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ARTIFICIAL INTELLIGENCE IN NOVEL FOOD INNOVATION: APPLICATIONS AND IMPLICATIONS FOR HALAL COMPLIANCE

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Abstract

Artificial intelligence (AI) supports the development of novel halal foods, including plant-based and cultivated alternatives, offering environmentally sustainable and cost-effective solutions to global food security challenges. While facilitating innovation and strengthening consumer trust, these advancements also raise significant ethical, regulatory, and religious concerns in Muslim contexts where compliance with Shari'ah principles is essential. This study aims to examine how AI-enabled food innovations can align with Shari'ah requirements while safeguarding halal integrity and consumer confidence. Employing a conceptual review methodology, the paper synthesizes Qur'anic and ḥadīth-based principles with contemporary scholarly literature and regulatory frameworks on AI integration, halal certification, and novel food governance. The study addresses a critical research gap concerning the absence of comprehensive Shari'ah-based guidelines and harmonised regulatory

standards for AI-driven novel foods, particularly in relation to certification, traceability, and consumer assurance. The analysis yields three key findings: (1) AI technologies enhance halal assurance systems through improved traceability, transparency, and risk management; (2) AI-enabled novel foods may be considered permissible under the concept of bid‘ah ḥasanah (beneficial innovation) when their ingredients and production processes comply with established Sharī‘ah principles; and (3) inadequate regulatory oversight and the lack of standardised certification frameworks pose risks to halal integrity and may erode consumer trust. The study concludes that responsible integration of AI in novel food innovation requires coupling technological advancement with robust Islamic ethical governance and recommends the development of harmonised standards through collaboration among halal authorities, policymakers, and industry stakeholders. © The Author(s).

Author keywords

Artificial Intelligence; Halal Assurance; Novel Foods; Sharī‘ah Compliance

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