive engagement (Camilleri and Filieri, 2023).

Today, people frequently share their opinions and reviews about their service experiences online, especially those using smartphones (Chonsalasin et al., 2021). Due to the growing volume of user-generated content, individuals now rely more on online reviews than ever when choosing destinations or booking services. Guests can express their thoughts, knowledge, and suggestions about businesses, locations, or services on various specialized platforms such as Yelp and TripAdvisor (Sann et al., 2024). When selecting a restaurant, customers often take the opinions of others into consideration. This underscores the need for trustworthy and accurate recommendation systems capable of delivering authentic user reviews and filtering them effectively (Romero et al., 2023).

In this vein, many studies are currently being conducted on customer reviews in online platforms within the tourism and hospitality context, offering new opportunities to understand customer perspectives and expectations regarding service quality (Arasli et al., 2023). Review platforms assist potential customers in making decisions about what to purchase and why. They enable users to quickly access customer experiences across a diverse range of service providers and to compare varying perspectives (Camilleri and Filieri, 2023). Such online customer reviews are a valuable tool for understanding consumer demand and preferences (Brochado et al., 2019), as well as the perceived service quality of providers (Park et al., 2021).

In this sense, service providers can utilize the vital information provided by online reviews to design tailored experiences, by gaining insights into the needs, preferences, and behaviors of their guests (Sann et al., 2024). However, the food delivery sector still faces several challenges to remain competitive, including the need to develop effective digital marketing strategies (Yaiprasert and Hidayanto, 2023).

3. Methodology

Prior research has employed qualitative methodologies to examine the integration of technology in the tourism industry (Hausmann and Weuster, 2018; Rashideh, 2020; Gelter et al., 2022; Zhang and Prebensen, 2024). In line with this approach, the present exploratory research adopts qualitative methods to investigate the implementation of ChatGPT in developing a Green Customer Service system in restaurants, analyzing food tourists' perceived value of this tool.

3.1. Research context

Recent research suggests that restaurants could face accusations of greenwashing if they prioritize activities that appear to benefit their customers over those that benefit society (Kaur et al., 2022). In light of this, the present study specifically focuses on sustainable restaurants to avoid greenwashing practices, particularly those linked to the misuse of AI in digital marketing (Boechat et al., 2024).

Through this research, the authors aim to test the use of a tool that can help sustainable restaurants respond to reviews using a customer-love care approach, while also promoting sustainable food consumption behavior after the restaurant visit. Aligned with this objective, reviews of sustainable restaurants were identified in a real and specific context to facilitate a deeper exploration of customer perceptions and experiences related to the development of a Green Customer-Love Service (GCLS) system. In this sense, sustainable restaurants in Barcelona serve as the source for the restaurant reviews analyzed in the study. Barcelona represents an exemplary case due to its leadership in tourism

and its active transition toward a slower, sustainable, and regenerative model. With a substantial tourist influx—26 million visitors in 2023, including 15.6 million within the city and 10.3 million in the surrounding area (Observatori del Turisme a Barcelona, 2024a, 2024b)—the city embodies both the challenges and the potential of sustainable tourism practices. Its Sustainable Tourism Strategy 2023–2025 reflects a commitment to competitive, profitable tourism that preserves cultural and natural values while ensuring a fair distribution of tourism impacts (Barcelona Turisme, 2023). Further supported by the Barcelona Declaration: Better Places to Live, Better Places to Visit (Necstour, n.d.), the city aligns its tourism agenda with cultural heritage preservation and the Sustainable Development Goals, operating as a leading smart city (Galič and Schuilenburg, 2020; Ivars-Baidal et al., 2023). These characteristics make Barcelona an ideal setting for assessing sustainable restaurant practices.

Furthermore, the initiative "Sustainable Restaurants Barcelona" provides a strong foundation for focusing the study on restaurants included in this program. This initiative is a collaborative effort between the non-profit association of the same name and the Barcelona City Council's Council of Commerce and Markets. It aims to enhance sustainability awareness among restaurant managers and staff through specialized training programs. The initiative is also linked to the project "Assilvestrem l'alimentació als restaurants de Barcelona" (Catalan for *'make the food in Barcelona restaurants wilder'*), promoted by Fundación Restaurantes Sostenibles in collaboration with local and regional organizations (Fundación Restaurantes Sostenibles, 2022). This selection ensures that the study is grounded in real reviews, enabling the extraction of insights from authentic customer experiences and perceptions.

3.2. Phase 1. GPT creation and training process

3.2.1. Creation and GPT initial training process

Generative Pre-trained Transformers (GPTs), developed by ChatGPT, are advanced artificial intelligence models designed to comprehend and generate natural language. These models utilize the Transformer architecture, enabling them to produce text that closely mimics human language by leveraging the input they receive. The development and training of a GPT model involve two primary phases: pre-training and fine-tuning. This specific process began in June 2023, with adaptation to the more advanced GPT-4 model completed in April 2024.

The current GPT was developed with the objective of creating a Customer-Love Specialist capable of responding to restaurant reviews and contributing to the creation of a personalized customer experience through its responses. It is designed to address reviewers by name, acknowledge specific praises or concerns, and provide tailored responses or expressions of gratitude. Additionally, the GPT was trained to respond in the same language used by the customer and to incorporate contextual information such as the restaurant's name and menu.

The GPT was also trained to handle negative feedback using the following principles:

1. Begin by acknowledging the customer's experience and expressing regret for any dissatisfaction or inconvenience. This demonstrates empathy and communicates that the restaurant takes feedback seriously.
2. While offering discounts or freebies can be effective, they are not always necessary. Resolutions should be customized to the specific nature of the complaint. For instance, if the issue involves a particular dish, an alternative recommendation should be provided. If the concern relates to service, the response should emphasize ongoing training or service improvements.
3. Responses should be sufficiently detailed to reflect a comprehensive understanding and thoughtful consideration of the feedback. Personalization—such as addressing specific elements of the complaint—signals authenticity and avoids generic replies.

For positive reviews, the GPT was trained to express appreciation, personalize the response, encourage customers to try other menu items, and invite them to share their experience with others. It also draws on the restaurant menu to suggest new dishes and alternatives.

Moreover, this GPT was trained to promote sustainable food consumption practices. Beyond responding to reviews, the system provides guidance on sustainability—offering recommendations on eco-friendly dining habits at the restaurant and tips for adopting more environmentally conscious behaviors both at home and when dining out.

3.2.2. Extended training process and answers to reviews generated

The initial phase of the extended training process involved the identification of environmentally friendly restaurants located in Barcelona, followed by the collection of a series of customer reviews and the systematic organization of this material to facilitate GPT training. In line with the study's objective, Table 1 presents a concise overview of the types of restaurants included and the corresponding number of selected reviews.

The extended training process consisted of inputting textual reviews and screenshots of reviews (Image 1) to promote valuable answers from the GPT to our requirements.

Following this procedure, a total of 60 individualized responses to customer reviews were generated. Selected examples of these responses will be used as stimuli for discussion in Phase 2 of the study, which involves interviews with participants.

3.3. Phase 2. Interviews

The second phase of this study involves conducting in-depth interviews with food tourists who regularly consult or write reviews related to their travel experiences, following the development of the GPT and the generation of review responses. The aim of this phase is to evaluate the effectiveness and perceived value of this customer service strategy. Prior research has explored the dynamics of the customer–restaurant relationship using qualitative methodologies (Gallarza-Granizo et al., 2020; Li et al., 2023; Loo et al., 2021; Wong et al., 2022).

3.3.1. Interview design

The interview was developed based on a comprehensive review of the existing literature on customer service in restaurants and its intersection with ChatGPT integration in restaurant operations. Table 2 presents the interview questions, along with the structure informed by prior studies to ensure methodological rigor and alignment with established qualitative research practices.

The segment of the interview focused on visualizing and evaluating two sample responses was conducted without disclosing that the answers were generated by ChatGPT. This approach was adopted to minimize potential bias and avoid preconceived notions participants might hold regarding AI-generated content. By withholding this information, the study aimed to elicit authentic perceptions and reactions based solely on the responses' content, tone, and relevance, unaffected

Table 1
Restaurants' classification and codes.

Food establishment code	Type of food	Price range	Number of reviews selected	Languages employed
SR1	Vegetarian cuisine. Seasonal products.	30–40€/pp	20	English Spanish
SR2	Slow food. Vegetarian cuisine.	20–30€/pp	20	English Spanish
SR3	Vegan and vegetarian cuisine. Locally sourced ingredients,	25–35€/pp	20	English Spanish

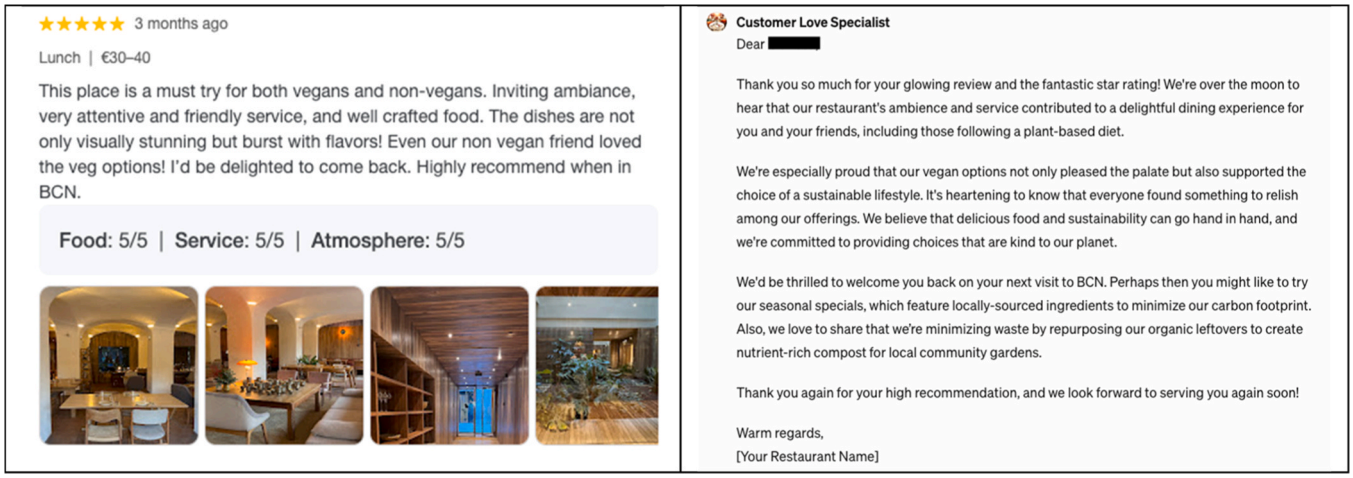

Image 1. Example of the GPT training process (own source).

Table 2
Interview design (own source).

Questions	Refences
Are you influenced by other people's reviews when choosing a restaurant when you travel?	Romero et al., (2023)
Do you think it is important to get feedback on restaurant reviews?	Sann et al., 2024
Would you like to receive feedback if it is a negative review after a bad experience?	Arasli et al., (2023)
How would you like bad experiences to be handled?	Brochado et al., (2019)
The next part of the interview consists of visualising two examples of responses (one positive and one negative) generated by our GPT, focused on co-creating a "green customer-love service". After reading the two responses, the following questions are asked:	
Do you think that the involvement of restaurants in implementing this type of service can improve the customer experience? How?	Hu et al., (2019) Zhao et al., (2019)
How would you feel if you were responded to in this personalised way?	Nemeschansky, (2020) Agarwal et al., (2023)
Would it affect your decision to return to the restaurant?	Tang et al., (2023)
Do you think it would increase your interest in responsible consumption?	Tussyadiah and Miller, (2020) Moon, (2021)

by participants' prior experiences or assumptions about AI technologies.

3.3.2. Participants and interview development

Participants were selected through purposive sampling (Rossiter, 2011), ensuring a targeted approach to recruit individuals most relevant to the study's objectives. Specifically, participants were chosen based on their active engagement in food consumption and sustainable food practices, their motivation to travel for food-related experiences, and their recent activity in evaluating dining establishments—demonstrated by having published at least one restaurant review in the past year. Instagram and LinkedIn were used as the primary recruitment platforms due to their visual orientation and their role in fostering communities centered around shared values, such as ethical food consumption (Wilson, 2019; Orea-Giner & Francesc-Fusté, 2023). A researcher from the team, using a public Instagram profile to ensure transparency, contacted potential participants via direct messages outlining the study's objectives and eligibility criteria, with a focus on individuals who met the inclusion parameters.

To mitigate potential selection bias associated with social media recruitment, snowball sampling was also employed to diversify the participant pool by leveraging existing participants' social networks (Noy, 2008). A total of 73 potential participants were contacted between 15 April and 5 June 2024.

Following this process, the interview phase commenced, with all participants residing in Spain. To ensure methodological rigor, the interview protocol was developed through an extensive literature review (see Table 2) and refined through pilot testing with three participants, which enhanced clarity and relevance. A total of 15 interviews were conducted, enabling the research team to reach thematic saturation—where no new insights emerged from additional interviews. Given the qualitative nature of this study, this sample size provided a robust dataset for in-depth analysis, offering diverse perspectives without redundancy. This aligns with established qualitative research guidelines, which suggest that saturation is typically achieved with 12–15 participants in focused studies within clearly defined contexts, such as sustainable practices in Barcelona's restaurant sector (Guest, Bunce, and Johnson, 2006).

To further deepen the insights obtained from the interviews, a focus group will be conducted to facilitate collective discussion. This will allow participants to elaborate on shared experiences and contribute to validating the themes identified during the individual interviews. The duration of the interviews ranged from 18 to 32 minutes. Participant profiles are presented in Table 3, and the order of participation (IP + number) determines their coding.

3.4. Phase 3. GPT improvement based on the interview results

Following the analysis of interview outcomes, the GPT underwent significant enhancements aimed at refining its interaction capabilities to better align with user expectations. The modifications were extensive, focusing on streamlining communication and making the interface more

Table 3
Participants' profiles.

Code	Birth year	Profession
IP1	2000	Assistant Reception Manager
IP2	1997	Teacher and protocol specialist
IP3	1998	Customer Service and Back Office
IP4	1993	Marketing specialist
IP5	1992	Lecturer
IP6	1998	Camping site promoter
I7	1990	Food events entrepreneur
IP8	1999	Journalist
IP9	1990	Marketing lecturer
IP10	1959	Administrative officer
IP11	1987	Digital marketing specialist
IP12	1998	Tourism specialist
IP13	1988	Chef and gastronomy specialist
IP14	2001	Tourism student
IP15	1984	PhD student

intuitive, user-friendly, and responsive. The model now prioritizes avoiding repetition, ensuring that replies are concise and directly relevant to user queries. Unnecessary redundancies and repetitive information have been eliminated, improving the overall efficiency of communication. These refinements were implemented during June 2024.

Responses to positive feedback have been optimized to combine expressions of gratitude with sustainability-oriented suggestions, condensed into a single, effective sentence (Image 2). Each issue raised by users is now addressed distinctly and thoroughly, supporting a structured and comprehensive approach to problem-solving. Additional adjustments were made to the model's output generation to enhance the human-like tone of responses and to eliminate any language patterns suggestive of artificial origin. To support a more fluid and engaging conversational style, the use of bullet points and numbered lists has been discontinued, in favor of a smoother, narrative response format.

3.5. Phase 4. Focus Group

The purpose of this phase is to gain a comprehensive understanding of participants' perspectives and to validate the enhancements made to the GPT following the interview phase. Prior research has demonstrated the effectiveness of focus groups in capturing rich qualitative data and facilitating in-depth discussions among participants (Morgan, 1996; Krueger and Casey, 2015; Humagain, Singleton, 2021; Gilang et al. n.d.).

3.5.1. Focus group design

The purpose of the focus group was to evaluate the modifications implemented in the GPT, taking into account the perspectives shared by interviewees during Phase 2. In addition, supplementary questions were introduced to explore participants' views on the relationship between responding to reviews and sustainability, specifically through the lens of the proposed "Green Customer-Love Service" (GCLS) framework. To prevent bias and ensure authentic responses, participants were deliberately not informed of AI's involvement in the customer love system during this phase. This approach ensured that participant feedback reflected genuine experiences and expectations, thereby enriching the understanding of customer interaction and sustainability considerations within the dining context. Table 4 outlines the focus group design, developed with reference to prior literature to ensure methodological consistency and alignment with established qualitative research practices.

3.5.2. Participants and focus group development

For the focus group, participants from the interview phase were recontacted with the objective of evaluating the changes and improvements made to the GPT. Following the invitation, four participants agreed to take part. Smaller focus groups of this size are particularly effective for fostering in-depth discussions in which all members can contribute, often resulting in richer qualitative data (Morgan, 1996; Krueger and Casey, 2015). Participant profiles are presented in Table 5, and the order of participation (FGP + number) was used for coding purposes.

The focus group took place on June 11, 2024. The focus group lasted for a total of 68 minutes.

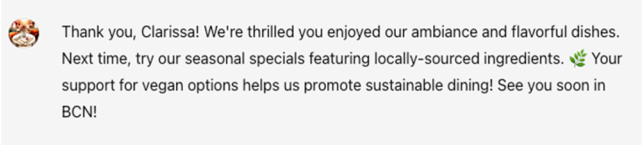

Image 2. Example of the GPT improvement process (own source).

Table 4
Focus group design (own source).

Questions	References
The first part of the focus group consists of visualising the changes that the GPT has generated in their responses using the same three examples that were used in the interview process, focused on co-creating a "green customer-love service". After reading the two responses, the following questions are asked:	
Do you think that the changes introduced to improve the answers can generate a better customer experience? How?	Hu et al., (2019) Zhao et al., (2019)
How would you feel if you were responded to in this personalized way?	Nemeschansky, (2020) Agarwal et al., (2023)
Would it affect your decision to return to the restaurant?	Tang et al., (2023)
Do you think that this type of answers would increase your interest in responsible consumption?	Tussyadiah and Miller, (2020) Moon, (2021)
Do you think this kind of educational information on sustainability could enrich your experience?	Meschini et al., (2021)
In what way can you influence your decision to visit a restaurant's commitment to sustainability? How do you check this information? Do you believe that easily finding it through review answers can be helpful?	Koch et al., (2020)

Table 5
Participants' profiles (own source).

Code	Birth year	Profession
FGP1	1997	Teacher and protocol specialist
FGP2	1993	Marketing specialist
FGP3	1992	Lecturer
FGP4	1988	Chef and gastronomy specialist

3.6. Analysis

The results analysis was strengthened through a rigorous approach based on Grounded Theory, using NVivo (2022) for in-depth qualitative analysis (Bingham and Witkowsky, 2021). Two researchers participated independently in the analysis to ensure consistency and reliability. Initially, one researcher conducted open coding of the interview and focus group data, identifying preliminary concepts. These concepts were then organized into sub-themes and refined into axial codes, capturing the relationships among codes and the emergence of broader categories. Through axial coding, comprehensive themes were developed, providing a structured analytical framework.

To enhance analytical rigor, a second researcher reviewed and validated the coding structure, ensuring the reliability and credibility of the findings. Intercoder reliability checks were performed on a subset of the data, and discrepancies were discussed and resolved collaboratively. Member checking was also implemented, allowing participants to review and confirm the accuracy of their responses. Additionally, triangulation with secondary sources—including industry reports and academic literature—was used to validate insights, thereby improving both the consistency and validity of the data.

This robust methodology is summarized in Tables 6 and 7, which present the themes derived from axial coding, the corresponding axial codes, and illustrative examples. Finally, the use of systematic coding (with IP numbers) ensured consistency in data interpretation, and the inclusion of participant profiles (Table 3) adds contextual depth to the analysis, supporting a richer understanding of the identified themes.

The quotes in the results section were translated directly to English to preserve original meaning, ensuring that the data remains reflective of participants' authentic perspectives.

4. Results and discussion

This section provides the results obtained through the interview process and the focus group to propose a green-customer love service for

Table 6
Analysis of results. Phase 2. Interviews (own source).

Themes obtained after axial coding	Axial codes	Examples
Influence of negative and positive reviews	Negative reviews Positive reviews	"I like to pay attention to how they have responded, especially to the criticisms of the most negative parts and that there is feedback" (IP14)
Beginning of the experience	Reservation Influence of reviews	"Sometimes visually, I also consider that it influences not what I might order" (IP4)
Personalization	Customised Specific response Personal experience Specific response	"And if they mentioned my name? And if they referred to my personal experience?" (IP2)
Restaurant improvements based on reviews	Changes to the menu and improvements Allergens Honest action and improvement following customer feedback	"If they address the complaint and improve it, I will feel more satisfied" (IP5)
Restaurant image communicated through answers to reviews	Added value Customer value Customer service Automated responses Feedback Restaurant positioning through responses Active listening Mistrust	"There are so many restaurants, and it is increasingly difficult to differentiate in that a company can convey personalization and adaptability to the consumer is fundamental" (IP9)
Expectations after reading reviews and answers	Authenticity Honesty Solutions Transparency	"I think you have to be very transparent and say what it is directly, not try to make it sexier" (IP7)
Recommendations for future experiences	Compensation Second chance Helpful restaurant response Loyalty	"Inviting next time, perhaps is a way to win back the customer" (IP11)
Artificial Intelligence	AI Automated Generic Dehumanized	"It would be nice to have AI that could create responses" (IP5)
Green-customer love service	Redundancies Extension	"As a customer, this service would be helpful" (IP13)
Sustainable advice	Sustainable experience Vegan Vegetarian Local food products Km0 food products	"They can highlight the characteristic of sustainability" (IP5)

Table 7
Analysis of results. Phase 4. Focus Group (own source).

Themes obtained after axial coding	Axial codes	Examples
Restaurant image communicated through answers to reviews	Added value Customer value Customer service Automated responses Feedback Active listening	"I would return because I feel heard, and I have been given an answer" (FGP2)
Restaurant improvements based on reviews	Changes to the menu and improvements Allergens	"Getting an answer creates a better experiencer" (FGP3)
Artificial Intelligence	AI Automated Human implication Information bank	"The same ongoing response looks very shoddy" (FGP1)
Green-customer love service	Accurate Improve the experience Loyalty	"The response is also much more personalized" (FGP1)
Sustainability	Sustainable experience Vegan Vegetarian Local food products Km0 food products Greenwashing	"I look for restaurants that usually have local products."" (FGP4)

sustainable restaurants based on the AI framework proposed. The first section develops the data analysis divided into different subsections that discuss the themes obtained, and the second section proposes the framework based on these themes.

4.1. How do tourists perceive Green Customer-Love Service in restaurants?

4.1.1. The personalization of restaurants' responses to the reviews

Positive reviews, especially when numerous, generally foster a favorable impression and attract potential customers (Hu et al., 2019; Zhao et al., 2019). However, negative reviews serve a critical warning function, which may deter customers from visiting a restaurant (Bilgihan et al., 2018; Liu et al., 2020). The following excerpt offers significant insights into the cognitive and decision-making processes consumers employ when evaluating online restaurant reviews:

"If I see several very positive reviews, I particularly pay attention to the photos. With the negative ones, I always try to see what points might make me consider not going to that restaurant" (IP14)

Furthermore, responsive communication, as an integral component of service quality, is fundamental (Ali et al., 2021), along with the continuum of customer service that begins prior to actual service delivery and extends into post-visit engagement (Kesgin et al., 2021). This perspective underscores the need for restaurants to adopt a holistic approach to customer service management (Kandampully et al., 2023). The following quote encapsulates this view:

"I have generally found that the interactions I have encountered tend to be quite generic, that is, either the restaurant does not respond to any diner, or they may put out a series of generic messages" (IP5)

One of the aspects linked to this holistic service approach is personalization based on the restaurants' knowledge of their guests (Sann et al., 2024), a critical factor in fostering a deeper sense of customer satisfaction, and trust and loyalty (see, for example, Javed et al., 2021; Rita et al., 2023). The importance of personalized responses in the service industry, particularly in how businesses handle feedback and customer interactions (Lei et al., 2024), as reported in previous research, is emphasized in statements by IP9 and IP14:

"If it's the typical response that is standard for everyone, that does not instil confidence in me. But if it is a motivated and personalized response to the consumer's complaint or question, that indeed conveys trust" (IP9)

The ability to respond appropriately to feedback—by admitting faults, offering sincere apologies, and making targeted improvements—can also transform potential negative experiences into demonstrations of accountability and commitment to excellence. The following quotes delve into these critical issues of how restaurants can leverage reviews for operational and service improvements (Daradkeh et al., 2023; Roy et al., 2022):

"I understand that the restaurant also has to admit its faults, it has to understand that something went wrong" (IP13)

"What I would like to see is an honest apology and acknowledgment of the mistake and that they can improve it next time" (IP3)

Customers need to feel that their feedback is genuinely heard and understood, which is fundamental to building trust and loyalty, as reported above. While diplomatic responses may appear safe, they sometimes lack the authenticity and emotional appeal that is appreciated by customers (Kim and Kim, 2020), suggesting a balance is necessary to maintain both professionalism and genuine, and emotional,

engagement (Aureliano-Silva et al., 2021). Crafting responses that are both empathetic and personalized, without sacrificing professionalism, is crucial for restaurants that aim to improve not only individual customer experiences but also their overall market reputation. The following quotes highlight these aspects:

"I prefer that they respond in such a way that at least it is understood that they have listened to me" (IP9)

"You often realize how a restaurant operates based on the response, because there are restaurants that are very diplomatic and, for example, they limit themselves to saying 'we are very sorry that your experience was not as expected. We hope to see you again soon and that it will be better'. Or restaurants that you can tell are backed by someone who is quite angry…" (IP13)

However, during the focus group, one participant proposed the use of an automated response bank, particularly for replying to very positive reviews (e.g., five-star ratings). This idea aligns with findings that high-rated reviews—especially those with images—are especially influential for prospective customers (Park et al., 2021), as reflected in the earlier quote from IP14. The suggestion was as follows:

"You can create a bank of automated responses that alternate when responding to questions with certain characteristics […] I don't think anyone reads 50 reviews in a row. So, a new customer won't see the same continuous response, which looks very tacky. However, it's not much work; you have that automatic bank that keeps renewing itself, but always with the same characteristics" (FGP1)

4.1.2. Co-creating a system to improve service quality

The expectations set by responses to reviews require a careful balance between operational feasibility, genuine emotional engagement, and strategic communication. Businesses that navigate this terrain effectively can significantly strengthen customer relationships and enhance brand perception (Wang and Kim, 2021; Zhang et al., 2021), turning routine interactions into opportunities for brand reinforcement and meaningful customer engagement. The following excerpt illustrates this finding:

"I believe it always corresponds to a way of approaching the customer, which is positive. So, if they have the means to respond to all questions, i.e., all reviews, and if it additionally includes something about your values, it would ultimately be like a more developed slogan. So yes, I see it as positive, I believe I would advocate for that customer-to-customer, business relationship that ultimately also has a social aspect, right?" (IP8)

The results indicate that strategic and intentional responses can transform customer dissatisfaction into loyalty (Morgeson et al., 2020), highlighting the role of adaptability, empathy, and communication in effective customer service. However, this strategy relies on the restaurant's ability to accurately understand customer values and preferences (Brochado et al., 2019; Romero et al., 2023), which may vary considerably across different customer profiles (Iofrida et al., 2022). The following quote supports this view:

"I think that adapting the response to the complaints of the consumers in a refined way, is definitely going to help with that loyalty. And not only that, but it is also a channel, a communication tool" (IP9)

The integration of AI introduces a technological dimension where routine positive feedback could be automated to enhance efficiency (Shah et al., 2023). However, the importance of personalization even in automated contexts is stressed, reflecting a need for balance between technological efficiency and personal touch, which is crucial in dining experiences (Fusté-Forné, 2021). The following quotes exemplify it:

"I think the [responses] can be automated for positive ones" (IP7)

"I think personalization in a positive comment is not so important, but it is important to know that there is someone behind" (IP9)

4.1.3. Technology to foster green-customer love services

Regarding the development of a Green Customer-Love Service based on ChatGPT, participants highlighted that the key challenge here is balancing the need for thorough, meaningful responses with customers' expectations for quick and efficient communication (Buhalis and Sinarta, 2019). For example:

" I think the response might be a bit long because we are in this moment of immediacy and of not having time for anything, so it may be extensive, but I understand that they want to justify it well" (IP11)

About the green-customer love service and the implications of using AI, IP4 and IP5 highlighted the importance of humanizing AI-supported interactions, even when AI is used to support service processes. The human touch is crucial in making customers feel valued and understood, particularly in discussions related to sustainability (Madanaguli et al., 2022), where customers may seek reassurance that their concerns are taken seriously and not just handled algorithmically.

"I think it is always important to add a human touch in the sense that yes we can give support [with AI]" (IP4)

"It would be good if artificial intelligence could create those responses, but I think the most important thing is that the restaurant echoes what the customers are telling them" (IP5)

Through the focus group, other important elements related to the proposed green-customer love were identified, allowing the co-creation process to continue (Fusté-Forné and Jamal, 2021). One of the aspects that emerged is the implementation of a restaurant information database, indicating that the essential information of the restaurant can be integrated into the system so that the AI used can consult the data when generating responses to reviews (Shah et al., 2023), as an AI-based customer relationship management system (Chatterjee et al., 2022). This aspect was already integrated into the created GPT by the researchers, confirming the necessity of considering it beforehand and showing the participants in the focus groups an interest in having such a resource. The following sentence specifies this aspect:

"There is also what is called a company information database. Nowadays, on any artificial intelligence platform, you can create an information database that includes information about the restaurant, such as the entire menu in PDF, so it knows everything that is written. […] This can also help generate a more appropriate response" (FGP2).

Participants also recognized and appreciated the improvements made to the responses following the interview phase, describing them as more human and personalized. Several participants highlighted the value of such personalized responses, especially when dining while traveling:

"I find it interesting, and I think it does create a better experience, especially when you go to a restaurant that is not in your local area, you're traveling, going to another country or city…" (FGP3)

"However, if I receive a message like this after leaving a positive or negative review of my experience, it makes me feel that they have been very considerate in taking me into account, and the response is also much more personalized" (FGP1)

The developed green-customer love service is also linked to the possibility of promoting customer loyalty, as it generates interest in the customer to learn more about the restaurant's philosophy and offerings, and construct the identification of customers with restaurants' identity (Han et al., 2020), as indicated by the following participant:

"And that act of communicating with a call to action like 'we hope to see you here soon to try other dishes' is a small incentive to make the person visit again. In my opinion, leaving a message for someone who has already visited is not a bad idea, regardless of the star rating they gave" (FGP2)

4.1.4. A commitment to sustainability

For restaurants committed to sustainability, this approach not only helps in handling the logistical aspects of customer service to building trust and loyalty among environmentally conscious consumers as a segment of tourists (Gautam, 2020; Han, 2021; Orea-Giner and Fusté-Forné, 2023). The challenge lies in effectively integrating technology to handle repetitive tasks while ensuring that each customer interaction remains personalized and reflective of the restaurant's genuine commitment to both quality service and environmental values. The following results indicate that sustainability is not just an

operational practice but a powerful engagement tool that can lead to increased customer interaction and loyalty.

"They should be concerned about [sustainability], it certainly catches my attention and makes me more curious, clear and more confident" (IP10)

"It would definitely cause me more interest personally and I would probably check their website to see what they are doing and would look a bit to know a bit more" (IP6)

Additionally, vegan and vegetarian restaurants are also valued for other aspects beyond sustainability, such as food safety (Badu-Baiden et al., 2024; Orea-Giner, 2023). This fragment expresses this opinion:

"Considering my allergies, a restaurant with more options, like vegan options, is a super safe choice for me to eat, and it makes me feel a bit more included in a world where many times I went to a restaurant and didn't have many options to eat" (FGP1)

The critical challenge here is ensuring that the commitment to sustainability is genuine and substantiated rather than merely superficial or promotional, as consumers are becoming increasingly savvy about recognizing "greenwashing" (Volschenk et al., 2022). These results show that sustainability is also linked to building a brand, enhancing customer engagement, and reducing environmental impact. However, it is essential to acknowledge that AI itself consumes significant resources and also contributes to pollution through energy-intensive processes, raising concerns about the true sustainability of AI-driven solutions.

Based on these findings, it is possible to co-create a framework that defines and supports the implementation of a Green Customer-Love Service (GCLS) for sustainable restaurants—one that integrates technological efficiency, human empathy, and environmental responsibility.

4.2. Green-customer love service for sustainable restaurants framework

The framework depicted in Fig. 1 outlines a comprehensive strategy for implementing a Green Customer-Love Service (GCLS) in sustainable restaurants using Grounded Theory. This framework represents the main elements involved in the creation of a green customer-love service system for restaurants. Through strategic feedback management and the assurance of personalized, responsive communication, it aims to improve customer relationships. In this sense, AI is considered as a Social Technology tool to foster sustainable and customer-centric interactions. However, this system can function without AI implementation through human-centred strategies and traditional technologies to achieve similar goals of enhancing customer relationships and promoting sustainability. Specifically, AI can contribute by offering data-driven insights into customer preferences for sustainable choices, enabling businesses to adjust their operations to align with eco-friendly expectations (see Nguyen et al., 2023). The integration of AI-driven solutions such as ChatGPT facilitates real-time customer

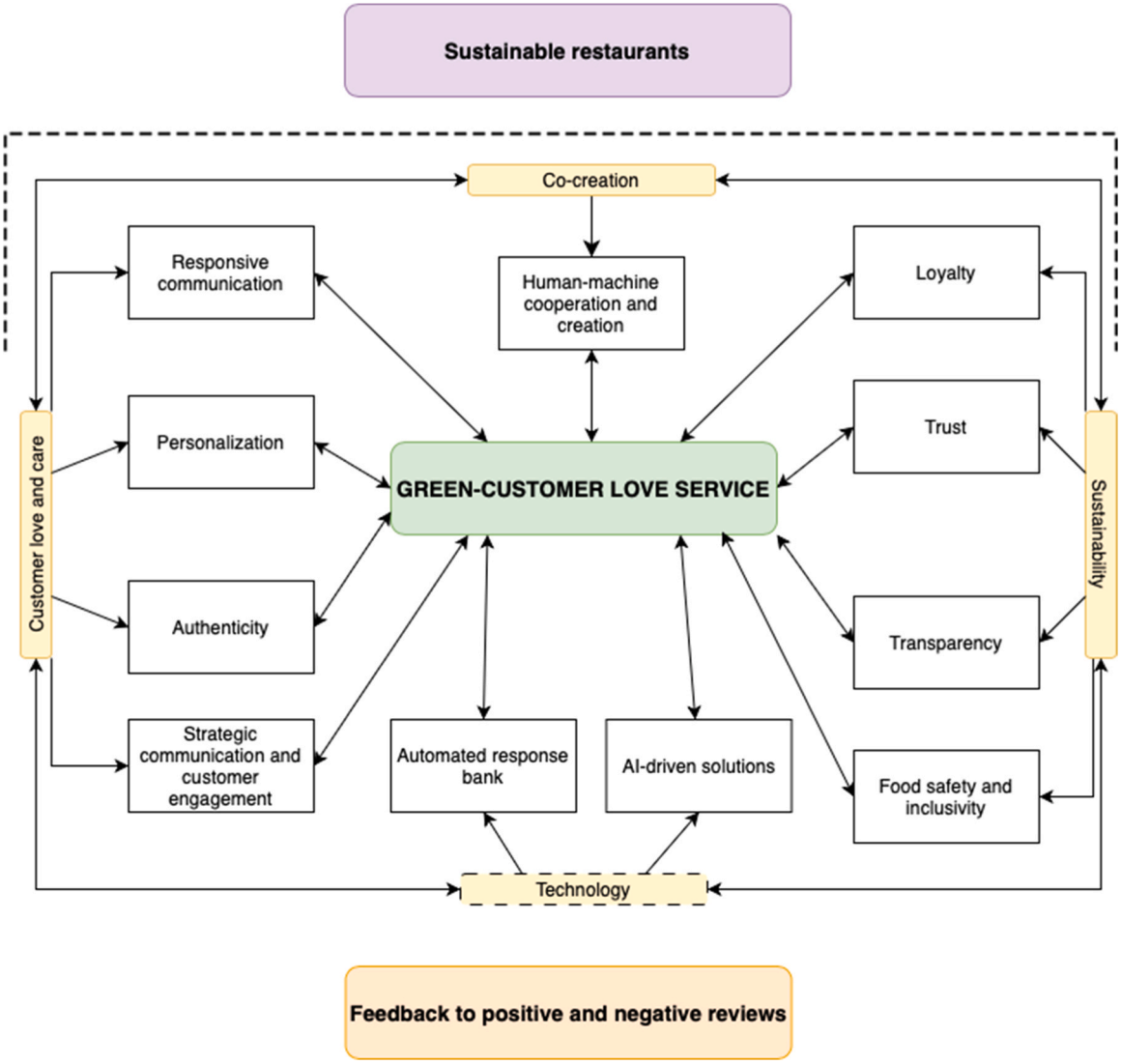

Fig. 1. Green-customer Love Service (GCLS) for sustainable restaurants framework (own source).

engagement (Gursoy et al., 2023).

To create one-of-a-kind experiences for customers, the framework advocates for human-machine cooperation and relationships, which are crucial for value co-creation in the framework of Service-Dominant Logic (see Vargo and Lusch, 2004), a customer-centric approach that creates value through service. In addition, the discussion of AI and sustainability is not without challenges and limitations of implementing such systems in real-world restaurant settings. While AI excels at consistency, efficiency, and scalability, its ability to understand and respond to human emotions may remain limited (see Sharma et al., 2023). In this sense, the AI system that we have developed works towards the comprehension of varied human experiences, leading to interactions that feel personal in sensitive situations, such as when addressing complaints. Also, we acknowledge that AI's reliance on algorithms also raises concerns about bias (see Arora et al., 2023); for example, it might unintentionally favor certain demographics or languages, leading to inequitable treatment. In addition, ethical concerns such as data privacy and security are significant (Fusté-Forné and Jamal, 2021), as AI systems require extensive customer data to function. The automated response bank ensures consistency in communication, reduces redundant operational efforts, and supports the restaurant's commitment to sustainability by providing informed, eco-conscious responses that encourage responsible consumption. This system also aids in waste reduction by guiding customers towards sustainable menu options and practices, fostering a culture of environmental responsibility from production to consumption.

Authenticity plays a meaningful role, especially when addressing negative feedback, as acknowledging mistakes and offering sincere apologies can go a long way in reshaping customer perceptions and fostering trust. The framework also incorporates strategic communication to balance operational efficiency with genuine customer engagement, emphasizing a personal touch in critical interactions. This is also crucial in the context of Relationship Marketing Theory (Morgan and Hunt, 1999), which is focused on direct communication as a source for building trust and fostering long-term loyalty, and accentuates the influence of Service-Dominant Logic in promoting customer loyalty (Blazquez-Resino et al., 2015).

Transparent and verifiable processes enhance client trust and loyalty via integrated sustainability, which is more than just a promotional tool, and align with CSR strategies in hospitality and tourism (see, for example, Alsheyab et al., 2024), and include the Triple Bottom Line (Elkington, 1998) as a platform for businesses to integrate environmental and social sustainability strategies in their operations (Stoddard et al., 2012). This also stresses the significance of being inclusive and ensuring that food is safe for all customers, which reflects the principles of the Theory of Planned Behavior (Ajzen, 1991), particularly when it comes to offering vegan and vegetarian alternatives that enable businesses to understand why customers choose sustainable options or identify barriers that prevent them from doing so (see, for example, Vesci and Botti, 2019). With this strategy, the restaurant can strengthen its dedication to sustainability and customer care while simultaneously optimizing customer service through technology.

Through the strategic implementation of AI-driven tools, restaurants could strengthen their commitment to sustainability and customer care while optimizing operations, ensuring both environmental and customer-centric value creation. However, to avoid the risks of greenwashing and superficial sustainability claims, it is essential that AI is integrated within a holistic, socially responsible framework that prioritizes transparency, inclusivity, and long-term impact, and is based on AI and human collaboration. The success of AI in restaurant sustainability lies in its ability to enhance—and not replace—human decision-making, fostering an ecosystem where technology serves as an enabler of authentic sustainability practices, social equity, and meaningful customer engagement.

5. Conclusion

This paper has explored the development and usability of the implementation of a Green Customer-Love Service from the perspective of tourists in the context of restaurant reviews. Through this research, the authors have developed a framework that can help sustainable restaurants to improve customer engagement and sustainability commitment through the adoption of AI-driven solutions working with human collaboration. However, it is crucial to recognize that the adoption of AI in sustainability initiatives must go beyond surface-level commitments to avoid the pitfalls of greenwashing and ethical shortcomings. Restaurants must ensure that AI integration is transparent and aligned with sustainability goals, rather than being used as a marketing tool to create an illusion of environmental responsibility without real, substantial impact. This study employs AI to test customer engagement and optimize service quality in sustainable restaurant settings. However, despite the technological advancements and enhanced capabilities of AI, concerns regarding its environmental impact have been raised, particularly in terms of high energy consumption and carbon footprint (Bhaskar and Seth, 2024).

The framework developed above (Fig. 1) demonstrates that the implementation of AI-driven solutions in managing restaurant reviews plays a significant role in enhancing service quality and fostering sustainable interactions within a Green Customer-Love Service system, particularly in the context of food tourism (RQ1). In particular, results show that sustainable restaurants that aim to build a Green Customer-Love Service must respond to both positive and negative reviews based on four axes that provide evidence of their commitment to the co-creation of customer love and care, which is, at the same time, based on the strong relationship between technology and sustainability. Feedback to both positive and negative reviews is crucial in informing customers about the identity of restaurants, and how they contribute to customer satisfaction, trust, and loyalty. While positive reviews create a favourable impression and attract potential customers in a more efficient way, negative reviews serve as critical warnings and provide insights into areas needing improvement, which may also contribute to attracting customers. They are both necessary to enhance service quality in the current experience society, as businesses are far from "error-free" services and experiences (Elbaz et al., 2023b).

The effect of strategic communication on customer engagement is the result of the combination of operational efficiency and genuine and emotional engagement to enhance customer relationships (Shah et al., 2023). This can be achieved through responsive communication, which is essential for service quality and encompasses pre-visit, during-visit, and post-visit engagement. In this sense, the provision of authentic and personalized responses is also crucial for customer satisfaction and loyalty, as observed in the previous section. Balancing empathetic and personalized responses with professionalism, and avoiding generic and automated responses, will ensure customers feel genuinely heard, which is important for the success of the framework implementation. This may also influence the sustainable behavior of customers, as advocating for social change also relies heavily on the use of technology (Hick and McNutt, 2002).

The Green Customer-Love Service should be part of a process of feedback generation, which is the result of human-machine cooperation and co-creation (RQ2). Chatbots, like ChatGPT, are often used for customer service in restaurants (Sam and Jasim, 2023), which also leads to the improvement of the customers' perception of automation, which in turn affects the consumers' acceptance of AI services (Shah et al., 2023). In particular, the use of AI to handle routine feedback and the creation of an automated response bank, which mirrors a detailed and technology-based CRM system, are efficient approaches for replying to reviews while maintaining varied and non-repetitive responses that preserve personalization (Agarwal et al., 2023).

Finally, this paper also shows that this framework facilitates the co-creation of responses to customer reviews that promote sustainability

(RQ3). We argue that this requires a fair integration of sustainability efforts that, in order to effectively lead to customer loyalty and trust, should be genuine and integrated into the brand's identity, and not just promotional. Transparency in sustainable practices needs to be traceable and verifiable by customers, as observed in elements that highlight food safety and inclusivity, especially in vegan and vegetarian options, or the origin of the products (Orea-Giner et al., 2024), to enhance customer inclusion and satisfaction. However, sustainable social technology is also a movement generating a profound change in the use of ST to promote sustainability and social justice. For example, sustainable AI should promote ecological integrity and social justice (van Wynsberghe, 2021). In this sense, the implementation of sustainable ST should consider ethical issues such as privacy protection and cybersecurity of data, ethical and human-centred technology design principles, and diversity and inclusion (Du, 2021). Considering that social technologies such as AI can also generate pollution and misuse of resources, a balanced and responsible approach in the development and application of this system is needed (Nishant et al., 2020; Brevini, 2020).

5.1. Theoretical implications

This theoretical framework proposed in this paper introduces a new approach to understanding the relationship between technology and sustainability in the context of customer engagement in the restaurant industry. Based on the importance of responding to both positive and negative reviews, the framework reveals the role of strategic communication in shaping customer perceptions and fostering customer loyalty. The four axes of commitment in the framework highlight key elements for restaurants that aim to establish a Green Customer-Love Service and contribute to the literature on service quality and customer relationship management in tourism and hospitality.

The framework also highlights that effective customer engagement is achieved not only through efficient operations but also through genuine and emotional personalized interactions facilitated by both humans and their technological counterparts. This dual focus on technology and the human touch is essential in service delivery and contributes to previous research on customer satisfaction and loyalty in the context of sustainable business practices.

Also, the framework's emphasis on a dynamic dialogue and continuous feedback mechanisms adds texture to current conversations about co-creation and customer participation in automated services. Based on a framework of feedback generation, which relies on a process of human-machine cooperation, the framework provides a new avenue to analyze the role of AI in enhancing customer service. This contributes to the theoretical discourse on the integration of AI in tourism and hospitality and suggests that AI can augment human efforts to create personalized customer experiences that meet the customers' desire for rapid communication while maintaining authenticity. However, it is essential to acknowledge the potential challenges associated with over-reliance on AI, such as its contribution to greenwashing or data privacy concerns.

5.2. Practical implications

This study offers several concrete implications for restaurant managers and practitioners aiming to enhance customer satisfaction and foster long-term loyalty through the integration of sustainability and technological innovation. The proposed Green Customer-Love Service (GCLS) framework underscores the strategic value of review response management as a core element of customer relationship practices in sustainable hospitality settings.

Initially, managers ought to implement a systematic strategy for addressing both favorable and unfavorable reports. Responses to reviews should be regarded as an integral aspect of service delivery, equally significant as the physical eating experience, reflecting attentiveness, empathy, and the establishment's commitment to social and environmental principles. A structured yet adaptable review response approach should be integrated into everyday operations, preferably managed by skilled personnel knowledgeable about the brand's sustainability promises and service philosophy.

The deployment of AI systems for overseeing routine review contacts provides a scalable response to the rising volumes of online input. Managers are encouraged to include automatic response systems into current Customer Relationship Management (CRM) platforms, facilitating immediate involvement with low latency. Nevertheless, automated responses must be evaluated, modified, and, when suitable, personalized by service personnel to maintain emotional authenticity. Restaurants might invest in AI training programs for front-of-house and communications personnel to enhance collaboration between human and computer inputs in customer engagement.

Third, the GCLS approach emphasizes the necessity for operational transparency and credibility in sustainability initiatives. Managers must transcend superficial green branding and integrate sustainability into the brand's service philosophy. This entails ensuring that sustainable sourcing standards, waste reduction measures, and dietary accommodations—such as vegan, vegetarian, and allergen-sensitive options—are transparent and verifiable across all communication channels.

Finally, staff tasked with digital engagement should be prepared to clearly and consistently communicate the restaurant's sustainability commitments, supported by credible evidence. Sustainability messaging must avoid generic claims and vague affirmations, instead being based on demonstrable practices and aligned with the expectations of a critically informed customer base. This may entail the development of a tone-of-voice framework for digital platforms that extends beyond branding to encompass verifiable sustainability content, alongside the creation of adaptable response templates that can be customized to reflect specific actions or policies. By adopting this approach, restaurants can enhance transparency and accountability in their communication, thereby mitigating the reputational risks linked to greenwashing.

5.3. Limitations and future research lines

Considering the qualitative nature of this research, the focus was placed on achieving depth and richness of data rather than generalizability. While the geographical focus on Spain limits the direct applicability of findings to other contexts, its emphasis on the restaurant experience can serve as a platform for innovative and sustainable solutions in other cultural and geographical contexts and food-based businesses. Future research could expand the participant base to different regions and adopt mixed-method approaches to quantitatively validate the framework's impact on customer satisfaction and sustainability metrics, thereby enhancing generalizability. Additionally, as the study focuses on tourists, further research could engage restaurant owners and stakeholders to provide a more holistic perspective. The tool used was tested in hypothetical scenarios rather than real-world settings, which may limit its applicability. Future studies should conduct real-world testing to validate the framework's effectiveness in dynamic service environments.

While the theoretical and practical implications of this study are valuable, several limitations should be acknowledged. The use of GPT models presents inherent challenges, particularly due to their "black box" nature. The GPT models function without transparent decision-making processes, complicating the understanding of the rationale behind particular predictions or recommendations, as they depend on complex and extensive datasets. The absence of explainability presents a notable constraint, particularly in contexts where transparency and interpretability are essential for establishing trust and promoting broad acceptance among users—from both the supply and demand sides. The integration of human oversight and co-creation within the system facilitates the monitoring and validation of AI-generated responses, thereby ensuring adherence to sustainability objectives and ethical

standards. Conducting regular bias audits and adhering to ethical AI practices are crucial for mitigating the potential risks linked to GPT models. Additionally, permitting customer input on AI-generated responses enhances engagement and facilitates system refinement to more effectively meet customer needs and expectations. A participatory approach guarantees that the AI-driven Green Customer-Love Service framework is dynamic and responsive to real-world experiences. It is also necessary to advance public and green AI initiatives that prioritize environmental and social sustainability, and future research should investigate the implementation of circular AI economies.

Future research should also involve pilot studies in restaurants to evaluate the tool's performance in live environments. This approach will help identify potential challenges and areas for improvement and ensure the tool is robust and applicable across diverse restaurant settings, improving service quality as well as customer satisfaction, trust, and loyalty—as explored in this paper. In this sense, the inclusion of a more diverse range of restaurants and customer segments would further enhance the generalizability of the results. Future research could also explore the transformation of this framework into a model that includes implementation guidelines, cost-benefit analysis, and assessments of environmental and social impact, which could significantly support its adoption in hospitality services. Comparative studies across different types of restaurants and regions could also provide a more robust understanding of how the proposed framework could be adapted to varied economic, sociocultural, and tourism contexts (for example, business, rural, or sun-and-sea destinations), to develop more reliable, fair, and effective AI tools that enhance customer engagement and sustainability in the restaurant experience.

CRediT authorship contribution statement

Francesc Fusté-Forné: Writing – review & editing, Writing – original draft, Validation, Formal analysis, Data curation. **Alicia Orea-Giner:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Mohammad Soliman:** Writing – review & editing, Writing – original draft, Validation, Formal analysis.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

The authors used Grammarly to assist with grammar and language editing during the preparation of this manuscript.

Data availability

Data will be made available on request.

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