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Artificial Intelligence in Nutrition and Food Marketing: Consumer Trust, Misinformation and Legal Challenges

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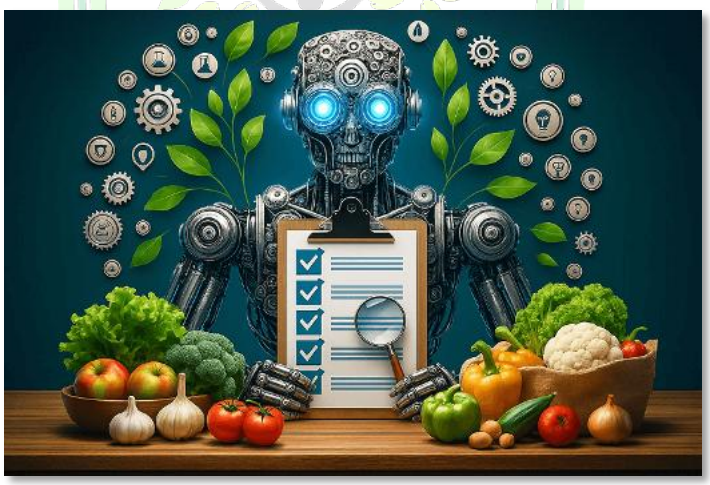
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Artificial Intelligence (AI) is increasingly influencing the food and nutrition sector. AI-based technologies are being used to generate personalized dietary recommendations, support dietary assessment, improve food-safety monitoring, power recommendation engines on grocery and food-delivery platforms, and automate customer engagement through chatbots and virtual assistants. These applications are changing how consumers receive nutritional information and how food and beverage companies communicate with their customers.



Market estimates indicate that the global AI-in-food-and-beverage market was valued at approximately USD 10.8 billion in 2024 and is projected to reach USD 50.6 billion by 2030, with an estimated compound annual growth rate (CAGR) of 29.6% [1]. This growth reflects increasing commercial interest in AI applications such as personalization, predictive analytics, quality control, and targeted marketing.

However, the rapid adoption of AI has also raised concerns about consumer trust, data privacy, misleading advertisements, and the accuracy of AI-generated nutritional information. AI systems can produce convincing but inaccurate responses, which may influence consumers' dietary decisions and purchasing behaviour. This article examines the applications of AI in nutrition and food marketing, reviews evidence concerning consum er trust and misinformation, and discusses the legal and regulatory challenges associated with its use.

1. Ai In Nutrition: Personalization And Dietary Guidance

AI technologies based on machine learning and natural-language processing are increasingly being explored for personalized nutrition. These systems can analyse dietary habits, food preferences, lifestyle patterns, and selected health-related information to generate individualized dietary suggestions [2], [3].

Major applications include:

- **AI-Based Food Recognition:** Image-recognition systems can identify food items in meal photographs and estimate their calorie and nutrient content.
- **Personalized Dietary Recommendations:** Machine-learning models can use dietary preferences and relevant health information to suggest meal plans.
- **Nutrition Chatbots:** AI-powered chatbots can respond to general questions about food, nutrition, and healthy eating.
- **Chronic Disease Management:** AI tools are being investigated for supporting dietary planning for conditions such as diabetes and cardiovascular diseases.
- **Dietary Assessment:** Automated systems can assist in recording food intake and estimating nutrient consumption.

A scoping review of AI applications in nutrition research found that much of the existing research focuses on dietary assessment, while comparatively fewer studies have validated AI tools for long-term lifestyle interventions and malnutrition prediction [3]. This indicates that, despite considerable technological progress, further research and clinical validation are required before AI-based nutrition tools can be relied upon for complex dietary decisions.

2. Ai In Food Marketing

2.1 Personalization And Targeted Advertising

AI is transforming food marketing by enabling companies to analyse purchase histories, browsing patterns, customer preferences, and other behavioural information. These insights can be used to develop personalized product recommendations and targeted advertising campaigns [5].

AI is also applied in demand forecasting, inventory management, customer segmentation, dynamic pricing, and campaign optimization. These applications can help food businesses understand changing consumer preferences and improve the efficiency of their marketing activities [6].

However, the collection and analysis of consumer information also raise concerns about privacy, transparency, and the possibility of manipulating purchasing decisions through highly personalized advertisements.

2.2 AI-Driven Recommendations For Functional And Health Foods

AI-based recommendation systems are increasingly being used to promote functional foods and products marketed for specific nutritional or health-related benefits. These systems can suggest products based on consumers' preferences, purchasing patterns, and dietary interests.

Research on AI-driven recommendations and functional-food purchasing indicates that

personalization and the perceived transparency of recommendations can influence consumer decision-making [7]. This creates an important responsibility for food companies to ensure that AI-generated recommendations are based on reliable information and do not exaggerate the nutritional or health benefits of products.

Companies should also distinguish between scientifically substantiated nutrition claims and promotional statements that may mislead consumers.

3. Consumer Trust: What The Data Show

Consumer trust is an important factor in the successful adoption of AI in nutrition and food marketing. Although AI can improve convenience and personalization, consumers may remain uncertain about the accuracy, transparency, and reliability of AI-generated information.

The 2026 Klaviyo AI Consumer Trends research reported that approximately 13% of surveyed consumers completely trusted AI, while 36% somewhat trusted it. The survey also indicated that 32% of consumers felt that AI-generated marketing content reduced their trust in a brand, while 61% expressed a neutral response [8]. These findings suggest that consumer attitudes towards AI-generated marketing remain mixed.

Evidence from the food sector provides additional insight. The Consumer Food Insights Report published by Purdue University's Center for Food Demand Analysis and Sustainability in August 2025 indicated that approximately half of surveyed consumers expressed moderate-to-high trust in AI applications within the food system. The report also found that 64% considered transparency about the use of AI to be very or extremely important [10].

These findings highlight the importance of responsible AI use. Food businesses should clearly communicate when consumers are interacting with AI systems and should ensure that AI-generated information is accurate, understandable, and appropriately supported by evidence.

4. False Information And Nutrition Misinformation Risk

One of the major concerns associated with AI in nutrition is the possibility of generating inaccurate or misleading dietary information. AI chatbots can produce fluent and confident responses even when the information is incomplete, outdated, or inconsistent with established nutritional guidelines.

A controlled study evaluating ChatGPT-generated dietary advice against clinical nutrition guidelines for different non-communicable diseases reported varying levels of appropriateness. The appropriateness of recommendations ranged from 55.5% for sarcopenia to 73.3% for non-alcoholic fatty liver disease [12]. These findings demonstrate that AI-generated dietary advice may not always meet professional standards, particularly when recommendations involve complex health conditions.

AI-generated information may also contain incorrect portion sizes, nutrient estimates, food substitutions, or references. Such errors can become particularly serious when dietary advice is intended for people with food allergies, medical conditions, or specific nutritional requirements.

Another concern is the generation of incomplete or inaccurate references. AI systems may provide citations that appear credible but do not adequately support the information presented. Therefore, users should independently verify scientific references and consult qualified nutrition professionals before applying AI-generated advice to medical or therapeutic diets.

The risk of misinformation becomes more significant when AI-generated content is reused in advertisements, social-media posts, influencer promotions, and commercial nutrition products. Misleading claims may influence consumer choices and create unrealistic expectations about the benefits of particular foods or supplements.

AI should therefore be considered a supportive information tool rather than a replacement for qualified dietitians, nutritionists, or healthcare professionals.

5. Legal And Regulatory Issues

5.1 United States: Federal Trade Commission Enforcement

In the United States, the Federal Trade Commission (FTC) has increased its attention to deceptive practices involving artificial intelligence. In September 2024, the FTC announced Operation AI Comply, an enforcement initiative addressing deceptive claims about AI capabilities and unfair or misleading uses of AI in commercial activities [14].

The FTC also introduced a final rule addressing fake reviews and testimonials, which became effective on October 21, 2024 [16]. The rule prohibits specified deceptive practices involving fake or false reviews and testimonials, including AI-generated reviews that misrepresent the identity or experience of the reviewer. This regulation is relevant to food and supplement marketing because online reviews and testimonials can strongly influence consumer purchasing decisions. Businesses must ensure that customer reviews and promotional claims are genuine and do not create misleading impressions.

Health and nutrition-related advertising is also subject to established FTC requirements. Health claims must be truthful, not misleading, and supported by adequate scientific evidence [17]. These requirements apply regardless of whether the claims are generated by humans or AI systems.

5.2 European Union: The Artificial Intelligence Act

The European Union's Artificial Intelligence Act, Regulation (EU) 2024/1689, establishes a risk-based regulatory framework for the development and use of AI systems [18]. The regulation entered into force in August 2024, with its requirements becoming applicable in stages.

Article 50 establishes transparency obligations for certain AI systems. For example, providers of systems intended to interact directly with people generally need to ensure that individuals are informed when they are interacting with an AI system, unless this is obvious from the circumstances. These transparency provisions are scheduled to apply from August 2, 2026 [19].

The Act also identifies certain AI applications as high-risk, depending on their intended purpose and the relevant statutory categories. High-risk systems are subject to additional requirements, including risk management, data governance, technical

documentation, human oversight, and conformity assessment.

Not every AI-powered nutrition chatbot or food recommendation system automatically qualifies as high-risk. Its classification depends on the system's intended purpose and the applicable provisions of the regulation. However, AI systems used in regulated healthcare-related contexts may face more demanding compliance obligations.

5.3 Data Privacy And Other Legal Concerns

AI-based food marketing often involves the collection and analysis of personal information, including purchasing history, browsing behaviour, food preferences, and, in some cases, health-related data. The use of such information raises important questions about consent, data security, transparency, and responsible processing.

In the European Union, the General Data Protection Regulation (GDPR) provides safeguards for personal data and imposes additional protections for special categories of information, including health data [20].

Another important issue is professional accountability. AI-generated dietary advice may be inaccurate or unsuitable for an individual's health condition. General-purpose AI chatbots do not automatically operate under the same professional licensing and ethical requirements as registered dietitians and qualified healthcare professionals.

Therefore, businesses using AI for nutrition-related services should establish clear accountability mechanisms, provide appropriate disclaimers, protect consumer information, and ensure human review wherever necessary.

6. Discussion And Way Forward

The evidence discussed in this article indicates that AI offers considerable opportunities for improving nutrition services and food marketing. Its applications in dietary assessment, personalized recommendations, consumer engagement, and demand forecasting can support greater efficiency and convenience.

However, technological advancement must be accompanied by appropriate safeguards. The following measures are important for responsible AI adoption in the food and nutrition sector:

1. **Accuracy Validation:** AI-generated nutritional information should be checked against recognized scientific evidence and established dietary guidelines.
2. **Transparency:** Food companies should inform consumers when AI is being used to generate recommendations, advertisements, or customer-service responses.
3. **Professional Supervision:** Qualified nutritionists and healthcare professionals should review AI-generated dietary advice, particularly when it concerns medical conditions.
4. **Responsible Marketing:** Businesses should ensure that AI-generated product descriptions and health claims are truthful, evidence-based, and compliant with applicable advertising regulations.
5. **Data Protection:** Consumer information should be collected and processed responsibly, with appropriate attention to consent, privacy, and security.
6. **Consumer Awareness:** Consumers should be encouraged to verify important nutritional

information and avoid relying entirely on AI-generated advice.

The future of AI in nutrition and food marketing will depend not only on technological development but also on public confidence, scientific reliability, and effective regulatory compliance.

7. Conclusion

Artificial Intelligence is transforming the way nutritional information is generated and how food products are marketed. Its applications in personalized nutrition, dietary assessment, customer engagement, and targeted advertising offer significant opportunities for the food industry. Market projections indicate substantial growth in AI adoption, but consumer trust and the reliability of AI-generated information remain important concerns.

Research has demonstrated that AI-generated dietary recommendations may not always meet established clinical nutrition guidelines. The possibility of inaccurate information, misleading marketing claims, and inappropriate use of consumer data highlights the need for responsible implementation.

Regulatory developments in the United States and the European Union demonstrate the growing importance of transparency, consumer protection, and accountability in AI applications. For AI to contribute meaningfully to nutrition and food marketing, its adoption must be supported by scientific validation, professional supervision, responsible communication, and compliance with applicable legal requirements.

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