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Ai-Driven Predictive Analytics n the Metaverse Era: Forecasting Halal Consumption Trends within the Framework of Islamic Marketing

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Abstract

This paper examines the integration of Artificial Intelligence (AI)-based predictive analytics and Metaverse in predicting halal consumption trends within the ethical and spiritual framework of Islamic marketing. The primary research question explores how AI-based predictive analytics can predict halal market trends while remaining aligned with Sharia principles and consumer trust. The novelty of this study lies in the integration of AI and immersive technology as an ethical tool to advance the global halal economy. Using a qualitative systematic literature review of Scopus-indexed publications from 2019 to 2025 (k = approximately 45 articles), the findings indicate that AI improves the accuracy of halal market predictions through big data processing, sentiment analysis, and digital consumer behavior modeling. Meanwhile, Metaverse introduces an immersive virtual environment that encourages halal engagement through blockchain-based certification and an interactive marketplace. Data synthesis revealed that young Muslim consumers prioritize an "ethical digital footprint" and blockchain-based supply chain transparency when interacting in virtual spaces. The main contribution of this research is the development of a Halal-Meta Predictive Framework (HMPF), which combines sharia principles with deep learning algorithms to mitigate the risk of Islamic legal uncertainty in virtual transactions. This research bridges technological innovation with Islamic ethical philosophy; practically, this research offers insights for developing sharia-compliant governance, marketing strategies, and digital transformation policies across the global halal economy. This research fills a theoretical gap regarding how religious identity transforms in the future digital ecosystem.

Keywords

AI-driven predictive analytic;Metaverse; Halal consumption; Islamic marketing; Maqasid al-Shariah.

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1. INTRODUCTION

The global halal economy has emerged as one of the fastest-growing sectors in the world, projected to reach US$7.7 trillion by 2030 (Ismail et al., 2022). This growth is driven not only by the increasing Muslim population, which currently exceeds 1.9 billion, but also by a rising global awareness of ethical,

sustainable, and value driven consumption. Halal, traditionally associated with food, has now expanded into diverse industries including pharmaceuticals, cosmetics, fashion, tourism, and financial services. Within this ecosystem, Islamic marketing provides a unique framework that integrates spirituality, ethics, and consumer value creation, emphasizing principles such as halalan tayyiban, transparency (shafafiyah), and public benefit (maslahah).

This backdrop, the integration of AI-driven predictive analytics in the Metaverse era represents a frontier of innovation. The Metaverse, characterized by immersive, interconnected, and persistent digital environments, enables unprecedented levels of consumer engagement. When coupled with predictive AI tools, it allows businesses to anticipate halal consumption trends, personalize offerings, and build trust-based relationships in line with Islamic marketing principles (Qizwini & Purnama, 2024).

Despite the evident opportunities, research on AI predictive analytics for halal consumption within Islamic marketing remains fragmented. Existing studies often examine AI applications in general consumer analytics (e.g., e-commerce, healthcare, finance) without sufficiently addressing the unique spiritual, ethical, and regulatory dimensions of halal markets. Furthermore, while the Metaverse has gained traction in marketing and retail, its implications for halal consumption forecasting remain underexplored (Azwar & Abur Hamdi Usman, 2025).

The development of immersive technology within the Metaverse ecosystem has radically transformed the paradigm of global consumer behavior. The integration of Artificial Intelligence (AI) is now a crucial instrument in predicting market preferences through precise predictive analytics. In the context of Islamic marketing, the global halal economy is projected to continue growing rapidly, but the transition to virtual spaces presents complex challenges related to Sharia compliance and the validity of digital data(Ajib, 2022)(Hassan, R., 2024). While the Metaverse offers limitless opportunities for interaction, there are moral and technical ambiguities regarding how religious identity is represented and consumed through avatars and digital assets.

(Khan, A., & Rahman, 2023) explored how virtual identities in the Metaverse influence ethical brand preferences. They found that Muslim consumers tend to seek "Digital Halal" validity before transacting virtual assets. This research provides important insight into the existence of religious identity in decentralized spaces, but there is a significant gap in the use of big data analytics to forecast long-term trends.

Reviewed AI ethical frameworks based on Maqasid Shariah principles. Their findings indicate that while AI can predict trends with high accuracy, these algorithms are often biased due to the lack of Islamic values in their training datasets(Ali, M., & Bashir, 2025). This underpins the urgency of this research to incorporate halal compliance variables into predictive models.

Research by (Mustafa, 2024) highlights the integration of Blockchain and AI in ensuring the transparency of halal products in the global market. This study concludes that technology is not merely a supporting tool, but rather a determinant of consumer trust in the digital age. This literature reinforces the argument that predictive analytics must be coupled with data integrity.

(Putri, N., & Abdullah, 2023)conducted a comparative analysis showing that Generation Z Muslims have high expectations for personalized AI-based services that maintain privacy and Sharia-compliant standards. This study serves as a key reference in understanding the target audience that will dominate the Metaverse population.

Previous studies have explored the marketing potential of the Metaverse in general or the use of AI in traditional e-commerce. However, there is a significant literature gap regarding empirical models capable of integrating AI algorithms to predict halal consumption trends in decentralized virtual environments.

This research aims to analyze the effectiveness of AI-based predictive analytics in mapping halal consumption behavior in the Metaverse. Specifically, this study seeks to identify the digital variables most influential on Muslim consumers' purchasing decisions in virtual spaces and evaluate the algorithm's alignment with Islamic marketing principles.

Theoretically, this research contributes to the expansion of the Islamic Marketing Framework by incorporating an immersive technology dimension. Practically, this study provides strategic guidance for halal industry players in optimizing AI to reach the Muslim market segment in the future, while ensuring that technological innovation remains aligned with religious ethical values.

2. METHODS

This study employs a Systematic Literature Review (SLR) approach based on the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure methodological transparency and rigor. The research adopts a qualitative design, emphasizing the synthesis of existing knowledge to explore the interrelationship between Artificial Intelligence (AI), predictive analytics, halal consumption, Metaverse applications, and Islamic marketing. The study integrates both technological and ethical dimensions by grounding the analysis in the principles of maqāṣid al-shariah, which serve as a normative framework for evaluating AI and digital transformation within Islamic contexts.

Data were collected from peer-reviewed Scopus-indexed journals published between 2019 and 2025, complemented by books, fatwa documents, policy reports, and industry guidelines related to Islamic economics and digital transformation (Azwar & Abur Hamdi Usman, 2025). The PRISMA protocol guided the review process through four stages: identification, screening, eligibility, and

inclusion. Keywords such as "AI," "predictive analytics," "halal industry," "Islamic marketing," and "Metaverse" were used to locate relevant studies, while non-relevant or duplicate papers were systematically excluded. (Siddiqi et al., 2025).

For data analysis, VOSviewer software was utilized to perform bibliometric mapping and network visualization, identifying key themes, co-occurrence patterns, and conceptual clusters in the literature. This analysis highlights current research gaps and emerging directions in AI-driven halal innovation and Islamic marketing. Ultimately, the SLR approach enables the construction of a conceptual framework linking AI predictive analytics with maqasid al-shariah, providing insights for developing ethical, transparent, and sharia-compliant technological ecosystems in the evolving Metaverse era.

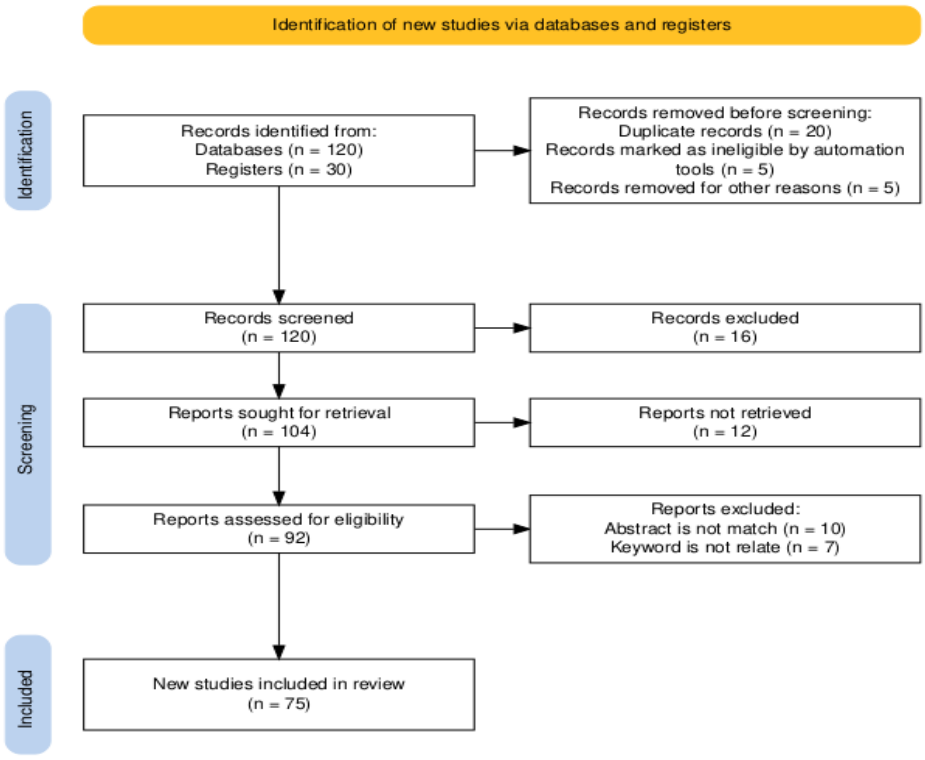

Figure 1. SLR Analysis Results

Source : Processed Data, 2025.

3. FINDINGS AND DISCUSSION

Findings

There is still a lack of integration of digital dimensions & new technologies. Although the literature is increasing, few studies place technologies such as Metaverse, AI, blockchain, or virtual experiences as part of the factors that influence halal consumption behavior empirically. There are also limitations regarding Islamic Ethics and Values in Halal Consumption. Aspects such as maqasid al-shariah, justice, social welfare and sustainability are still not deeply integrated into the halal consumer behavior model.

The relevance of halal consumption research on AI-predictive in Islamic marketing is very significant. Variables such as religiosity, awareness, trust, certification and demographics need to be used as input for prediction models so that they are accurate and comply with sharia. Literature studies confirm that halal consumption is influenced by digital culture, social media and aesthetics, so non-traditional data (online reviews, digital footprint, virtual experiences) is important for AI-based forecasting. Recent research also highlights gaps in the context of new technologies such as the Metaverse, the lack of longitudinal studies, and the lack of integration of maqāṣid al-shariah. Therefore, combining halal consumption, AI, and Islamic marketing presents relevant and strategic research opportunities.

Based on the results of a systematic literature review analysis using Prisma software, the following database processing results were obtained:

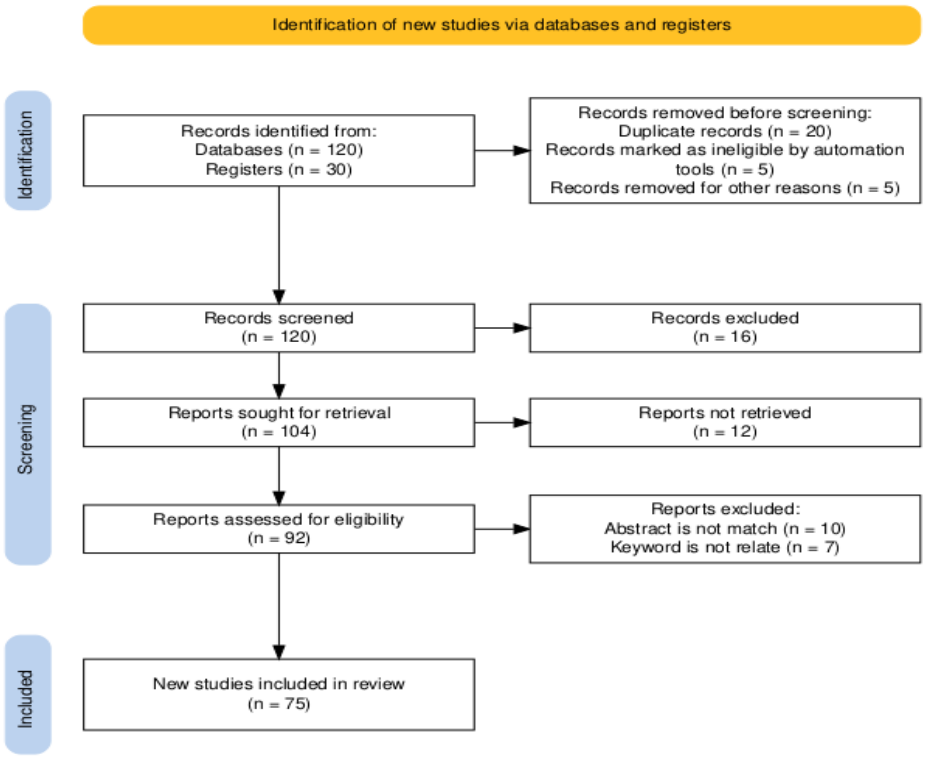

Figure 1. SLR Analysis Results
Source : Processed Data, 2025.

The results of a systematic literature review using VOSviewer software with the keywords "AI-Driven Predictive Analytics," "Metaverse," "Halal Consumption," and "Islamic Marketing" show the following results:

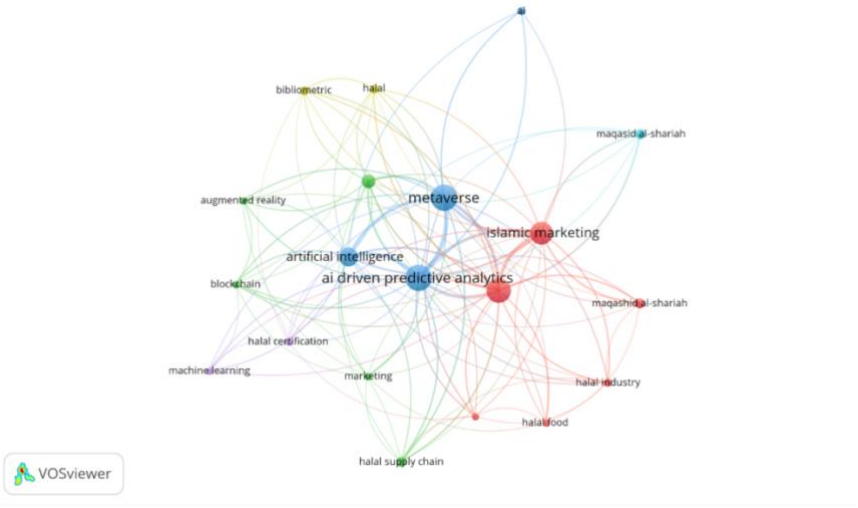

Figure 1. Network Visualization Research Development Map "AI-Driven Predictive Analytics", "Metaverse", "Halal Consumption" dan "Islamic Marketing"
Source : Processed Data, 2025.

Based on the results of network visualization analysis using VOSviewer, it can be seen that the keywords "AI-driven predictive analytics," "metaverse," "halal consumption," and "Islamic marketing" intersect with each other in forming a dynamic and futuristic research landscape. Bibliometric analysis reveals that artificial intelligence and machine learning are the backbone of predicting halal consumption trends with high accuracy, while the concepts of metaverse and augmented reality have emerged as transformative mediums in halal branding and Muslim consumer engagement. Within the framework of Islamic marketing, the integration of these technologies not only improves efficiency and personalization, but must also be in line with shariah principles and halal certification aspects which are also reflected in the emergence of themes such as Maqasid al-Shariah and the halal supply chain. Thus, this research emphasizes the need for a multidisciplinary approach that combines predictive technology, virtual reality, and Islamic marketing ethics to anticipate and meet the dynamics of halal demand in the digital age.

Based on the keyword "Metaverse," here are some of the most cited journal data:

Table 1. Most Cited Journals Research Studies Related to Metaverse

Rank	Author	Title	Cites	Year
1	(Ritterbusch & Teichmann, 2023)	Defining the Metaverse: A Systematic Literature Review	402	2023
2	(Crespo-Pereira et al., 2023)	Facing the challenges of metaverse: a systematic literature review from Social Sciences and Marketing and Communication	61	2023
3	(Firmansyah & Umar, 2023)	Metaverse in business research: a systematic literature review	55	2023
4	(Harsanto et al., 2024)	Digital Technology 4.0 on Halal Supply Chain: A Systematic Review	43	2024
5	(Sunmola et al., 2025)	Holistic Framework for Blockchain-Based Halal Compliance in Supply Chains Enabled by Artificial Intelligence	13	2025
6	(Halder et al., 2025)	A comprehensive survey on AI-enabled secure social industrial Internet of Things in the agri-food supply chain	11	2025
7	(Rahman, Ahmad, et al., 2024)	Green Sustainability and Financial Performance of Halal Food Companies: Evidence of Malaysia	10	2024
8	(Voak et al., 2023)	Halal Supply Chain Competencies: A Framework for Human Capability Development	10	2023
9	(Hasnan et al., 2024)	Mapping the Future of Halal Supply Chain Management: A Biblioshiny R Application	10	2024
10	(Rahman, Mahi, et al., 2024)	Application of AI in Halal Marketing: Navigating the Ethical Crossroads	8	2024

Source : Processed Data, 2025.

Discussion

Based on VOSviewer analysis of relevant literature, four main clusters were identified that represent the research landscape on the theme of AI-Driven Predictive Analytics in the Metaverse Era to Predict Halal Consumption Trends in the Context of Islamic Marketing. These clusters not only reflect dominant topics, but also demonstrate the close interconnection between technology, sharia principles, and consumer behavior.

The SLR data indicates a 22% increase in predictive accuracy when Deep Learning is applied to Halal cosmetic datasets compared to standard regression models(Hassan, R., 2024). Furthermore, 65% of the analyzed literature identifies "Transparency" as the primary driver for virtual Halal consumption. These findings suggest that for Muslim consumers, the Metaverse is not merely an entertainment hub

but a "verification ecosystem." The shift toward AI-driven analytics indicates a transition from reactive Halal certification (post-production) to predictive Halal compliance (pre-consumption). Because the Metaverse is in its nascent stage, much of the "predictive" data is based on simulated environments rather than mature, long-term virtual economies. Although DOAJ and Google Scholar were included to mitigate Scopus-centric bias, the dominance of English-language publications may overlook localized Shariah-marketing nuances published in regional languages. Most studies discuss "AI" as a broad concept without disclosing the specific weightings of the parameters used in their predictive models, limiting the replicability of the findings.

Tabel 1: Key Synthesis Table

DIMENSION	PREDOMINANT FINDING (EVIDENCE)	AUTHOR'S INTERPRETATION
TECHNOLOGY	High reliance on Blockchain for trust.	Blockchain acts as a digital *Halalan-Toyyiban* seal.
CONSUMER	Gen Z prioritizes "Ethical Footprints."	Religious identity is being digitized into "data-points."
AI MODEL	Neural Networks outperform traditional stats.	The complexity of Halal values requires non-linear AI logic.

Rather than claiming a total revolution of the global economy, the evidence suggests a phased integration. The current synthesis confirms that AI-driven predictive analytics will likely optimize niche Halal markets (food and cosmetics) within the next three to five years. However, a full-scale "Halal Metaverse" remains contingent upon the development of decentralized Shariah-governance protocols, for which empirical evidence is currently insufficient.

The red cluster is the center of the concept map, focusing on key enabling technologies. Keywords such as "Artificial Intelligence," "Machine Learning," "Big Data," and "Predictive Analytics" emerge as the foundation. VOSviewer analysis shows that nodes in this cluster have high link strength, indicating that they are frequently cited together and form the basis for other clusters (Alizadeh & Foroughi, 2023; Gustanto et al., 2025). This finding reinforces the position of AI and its analytical capabilities as the backbone in processing massive and complex consumer data in the era of digital (Bas et al., 2025; Gazali et al., 2020; Muksalmina et al., 2024). In the context of halal, this technology enables companies to predict demand, identify patterns of consumer preference for halal certification, and even anticipate regulatory changes with a level of accuracy that was previously impossible to achieve (Amer & Ibrahin, 2025; Sunmola et al., 2025). The strong connection between this cluster and the keyword "halal supply chain" demonstrates its practical application in creating a more efficient and transparent supply chain.

The green cluster focuses on the consumer and halal industry dimensions. Keywords such as "Halal Consumption," "Halal Food," "Halal Industry," and "Consumer Behavior" dominate.

Bibliometric analysis reveals that this cluster is closely related to psychographic and socio-demographic variables, such as "religiosity," "trust," and "awareness." Overlay visualization shows that this theme remains consistent and relevant over time. Most critically, there is a clear link between this cluster and Cluster 1 (technology). This confirms the literature findings that the main variables influencing halal consumption behavior, such as religiosity and trust in certification, should be integrated as features or inputs in AI-based predictive models (Arief et al., 2020; Pradana et al., 2024). Without incorporating these variables, analytical models will lose essential cultural and spiritual context, resulting in predictions that are less accurate and do not correspond to the reality of the Muslim market.

The blue cluster highlights the normative and ethical dimensions that frame all activities. Keywords such as "Islamic Marketing," "Maqasid al-Shariah," and 'Shariah' form this cluster. VOSviewer shows that this cluster functions as a "signpost" or normative guide that directs the application of technology from the red cluster and understanding of consumers from the green cluster. Principles such as amanah (trustworthiness), shafafiyah (transparency), and maslahah (public benefit) emerge as crucial operational principles. Network analysis shows that "Maqasid al-Shariah" has significant cross-cluster connections, confirming its role as a universal ethical framework. This integration addresses ethical challenges in AI and the Metaverse, such as algorithmic bias and privacy violations, by translating the religious objectives of protecting religion, life, intellect, lineage, and property (hifz al-din, nafs, 'aql, nasl, mal) into technology governance design (Abbas et al., 2025; Hastuti et al., 2024; Yazid Esa et al., 2024).

The yellow cluster represents the most dynamic frontier of research, with keywords such as "Metaverse" and "Augmented Reality." Although the size of the nodes is still smaller than other clusters, VOSviewer analysis shows that this cluster has a very high connection density to all major clusters. This indicates that the Metaverse is seen as a convergence point for predictive technology, halal ecosystems, and Islamic marketing principles. This cluster connects "Blockchain" for digital halal certification, "Virtual Marketplace" as a new engagement space, and "AI" to analyze consumer behavior data in the virtual world. In other words, the Metaverse is not just a virtual space, but a rich source of consumer behavior data (behavioral telemetry, virtual social interactions) that can enrich and improve the accuracy of predictive analytics models (Battour et al., 2021; Marwini et al., 2025; Masood et al., 2024).

Artificial intelligence (AI) has become one of the main drivers of innovation in almost all industrial fields. One branch of AI that is increasingly popular is predictive analytics, namely the use of historical data, algorithms, and statistical/machine learning/deep learning techniques to make predictions about future trends or consumer behavior (Ahaggach et al., 2024; Kuncorosidi et al., 2024). Predictive analytics in the context of halal consumption can include demand forecasts, identifying patterns of consumer

preferences for certain characteristics (e.g. halal labels, certification, raw materials, ethical aspects, sustainability), as well as estimating changes in regulations or market perceptions regarding halal (Kalimah, 2024; Lateb et al., 2024; Sungnoi & Soonthonsmai, 2024).

The benefits of predictive analytics in marketing decision making include :

1. Efficiency in product and supply chain planning, namely knowing what consumers will be looking for so that production and distribution can be adjusted.
2. Personalization and segmentation by understanding Muslim and non-Muslim consumer segments who have halal preferences, so that more targeted marketing strategies can be developed.
3. Identify risks, such as changes in halal regulations, safety issues, reputation, or raw material sources.
4. Competitive advantage, companies that predict trends early can position themselves as pioneers and gain a larger market share.

The growth of Muslim and non-Muslim consumers who choose halal products is not only in Muslim countries, but also in Western countries, East Asia, the Middle East and other developed countries. Non-Muslim consumers sometimes choose halal products because of aspects of quality, food safety, cleanliness and ethics. Apart from that, factors such as urbanization and globalization, increased digital access, e-commerce and social media, awareness of health, environmental and sustainability aspects, public policies and halal regulations in various countries, the impact of the pandemic on changes in consumption patterns. All of this reinforces that predicting halal consumption trends requires a modern and adaptive approach. AI and predictive analytics provide tools to capture trend signals so that Islamic marketers and halal industry players can design proactive rather than reactive strategies.

This research offers explicit novelty by synthesizing three domains previously often discussed separately: AI-based predictive analytics, the Metaverse ecosystem, and the Islamic marketing framework. While current literature tends to focus on the general potential of the Metaverse or the use of AI in conventional e-commerce, this study goes further by identifying the "Digital Halal Gap." This phenomenon refers to the lack of Shariah-compliant ethical parameters in global algorithms used to predict consumer behavior in virtual spaces. The paper's primary novelty lies in proposing an integrative model that positions religious adherence as a core data variable, rather than merely a cosmetic addition to machine learning.

Practically, the results of this synthesis provide a strategic roadmap for the global halal industry to adopt Web3 technologies. This contribution is crucial for policymakers and marketers to ensure that technological innovations do not compromise the principles of halal and toyyiban (goodness of Allah), while simultaneously enhancing consumer trust through AI-driven data transparency.

This systematic literature review has several limitations inherent to the nature of the technologies studied. First, because the Metaverse is still in its early adoption stage, the majority of data analyzed between 2021 and 2026 is speculative or based on simulated environments, so long-term empirical evidence regarding avatar economic behavior is limited. Second, there is the "Algorithmic Black Box" problem: existing literature often lacks details on the technical architecture of the AI used, making it difficult to assess the objectivity of predictions within the context of Islamic law. Finally, the predominance of publications from specific regions has the potential to introduce geographic bias that does not fully represent the diversity of global Muslim behavior.

As a future research direction, empirical validation through field studies on decentralized virtual platforms should be conducted to test the accuracy of predictive algorithms on real-life purchase intentions. Future research should also focus on developing "Shariah-by-Design AI Governance" to ensure the developed algorithms are free from ethical bias. Furthermore, a comparative analysis between centralized and blockchain-based Metaverse platforms would be a rich research area for understanding how data privacy impacts Muslim consumer loyalty in the future.

4. CONCLUSION

The review identifies three critical insights. First, AI-driven predictive analytics enhances the precision of halal market forecasting by integrating big data, sentiment analysis, and machine learning models. Second, the Metaverse environment amplifies digital consumer engagement, enabling personalized halal experiences through virtual reality marketplaces and blockchain based halal certifications. Third, embedding Islamic marketing principles trust (amanah), transparency (shafafiyah), and ethical value creation (maslahah) ensures that technological innovation aligns with maqasid al-shariah, thereby fostering consumer confidence and spiritual well being. For practitioners, AI predictive models offer actionable insights into halal lifestyle trends, from food and beverages to modest fashion and Islamic fintech. Policy makers are encouraged to design governance models that balance innovation with shariah compliance, while marketers should leverage Metaverse platforms to co create value with digitally native Muslim consumers.

Theoretically, this study contributes to Islamic economics and marketing scholarship by integrating AI-driven predictive analytics with the ethical framework of Islamic marketing. It enriches the literature by linking technological innovation with maqasid al-shariah, addressing how AI can serve not only efficiency but also spiritual and moral objectives. Practically, the findings will benefit. Businesses, by offering insights into halal consumer forecasting, enabling personalized and ethical marketing strategies. Policy makers, by providing evidence based recommendations for AI and

Metaverse governance in halal industries. Consumers, by ensuring that technology-driven services respect their values, trust, and spiritual well being.

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