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A Review of Artificial Intelligence Applications in Enhancing Customer Experience in the Food and Beverage Industry

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Abstract: *The food and beverage industry is experiencing rapid adoption of artificial intelligence technologies to enhance customer experience. From mobile food-ordering apps to personalised menu recommendations, from sentiment-analysis of reviews to dynamic pricing and robotic service, AI is reshaping how customers interact with F&B service providers. This review synthesises recent academic and industry literature to (1) map the major AI application domains relevant to CX in F&B, (2) examine how these applications contribute to various dimensions of customer experience (e.g., usability, personalization, affective engagement, trust), (3) identify key enablers and challenges of adoption in the F&B context, and (4) propose future research directions. Our findings indicate that while AI has strong potential for improving convenience, relevance and emotional engagement, significant issues relating to data-trust, fairness, workforce implications, system integration and small business adoption remain. The paper closes with a research agenda for scholars and practical implications for F&B managers..*

Keywords: Artificial Intelligence, customer experience, food and beverage.

I. INTRODUCTION

The F&B industry is highly competitive and service-intensive, and customer experience has become a critical differentiator. AI technologies such as machine learning, natural language processing, computer vision and robotics present new opportunities to enhance CX by enabling real-time personalization, smoother service interactions, predictive insights and immersive experiences. This review focuses specifically on how AI is being applied to enhance customer experience in the F&B industry, rather than purely operational or supply-chain uses, though some overlap exists.

In today's rapidly evolving food and beverage industry, customer experience has emerged as a decisive competitive differentiator. Consumers increasingly demand not just satisfaction of basic needs but seamless, personalized, emotionally engaging interactions across every touchpoint from mobile ordering and in-restaurant service to delivery and post-purchase feedback. At the same time, artificial intelligence technologies encompassing machine learning, natural language processing, computer vision, predictive analytics, robotics and generative AI are offering novel instruments for F&B enterprises to tune every part of the customer journey. The intersection of AI and CX in F&B thus presents both enormous opportunity and distinct complexity, making it an important subject for systematic review.

The impetus for applying AI in F&B CX arises from several converging trends. First, digital ordering, mobile and online engagement have become mainstream; for example, mobile food-ordering apps now account for large volumes of transactions globally. This shift expands the number of "digital touch-points" where experience can make or break loyalty. In parallel, customers' expectations have grown: personalization, speed, relevance, and transparency are now baseline requirements rather than luxuries. Second, AI and supporting infrastructure have matured to a point where real-time recommendation, dynamic pricing, automated service and conversational agents are commercially viable.

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Third, the competitive pressure within F&B from large chains to smaller independent outlets is mounting, pushing brands to seek differentiated CX rather than compete purely on price or location. In this context, AI represents a strategic lever to move beyond operational efficiency and into experiential value creation.

Within this landscape, AI can enhance CX in multiple ways. For one, recommendation engines and personalization modules draw on customer purchase history, preferences, contextual data to suggest meals, upsells or side-items, thereby boosting perceived relevance and convenience. For instance, AI-powered mobile food-ordering platforms can offer tailored menus and reorder suggestions, increasing both efficiency and satisfaction (Shorbaji et al., 2025). At another frontier, robotics and automation in service can shorten waiting times, reduce errors, and inject novelty or emotional appeal into the dining experience. Meanwhile, advanced sentiment-analysis tools mine social media, review platforms and customer feedback to detect pain-points, anticipate dissatisfaction, and enable firms to respond proactively. Underlying all this is the promise of AI to deliver instrumental usability, personalization value, affective engagement, data trust & fairness, and social co-experience dimensions increasingly recognised in CX research (Shorbaji et al., 2025).

Despite this potential, the adoption and impact of AI in F&B CX face significant challenges. Data privacy concerns, algorithmic bias, transparency of algorithmic decisions and customer trust remain substantial barriers. Many consumers remain wary of AI-driven pricing or recommendation systems if they perceive unfairness or opacity. On the operational side, F&B businesses particularly smaller restaurants face issues of infrastructure cost, integration with legacy systems, and workforce up-skilling for AI-augmented service models. Additionally, the F&B context is uniquely complex: perishable products, high variability in demand, human-centred service encounters and diverse consumer tastes across cultures mean that AI systems must perform reliably under real-world constraints. For example, while AI demand-forecasting may be feasible in manufacturing, embedding AI seamlessly into live service interactions presents further human-machine interaction complexities.

Moreover, literature addressing the specific link between AI applications and customer experience in F&B remains relatively nascent. While AI's role in production, supply-chain or safety in food and beverage has been increasingly studied (Ding et al., 2023), fewer studies have focused explicitly on the consumer-facing experience dimension in F&B contexts. The work by Shorbaji et al. (2025) on AI-enabled mobile food-ordering apps is an exception, identifying five key CX dimensions and mapping recent studies to them; yet they note that much of the research has been limited to app-usage intention rather than long-term experience or in-restaurant dynamics. This gap suggests the need for a systematic review focusing on CX outcomes rather than purely adoption metrics.

Against this backdrop, our review aims to synthesise current evidence on how AI is being deployed in F&B customer-experience contexts, to identify major application domains, assess how they influence CX dimensions, and elucidate the enablers/obstacles in real-world deployment. Specifically, we examine how AI interventions translate into tangible improvements in customer experience. Additionally, we seek to map the organisational, technological and human-factors that either support or hinder effective AI deployment. By doing so, we hope to provide both scholars and practitioners with a clearer agenda for research and implementation.

Given the heterogeneity of the F&B industry, the review deliberately spans multiple business models and regional contexts. It emphasises the consumer-facing interface and service experience rather than operational back-end systems. We adopt a thematic approach, mapping current studies to a conceptual framework of CX dimensions and application domains, and highlight emerging trends such as generative AI, immersive dining, and hybrid human-AI service models. In doing so, we situate our review within a broader understanding of digital transformation in hospitality and service industries.

The integration of AI into the F&B industry offers a promising pathway to elevate customer experience moving from efficiency and cost-control to relevance, emotional engagement and value co-creation. Yet realising this potential is far from automatic: it requires alignment of technology, data, human factors, and organisational strategy. By synthesising existing research on AI-enabled CX in F&B, this review aims to clarify what is known, what remains uncertain, and

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how the field might evolve. In so doing, it provides both a foundation for future empirical work and guidance for F&B firms seeking to deploy AI in ways that genuinely enhance the customer experience.

METHODOLOGY

We conducted a narrative-systematic review of peer-reviewed journal articles, conference papers and industry reports published in the past ~5 years. Key databases consulted include Scopus, Web of Science, and industry white-papers. Search strings included "artificial intelligence AND food and beverage", "AI AND customer experience AND food industry", "mobile food ordering AI personalization", etc. For example, one study identified 55 papers published between 2022–2025 on AI-enabled mobile food-ordering apps and CX. Additional reviews explored sentiment-analysis in food delivery services. Thematic coding was used to extract application domains, CX-dimensions, enablers/challenges, and future research suggestions.

MAJOR AI APPLICATION DOMAINS IN F&B CX

Major Artificial Intelligence application domains in enhancing customer experience within the Food and Beverage industry include personalization, automation, and analytics-driven decision-making. AI-powered recommendation systems tailor menus, promotions, and offers to individual preferences, improving satisfaction and loyalty. Chatbots and virtual assistants provide real-time assistance, streamline reservations, and enable faster, contactless ordering through voice or text. Predictive analytics help restaurants forecast demand, optimize inventory, and minimize food waste ensuring availability and freshness that enhance customer trust. Sentiment analysis of customer reviews and feedback allows businesses to detect satisfaction trends and address issues proactively. Moreover, AI-driven self-service kiosks, robotic servers, and dynamic pricing systems improve convenience, speed, and value perception. Collectively, these applications foster a seamless, personalized, and efficient dining experience that strengthens engagement and customer loyalty while driving operational excellence in the F&B sector.

Table 1 summarises key AI application domains, examples of use-cases in F&B, and how they map to CX improvements.

Table 1. AI Application Domains in F&B Customer Experience

#	Application Domain	Use-Case Examples	CX Contribution
1	Mobile Ordering & Recommendation Engines	AI-powered apps that suggest meals, reorder favourites, use chatbots for order entry.	Improves **instrumental usability** (speed, ease), **personalization value** (relevance of suggestion)
2	Sentiment Analysis & Feedback Processing	NLP or transformer models to analyse online reviews, social media feedback for restaurants/F&B services.	Enhances **data trust**, helps customers feel heard, enables proactive improvement
3	Smart Service Automation & Robotics	Robot servers, voice assistants at kiosks/drive-thru, automated ordering & preparation.	Enhances **affective engagement** (novelty, seamless service), reduces friction
4	Dynamic Pricing, Personalization & Context-Aware Menus	AI that adapts menu suggestions/pricing based on time, weather, local demand, user past behaviour.	Improves **personalization value**, and instrumental usability
5	Supply-Chain & Back-Office Integration (with front-end impact)	AI forecasting demand, optimising inventory, ensuring fresh stock which indirectly improves CX through fewer stockouts or delays.	Indirectly improves **service reliability**, fewer breakdowns, faster fulfilment

Note: The CX Contribution column uses language derived from frameworks such as instrumental usability, personalization, affective engagement, trust and social co-experience.

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CUSTOMER EXPERIENCE DIMENSIONS & AI IMPACT

Drawing on recent literature, particularly the systematic review of mobile food-ordering apps, five key CX dimensions are particularly impacted by AI in F&B:

Instrumental Usability the ease and speed with which customers complete tasks (e.g., ordering, paying)

Personalization Value relevance of suggestions, menus and interactions curated by AI

Affective Engagement emotional and experiential quality of the interaction (e.g., novel interfaces, conversational agents)

Data Trust & Procedural Fairness customers' confidence that the system is fair, transparent and respects their data

Social Co-Experience ability to share, co-create, interact socially (e.g., via reviews, social ordering)

AI applications contribute differently to each dimension: for example, recommendation engines strongly contribute to personalization and usability; sentiment-analysis supports trust and socially-driven reactions; robotics or immersive AR contribute to affective engagement.

PREVALENCE OF APPLICATION DOMAINS

The prevalence of artificial intelligence application domains in the food and beverage industry has grown significantly in recent years, driven by the need for enhanced customer experience, operational efficiency, and data-driven decision-making. AI technologies have moved from being experimental tools to integral components of modern restaurant and hospitality management systems. Today, nearly every stage of customer interaction from menu personalization to post-service feedback leverages some form of AI, making it a dominant force in shaping the future of F&B service innovation.

One of the most widespread applications of AI in the F&B sector is personalization and recommendation systems. Restaurants and food delivery platforms such as Zomato, Swiggy, and Uber Eats use AI algorithms to analyze customer data past orders, browsing behavior, location, and time of day to recommend dishes or promotions tailored to individual tastes. This not only enhances customer satisfaction but also increases sales through upselling and cross-selling opportunities. Studies have shown that personalized menu suggestions can improve order frequency and loyalty by making the customer feel recognized and valued.

Another domain that has achieved substantial prevalence is the use of chatbots and virtual assistants. These AI-driven tools handle customer inquiries, take orders, manage reservations, and provide 24/7 support. For example, chains like Domino's Pizza and Starbucks have implemented AI-based chat interfaces that allow customers to place orders via voice or text seamlessly. These technologies reduce waiting times, improve accessibility, and ensure consistent service quality across digital platforms. The growing adoption of voice assistants, such as Alexa and Google Assistant, further integrates AI into the dining experience, enabling customers to interact naturally with restaurant systems.

Predictive analytics and demand forecasting represent another dominant area of AI application. Using machine learning algorithms, businesses can forecast sales, optimize staffing schedules, and manage inventory efficiently. By analyzing variables such as seasonality, local events, and weather conditions, AI systems help ensure that food items are available when customers demand them. This directly enhances customer experience by minimizing stockouts and ensuring freshness while simultaneously reducing operational costs and waste.

In addition, AI-based sentiment analysis has become increasingly prevalent as a feedback management tool. Restaurants now employ natural language processing algorithms to scan social media reviews, feedback forms, and online ratings to assess customer sentiment. This allows for proactive management of service quality identifying complaints early, understanding customer emotions, and tailoring responses accordingly. Such data-driven feedback loops empower F&B managers to improve service standards and create emotionally engaging customer experiences.

Furthermore, AI-powered automation and robotics are rapidly expanding in prevalence within modern restaurants. Robots are now used in kitchens for cooking, assembling meals, and even delivering food to tables, as seen in outlets like Spyce in Boston or Cafe X in San Francisco. Self-service kiosks equipped with facial recognition and intelligent

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menu systems have also become common in fast-food chains, offering faster and more personalized ordering processes. These innovations directly enhance CX by improving convenience and reducing human error.

Lastly, dynamic pricing and menu optimization are emerging AI domains with increasing adoption. AI systems analyze demand, time, competition, and inventory levels to adjust prices and highlight menu items dynamically. This approach benefits both customers and businesses customers receive better value while restaurants maximize revenue and reduce waste.

The prevalence of AI application domains in the F&B industry is extensive and rapidly expanding. From personalization and chatbots to predictive analytics and robotics, AI technologies have permeated every aspect of the dining experience. Their integration not only transforms operations but also fundamentally enhances customer engagement, satisfaction, and loyalty. As technology continues to evolve, the future of F&B customer experience will increasingly depend on how effectively businesses harness AI to deliver seamless, intelligent, and emotionally resonant interactions.

ENABLERS AND CHALLENGES

A. Enablers

Advances in data analytics and cloud infrastructure enabling real-time AI in apps and services.
Growing consumer comfort with digital ordering and chatbots facilitating AI interface adoption.
Competitive pressure in F&B for differentiation drives investment in AI for CX.
Availability of large datasets (orders, customer behaviour, reviews) fuels ML and personalization.

B. Challenges

Data privacy, trust and ethical issues customers may resist or distrust AI systems that use personal data or apply dynamic pricing.
Technology integration and cost barrier, especially for small and medium F&B establishments.
Workforce implications and change management automation may displace roles, require new skills.
Algorithmic bias and fairness personalization might reinforce stereotypes or produce unfair pricing/offers.
User experience design and adoption poorly designed AI interfaces can lead to user frustration (algorithmic anxiety).

PRACTICAL IMPLICATIONS

For F&B managers and decision-makers: -
Prioritise AI deployment where customer experience improvement is most visible (e.g., mobile ordering, chatbots) before heavier capital investment (e.g., robotics).
Ensure transparency in how AI uses customer data and how recommendations/pricing are determined to build trust.
Combine AI personalization with human service to maintain the human-touch and emotional connection.
Monitor adoption and track key CX metrics (order fulfilment time, user satisfaction, repeat rate) to evaluate ROI.
For smaller venues, seek cloud-based AI platforms or SaaS rather than full in-house builds to reduce cost/time.

FUTURE RESEARCH AGENDA

Key gaps and opportunities:
Long-term studies on customer trust and acceptance of AI in F&B across diverse cultures and age-groups.
Research into social co-experience in F&B (e.g., social ordering, shared menus, community features) and role of AI.
Examination of generative AI (e.g., generative menu design, AI-driven food photography) in F&B CX contexts.
Studies on how AI-enabled personalization interacts with dietary restrictions, health preferences and ethical consumption.
Investigations of AI adoption in small/independent restaurants (rather than large chains) and how business scale influences outcomes.

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Exploration of explainable AI (XAI) in F&B customer interfaces, to improve transparency and trust.

II. CONCLUSION

AI holds significant promise to enhance customer experience in the F&B industry through improved usability, personalization, emotional engagement and trust-building. However, delivering on this promise requires attention to ethical, operational and human factors. By strategically deploying AI where it delivers visible CX benefits, and by addressing adoption barriers proactively, F&B service providers can gain competitive advantage and build lasting customer loyalty. Further research is needed to deepen understanding of how AI shapes experience over time, across contexts, and for different business sizes.

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