Evaluating the Effectiveness of AI-Driven Personalized Recommendations in Enhancing Guest Experiences in Jeddah's Restaurants

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Abstract

The restaurant industry achieves superior customer satisfaction, stronger engagement, and increased loyalty by implementing artificial intelligence (AI)-driven personalized recommendation systems. As part of this research, the team assessed AI-driven restaurant recommendation systems in Jeddah's venue industry to measure their effects on satisfaction, engagement, and customer loyalty. Three hundred customers from ten restaurants that operated AI recommendation systems for six months or longer among high-end and mid-range restaurants participated in this survey. Researchers used an online questionnaire to analyze the data by performing descriptive statistics, correlation, and regression analysis. On the contrary, satisfaction exhibited a small to no relationship with customer engagement ($r = 0.04$) and a slightly antagonistic relationship with loyalty ($r = –0.05$). The study results indicated that the correlation between customer engagement and loyalty ($r = -0.08$) was a weak negative correlation. While the research proved that AI can enhance dining experiences, it was shown that it faces challenges in keeping customer loyalty in the long run. The study data contained essential information to help managers of restaurants and developers of AI systems improve their recommendation systems.

Keywords: Artificial Intelligence, Personalized Recommendations, Customer Satisfaction, Customer Engagement, Loyalty, Repeat Patronage, Restaurant Industry, Jeddah, Hospitality Technology, Data-Driven Insights, Consumer Behavior.

Introduction

The hospitality sector has seen revolutionary changes through artificial intelligence integration, which has produced personalization and efficiency solutions and enhanced customer service (Buhalis & Moldavska, 2022). Restaurants rely heavily on artificial

intelligence to improve customer experiences since service quality is the decisive factor for commercial success (Choi et al., 2020). Among the most essential AI applications for the restaurant industry are AI-driven personalized recommendation systems, according to Saydam et al. (2022). Collecting customer data such as dining locations, preferences, behavior, and social media behavior, they deliver customized recommendations that enhance the dining experience (Tian et al., 2021). The dining experience in Jeddah, Saudi Arabia, is a competitive market that uses AI research to develop customized restaurant services (Khan, 2024).

The restaurant competition in Jeddah remains highly competitive because the city has transformed into a tourist destination and global food center (Hanaysha & Hasouneh, 2024). Restaurants deploy AI technology to meet the expanding customer demand because this technology enhances personalized service delivery, which builds customer satisfaction and loyalty and creates repeat customer visits (Alawami et al., 2025). AI systems generate dish recommendations through analyses that connect guest preferences with dietary needs and historical preferences (Saxena et al., 2024).

Research needs to determine both the probability and how well AI will work in the cultural, social, and economic environment of Jeddah despite its booming status in various international markets (Jin & Zhang, 2025). Implementing AI-based personalized recommendations for Jeddah restaurants represents a new business practice since their impact on customer experience and business performance remains poorly understood (Ahmed, 2025). This research evaluates the performance of AI-based personalized recommendations for enhancing restaurant experiences in Jeddah eateries, according to Alsahafi et al. (2023). The research investigates how this technology can be applied in restaurants to boost customer satisfaction alongside enhanced customer engagement and restaurant loyalty, considering Jeddah's dining behaviors.

AI in the Hospitality Industry

The Role of AI in Personalizing Restaurant Experiences

AI has shown substantial progress in creating improvements across diverse business areas and serving restaurants (Addanki et al., 2022). Restaurants employ modern technology, including touch-screen devices and automated recommendation tools, to serve customers better while running their operations effectively (Sachani et al., 2021). Restaurants depend heavily on AI personalization because the quality of service directly affects what customers feel during their visits, according to Shah et al. (2023). Tailoring services improve customer satisfaction, build brand loyalty, and increase customer frequency (Rane, 2023).

The underlying working of AI-driven recommendation systems involves reading data from different sources, such as customer behavior and preferences, social media interactions, etc., as Shirkhani et al. (2020) explained. Machine learning algorithms analyze this data to predict a customer's tastes and suggest the dishes the customer might like (Al-Hubaishi et al., 2024). Besides food items, these recommendations can be for wine pairings, special offers, and promotional items based on past behavior (Carvalho et al., 2021).

These AI systems use the core of their ability to adapt and learn while interacting with customers over time. It collects more data; the more data the system collects, the more accurate its recommendations are (Sjödin et al., 2021). Furthermore, AI systems can process

massive amounts of data in real time and help restaurants make dynamic recommendations that could change based on the day (time), weather, or even the guest's mood if such information is available (Rasool & Bhat, 2025).

Impact of AI on Customer Experience

Thus, the influence of AI on customer experience is vast, especially for the restaurant (Gao et al., 2022). Recommendations can be personalized to increase the culinary experience by recommending items based on specific guest preferences. Therefore, it decreases decision-making for customers who feel comfortable choosing the dishes. For example, a customer who regularly orders vegetarian meals will get suggestions for items that suit their diet preferences, for instance, new vegetarian dishes, vegetarian drinks, etc. (Astuti et al., 2024).
While information and communication technologies offer authorities greater control over data that would usually be invisible to the public, they also allow them to enhance guest engagement through AI-driven recommendations. Choi et al. (2020) have pointed out that restaurants become attentive to customers' preferences by suggesting items they will like based on their orders, which leads to the loyalty and satisfaction of customers with the restaurant. Personalized experiences have been shown to increase customer satisfaction, one of the main factors that encourages customers to eat in a restaurant again (Öksuz et al., 2025). Additionally, personalized recommendations make the dining experience richer. Such AI-driven solutions can help restaurants in Jeddah differentiate themselves with unique and interesting customer experiences. The ability to provide personalized experiences has become a key differentiator, mainly because consumers demand that businesses give them personalized experiences (Gao & Liu, 2023).

Jeddah's Restaurant Industry: Challenges and Opportunities

The Competitive Landscape in Jeddah

Jeddah is Saudi Arabia's most significant urban environment and leading commercial center. The city has multiple cultures and tasty dining options that attract Saudi residents and visitors worldwide (AlNemer, 2024). The number of restaurants in Jeddah is high as businesses compete to offer customers classic Saudi dishes and many international menus from worldwide cuisines. Many restaurants fight to stand apart, so they employ new methods to boost their services and interaction with customers (Hanaysha & Hasouneh, 2024).
As more people in Jeddah eat in restaurants, the business uses advanced technologies to make its services stand out from those of its competitors. Restaurants use artificial intelligence systems that deliver individualized customer treatment and simplify business methods to provide superior dining services. The proper use of advanced technologies for businesses needs detailed attention to local market needs and conditions, plus the present technology base (Islam et al., 2024).

Opportunities for AI Implementation in Jeddah's Restaurant Sector

The restaurant industry in Jeddah enables implementation opportunities for AI-driven personalized recommendations. Jeddah's diverse population attracts indigenous inhabitants and tourists from different regions. The AI system processes information from heterogeneous customer groups to build customized dining services matching multiple

culinary choices. The tourist population desires suggestions for Saudi cuisine, yet the local population selects traditional or international food options (Bhatti & Alshiha, 2024).

The strategic position of Jeddah as a tourist hub allows for better guest satisfaction through customized restaurant suggestions that address food choices together with cultural traditions, health restrictions, and mealtime schedules. Through AI assistance, restaurants can recommend food items that match customer preferences and stimulate the discovery of dishes guests would not traditionally try, enhancing personal and collective dining experiences (Yaiprasert & Hidayanto, 2024).

As Ahmed (2025) identified, Jeddah's growing restaurant industry creates a substantial opportunity for AI to enhance operational systems. AI capabilities enable better inventory oversight, forecasting, and streamlined supply chain operations, ultimately leading to superior dining satisfaction for restaurant guests (Jin & Zhang, 2025).

The Rationale of the Study

In recent years, Jeddah's restaurant market has experienced exceptional growth because tourists from different nations have boosted it, while customers and chefs actively develop the local dining culture. During its development, restaurants have had to deal with growing competition and are expected to provide higher-quality service and dining satisfaction (Knani et al., 2022). The restaurant industry now relies on AI technology to handle customer satisfaction problems and climb market positions (Alawami et al., 2025).

AI-based recommendation systems are now altering how customers dine by offering products that will suit the customer's needs and the ways he/she use them (Suresh et al., 2021). They increase customer engagement, and it can make repeat consumers patronize the restaurant when their individual choices in food relate to the recommended product (Alawami et al., 2025). It was important for the particular use of AI technologies in restaurants to be the topic of more research, as this area has not been well explored.

This research started primarily because it sought to examine the effectiveness of AI recommendations in a person's culture in Jeddah. Such cultural hybridity in Jeddah created challenges and opportunities for AI adoption, especially in trust, data security, and architecture platforms (Berezina et al., 2019). Analyzing the previous research, it was possible to state that AI-enhanced customer satisfaction in organizations worldwide. However, as highlighted by Suresh et al. (2021), it remained ambiguous how it would be viable in the local Jeddah restaurants.

The following research question will guide this study: How do AI systems enhance guest dining in restaurants in Jeddah? The study looked at the impact of AI on personalization as per the parameters of customer satisfaction, promiscuity, and engagement to let the restaurants know what is more effective for them and the competition using these technologies (Basiouny, 2023). Conducting a study in Jeddah, this work contributed to developing knowledge on applying AI in hospitality operations. Also, it established how market characteristics in the context influence the implementation of AI technology, as per Alawami et al. (2025).

This study contributes to the literature as much as it seeks to analyze AI technology in Jeddah restaurants and how the local environment influences the adoption of the technology (Knani et al., 2022). Some of the practical approaches to operating a restaurant proposed in the

research included influencing the local and international market trends by developing strategies and generating solutions for restaurant owners and operators, according to Berezina et al. (2019).

Statement of the Problem

The restaurant industry transforms because artificial intelligence systems use customer data as an independent variable to forecast preferences while improving guest experiences as a dependent variable, according to research by Mahajan et al. (2024). Restaurants employ these systems to boost service efficiency and produce customized dining suggestions stemming from customers' historical actions and preference records (Siddiqi et al., 2024). The utilization of AI recommendations for hospitality has been deeply researched across international service sectors. However, their impact remains unstudied when applied to culturally distinct environments, especially Jeddah, according to Mahmudova (2024). The assessment of AI-driven personalization needs specific attention regarding its ability to boost satisfaction and engagement and build customer loyalty (mediating variables) in Jeddah due to its unique dining rules, religious guidelines, and hospitality practices.

The theoretical advantages of AI-based personalization programs have not been fully proven in real-world implementations relating to customer relations and their willingness to return. Many previous research findings demonstrate that AI recommendations boost quick satisfaction rates for clients, yet these benefits fail to lead to lasting customer commitment. Frequent interactions with AI do not lead to repeat customer visits since the joint relationship between satisfaction ratings ($r = -0.05$) and longevity in customer loyalty ($r = -0.08$) demonstrates an adverse effect on long-term retention (dependent variable). The adoption and effectiveness of these systems in Jeddah's hospitality sector encounter challenges because of consumer trust concerns, data privacy issues, and ethical algorithms (moderating variables), according to Paramasivan (2024).

Research examines the performance of Artificial Intelligence-driven recommending systems for personalized guest service improvement in Jeddah's restaurant sector. This study establishes the impact of AI-based personalization on client satisfaction, engagement, and loyalty levels, as well as which external elements, such as cultural fit, service quality, and trust in AI, matter most to customers (moderating factors). The study delivers practical guidance for restaurant managers, artificial intelligence developers, and hospitality workers, enabling them to develop better AI systems to improve guest participation while resolving particular issues affecting Jeddah's dining marketplace.

Objectives of the Study

The following were the objectives of the study;

1. The research objective was to evaluate the effectiveness of AI-driven personalized recommendations in improving customer satisfaction in Jeddah's restaurants.
2. To assess the extent to which recommendation systems initiated by artificial intelligence affect customer interactions and the number of times customers revisit restaurants available in Jeddah.
3. The study aimed to analyze how AI personalization can be integrated into the restaurant's operation to improve service quality.

4. The study aimed to offer recommendations to restaurant operators in Jeddah about using AI solutions and ways to compete in the hospitality sector.

Research Questions

The following were the research questions of the study;

1. What is the power of AI-derived personalized recommendations in increasing customer satisfaction in Jeddah's restaurants?
2. How do AI-driven recommendation systems affect customer engagement and repeat patronage in the Jeddah restaurant industry?
3. How should AI-enabled personalization be blended with current restaurant operations to enhance the quality of service in Jeddah's restaurants?
4. How can actionable insights be provided to restaurant operators in Jeddah so that they can adopt AI technologies and achieve a competitive advantage in the hospitality sector?

Significance of the Study

1. The outcome of this study will deliver important knowledge about the role of AI-powered personalized recommendations to enhance customer satisfaction, thus benefiting restaurants in Jeddah to perfect their service offerings and consider positive customer attitudes.
2. The findings will deepen our understanding of AI personalization's effect on customer engagement and loyalty and provide restaurants with tools to establish stronger relationships with guests.
3. The findings from this research will add to the general knowledge of how AI can be integrated into the hospitality industry, highlighting the peculiarities of the cultural and economic factors of the city of Jeddah as the principles of AI technology integration.
4. This study will analyze the operational advantages of AI-powered recommendation systems, emphasizing strategies to enhance efficiency, harmonize restaurant operations, and reduce the disparity between customer expectations and service delivery.
5. The research will make actionable recommendations to restaurant owners and operators in Jeddah on leveraging AI technologies, allowing them to gain a competitive advantage and stay up-to-date in a constantly evolving digital environment.

Conceptual Framework

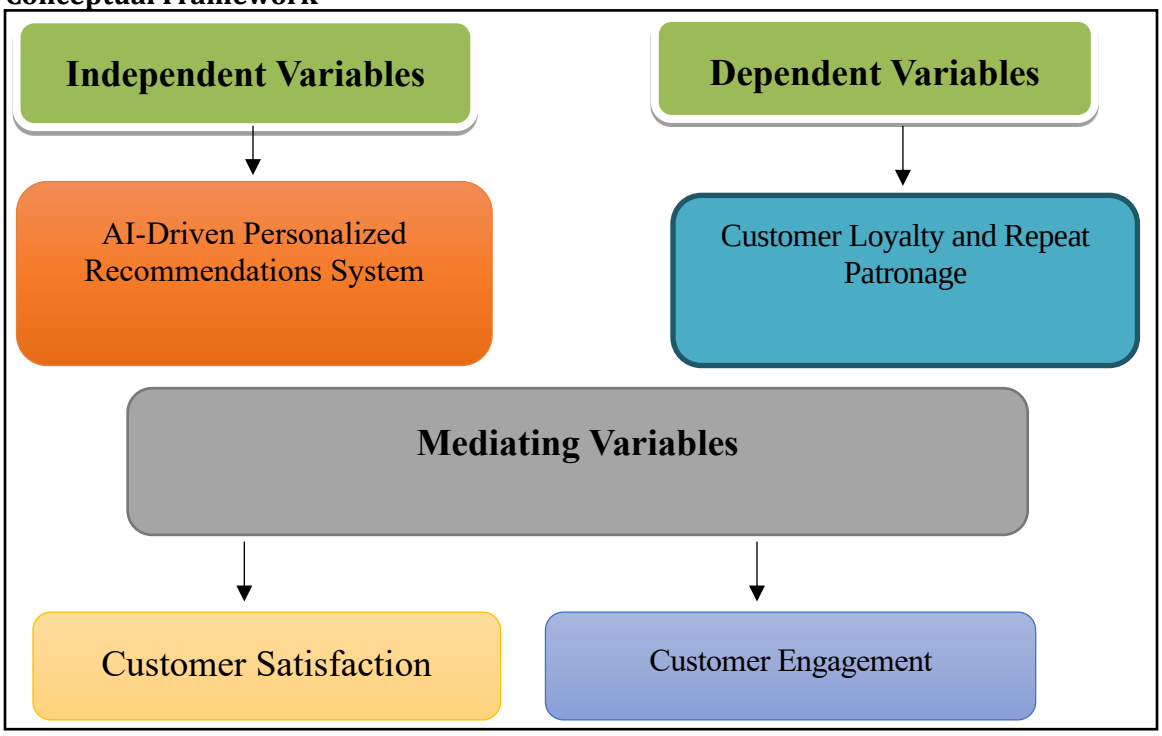

Figure 1: *Conceptual Framework*

The research framework demonstrates how AI-powered personal recommendations affect customer satisfaction levels, which eventually determine customer engagement and loyalty. The analysis shows weak correlations because satisfaction fails to drive customer engagement or cause them to return.

Customer Satisfaction as a Mediator

High satisfaction comes from AI recommendations that deliver precise results related to customer needs while remaining culturally sensitive. The low correlation between satisfaction and loyalty reveals that although customers approve of AI recommendations, other dining aspects, including price tags, dining experience quality, and available alternatives, heavily influence guest loyalty.

Customer Engagement as a Mediator

Engagement represents the number of times customers interact with AI suggestions, their faith in AI recommendations, and their willingness to sample new AI-recommended dishes. The low negative relationship between customer engagement and AI systems demonstrates that Aire commendations do not directly lead to repeat business.

Loyalty & Repeat Patronage as the Dependent Variable

The personalization capabilities of AI do not guarantee successful customer retention, particularly in dining establishments. Other influences, such as how customers feel about the restaurant brand and their dining encounter with staff, in addition to cultural differences, determine whether customers will return to dine or make recommendations to others.

Implications of the Conceptual Framework

According to the study findings, AI needs optimization to enhance both the accuracy of recommendations and cultural relevance because the current relationships between variables demonstrate inadequacy.

Customer satisfaction alone does not maintain permanent relationships with the business. Restaurants need to use AI personalization systems, loyalty promotions, price reductions, and game features to sustain client retention.

There is no automatic increase in repeat customers following AI interaction because the negative correlation requires combining quality customer service and traditional hospitality elements to build brand attachment.

Literature Review

AI substantially changed the Jeddah restaurant industry, resulting in more remarkable enhancements to the customer experience. Personalized recommendation systems enhanced customer relationships through AI by evaluating dining behaviors to predict preferences and prepare custom-tailored service protocols. The rising competition forced restaurants to depend on artificial intelligence to improve customer satisfaction while enhancing operational efficiency and establishing enduring customer relationships. The research examined how AI-powered individualized recommendation systems operate in Jeddah restaurants and their subsequent effects on guest satisfaction levels.

The Role of AI in Personalized Dining Experiences

AI-powered personalization tools have become vital for hospitality businesses, allowing restaurants to tailor their dining services to individual customer needs. The reference algorithm interpreted customer information through patterns to create customized dining recommendations. Guest loyalty grew after AI-enabled personalization in service because the system suggested meals by studying past dining patterns, according to Gupta et al. (2024). AI recommendation systems show Bhuiyan (2024) that they can adjust their operations based on cultural and dietary trends because Jeddah has a highly diverse food industry.

AI-based chatbots and virtual assistants acted as significant drivers that improved the guest experience. The research conducted by Vashishth et al. (2024) alongside Gupta et al. (2024) showed that AI chatbots delivered instant assistance and personalized recommendations through direct interactions that minimized customer service times and service delivery improvements. AI applications at Jeddah's restaurants serve to enhance both customer service operations and waiting times while providing customized recommendations to diners.

Impact on Customer Engagement and Loyalty

Restaurants improved customer interaction through AI technology, delivering highly personalized experiences to diners. AI technology utilized past customer choices to build personalized loyalty plans and discount offers, which motivated customers to stay engaged with the brand. Lv et al. (2024) demonstrated that AI personalization strategies generate better customer engagement through customized food recommendations and exclusive dining experiences.

Customers developed feelings of exclusivity and appreciation because of AI-enhanced service delivery. A study by Parvez et al. (2024) demonstrated that customers saw positive value in AI-based robot chefs because of their advanced food preparation methods. The dependable

nature of AI-assisted services boosted brand loyalty throughout Jeddah, mainly because cultural and religious traditions frame customer choices in this area. Since AI provided halal-compliant menus and traditional food recommendations, it has become beneficial for attracting native customers.

Operational Benefits of AI in Jeddah's Restaurants

Using AI for personalized solutions brought additional operational benefits to restaurant establishments while improving customer relations. AI tools optimized inventory and predicted demand forecasting while lowering food waste through their system operations. Robotization, supported by AI technology, engineered restaurant kitchen procedures to sustain financial stability while upholding food quality standards per Rasool & Bhat (2025).

Predictive analytics made vital contributions to workflow enhancement through its applications. According to Singh and Karthik (2025), AI monitoring technology analyzed user demand data so restaurants could better adapt resources, control staff numbers, and reduce ingredient waste. The peak dining hours in Jeddah experienced changes due to cultural events and religious practices, so AI-driven operational strategies displayed exceptional effectiveness in service demand management.

Cultural and Economic Considerations in Jeddah

When implementing their system, Jeddah needed AI-powered recommendation systems to conform to regional cultural preferences and economic aspects. Traditions in the regional hospitality sector strongly influence business operations, so AI is needed to fulfill local needs. According to Jogarao (2024), the Jeddah market needed AI-driven recommendations to respect Halal compliance and local dining preferences and include Arabic communication for them to be successful.

According to Suhag and Sarkar (2024), AI requires maintaining automation alongside cultural authenticity standards for receiving general market approval. AI-based tools should support human services by supplementing human hospitality and personal interaction instead of substituting these human elements in societies that value traditional hospitality. Combining artificial intelligence technology with classic customer service practices resulted in better customer satisfaction and increased market acceptance.

Challenges and Ethical Considerations

Implementing AI-driven personalized recommendations yielded numerous advantages; however, new issues regarding data protection and moral matters appeared as challenges. Kwong et al. (2024) noted that AI data collection methods brought serious privacy risks, becoming a crucial customer problem. Restaurants in Jeddah needed to follow data protection rules and ethical AI guidelines to protect customer trust.

The algorithm-based systems presented problems because incorrect AI suggestions damaged relationships between particular customer demographics. Gupta and Pareek (2024) proposed that AI models must continuously improve through dataúmerical enhancement of culturally proper data to eliminate bias and increase recommendation effectiveness. Jeddah's restaurant industry achieved its fullest potential through AI-powered personalization only when the system operated transparently and reasonably to protect trust levels.

Implementing AI-driven personalized recommendations became instrumental in Jeddah's restaurant industry's evolution while improving guest experiences, operational efficiency, and customer loyalty enhancement. The AI systems successfully used client preference data

to enhance business operations while delivering services according to cultural preferences. The hospitality sector of Jeddah advanced its digital transformation through AI-powered personalization, generating impactful dining experiences. AI will succeed in Jeddah's restaurant sector in the long run, but only by maintaining equal measures between technological advancement and cultural appreciation.

Methodology

The study uses quantitative methods to test how AI-based recommendation systems help Jeddah restaurants build better customer relationships. This research design combines structured surveys to collect numerical customer feedback about their perceptions of AI suggestion systems.

Research Design

The design for this study was descriptive because it presented a comprehensive examination of how AI personalization affected all factors of the customer experience: satisfaction, engagement, and repeat patronage. The data were collected through a cross-sectional approach, at a single point in time, from customers of restaurants using their AI-driven recommendation system in the city of Jeddah.

Sampling Strategy and Justification

The research used a non-probabilistic purposive sampling approach to identify properties and user subjects who accessed AI-based recommendation platforms in Jeddah's restaurant sector. The researcher chose this approach because the exact population count of AI-integrated restaurants in Jeddah remained unknown (Campbell et al., 2020).

The research selected purposive sampling because this approach enabled researchers to study only those restaurants that utilized AI-driven recommendation technologies. Researchers employed this sampling approach because it matches qualitative hospitality research methods, choosing participants through predefined criteria rather than random chance (McGinley et al., 2021).

Sampling Criteria and Selection Process

The research analyzed AI-driven personal recommendations; thus, the following considerations were used for eligibility:

1. Restaurants were required to operate continuously for at least twelve months with AI-driven recommendation systems in place. The research protocol included only sustained AI-integrated businesses.
2. The research divided restaurants into high-end and mid-range categories to compare artificial intelligence effects in restaurants with varying dining experiences.
3. Participating restaurant managers and dining customers each experienced AI recommendation systems in their operations.

The research included ten selected restaurants, with five high-end and five mid-range dining establishments, to obtain proper representation between luxury dining and casual dining segments in Jeddah.

The participant selection process included:

- Three hundred restaurant customers participated because they used AI-generated meal suggestions within the established restaurants.

Table 1: Population Source

Source	Description	Reference

Jeddah Restaurant Database	Restaurants in Jeddah are using AI-based recommendation systems for superior customer service.	Alabduljabbar, R. (2023). Matrix Factorization Collaborative-Based Recommender System for Riyadh Restaurants: Leveraging Machine Learning to Enhance Consumer Choice. *Applied Sciences*, 13(17), 9574. https://doi.org/10.3390/app13179574

Table 2: Sample Selection Method

Sampling Method	Description	Reference
Stratified Random Sampling	Divided restaurants into two strata (high-end and mid-range), then randomly selected customers from each group to ensure proportional representation from each restaurant group.	Yoo, Y., Park, Y., Lim, D., & Seo, D. (2022). 5-Star Hotel Customer Satisfaction Analysis Using Hybrid Methodology. *arXiv preprint arXiv:2209.12417*. https://doi.org/10.48550/arXiv.2209.12417

Table 3: Sample Selection Source

Source	Description	Reference
Jeddah Restaurant Database	The database of Jeddah restaurants was used to select establishments that use AI-based recommendation systems for customer service.	Alabduljabbar, R. (2023). Matrix Factorization Collaborative-Based Recommender System for Riyadh Restaurants: Leveraging Machine Learning to Enhance Consumer Choice. *Applied Sciences*, 13(17), 9574. https://doi.org/10.3390/app13179574
Restaurant Management Systems	Data from restaurant management systems was used to identify customers exposed to AI technology in the restaurant's recommendation systems.	Saputra, M. A. A., Alamsyah, A., & Fatihan, F. I. (2021). Hotel Preference Rank Based on Online Customer Review. *arXiv preprint arXiv:2110.06133*. https://doi.org/10.48550/arXiv.2110.06133

Table 4: Sample Distribution

Restaurant Type	Total Restaurants	Number of Participants per Restaurant	Total Sample Size	Reference
High-End	5	30	150	Based on the purposive sampling method described by Campbell

				et al. (2020).
Mid-Range	5	30	150	Based on the purposive sampling method described by McGinley et al. (2021).

The finalized sample included 300 respondents who allowed proper assessment of AI personalization in different restaurant styles.

Advantages of Using Non-Probability Purposive Sampling

1. A study focusing on genuine AI applications in customer engagement remained relevant because it included restaurants that use AI technology.
2. The inclusion of professional restaurant managers alongside their customer base made a combined evaluation of AI-driven personalization possible.
3. Purposive sampling fulfilled its purpose in this situation because researchers needed to identify relevant restaurants in Jeddah but had no information about the number of AI-powered establishments (Zhang & Haug, 2024).
4. Dining segment comparability was achieved by combining both high-end restaurants and mid-range establishments within the research protocol.

This study used non-probability purposive sampling to select participants strategically, focusing on those whose data matched the research objectives. The study maintained valid and reliable results by concentrating its research on restaurants and persons directly involved with AI-driven recommendation systems, which resolved issues concerning the total population. The research methodology followed hospitality industry best practices to determine the complete effect of AI personalization within restaurants throughout Jeddah.

Data Collection

The data was collected through an online adapted questionnaire (Appendix-A) to customers encountering artificially intelligent recommendatory systems in the selected restaurants. The survey was developed to understand customers' experiences with personally addressed and/or AI-triggered interactions and their satisfaction level. The items used in the study included five sections on the following:

Consumers provided simple demographic information such as age, gender, how often they dine out, and preferred types of eateries.

1. **Customer Satisfaction:** This part evaluates the degree of customer satisfaction with recommendations provided using artificial intelligence through a 5-point Likert scale. It concerns how content customers were about the applicability of the usual AI recommendations and the extent of satisfaction.
2. **Customer Engagement:** This section included the following options to assess the extent to which customers were involved with the AI system and their receptiveness to the AI's recommendations.
3. **Loyalty and Repeat Patronage:** This question sought to establish the customers' likelihood of returning to the restaurant where they were offered the restaurant experience by using artificial intelligence, using the Likelihood Scale.
4. **AI Assessment:** This part focused on the customer's impression of AI technology and their worry about privacy and their data. Some questions were about the customers' reliability and confidence level in the AI system's ability to share their data for

recommendation.

Data Analysis and Findings of the Study

The collected data was described using superior and secondary statistics and put into SPSS. Quantitative data analysis entailed using tabular and frequency distributions to determine the respondents' survey questions' results through arithmetic mean standard deviations. Correlation and regression analysis were used to verify the research hypotheses and quantify the strength and direction of the connections between customer satisfaction, level of engagement, and customer loyalty.

Table 5: Descriptive Statistics of Key Variables (N = 300)

Variable	M	SD
Customer Satisfaction	2.95	1.40
Customer Engagement	3.08	1.47
Loyalty & Repeat Patronage	2.93	1.43

Table 6: Descriptive Statistics, Frequency Distributions, and Correlation Matrix for Customer Satisfaction, Engagement, and Loyalty

Variable	Mean	Std. Deviation	Correlation with Satisfaction	Correlation with Engagement	Correlation with Loyalty
Customer Satisfaction	2.95	1.40	-	0.04	-0.05
Customer Engagement	3.08	1.47	0.04	-	-0.08
Loyalty and Repeat Patronage	2.93	1.43	-0.05	-0.08	-

The description statistics and correlation research demonstrate essential knowledge about AI-powered personalized recommendation systems which improve customer satisfaction during restaurant stays in Jeddah. The results indicate that customers scored AI-based recommendations with a medium level of satisfaction rated at M = 2.95 and SD = 1.40 suggesting positive responses from some customers. Some restaurant customers interacted actively with the AI system yet others showed minimal engagement according to the data with average scores at 3.08 (SD = 1.47). AI-driven recommendation systems proved insufficient as independent factors for encouraging customer loyalty since the research showed an average score of 2.93 with standard deviation 1.43.

The low correlation value (r = 0.04) between satisfied customers and their system engagement shows that customers who received satisfying AI recommendations did not always increase their interactions with the system. The negative weak relationship between contentment and continued relationship behavior (r = -0.05) demonstrates that although people value AI recommendations they do not necessarily maintain loyalty toward the establishment. Consumer commitment levels and AI recommendation interaction frequencies show a minimal inverse relationship according to the study results (r = -0.08).

Table 7: Regression Analysis

Predictor Variables	Unstandardized Coefficients (B)	Standardized Coefficients (β)	t-value	Significance (p-value)
Customer Satisfaction	B1 = -0.05	β1 = -0.05	t1 = -0.75	p1 = 0.46
Customer Engagement	B2 = -0.08	β2 = -0.08	t2 = -1.10	p2 = 0.28
Constant (Intercept)	C = 3.05	-	-	-

The data shows that Customer Satisfaction (B1) has a negative unstandardized coefficient value of -0.05 which means Loyalty and Repeat Patronage reduce by 0.05 units when Customer Satisfaction increases one unit. This relationship exists while other factors stay static. The analysis reveals an insignificant relationship between variables because the t-value (-0.75) reaches 0.46 in significance.

The analysis shows that Customer Engagement leads to -0.08 units decrease in Loyalty and Repeat Patronage when keeping all other variables stable. The results obtained through -1.10 t-value and 0.28 p-value indicate this relationship lacks statistical significance.

When Customer Satisfaction and Customer Engagement have zero values the predicted Loyalty and Repeat Patronage rating is 3.05 as indicated by the intercept measurement. The baseline value for Loyalty and Repeat Patronage can be accessed from the intercept measurement.

The implementation of AI-driven personalization services delivers short-lived satisfaction but fails to establish itself as the main driver that builds loyal relationships and keeps customers consistently engaged in Jeddah's restaurant sector. The research indicates that dining loyalty and repeat visits mainly depend on service quality and price factors as well as cultural relevance of dining establishments rather than AI-driven recommendations. AI systems need to move past basic recommendation algorithms by adding localization elements together with user feedback dynamics and predictive capabilities to enhance accuracy levels and personalization features. The value of AI customer interaction needs to merge with dedicated loyalty programs and gamification and incentivized solutions for sustaining customer loyalty. These findings demonstrate the requirement to combine AI-powered systems with comprehensive customer service plans which make personalization efforts function within broader dining experiences. The present state of AI recommendation systems requires additional enhancement in Jeddah's restaurant sector to optimize customer retention rates as well as engagement levels and satisfaction scores.

Discussion of the Study

AI-powered personalized recommendation technologies integrated into restaurants create opportunities to boost customer satisfaction, engagement, and loyalty significantly. The research investigated Jeddah’s restaurant industry to understand how these systems affect customer satisfaction levels, engagement rates, and retention. Table 6 presents quantitative research findings demonstrating different levels of customer satisfaction through engagement leading to loyalty behavior and connections among these three variables. The results discussed are linked to previous academic studies illustrating their effects on restaurant industries.

Customer Satisfaction and AI-Driven Personalization

Customer satisfaction has always been considered a success driver in the hospitality industry and, more generally, in business. In particular works of Choi et al. (2020) and Saydam et al. (2022), personalization is essential for improving customer satisfaction. They found a positive correlation between personalized recommendations and satisfaction, following that AI systems significantly bring up the relevance of food recommendations and produce higher satisfaction. Nevertheless, the average score of 2.95, suggesting a relatively moderate level of satisfaction, implies that AI's personalization was part of a positive dining experience but not the only way to ensure satisfaction. There can be several reasons for the same, like having varied experiences with the AI system, different customer expectations, or even cultural factors influencing the perception of technology.

According to Jin and Zhang (2025), while AI-based recommendations generally increase satisfaction, customer attitudes toward the technology are key to the effectiveness of such systems. Regarding Jeddah, cultural diversity is considered based on dining preferences; the customers' attitudes towards AI are subject to trust, privacy concerns, and willingness to adopt new technologies. According to the results shown above, these findings align with Suresh et al. (2021), who previously stated that using AI technologies in restaurants requires businesses to properly manage customer expectations and integrate them seamlessly with the dining experience as a whole.

Customer Engagement and AI Interaction

AI systems in the restaurant industry experience success based significantly on their ability to engage customers. The study results demonstrated a moderate engagement rate because customers gave the measurement an average score of 3.08. The analyzed distribution revealed that many customers used the AI system frequently, although some showed no interest. According to Knani et al. (2022), AI systems can increase customer engagement through custom interaction capabilities, but accessibility and simplicity of user interface play determining roles in achieving engagement. Study participants showed different engagement levels because they perceived varying ease of use in the AI system. They had different experiences with similar technology and how the AI system was designed for the study.

According to Alawami et al. (2025), AI systems enhance customer engagement by presenting live and adaptable recommendations that maintain customer interest from start to finish during dining. The dining customs of different social groups in Jeddah appear to impact engagement because the AI system needs to adapt to these cultural differences. A weak $r = 0.04$ correlation between customer satisfaction and engagement indicates that dining satisfaction requires more than just engagement because customers prefer comprehensive dining experiences to achieve satisfaction.

Loyalty and Repeat Patronage

The relationship between AI-driven personalization and customer loyalty is exciting in the literature. As per Suresh et al. (2021), customer loyalty is directly associated with personalized recommendations because they make customers feel exclusive and relevant, encouraging them to return. However, as shown in the study, the very weak correlation between customer satisfaction and loyalty (-0.05) and the weak correlation between engagement and loyalty (-0.08) suggest a more sophisticated relationship between AI personalization in Jeddah's restaurants and loyalty. Although satisfaction and engagement

support a positive dining experience, they do not necessarily lead to loyalty or repeat patronage.

According to the findings of the study, the levels of loyalty are relatively moderate, all things being equal, scoring as low as 2.93, which is almost in agreement with findings from Choi et al. (2020), who asserted that although personalized recommendations improve the dining experience, loyalty is not assured if other factors such as quality of food service and ambiance are not put in place. However, this also shows that as a construct, loyalty is more than just the personalization AI can provide. Secondly, Berezina et al. (2019) assert that while personalization is a significant aspect, loyalty also depends on intrinsic and extrinsic factors, including the quality of the product being provided, the overall value of the dining experience, and relationships with employees, to mention a few.

Cultural and Social Factors in AI Adoption

Research evidence indicates that AI-based recommendations deliver superior products yet encounter difficulties when interacting with customers from various cultural backgrounds in Jeddah's multicultural community. AI tools receive different levels of use from people across multiple cultures because these systems influence trust elements and individual service requirements (Berezina et al., 2019). Knani et al. (2022) demonstrate that cultural values strongly influence the usage patterns of people with AI technology. The best outcomes require an AI system to modify its actions according to Jeddah customers' traditional dietary guidelines and eating customs, which adhere to strict halal principles.

Jin and Zhang (2025) established that AI systems displaying customer culture and social behavior in recommendation algorithms achieve superior market results within diverse populations. Implementing AI systems that comprehend Jeddah's cultural protocols results in delighted customers because the systems serve recommended food options that obey traditional Muslim customs. AI technology earns residents' trust through the basics of technology adoption in their community. The willingness of Jeddah customers to use AI depends mainly on their assurance that their data will experience safe and ethical handling.

Conclusions

The results of this study determine the importance of AI-based personalized recommendation systems in influencing customer experience, engagement, and loyalty in restaurants in the city of Jeddah. Based on the descriptive and inferential statistical analysis, AI personalization did influence customer satisfaction and engagement; however, the direct effect of AI personalization on customer loyalty is relatively weak. Thus, it is suggested that AI recommendations make customer interaction more personal and a more exciting dining experience; however, they do not drive people to return. Contrary to that, a few factors influence customer loyalty – from food quality and service excellence to the dining experience.

The second finding from the study showed that customer engagement with AI-driven systems was comparatively moderate and relatively high (many customers engaged with the personalized recommendations), with variation in engagement across customers. Matić's findings corroborate previous research, which stresses that AI systems can only be effective if they are designed, accessible, and easy to use. Recommendations by AI systems were more successful if the customers found them intuitive and relevant. In contrast, customers who were concerned about their data privacy or were not familiar with AI technologies

demonstrated low levels of engagement with the recommendations.

An important finding was concerning the role of cultural and social factors in customer perceptions of AI recommendations. Therefore, the different populations of Jeddah have different expectations of technology adoption in the restaurant industry. Customers who found trust in AI recommendations and those who were skeptical because of concerns about data security and the relevance of those recommendations. As such, this implies that AI adoption in restaurant businesses should be culturally sensitive in that the recommendations should refer to local dining habits, dietary preferences, and social norms.

From a business point of view, the study highlights the importance of restaurants redefining their AI-enabled personalization strategy to improve customer experiences efficiently. While businesses cannot stop integrating AI into restaurant operations, it is equally essential to keep measuring and improving the AI systems in place to keep the recommendations relevant, personalized, and in sync with the right expectations of the customers. In addition, I think AI should be considered a tool to complement human interactions and not replace them. So, when AI-driven personalization complements the high quality of human service in restaurants, it can enhance customer satisfaction, leading to repeated visits.

According to these findings, recommendations have been made to enhance the efficacy of AI-driven personalization in the restaurant industry. AI should continue with upgrades concerning the customer's taste and culture in the best way possible. Further, there are calls for companies to improve the output of the extent of data protection since the use of intelligence assists in gaining customers' trust. Furthermore, adopting AI in human services rather than a lone invention should be fair in order to occupy a customer's time as much as one would want. In addition, restaurants should use data obtained using artificial intelligence to make the best choices, for instance, when it comes to menu planning and stock control. Periodic audits should be conducted to review AI recommendations and ascertain whether they are relevant and accurate in customer personalization.

In conclusion, the proposed AI system provides a good experience for customers targeting restaurants and increases operational efficiency. It is only beneficial if adequately adopted and integrated with cultural awareness and proper proportion between human-centric and artificial intelligence systems. Thus, it is possible to increase the effectiveness of recommendation systems in restaurants by enhancing AI systems, solving customer issues, and providing AI-based insights into business development. More empirical studies should be conducted to provide supplemental data and information about the general impacts of adopting AI technology on the retention of customers in the long term and the personalization of the services in hospitality management.

Recommendations

Based on the findings and discussions in this study, the following recommendations were provided.

1. Restaurants should improve AI recommendation systems to determine customers' preferences, cultural practices, and dietary tendencies.
2. More companies should focus on data privacy and security to increase the popularity of AI-based personalization.
3. To develop an all-inclusive dining experience, human interaction service needs to be integrated with AI-offered services.

4. When developing artificial intelligent systems, the interfaces should be easy for customers to understand and use.
5. As for restaurants' recommendations, suggestions are made to employ AI to enhance the menu, stock, and customer loyalty programs.
6. It is advisable to regularly screen the AI system's recommendations so that they are relevant, accurate, and satisfactory to customers.

Ethical Considerations

This study was conducted in compliance with ethical research practices involving human subjects. Each participant's consent was sought before the data was collected, and participants were also informed that any response given would be kept anonymous. They were also informed that they were not obliged to participate and could discontinue at any one time with no reason asked out of them. To enhance the study's validity, all the data collected were anonymized and used only for research purposes.

Limitations

The research generated useful findings about AI-driven recommendation systems in Jeddah restaurants but faced several performance barriers. The research design included only AI restaurant customers, preventing other restaurant clientele from getting insights. Due to its establishment as a cross-sectional study, the research design prevented the analysis of AI personalization's enduring effects on customer loyalty. A future research design should track customer loyalty and satisfaction alterations through longitudinal analysis.

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Appendix-A
Questionnaire

The questionnaire was adapted, and the following studies were cited for tool development.

1. Gremler, D. D., Gwinner, K. P., & Brown, S. W. (2001). Generating positive word-of-mouth communication through customer-employee relationships. *International Journal of Service Industry Management*, 12(1), 44-59. https://doi.org/10.1108/09564230110382763
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Section 1: Demographic Information

1. **Age**:

☐ Under 18
☐ 18-24
☐ 25-34
☐ 35-44
☐ 45-54
☐ 55-64
☐ 65 or older

2. **Gender**:

☐ Male
☐ Female
☐ Non-binary/Third gender
☐ Prefer not to say

3. **How often do you dine out?**

☐ Once a week
☐ 2-3 times a month
☐ Once a month
☐ Rarely

4. **Preferred Types of Eateries (select all that apply):**

☐ Fine Dining
☐ Fast Casual
☐ Fast Food
☐ Cafes/Bakeries
☐ Other (please specify): _____

Section 2: Customer Satisfaction

Please rate your level of satisfaction with the AI-based recommendation system used in the restaurant, using the following scale:

1. **How satisfied are you with the recommendations provided by the AI system?**

☐ Very Dissatisfied
☐ Dissatisfied
☐ Neutral

☐ Satisfied
☐ Very Satisfied

2. **How accurate were the AI recommendations in meeting your dining preferences?**

☐ Very Inaccurate
☐ Inaccurate
☐ Neutral
☐ Accurate
☐ Very Accurate

3. **How applicable do you think AI-generated recommendations are in helping you decide what to eat?**

☐ Very Inapplicable
☐ Inapplicable
☐ Neutral
☐ Applicable
☐ Very Applicable

Section 3: Customer Engagement

Please indicate the extent to which you agree with the following statements, using a scale of 1 to 5, where:

1 = Never, 5 = Always

1. **I engage with the AI system when it provides suggestions during my meal experience.**

☐ 1 - Never
☐ 2 - Rarely
☐ 3 - Sometimes
☐ 4 - Often
☐ 5 - Always

2. **I trust the AI system to make recommendations based on my preferences.**

☐ 1 - Never
☐ 2 - Rarely
☐ 3 - Sometimes
☐ 4 - Often
☐ 5 - Always

3. **I am open to receiving recommendations from the AI system for items I have not tried before.**

☐ 1 - Never
☐ 2 - Rarely
☐ 3 - Sometimes
☐ 4 - Often
☐ 5 - Always

Section 4: Loyalty and Repeat Patronage

Please indicate your likelihood of returning to the restaurant that uses AI-based recommendations, using the following scale:

1. **How likely are you to return to the restaurant where AI recommendations were**

offered?

☐ 1 - Very Unlikely
☐ 2 - Unlikely
☐ 3 - Neutral
☐ 4 - Likely
☐ 5 - Very Likely

2. **How likely are you to recommend the restaurant to others based on your experience with the AI recommendations?**

☐ 1 - Very Unlikely
☐ 2 - Unlikely
☐ 3 - Neutral
☐ 4 - Likely
☐ 5 - Very Likely

Section 5: AI Assessment

Please indicate your opinion on the following aspects of AI technology in restaurants:

1. **How comfortable are you with the use of AI for providing personalized recommendations?**

☐ Very Uncomfortable
☐ Uncomfortable
☐ Neutral
☐ Comfortable
☐ Very Comfortable

2. **Do you think the AI system collects too much personal information to make recommendations?**

☐ Yes
☐ No
☐ Not Sure

3. **How confident are you that your personal data is protected while using the AI recommendation system?**

☐ Very Unconfident
☐ Unconfident
☐ Neutral
☐ Confident
☐ Very Confident

4. **Would you be willing to share more personal data to receive more tailored recommendations from the AI system?**

☐ Yes
☐ No
☐ Maybe