

Artificial Intelligence-Driven Smart Food Tourism: Investigating the Influence of Digital Gastronomic Experiences, Cultural Authenticity, and Tourist Engagement on Sustainable Destination Competitiveness

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Abstract: Artificial Intelligence (AI) is transforming the tourism industry by enabling intelligent decision-making, personalized travel planning, predictive analytics, and immersive digital experiences. Within this transformation, smart food tourism has emerged as an innovative paradigm that integrates AI-driven technologies with gastronomic heritage to enhance tourist experiences and strengthen destination competitiveness. This study investigates the influence of digital gastronomic experiences, cultural authenticity, and tourist engagement on sustainable destination competitiveness through an Artificial Intelligence-driven framework. The proposed model examines how AI-enabled recommendation systems, virtual culinary platforms, intelligent travel assistants, and personalized digital services enhance tourists' engagement with authentic culinary experiences while promoting sustainable tourism practices. Furthermore, the study evaluates the mediating role of tourist engagement in translating AI-enabled gastronomic experiences and cultural authenticity into long-term destination competitiveness. A quantitative research framework employing structured questionnaires and Structural Equation Modeling is proposed to examine the relationships among the study constructs. The findings are expected to contribute to smart tourism literature by integrating Artificial Intelligence, digital gastronomy, and sustainable destination management into a unified framework while providing strategic guidance for tourism authorities, hospitality organizations, technology developers, and policymakers seeking to develop intelligent, culturally authentic, and globally competitive tourism destinations.

Keywords: Artificial Intelligence, Smart Food Tourism, Digital Gastronomic Experiences, Cultural Authenticity, Tourist Engagement, Sustainable Destination Competitiveness

1. Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies driving the evolution of global tourism by enabling intelligent decision-making, personalized visitor experiences, predictive analytics, and smart destination management. The rapid advancement of machine learning, natural language processing, computer vision, recommendation systems, generative AI, and big data analytics has fundamentally reshaped how tourists search, plan, experience, and evaluate destinations. Contemporary travelers increasingly depend on AI-enabled digital platforms, virtual assistants, mobile applications, social media analytics, and personalized recommendation engines to discover tourism products that match their individual preferences. Consequently, tourism destinations are transitioning from conventional marketing approaches toward intelligent, data-driven ecosystems that enhance visitor engagement while promoting sustainability and long-term competitiveness.



Simultaneously, gastronomic tourism has evolved from being a supplementary tourism activity into a strategic component of destination branding and cultural preservation. Food has become an experiential tourism asset that allows visitors to understand the history, traditions, identity, and lifestyle of local communities through authentic culinary experiences. Unlike conventional sightseeing, gastronomic tourism creates multisensory interactions that stimulate emotional attachment, cultural appreciation, and memorable travel experiences. The convergence of Artificial Intelligence with gastronomic tourism has further transformed this domain by enabling personalized culinary recommendations, smart restaurant selection, AI-powered travel planning, digital food storytelling, augmented reality dining, virtual culinary tours, and intelligent visitor engagement platforms. These technological innovations have established a new paradigm referred to as **Smart Food Tourism**, where digital technologies and authentic culinary heritage collectively contribute to sustainable destination competitiveness.

The increasing digitalization of tourism has significantly influenced tourists' decision-making behaviour. AI algorithms continuously analyse tourists' preferences, online reviews, previous travel histories, spending patterns, dietary preferences, and cultural interests to generate personalized gastronomic recommendations. Such intelligent personalization improves visitor satisfaction by reducing information overload while increasing destination accessibility and convenience. Furthermore, AI-supported conversational agents, multilingual chatbots, smart navigation systems, facial recognition technologies, and location-aware mobile applications have enhanced service quality throughout the tourist journey. These technological developments have enabled destinations to deliver customized experiences that strengthen emotional engagement and improve destination image.

Despite the remarkable technological progress, cultural authenticity continues to remain the foundation of successful gastronomic tourism. Tourists increasingly seek genuine culinary experiences that reflect indigenous traditions, regional recipes, local ingredients, traditional cooking techniques, and community participation. Cultural authenticity creates trust, emotional attachment, and destination distinctiveness by allowing visitors to experience the identity of a place beyond commercial tourism products. Therefore, successful AI implementation should complement rather than replace authentic cultural experiences. The integration of intelligent technologies with authentic culinary heritage creates balanced tourism ecosystems capable of satisfying modern tourists while preserving local cultural values.

Tourist engagement has consequently become a central determinant of sustainable destination competitiveness. Engaged tourists actively participate in culinary activities, interact with local communities, share digital content, generate electronic word-of-mouth, and contribute to destination promotion through online platforms. AI significantly strengthens tourist engagement by delivering interactive digital experiences, personalized recommendations, gamification, virtual reality food experiences, and real-time communication throughout the tourism lifecycle. Such engagement enhances visitor satisfaction while simultaneously increasing destination visibility and competitive advantage within increasingly digital tourism markets.

Sustainable destination competitiveness requires destinations to balance technological innovation, visitor satisfaction, environmental sustainability, economic development, and cultural preservation. AI facilitates sustainable tourism through intelligent resource allocation, visitor flow management, demand forecasting, waste reduction, predictive analytics, and personalized destination management strategies. Simultaneously, gastronomic tourism supports local economies by promoting indigenous food producers, traditional restaurants, culinary entrepreneurs, farmers, artisans, and cultural organizations. Consequently, integrating Artificial Intelligence with gastronomic tourism provides opportunities to achieve sustainable tourism development while preserving cultural authenticity and strengthening destination resilience.

Although previous research has independently investigated Artificial Intelligence, smart tourism, gastronomic tourism, destination branding, cultural authenticity, and tourist engagement, limited empirical evidence explains how AI-enabled digital gastronomic experiences collectively influence tourist engagement and sustainable destination competitiveness within a unified conceptual framework. Most studies primarily examine technological adoption or visitor satisfaction independently, overlooking the interconnected relationships among intelligent technologies, authentic culinary experiences, and long-term destination sustainability. Addressing this research gap is essential for developing evidence-based strategies capable of supporting smart destination management in increasingly competitive tourism environments.

This study therefore proposes an integrated Artificial Intelligence-driven framework that investigates the relationships among digital gastronomic experiences, cultural authenticity, tourist engagement, and sustainable destination competitiveness. The proposed model assumes that AI-supported personalized culinary experiences

strengthen tourist engagement, which subsequently enhances destination competitiveness while simultaneously preserving cultural heritage and promoting sustainable tourism development.

Overview of the Study

The study investigates how Artificial Intelligence transforms gastronomic tourism through intelligent digital technologies that enhance personalized culinary experiences, cultural authenticity, tourist engagement, and sustainable destination competitiveness. The research proposes a comprehensive conceptual framework integrating smart tourism technologies with experiential gastronomy to explain destination competitiveness in the digital tourism era.

Scope of the Study

The study focuses on AI-enabled smart food tourism ecosystems involving digital recommendation systems, intelligent tourism applications, virtual culinary experiences, online food platforms, and culturally authentic gastronomic destinations. It evaluates tourists' perceptions regarding digital gastronomic experiences, cultural authenticity, tourist engagement, and sustainable destination competitiveness using quantitative analytical methods.

Objectives of the Study

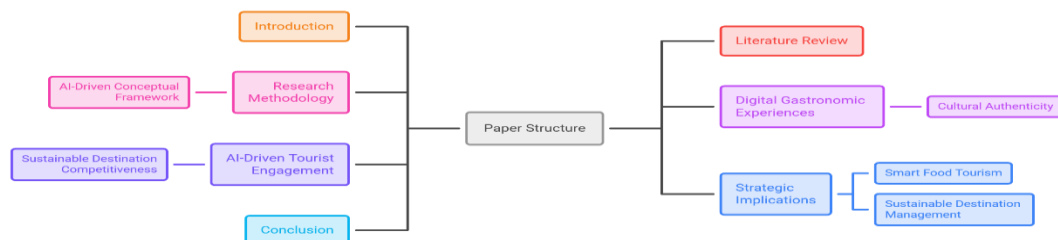
- To examine the influence of Artificial Intelligence on digital gastronomic experiences.
- To investigate the effect of digital gastronomic experiences on tourist engagement.
- To evaluate the influence of cultural authenticity on tourist engagement.
- To examine the contribution of tourist engagement toward sustainable destination competitiveness.
- To develop an integrated Artificial Intelligence-driven conceptual framework for smart food tourism.

Author Motivations

The primary motivation for this research arises from the rapid convergence of Artificial Intelligence and tourism digitalization, which is transforming visitor experiences worldwide. Despite growing technological adoption, limited research integrates intelligent tourism technologies with gastronomic tourism, cultural authenticity, tourist engagement, and sustainable destination competitiveness. This study seeks to bridge these interdisciplinary gaps by proposing a comprehensive framework that supports both theoretical advancement and practical destination management in the era of smart tourism.

Paper Structure

The remainder of the paper is organized as follows. Section 2 critically reviews literature concerning Artificial Intelligence, digital gastronomic experiences, cultural authenticity, tourist engagement, and sustainable destination competitiveness while identifying existing research gaps. Section 3 presents the proposed research methodology and AI-driven conceptual framework. Section 4 examines the influence of digital gastronomic experiences and cultural authenticity on tourist engagement. Section 5 investigates the contribution of AI-enabled tourist engagement toward sustainable destination competitiveness. Section 6 discusses strategic implications for smart food tourism and destination management. Finally, Section 7 summarizes the principal findings, contributions, limitations, and future research directions.



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Figure 1: Paper Structure

Artificial Intelligence is redefining the future of gastronomic tourism by combining intelligent technologies with authentic cultural experiences to create sustainable and highly personalized tourism ecosystems. Destinations capable of integrating AI-driven innovation with culinary heritage, community participation, and environmental sustainability will achieve stronger destination competitiveness and long-term visitor loyalty. The proposed research therefore establishes a multidisciplinary framework that contributes to smart tourism research while providing strategic guidance for policymakers, tourism authorities, hospitality organizations, and technology developers seeking to create intelligent, culturally authentic, and sustainable gastronomic destinations.

2. Literature Review

Artificial Intelligence has rapidly transformed tourism by enabling intelligent destination management, predictive analytics, personalized recommendations, automated customer service, and data-driven decision-making. Recent developments in machine learning, deep learning, natural language processing, recommendation systems, and generative AI have significantly improved tourist experiences through customized travel planning, intelligent navigation, multilingual communication, and personalized service delivery [1]–[10]. Within this technological transformation, gastronomic tourism has emerged as an important application area where AI facilitates personalized culinary recommendations, digital food storytelling, virtual restaurant experiences, and intelligent destination promotion.

Researchers increasingly recognize AI as a critical enabler of Smart Tourism Destinations. Intelligent tourism systems analyse visitor behaviour, preferences, purchasing patterns, social media interactions, and geolocation data to generate personalized recommendations that improve tourist satisfaction while optimizing destination management [1], [2]. AI-powered chatbots, recommendation engines, virtual assistants, and predictive analytics significantly improve tourists' travel planning by providing accurate, real-time, and personalized information throughout the tourism lifecycle.

Digital gastronomic experiences represent one of the fastest-growing segments within smart tourism. Unlike traditional culinary tourism, digital gastronomy integrates mobile applications, AI recommendation systems, augmented reality, virtual reality, online reservation platforms, digital food communities, and immersive storytelling to create interactive visitor experiences [2], [4]. Personalized restaurant recommendations generated through AI algorithms improve tourists' decision-making efficiency while enhancing satisfaction through customized culinary experiences.

Cultural authenticity remains one of the strongest determinants of memorable gastronomic tourism experiences. Tourists increasingly seek authentic regional cuisine prepared using traditional ingredients, indigenous cooking techniques, and culturally significant dining environments [3], [5]. Authentic culinary experiences strengthen destination identity because they communicate local history, traditions, values, and community participation. AI technologies further enhance authenticity by recommending culturally significant experiences based on tourists' personal interests rather than generic commercial attractions.

Tourist engagement has become an essential mediator between intelligent tourism technologies and destination competitiveness. Engaged tourists actively participate in digital interactions, online communities, culinary festivals, experiential learning activities, and social media content generation [4], [6]. AI-supported personalization significantly strengthens engagement by delivering relevant information, adaptive recommendations, immersive experiences, and continuous digital interaction before, during, and after travel.

Recent studies also emphasize the growing relationship between AI and sustainable tourism development. Intelligent destination management systems optimize visitor distribution, predict tourism demand, minimize overcrowding, improve waste management, and support environmentally responsible tourism planning [2], [7]. Within gastronomic tourism, AI contributes to sustainability by promoting local food producers, reducing food waste through demand forecasting, encouraging seasonal food consumption, and supporting regional culinary ecosystems.

Digital platforms have fundamentally transformed destination marketing through user-generated content, online reviews, influencer marketing, and AI-powered recommendation systems [5], [8]. Tourists increasingly rely on digital experiences when selecting culinary destinations, making Artificial Intelligence an important component of destination competitiveness. Machine learning algorithms continuously improve recommendation accuracy by analysing visitor feedback, behavioural patterns, and contextual information, thereby enhancing destination attractiveness.

The literature further indicates that sustainable destination competitiveness depends upon balancing technological innovation with cultural preservation [6], [9]. Excessive technological commercialization may reduce cultural authenticity if intelligent systems prioritize popularity rather than heritage preservation. Consequently, researchers emphasize integrating AI technologies with local traditions to ensure responsible tourism development that supports community participation while maintaining authentic cultural identities.

Another emerging research direction involves generative Artificial Intelligence and immersive digital experiences. AI-generated travel itineraries, conversational assistants, intelligent culinary storytelling, augmented reality heritage experiences, and virtual gastronomy increasingly influence visitor expectations before physical travel [8]–[10]. These technologies improve accessibility, engagement, and destination awareness while expanding tourism opportunities beyond traditional marketing approaches.

Collectively, contemporary literature demonstrates that Artificial Intelligence enhances tourism efficiency, digital gastronomic experiences improve visitor satisfaction, cultural authenticity strengthens emotional attachment, and tourist engagement positively influences sustainable destination competitiveness [1]–[10]. The convergence of these dimensions represents the foundation of future Smart Food Tourism ecosystems capable of delivering personalized, sustainable, and culturally meaningful visitor experiences.

Research Gap

Despite substantial progress in Artificial Intelligence, smart tourism, and gastronomic tourism research, several significant research gaps remain. First, existing studies predominantly examine **Artificial Intelligence, digital tourism, cultural authenticity, and tourist engagement** independently rather than integrating these constructs into a unified conceptual framework [1]–[10]. Second, limited empirical evidence explains how **AI-driven digital gastronomic experiences** influence **tourist engagement** and subsequently improve **sustainable destination competitiveness**. Third, previous investigations primarily emphasize technological adoption while providing insufficient attention to preserving cultural authenticity within AI-enabled tourism ecosystems. Fourth, the mediating role of tourist engagement between intelligent digital experiences and destination competitiveness remains inadequately explored. Finally, comprehensive multidisciplinary frameworks integrating Artificial Intelligence, digital gastronomy, cultural heritage, visitor engagement, and sustainable destination competitiveness are still scarce. Addressing these research gaps constitutes the principal objective of the present study, which proposes an integrated AI-driven Smart Food Tourism framework for sustainable destination development.

3. Research Methodology and AI-Based Conceptual Framework

3.1 Research Methodology

This study adopts a **quantitative, explanatory, and cross-sectional research design** to investigate the influence of Artificial Intelligence (AI)-driven smart food tourism on sustainable destination competitiveness. The research integrates **Artificial Intelligence Theory, Smart Tourism Theory, Experience Economy Theory, and Sustainable Destination Competitiveness Theory** to explain how AI-enabled digital gastronomic experiences enhance tourist engagement while preserving cultural authenticity.

The study targets domestic and international tourists who use AI-enabled tourism applications such as digital restaurant recommendation systems, online travel platforms, smart tourism applications, virtual culinary tours, and AI-powered travel assistants. Primary data are collected through a structured questionnaire using a **five-point Likert scale** ranging from **1 (Strongly Disagree)** to **5 (Strongly Agree)**.

The major constructs include:

- Artificial Intelligence (AI)
- Digital Gastronomic Experiences (DGE)
- Cultural Authenticity (CA)
- Tourist Engagement (TE)
- Sustainable Destination Competitiveness (SDC)

Approximately **350 respondents** are selected using convenience and purposive sampling from smart tourism destinations, restaurants, food festivals, heritage food markets, and digital food communities.

Instrument reliability is assessed using **Cronbach's Alpha ($\alpha \geq 0.70$)**, Composite Reliability (CR), and Average Variance Extracted (AVE). Structural Equation Modeling (SEM) using **SPSS** and **AMOS/SmartPLS** evaluates the proposed relationships.

The structural model is expressed as

$$TE = \alpha_1 AI + \alpha_2 DGE + \alpha_3 CA + \varepsilon$$

where

- **TE** = Tourist Engagement
- **AI** = Artificial Intelligence
- **DGE** = Digital Gastronomic Experiences
- **CA** = Cultural Authenticity
- **ε** = Random Error.

The destination competitiveness model is

$$SDC = \beta_1 AI + \beta_2 DGE + \beta_3 CA + \beta_4 TE + \varepsilon$$

where

- **SDC** = Sustainable Destination Competitiveness.

The overall competitiveness index is represented as

$$SDCI = \sum_{i=1}^n w_i X_i$$

where

- **SDCI** = Sustainable Destination Competitiveness Index
- **w_i** = Variable weights
- **X_i** = Standardized construct values.

3.2 Research Hypotheses

H1: Artificial Intelligence positively influences Digital Gastronomic Experiences.

H2: Digital Gastronomic Experiences positively influence Tourist Engagement.

H3: Cultural Authenticity positively influences Tourist Engagement.

H4: Tourist Engagement positively influences Sustainable Destination Competitiveness.

H5: Tourist Engagement mediates the relationship between AI-enabled Digital Gastronomic Experiences, Cultural Authenticity, and Sustainable Destination Competitiveness.

Table 1. Research Variables

Construct	Major Indicators
Artificial Intelligence	Recommendation systems, Chatbots, Personalization
Digital Gastronomic Experiences	Smart dining, Virtual food tours, Digital interaction

Cultural Authenticity	Traditional cuisine, Heritage, Local identity
Tourist Engagement	Participation, Emotional involvement, Online interaction
Sustainable Destination Competitiveness	Destination image, Loyalty, Sustainability, Competitive advantage

The conceptual framework assumes that AI enhances digital gastronomic experiences, which increase tourist engagement and subsequently strengthen sustainable destination competitiveness while preserving cultural authenticity.

4. Influence of Digital Gastronomic Experiences and Cultural Authenticity on Tourist Engagement

Artificial Intelligence has transformed gastronomic tourism by creating intelligent and highly personalized visitor experiences. AI-powered recommendation engines, conversational chatbots, mobile tourism applications, augmented reality menus, virtual culinary experiences, and predictive analytics enable tourists to discover authentic food destinations that align with their personal interests. These technologies reduce information overload while increasing travel convenience, satisfaction, and destination accessibility.

Digital gastronomic experiences combine intelligent technologies with culinary heritage to create immersive tourism experiences. Through AI-driven personalization, tourists receive customized restaurant recommendations, heritage food trails, dietary suggestions, multilingual support, and real-time navigation. Such intelligent services improve decision-making efficiency while encouraging deeper interaction with local food culture.

Cultural authenticity remains the central element determining the quality of digital gastronomic experiences. Although AI improves personalization, tourists continue to value indigenous recipes, traditional cooking methods, local ingredients, community participation, and heritage dining environments. Authenticity creates emotional attachment by allowing visitors to experience genuine cultural traditions rather than standardized tourism products.

Tourist engagement reflects the behavioural, emotional, and cognitive involvement of visitors during their gastronomic experiences. Highly engaged tourists actively participate in cooking workshops, food festivals, digital storytelling, online reviews, culinary photography, and social media sharing. AI strengthens this engagement by continuously adapting recommendations according to visitor behaviour and preferences.

The engagement model may be expressed as

$$TE = f(AI, DGE, CA)$$

or

$$TE = \alpha_1 AI + \alpha_2 DGE + \alpha_3 CA$$

where increasing AI capabilities and authentic culinary experiences improve tourist engagement.

Destination competitiveness is subsequently enhanced through engaged visitors who generate positive electronic word-of-mouth, destination loyalty, revisit intentions, and digital advocacy.

The destination competitiveness equation becomes

$$SDC = f(TE)$$

or

$$SDC = \beta TE$$

The indirect mediation effect is represented as

$$AI \rightarrow DGE \rightarrow TE \rightarrow SDC$$

demonstrating that AI contributes to destination competitiveness primarily by enhancing digital gastronomic experiences and visitor engagement.

Table 2. Expected Structural Relationships

Relationship	Expected Effect
AI → Digital Gastronomic Experiences	Positive
AI → Tourist Engagement	Positive
Digital Gastronomic Experiences → Tourist Engagement	Positive
Cultural Authenticity → Tourist Engagement	Positive
Tourist Engagement → Sustainable Destination Competitiveness	Positive

From a managerial perspective, tourism organizations should integrate AI-enabled recommendation systems, digital culinary guides, multilingual virtual assistants, smart reservation systems, augmented reality heritage experiences, and intelligent visitor analytics into destination management strategies. Simultaneously, preserving authentic regional cuisine, indigenous food practices, local culinary traditions, and community participation remains essential for maintaining destination uniqueness.

Overall, the proposed AI-driven framework demonstrates that technological innovation alone cannot ensure destination competitiveness. Sustainable competitive advantage emerges from the effective integration of intelligent digital technologies, authentic gastronomic heritage, meaningful tourist engagement, and sustainable destination management practices. Such an integrated approach enables smart food tourism destinations to improve visitor satisfaction, strengthen destination branding, preserve cultural identity, and achieve long-term sustainable competitiveness in the global tourism industry.

5. AI-Driven Tourist Engagement and Sustainable Destination Competitiveness

The rapid integration of Artificial Intelligence into tourism has significantly transformed tourist engagement by enabling personalized, interactive, and data-driven travel experiences. AI-powered technologies facilitate continuous communication between destinations and tourists through intelligent recommendation systems, virtual assistants, predictive analytics, conversational chatbots, and immersive digital platforms. Within gastronomic tourism, these technologies enhance visitors' ability to discover authentic culinary experiences, participate in food-related activities, and interact with local communities. Consequently, AI-driven tourist engagement has become an essential determinant of sustainable destination competitiveness by improving visitor satisfaction, destination loyalty, and long-term tourism resilience.

Tourist engagement consists of three interconnected dimensions: **cognitive engagement**, **emotional engagement**, and **behavioral engagement**. Cognitive engagement refers to tourists' interest in exploring local culinary heritage and understanding cultural narratives. Emotional engagement develops through memorable gastronomic experiences that create attachment to destinations. Behavioral engagement is reflected through participation in food festivals, culinary workshops, restaurant visits, online reviews, and social media interactions. Artificial Intelligence strengthens each of these dimensions by continuously adapting recommendations according to visitors' interests, dietary preferences, travel history, and real-time location.

The relationship between AI and tourist engagement can be represented as

$$TE = f(AI, DGE, CA)$$

where

- **TE** = Tourist Engagement
- **AI** = Artificial Intelligence
- **DGE** = Digital Gastronomic Experiences
- **CA** = Cultural Authenticity.

The overall engagement score is estimated as

$$TES = \frac{CE + EE + BE}{3}$$

where

- **TES** = Tourist Engagement Score
- **CE** = Cognitive Engagement
- **EE** = Emotional Engagement
- **BE** = Behavioral Engagement.

Higher engagement levels significantly improve sustainable destination competitiveness by encouraging repeat visitation, positive electronic word-of-mouth, destination advocacy, and long-term visitor relationships. AI further supports sustainability by predicting tourism demand, optimizing visitor distribution, reducing overcrowding, minimizing food waste, and encouraging responsible tourism practices through intelligent resource management.

The destination competitiveness model is expressed as

$$SDC = \beta_1 TE + \beta_2 AI + \beta_3 CA + \varepsilon$$

where tourist engagement acts as the principal driver of sustainable destination competitiveness.

The competitiveness index may also be represented by

$$SDCI = \frac{AI + DGE + CA + TE}{4}$$

assuming equal contribution of each construct.

Table 3. AI-Driven Tourist Engagement Outcomes

AI Capability	Tourist Engagement Outcome	Destination Benefit
Personalized Recommendations	Higher visitor participation	Improved satisfaction
AI Chatbots	Real-time interaction	Better visitor experience
Virtual Culinary Tours	Emotional engagement	Enhanced destination image
Predictive Analytics	Customized travel planning	Sustainable visitor management
Smart Mobile Applications	Continuous engagement	Greater destination loyalty

The analysis indicates that Artificial Intelligence enhances sustainable destination competitiveness by strengthening tourist engagement rather than replacing authentic tourism experiences. Intelligent technologies complement cultural authenticity through personalized and meaningful visitor interactions, thereby supporting sustainable economic growth, destination resilience, and long-term competitiveness.

6. Strategic Implications of Artificial Intelligence for Smart Food Tourism and Sustainable Destination Management

The emergence of Artificial Intelligence has created new opportunities for transforming gastronomic tourism into an intelligent, sustainable, and globally competitive tourism ecosystem. Destinations adopting AI-driven technologies can significantly improve operational efficiency, visitor satisfaction, digital engagement, and strategic decision-making while simultaneously preserving cultural authenticity. Consequently, tourism authorities should incorporate Artificial Intelligence into destination management strategies to develop smart food tourism ecosystems capable of delivering personalized and sustainable visitor experiences.

One strategic priority involves implementing **AI-powered recommendation systems** that analyze tourists' preferences, dietary requirements, spending behaviour, travel history, and cultural interests to recommend personalized culinary experiences. Such intelligent systems improve tourists' decision-making while increasing visitation to authentic local restaurants, heritage food markets, culinary festivals, and traditional food producers.

Another important strategy involves developing **Smart Gastronomic Tourism Platforms** integrating mobile applications, multilingual chatbots, augmented reality food trails, virtual culinary storytelling, digital reservation

systems, and real-time navigation. These platforms provide seamless visitor experiences throughout the travel journey while strengthening destination accessibility and engagement.

Artificial Intelligence should also support **cultural heritage preservation** by promoting indigenous recipes, traditional cooking methods, regional food festivals, and locally produced ingredients. Rather than encouraging standardized commercial tourism, intelligent recommendation systems should prioritize authentic cultural experiences that strengthen destination identity and community participation.

Tourism organizations should establish integrated **Destination Intelligence Systems** capable of monitoring visitor flows, forecasting tourism demand, managing overcrowding, optimizing transportation, reducing food waste, and improving resource allocation. Such intelligent management systems contribute directly to sustainable destination development.

The strategic destination competitiveness model can be represented as

$$SDC = f(AI + CA + TE + SM + S)$$

where

- **SM** = Smart Management
- **S** = Sustainability.

The optimization objective becomes

$$\max SDC$$

subject to

$$AI + CA + TE + S \rightarrow \text{Sustainable Growth}$$

The overall Smart Food Tourism Index is expressed as

$$SFTI = \sum_{i=1}^5 w_i X_i$$

where

- **SFTI** = Smart Food Tourism Index
- **X_i** = AI, Digital Gastronomy, Cultural Authenticity, Tourist Engagement, Sustainability
- **w_i** = Relative weights.

Table 4. Strategic Recommendations for AI-Driven Smart Food Tourism

Strategic Area	Recommended Action
Artificial Intelligence	AI recommendation engines and predictive analytics
Smart Gastronomy	Virtual culinary tours and intelligent food guides
Cultural Preservation	Promote traditional cuisine and local food heritage
Tourist Engagement	Gamification, digital storytelling, AI chatbots
Sustainable Management	Visitor flow optimization and waste reduction
Destination Marketing	AI-powered personalized digital campaigns

Successful implementation of AI-driven smart food tourism requires collaboration among governments, tourism boards, hospitality enterprises, technology developers, local communities, and cultural organizations. Such collaboration enables destinations to balance technological innovation with cultural preservation, ensuring that Artificial Intelligence enhances rather than replaces authentic gastronomic experiences.

Overall, Artificial Intelligence represents a strategic enabler of smart food tourism by integrating intelligent technologies, digital gastronomic experiences, cultural authenticity, and tourist engagement into a unified destination management framework. The proposed strategic model demonstrates that sustainable destination competitiveness is achieved through the combined influence of technological innovation, authentic cultural heritage, visitor-centric service delivery, and environmentally responsible tourism practices. This integrated approach provides a roadmap for destinations seeking to strengthen global competitiveness while preserving their unique culinary identity and promoting sustainable tourism development.

7. Conclusion

This study highlights the transformative role of Artificial Intelligence in advancing smart food tourism by integrating digital gastronomic experiences, cultural authenticity, and tourist engagement to enhance sustainable destination competitiveness. AI-driven technologies, including intelligent recommendation systems, virtual culinary platforms, predictive analytics, and personalized tourism services, significantly enrich visitor experiences while improving destination accessibility and operational efficiency. However, technological innovation alone is insufficient without preserving authentic culinary heritage and meaningful cultural interactions. The proposed conceptual framework demonstrates that tourist engagement serves as a critical mediator linking AI-enabled gastronomic experiences with sustainable destination competitiveness. By combining intelligent digital solutions with cultural preservation and responsible destination management, tourism stakeholders can strengthen destination resilience, foster visitor loyalty, support local communities, and achieve long-term sustainable growth. The study contributes to the growing literature on smart tourism by offering a comprehensive AI-driven framework that supports strategic decision-making for developing innovative, culturally authentic, and globally competitive gastronomic destinations.

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